IBC — General

2022 GROUP A PUBLIC COMMENT AGENDA

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DAVID L. LAWRENCE CONVENTION CENTER
PITTSBURGH, PA

INTERNATIONAL CODE COUNCIL®

2021 Public Comment Agenda

First Printing

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G1-21 Part I

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org); Joseph J Summers, Chair, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS AN 6 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. PART III WILL BE HEARD BY THE FUEL GAS CODE COMMITTEE. PART IV WILL BE HEARD BY THE PLUMBING CODE COMMITTEE. PART V WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART VI WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Add new definition as follows:

ACCESS (TO). . That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction [see also Ready access (to)].

READY ACCESS (TO). . That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel or similar obstruction [see Access (to)].

Revise as follows:

703.5 Marking and identification. Where there is ~~an accessible~~ access to a concealed floor, floor-ceiling or *attic* space, *fire walls*, *fire barriers*, *fire partitions*, *smoke barriers* and *smoke partitions* or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space. Such identification shall:

1. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition.
2. Include lettering not less than 3 inches (76 mm) in height with a minimum $^3/_8$-inch (9.5 mm) stroke in a contrasting color incorporating the suggested wording, “FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS,” or other wording.

1607.9.1 Handrails and guards. *Handrails* and *guards* shall be designed to resist a linear *load* of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1.1 of ASCE 7. Glass *handrail* assemblies and *guards* shall comply with Section 2407.

Exceptions:

1. For one- and two-family dwellings, only the single concentrated *load* required by Section 1607.9.1.1 shall be applied.
2. In Group I-3, F, H and S occupancies, for areas that are not ~~accessible to~~ for use by the general public and that have an *occupant load* less than 50, the minimum *load* shall be 20 pounds per foot (0.29 kN/m).

1607.14.4.4 Ground-mounted photovoltaic (PV) panel systems. or modules installed as an independent structure. Ground-mounted photovoltaic (PV) panel systems that are independent structures and do not have ~~accessible/~~ an easily accessed or occupied space underneath are not required to accommodate a roof photovoltaic *live load*. Other *loads* and combinations in accordance with Section 1605 shall be accommodated.

1704.2.2 Access for special inspection. The construction or work for which *special inspection* or testing is required shall remain ~~accessible and~~ exposed and with access for *special inspection* or testing purposes until completion of the required *special inspections* or tests.

2111.3.1 Ash dump cleanout. Cleanout openings, located within foundation walls below fireboxes, where provided, shall be equipped with ferrous metal or masonry doors and frames constructed to remain tightly closed, except when in use. Provide access to cleanouts ~~Cleanouts shall be accessible~~ and located the clean outs so that ash removal will not create a hazard to combustible materials.

2113.9.2 Spark arrestors. Where a spark arrestor is installed on a masonry chimney, the spark arrestor shall meet all of the following requirements:

1. The net free area of the arrestor shall be not less than four times the net free area of the outlet of the chimney flue it serves.
2. The arrestor screen shall have heat and *corrosion resistance* equivalent to 19-gage galvanized steel or 24-gage stainless steel.
3. Openings shall not permit the passage of spheres having a diameter greater than $^1/_2$ inch (12.7 mm) nor block the passage of spheres having a diameter less than $^3/_8$ inch (9.5 mm).
4. The spark arrestor shall ~~be accessible~~ provide access for cleaning and the screen or chimney cap shall be removable to allow for cleaning of the chimney flue.

2405.3 Screening. Where used in monolithic glazing systems, annealed, heat-strengthened, fully tempered and wired glass shall have broken glass retention screens installed below the glazing material. The screens and their fastenings shall be: capable of supporting twice the weight of the glazing; firmly and substantially fastened to the framing members; and installed within 4 inches (102 mm) of the glass. The screens shall be constructed of a noncombustible material not thinner than No. 12 B&S gage (0.0808 inch) with mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). In a corrosive atmosphere, structurally equivalent noncorrosive screen materials shall be used. Annealed, heat-strengthened, fully tempered and wired glass, where used in multiple-layer glazing systems as the bottom glass layer over the walking surface, shall be equipped with screening that conforms to the requirements for monolithic glazing systems.

Exception: In monolithic and multiple-layer sloped glazing systems, the following applies:

1. Fully tempered glass installed without protective screens where glazed between intervening floors at a slope of 30 degrees (0.52 rad) or less from the vertical plane shall have the highest point of the glass 10 feet (3048 mm) or less above the walking surface.
2. Screens are not required below any glazing material, including annealed glass, where the walking surface below the glazing material is permanently protected from the risk of falling glass or the area below the glazing material is not a walking surface.
3. Any glazing material, including annealed glass, is permitted to be installed without screens in the sloped glazing systems of commercial or detached noncombustible *greenhouses* used exclusively for growing plants and not open to the public, provided that the height of the *greenhouse* at the ridge does not exceed 30 feet (9144 mm) above grade.
4. Screens shall not be required in individual *dwelling units* in Groups R-2, R-3 and R-4 where fully tempered glass is used as single glazing or as both panes in an insulating glass unit, and the following conditions are met:
    4.1. Each pane of the glass is 16 square feet (1.5 m^2) or less in area.
    4.2. The highest point of the glass is 12 feet (3658 mm) or less above any walking surface ~~or other accessible area~~.
    4.3. The glass thickness is $^3/_{16}$ inch (4.8 mm) or less.
5. Screens shall not be required for laminated glass with a 15-mil (0.38 mm) polyvinyl butyral (or equivalent) interlayer used in individual *dwelling units* in Groups R-2, R-3 and R-4 within the following limits:
    5.1. Each pane of glass is 16 square feet (1.5 m^2) or less in area.
    5.2. The highest point of the glass is 12 feet (3658 mm) or less above a walking surface ~~or other accessible area~~.

2406.4.3 Glazing in windows. Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered to be a hazardous location:

1. The exposed area of an individual pane is greater than 9 square feet (0.84 m^2).
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor.
3. The top edge of the glazing is greater than 36 inches (914 mm) above the floor.
4. One or more walking surface(s) are within 36 inches (914 mm), measured horizontally and in a straight line, of the plane of the glazing.

Exceptions:

1. Decorative glazing.
2. Where a horizontal rail is installed on the ~~accessible~~ walking surface side(s) of the glazing adjacent to and 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal *load* of 50 pounds per linear foot (730 N/m) without contacting the glass and be not less than $1^1/_2$ inches (38 mm) in cross-sectional height.
3. Outboard panes in insulating glass units or multiple glazing where the bottom exposed edge of the glass is 25 feet (7620 mm) or more above any grade, roof, walking surface or other horizontal or sloped (within 45 degrees of horizontal) (0.79 rad) surface adjacent to the glass exterior.

3008.9 Emergency voice/alarm communication system. The building shall be provided with an *emergency voice/alarm communication system*. The *emergency voice/alarm communication system* shall ~~be accessible to~~ allow access for the fire department. The system shall be provided in accordance with Section 907.5.2.2.

F101.5.1 Rodent ~~accessible~~ attainable openings. Windows and other openings for the purpose of light and ventilation in the *exterior walls* not covered in this chapter, ~~accessible~~ attainable to rodents by way of exposed pipes, wires, conduits and other appurtenances, shall be covered with wire cloth of at least 0.035-inch (0.89 mm) wire. In lieu of wire cloth covering, said pipes, wires, conduits and other appurtenances shall be blocked from rodent usage by installing solid sheet metal guards 0.024 inch (0.61 mm) thick or heavier. Guards shall be fitted around pipes, wires, conduits or other appurtenances. In addition, they shall be fastened securely to and shall extend perpendicularly from the *exterior wall* for not less than 12 inches (305 mm) beyond and on either side of pipes, wires, conduits or appurtenances.

H110.1 General. Roof signs shall be constructed entirely of metal or other approved noncombustible material except as provided for in Sections H106.1.1 and H107.1. Provisions shall be made for electric grounding of metallic parts. Where combustible materials are permitted in letters or other ornamental features, wiring and tubing shall be kept free and insulated therefrom. Roof signs shall be so constructed as to leave a clear space of not less than 6 feet (1829 mm) between the roof level and the lowest part of the sign and shall have not less than 5 feet (1524 mm) clearance between the vertical supports thereof. Roof sign structures shall not project beyond an *exterior wall*.

Exception: Signs on flat roofs with every part of the roof ~~accessible~~ allowing access.

2021 International Property Maintenance Code

Revise as follows:

[BF] 703.3 Maintenance. The required fire-resistance rating of fire-resistance-rated construction, including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and joint systems, shall be maintained. Such elements shall be visually inspected annually by the *owner* and repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space ~~is accessible~~ has access by the removal or movement of a panel, access door, ceiling tile or entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer and any other reason shall be protected with *approved* methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of *approved* construction meeting the fire protection requirements for the assembly.

Reason: This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term ‘accessible’ is most commonly understood as requiring access for persons with disabilities we are making the changes to delete the word accessible from the remaining codes and replace it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. Many of the codes use the defined term ‘access (to)’ or ‘ready access (to)’ for access by maintenance and service personnel or fire departments. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes.

Similar proposals will be submitted for the Group B cycle for IRC, IECC and IEBC.

This proposal is submitted by the ICC Building Code Action Committee (BCAC), ICC Fire Code Action Committee (BCAC), and ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC).
BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

The PMG CAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020, the PMG CAC has held several virtual meetings open to any interested party. Numerous interested parties attended the committee meetings and offered their input. Related documentation and reports are posted on the PMG CAC website at: PMGCAC.

The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire and life safety in new and existing buildings and facilities as well as the protection of life and property in wildland urban interface areas. In 2020 and 2021 the Fire-CAC held multiple virtual meetings that were open to any interested party. In addition, there were numerous virtual specific working group meetings that were also open to any interested parties, to develop, discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: FCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

G1-21 Part I

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved due to the following concerns:
Section 703.5 - the term 'access to' only includes mechanical equipment, so if a ceiling space did not include mechanical equipment could a contractor argue that stenciling for fire rated walls was not required?

Section 1607.14.4.4 - "easily accessed" is not a defined term

Section 3008.9 - It was not clear what was meant by "allow access" for the fire department to the emergency/voice alarm communication systems. (Vote: 13-1)

G1-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: 202

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

ACCESS (TO) . That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction [see also Ready access (to)].

READY ACCESS (TO) . That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel or similar obstruction [see Access (to)].

Commenter's Reason: The defined terms are used in the IBC and copied from the IMC. The Egress committee requested that the defined terms be entered as a separate proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

Public Comment# 2639

Public Comment 2:

IBC: 703.5, 1607.9.1, 1607.14.4.4, 1704.2.2, 2111.3.1, 2113.9.2, 2405.3, 2406.4.3, 3008.9, F101.5.1, H110.1; IPMC: [BF] 703.3

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

703.5 Marking and identification . Where there is an opening provided into ~~accessible~~ a concealed floor, floor-ceiling or *attic* space, *fire walls*, *fire barriers*, *fire partitions*, *smoke barriers* and *smoke partitions* or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space. Such identification shall:

1. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition.
2. Include lettering not less than 3 inches (76 mm) in height with a minimum $^3/_8$-inch (9.5 mm) stroke in a contrasting color incorporating the suggested wording, “FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS,” or other wording.

1607.9.1 Handrails and guards . *Handrails* and *guards* shall be designed to resist a linear *load* of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1.1 of ASCE 7. Glass *handrail* assemblies and *guards* shall comply with Section 2407.

Exceptions:

1. For one- and two-family dwellings, only the single concentrated *load* required by Section 1607.9.1.1 shall be applied.
2. In Group I-3, F, H and S occupancies, for areas that are not ~~accessible to the general~~ for public use and that have an *occupant load* less than 50, the minimum *load* shall be 20 pounds per foot (0.29 kN/m).

1607.14.4.4 Ground-mounted photovoltaic (PV) panel systems or modules installed as an independent structure . Ground-mounted photovoltaic (PV) panel systems that are independent structures and do not have ~~accessible/~~ an occupied space underneath are not required to accommodate a roof photovoltaic *live load*. Other *loads* and combinations in accordance with Section 1605 shall be accommodated.

1704.2.2 Access for special inspection . The construction or work for which *special inspection* or testing is required shall remain ~~accessible and~~ exposed and with access for *special inspection* or testing purposes until completion of the required *special inspections* or tests.

2111.3.1 Ash dump cleanout . Cleanout openings, located within foundation walls below fireboxes, where provided, shall be equipped with ferrous metal or masonry doors and frames constructed to remain tightly closed, except when in use. Cleanouts shall be provided with access ~~accessible~~ and located so that ash removal will not create a hazard to combustible materials.

2113.9.2 Spark arrestors . Where a spark arrestor is installed on a masonry chimney, the spark arrestor shall meet all of the following requirements:

1. The net free area of the arrestor shall be not less than four times the net free area of the outlet of the chimney flue it serves.
2. The arrestor screen shall have heat and *corrosion resistance* equivalent to 19-gage galvanized steel or 24-gage stainless steel.
3. Openings shall not permit the passage of spheres having a diameter greater than $^1/_2$ inch (12.7 mm) nor block the passage of spheres having a diameter less than $^3/_8$ inch (9.5 mm).
4. The spark arrestor shall be ~~accessible~~ provided with access for cleaning and the screen or chimney cap shall be removable to allow for cleaning of the chimney flue.

2405.3 Screening . Where used in monolithic glazing systems, annealed, heat-strengthened, fully tempered and wired glass shall have broken glass retention screens installed below the glazing material. The screens and their fastenings shall be: capable of supporting twice the weight of the glazing; firmly and substantially fastened to the framing members; and installed within 4 inches (102 mm) of the glass. The screens shall be constructed of a noncombustible material not thinner than No. 12 B&S gage (0.0808 inch) with mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). In a corrosive atmosphere, structurally equivalent noncorrosive screen materials shall be used. Annealed, heat-strengthened, fully tempered and wired glass, where used in multiple-layer glazing systems as the bottom glass layer over the walking surface, shall be equipped with screening that conforms to the requirements for monolithic glazing systems.

Exception: In monolithic and multiple-layer sloped glazing systems, the following applies:

1. Fully tempered glass installed without protective screens where glazed between intervening floors at a slope of 30 degrees (0.52 rad) or less from the vertical plane shall have the highest point of the glass 10 feet (3048 mm) or less above the walking surface.
2. Screens are not required below any glazing material, including annealed glass, where the walking surface below the glazing material is permanently protected from the risk of falling glass or the area below the glazing material is not a walking surface.
3. Any glazing material, including annealed glass, is permitted to be installed without screens in the sloped glazing systems of commercial or detached noncombustible *greenhouses* used exclusively for growing plants and not open to the public, provided that the height of the *greenhouse* at the ridge does not exceed 30 feet (9144 mm) above grade.
4. Screens shall not be required in individual *dwelling units* in Groups R-2, R-3 and R-4 where fully tempered glass is used as single glazing or as both panes in an insulating glass unit, and the following conditions are met:
   - 4.1. Each pane of the glass is 16 square feet (1.5 m^2) or less in area.
   - 4.2. The highest point of the glass is 12 feet (3658 mm) or less above any walking surface ~~or other accessible area~~.
   - 4.3. The glass thickness is $^3/_{16}$ inch (4.8 mm) or less.
5. Screens shall not be required for laminated glass with a 15-mil (0.38 mm) polyvinyl butyral (or equivalent) interlayer used in individual *dwelling units* in Groups R-2, R-3 and R-4 within the following limits:
   - 5.1. Each pane of glass is 16 square feet (1.5 m^2) or less in area.
   - 5.2. The highest point of the glass is 12 feet (3658 mm) or less above a walking surface ~~or other accessible area~~.

2406.4.3 Glazing in windows . Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered to be a hazardous location:

1. The exposed area of an individual pane is greater than 9 square feet (0.84 m^2).
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor.
3. The top edge of the glazing is greater than 36 inches (914 mm) above the floor.

4. One or more walking surface(s) are within 36 inches (914 mm), measured horizontally and in a straight line, of the plane of the glazing.

Exceptions:

1. Decorative glazing.
2. Where a horizontal rail is installed on the ~~accessible~~ walking surface side(s) of the glazing adjacent to and 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal *load* of 50 pounds per linear foot (730 N/m) without contacting the glass and be not less than $1^1/_2$ inches (38 mm) in cross-sectional height.
3. Outboard panes in insulating glass units or multiple glazing where the bottom exposed edge of the glass is 25 feet (7620 mm) or more above any grade, roof, walking surface or other horizontal or sloped (within 45 degrees of horizontal) (0.79 rad) surface adjacent to the glass exterior.

3008.9 Emergency voice/alarm communication system . The building shall be provided with an *emergency voice/alarm communication system*. The fire department shall be provided with access to the ~~The~~ *emergency voice/alarm communication system* ~~shall be accessible to the fire department~~. The system shall be provided in accordance with Section 907.5.2.2.

F101.5.1 Rodent-~~accessible~~ attainable openings . Windows and other openings for the purpose of light and ventilation in the *exterior walls* not covered in this chapter, ~~accessible~~ attainable to rodents by way of exposed pipes, wires, conduits and other appurtenances, shall be covered with wire cloth of at least 0.035-inch (0.89 mm) wire. In lieu of wire cloth covering, said pipes, wires, conduits and other appurtenances shall be blocked from rodent usage by installing solid sheet metal guards 0.024 inch (0.61 mm) thick or heavier. Guards shall be fitted around pipes, wires, conduits or other appurtenances. In addition, they shall be fastened securely to and shall extend perpendicularly from the *exterior wall* for not less than 12 inches (305 mm) beyond and on either side of pipes, wires, conduits or appurtenances.

H110.1 General . Roof signs shall be constructed entirely of metal or other approved noncombustible material except as provided for in Sections H106.1.1 and H107.1. Provisions shall be made for electric grounding of metallic parts. Where combustible materials are permitted in letters or other ornamental features, wiring and tubing shall be kept free and insulated therefrom. Roof signs shall be so constructed as to leave a clear space of not less than 6 feet (1829 mm) between the roof level and the lowest part of the sign and shall have not less than 5 feet (1524 mm) clearance between the vertical supports thereof. Roof sign structures shall not project beyond an *exterior wall*.

Exception: Signs on flat roofs ~~with~~ where every part of the roof ~~accessible~~ allows for access to the sign .

2021 International Property Maintenance Code

[BF] 703.3 Maintenance . The required fire-resistance rating of fire-resistance-rated construction, including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and joint systems, shall be maintained. Such elements shall be visually inspected annually by the *owner* and repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space ~~is accessible~~ has access by the removal or movement of a panel, access door, ceiling tile or entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer and any other reason shall be protected with *approved* methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of *approved* construction meeting the fire protection requirements for the assembly.

Commenter's Reason: This proposal continues the committee work to remove ‘accessible’ where the context is not about accessibility for persons with disabilities. The defined terms ‘access to’ and ‘ready access’ is used where appropriate. The modifications were to address concerns expressed during the testimony and expressed by the Egress committee.
This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 as well at G1-21 Parts 2, 3, 5 and 6.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

Public Comment# 2640

NOTE: G1-21 PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G1-21 Part II

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org); Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Fire Code

Revise as follows:

MULTIPLE-LEVEL BOOTH. An exhibit that has a second level or tier constructed on top of the exhibit or portion of the exhibit that is ~~accessible~~ open to the public, or includes a live load above the exhibit area floor level.

504.1 Required access. Exterior doors and openings required by this code or the *International Building Code* shall be maintained ~~readily accessible~~ with ready access for emergency access by the fire department. An *approved* access walkway leading from fire apparatus access roads to exterior openings shall be provided where required by the *fire code official*.

509.2 Equipment access. *Approved* access shall be provided and maintained for all *fire protection system* equipment to permit immediate safe operation and maintenance of such equipment. Storage, trash and other materials or objects shall not be placed or kept in such a manner that would prevent such equipment from ~~being readily accessible~~ ready access.

701.6 Owner's responsibility. The *owner* shall maintain an inventory of all required *fire-resistance-rated* construction, construction installed to resist the passage of smoke and the construction included in Sections 703 through 707 and Sections 602.4.1 and 602.4.2 of the *International Building Code*. Such construction shall be visually inspected by the *owner* annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is ~~accessible~~ available by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.

2309.5.2.1 Identification. Manual emergency shutoff valves shall be identified and the location shall be clearly visible, ~~accessible~~ have access and be indicated by means of a sign.

3206.10.1.1 Sprinklered buildings. Aisles in sprinklered buildings shall be not less than 44 inches (1118 mm) wide. Aisles shall be not less than 96 inches (2438 mm) wide in *high-piled storage areas* exceeding 2,500 square feet (232 m^2) in area, that are ~~accessible~~ open to the public and designated to contain high-hazard commodities.
Aisles shall be not less than 96 inches (2438 mm) wide in areas open to the public where mechanical stocking methods are used.

Exceptions:

1. Aisles in *high-piled storage areas* exceeding 2,500 square feet (232 m^2) in area, that are open to the public and designated to contain high-hazard commodities, and that are protected by a sprinkler system designed for multiple-row racks of high-hazard commodities, shall be not less than 44 inches (1118 mm) wide.
2. Aisles that are in *high-piled storage areas* exceeding 2,500 square feet (232 m^2) in area, not open to the public and protected by a sprinkler system designed for multiple-row racks, shall be not less than 24 inches (610 mm) wide.

D102.1 Access and loading. Facilities, buildings or portions of buildings hereafter constructed shall ~~be accessible to~~ allow access for the fire department apparatus by way of an *approved* fire apparatus access road with an asphalt, concrete or other *approved* driving surface capable of supporting the imposed load of fire apparatus weighing up to 75,000 pounds (34 050 kg).

L104.6 Isolation valves. System isolation valves that ~~are accessible to~~ have access for the fire department shall be installed on the system riser to allow piping beyond any air cylinder refill panel to be blocked.

L104.14.1 Location. The location of the external mobile air connection shall ~~be accessible to~~ have access for mobile air apparatus and *approved* by the *fire code official*.

2021 International Building Code

Revise as follows:

[F] 415.11.7.4 Installations in corridors and above other occupancies. The installation of HPM piping and tubing within the space defined by the walls of corridors and the floor or roof above, or in concealed spaces above other occupancies, shall be in accordance with Sections 415.11.7.1 through 415.11.7.3 and the following conditions:

1. Automatic sprinklers shall be installed within the space unless the space is less than 6 inches (152 mm) in the least dimension.
2. *Ventilation* not less than six air changes per hour shall be provided. The space shall not be used to convey air from any other area.
3. Where the piping or tubing is used to transport HPM liquids, a receptor shall be installed below such piping or tubing. The receptor shall be designed to collect any discharge or leakage and drain it to an *approved* location. The 1-hour enclosure shall not be used as part of the receptor.
4. HPM supply piping and tubing and nonmetallic waste lines shall be separated from the corridor and from occupancies other than Group H-5 by *fire barriers* or by an approved method or assembly that has a *fire-resistance rating* of not less than 1 hour. Access openings into the enclosure shall be protected by approved fire-protection-rated assemblies.
5. ~~Readily accessible manual~~ Ready access to manual or automatic remotely activated fail-safe emergency shutoff valves shall be installed on piping and tubing other than waste lines at the following locations:

   5.1. At branch connections into the *fabrication area*.

   5.2. At entries into *corridors*.

Exception: Transverse crossings of the *corridors* by supply piping that is enclosed within a ferrous pipe or tube for the width of the *corridor* need not comply with Items 1 through 5.

[F] 914.1.1 Exterior access to shaftways. Outside openings ~~accessible~~ with access to the fire department and that open directly on a hoistway or shaftway communicating between two or more floors in a building shall be plainly marked with the word “SHAFTWAY” in red letters not less than 6 inches (152 mm) high on a white background. Such warning signs shall be placed so as to be readily discernible from the outside of the building.

2021 International Code Council Performance Code

Revise as follows:

[F] 2001.3.6 Water supply. Water supply for fire department operations shall be from a reliable~~, readily accessible~~ source with ready access acceptable to the fire department and capable of supporting fire-fighting operations.

Reason: This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term ‘accessible’ is most commonly understood as requiring access for persons with disabilities we are making the changes to delete the word accessible from the remaining codes and replace it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. Many of the codes use the defined term ‘access (to)’ or ‘ready access (to)’ for access by maintenance and service personnel or fire departments. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes.

Code change proposal M2-15 removed ‘door’ from the definitions for ‘access (to)’ and ‘ready access (to)’. That coordination item did not happen across codes and this proposal seeks to complete that effort.

Similar proposals will be submitted for the Group B cycle for IRC, IECC and IEBC.

This proposal is submitted by the ICC Building Code Action Committee (BCAC), ICC Fire Code Action Committee (BCAC), and ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC).
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Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

G1-21 Part II

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The committee stated that the reason for approval was that the proposal replaces an improper term with the proper term for the conditions listed. (Vote: 12-0)

G1-21 Part II

NOTE: G1-21 PART III DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G1-21 Part III

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org); Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Fuel Gas Code

Revise as follows:

403.11.7 Lapped flanges. Lapped flanges shall be used only above ground or in exposed locations ~~accessible~~ with access for inspection.

404.8.2 Conduit with both ends terminating indoors. Where the conduit originates and terminates within the same building, the conduit shall originate and terminate in ~~an accessible~~ a portion of the building with access and shall not be sealed. The conduit shall extend not less than 2 inches (51 mm) beyond the point where the pipe emerges from the floor.

404.14.2 Conduit with both ends terminating indoors. Where the conduit originates and terminates within the same building, the conduit shall originate and terminate in ~~an accessible~~ a portion of the building with access and shall not be sealed. The conduit shall extend not less than 2 inches (51 mm) beyond the point where the pipe emerges from the floor.

409.5.3 Located at manifold. Where the *appliance* shutoff valve is installed at a manifold, such shutoff valve shall be located within 50 feet (15 240 mm) of the *appliance* served and shall ~~be readily accessible~~ have ready access and be permanently identified. The *piping* from the manifold to within 6 feet (1829 mm) of the *appliance* shall be designed, sized and installed in accordance with Sections 401 through 408.

409.6 Shutoff valve for laboratories. Where provided with two or more fuel gas outlets, including table-, bench- and hood-mounted outlets, each laboratory space in educational, research, commercial and industrial *occupancies* shall be provided with a single dedicated shutoff valve through which all such gas outlets shall be supplied. The dedicated shutoff valve shall ~~be readily accessible~~ have ready access, be located within the laboratory space served, be located adjacent to the egress door from the space and shall be identified by *approved* signage stating “Gas Shutoff.”

411.1.6 Unions. A union fitting shall be provided for *appliances* connected by rigid metallic pipe. Such unions shall ~~be accessible~~ have access and be located within 6 feet (1829 mm) of the *appliance*.

501.7.3 Connection to masonry fireplace flue. A connector shall extend from the *appliance* to the flue serving a masonry *fireplace* such that the flue gases are exhausted directly into the flue. The connector shall ~~be accessible~~ have access or be removable for inspection and cleaning of both the connector and the flue. *Listed* direct connection devices shall be installed in accordance with their listing.

503.5.9 Cleanouts. Where a chimney that formerly carried flue products from liquid or solid fuel-burning appliances is used with an *appliance* using fuel gas, ~~an accessible~~ a cleanout with access shall be provided. The cleanout shall have a tight-fitting cover and shall be installed so its upper edge is not less than 6 inches (152 mm) below the lower edge of the lowest chimney inlet opening.

503.12.6 Positioning. Draft hoods and draft regulators shall be installed in the position for which they were designed with reference to the horizontal and vertical planes and shall be located so that the relief opening is not obstructed by any part of the *appliance* or adjacent construction. The *appliance* and its draft hood shall be located so that the relief opening ~~is accessible~~ has access for checking vent operation.

Reason: This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term ‘accessible’ is most commonly understood as requiring access for persons with disabilities we are making the changes to delete the word accessible from the remaining codes and replace it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. Many of the codes use the defined term ‘access (to)’ or ‘ready access (to)’ for access by maintenance and service personnel or fire departments. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes.

Code change proposal M2-15 removed ‘door’ from the definitions for ‘access (to)’ and ‘ready access (to)’. That coordination item did not happen across codes and this proposal seeks to complete that effort.

Similar proposals will be submitted for the Group B cycle for IRC, IECC and IEBC.

This proposal is submitted by the ICC Building Code Action Committee (BCAC), ICC Fire Code Action Committee (BCAC), and ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC).
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Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

G1-21 Part III

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The Committee agreed with the published reason statement. (11-0)

G1-21 Part III

G1-21 Part IV

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org); Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Plumbing Code

Revise as follows:

1302.9 Pumping and control system. Mechanical equipment including pumps, valves and filters shall be ~~easily accessible~~ have easy access and removable in order to perform repair, maintenance and cleaning. The minimum flow rate and flow pressure delivered by the pumping system shall be appropriate for the application and in accordance with Section 604 .

2021 International Building Code

Revise as follows:

[P] 1210.2.2 Walls and partitions. Walls and partitions within 2 feet (610 mm) of service sinks, urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of not less than 4 feet (1219 mm) above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.

Exception: This section does not apply to the following buildings and spaces:

1. Dwelling units and *sleeping units*.
2. Toilet rooms that are not ~~accessible to the~~ for use by the general public and that have not more than one water closet.

Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.

2021 International Code Council Performance Code

Revise as follows:

[P] 1204.3.3 ~~Accessibility~~ Access. The drainage system shall ~~be accessible~~ have access for maintenance and clearing of blockages.

Reason: This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term ‘accessible’ is most commonly understood as requiring access for persons with disabilities we are making the changes to delete the word accessible from the remaining codes and replace it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. Many of the codes use the defined term ‘access (to)’ or ‘ready access (to)’ for access by maintenance and service personnel or fire departments. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes.

Code change proposal M2-15 removed ‘door’ from the definitions for ‘access (to)’ and ‘ready access (to)’. That coordination item did not happen across codes and this proposal seeks to complete that effort.

Similar proposals will be submitted for the Group B cycle for IRC, IECC and IEBC.

This proposal is submitted by the ICC Building Code Action Committee (BCAC), ICC Fire Code Action Committee (BCAC), and ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC).
BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working

Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

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Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

G1-21 Part IV

Public Hearing Results

This proposal includes the following errata
In Section 1210.2.2 Item 2, "for use by the general" should be underlined.

Committee Action: **Disapproved**

Committee Reason: Although the intent of the proposal is understood, including the word "easy" continues a poor code text practice. Either something has access (see defined term) or it doesn't. (14-0)

G1-21 Part IV

Individual Consideration Agenda

Public Comment 1:

IPC: 1302.9

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Plumbing Code

1302.9 Pumping and control system . Mechanical equipment including pumps, valves and filters shall ~~be~~ have ~~easy~~ access and <u>be</u> removable in order to perform repair, maintenance and cleaning. The minimum flow rate and flow pressure delivered by the pumping system shall be appropriate for the application and in accordance with Section 604 .

Commenter's Reason: The Plumbing committee felt that this was an appropriate change, but did not like the word 'easy' in Section 1302.9 as this is not uniformly enforceable. The BCAC used the word only because the original language was 'easily accessible'. However, we agree with the committee and are proposing to delete that word. We ask the membership to approve this proposal with that revision.
This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 as well at G1-21 Parts 2, 3, 5 and 6.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal continues the committee work to remove 'accessible' where the context is not about accessibility for persons with disabilities. The defined terms 'access to' and 'ready access' is used where appropriate. The modifications were to address concerns expressed during the testimony and expressed by the Egress committee.

NOTE: G1-21 PART V DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G1-21 Part V

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org); Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

306.1 Access. *Appliances*, controls devices, heat exchangers and HVAC system components that utilize energy shall ~~be accessible~~ provide access for inspection, service, repair and replacement without disabling the function of a fire-resistance-rated assembly or removing permanent construction, other appliances, venting systems or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space not less than 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*.

506.3.2.2 Duct-to-hood joints. Duct-to-hood joints shall be made with continuous internal or external liquid-tight welded or brazed joints. Such joints shall be smooth, ~~accessible~~ available for inspection, and without grease traps.

Exceptions: This section shall not apply to:

1. A vertical duct-to-hood collar connection made in the top plane of the hood in accordance with all of the following:
   - 1.1. The hood duct opening shall have a 1-inch-deep (25 mm), full perimeter, welded flange turned down into the hood interior at an angle of 90 degrees (1.57 rad) from the plane of the opening.
   - 1.2. The duct shall have a 1-inch-deep (25 mm) flange made by a 1-inch by 1-inch (25 mm by 25 mm) angle iron welded to the full perimeter of the duct not less than 1 inch (25 mm) above the bottom end of the duct.
   - 1.3. A gasket rated for use at not less than 1,500ºF (816ºC) is installed between the duct flange and the top of the hood.
   - 1.4. The duct-to-hood joint shall be secured by stud bolts not less than $^1/_4$ inch (6.4 mm) in diameter welded to the hood with a spacing not greater than 4 inches (102 mm) on center for the full perimeter of the opening. The bolts and nuts shall be secured with lockwashers.
2. *Listed* and *labeled* duct-to-hood collar connections installed in accordance with Section 304.1.

2021 International Fuel Gas Code

Revise as follows:

[M] 306.1 Access for maintenance and replacement. Appliances, control devices, heat exchangers and HVAC components that utilize energy shall~~be accessible~~ have access for inspection, service, repair and replacement without disabling the function of a fire-resistance-rated assembly or removing permanent construction, other appliances, or any other *piping* or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be provided in front of the control side to service an *appliance*.

2021 International Code Council Performance Code

Add new definition as follows:

ACCESS (TO). That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction [see also Ready access (to)].

READY ACCESS (TO). . That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel or similar obstruction [see Access (to)].

Reason: This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term 'accessible' is most commonly understood as requiring access for persons with disabilities we are making the changes to delete the word accessible from the remaining codes and replace it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. Many of the codes use the defined term ‘access (to)’ or ‘ready access (to)’ for access by maintenance and service personnel or fire departments. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes.

Code change proposal M2-15 removed ‘door’ from the definitions for ‘access (to)’ and ‘ready access (to)’. That coordination item did not happen across codes and this proposal seeks to complete that effort.

Similar proposals will be submitted for the Group B cycle for IRC, IECC and IEBC.

This proposal is submitted by the ICC Building Code Action Committee (BCAC), ICC Fire Code Action Committee (BCAC), and ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC).
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Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

G1-21 Part V

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as submitted because it provides coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term ‘accessible’ is most commonly understood as requiring access for persons with disabilities, the proposal deletes the word accessible from the code and replaces it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes. (Vote: 11-0)

G1-21 Part V

NOTE: G1-21 PART VI DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G1-21 Part VI

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org); Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Swimming Pool and Spa Code

Add new definition as follows:

ACCESS (TO). . That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction [see also Ready access (to)].

Delete without substitution:

~~**ACCESSIBLE.** Signifies access that requires the removal of an access panel or similar removable obstruction.~~

Add new definition as follows:

READY ACCESS (TO). . That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel or similar obstruction [see Access (to)].

Revise as follows:

[A] 110.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain ~~accessible~~ available and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

303.1.1 Heaters. The electric power to heaters shall be controlled by ~~a readily accessible~~ an on-off switch with ready access that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously burning ignition pilots.

306.9 Valves under decks. Valves installed in or under decks shall be ~~accessible~~ provided access or operation, service, and maintenance. Where access through the deck walking surface is required, an access cover shall be provided for the opening in the deck. Such access covers shall be slip resistant and secured.

313.4 Location. Provide access to pumps
~~Pumps~~ and motors ~~shall be accessible~~ for inspection and service in accordance with the manufacturer's specifications.

314.5 Vacuum fittings. Where installed, provide access to *submerged vacuum fittings* ~~shall be accessible~~ and such fittings shall be located not greater than 12 inches (305 mm) below the water level.

324.2 Requirements. The equipment area or room floor shall be of concrete or other suitable material having a smooth slip-resistant finish and have positive drainage, including a sump drain pump, if necessary. Floors shall have a slope toward the floor drain or sump drain pump adequate to prevent standing water at all times. The opening to the equipment room or area shall be designed to provide access for all anticipated equipment. At least one hose bibb with backflow preventer shall be located in the equipment room or ~~be accessible~~ allow for access within an adequate distance of the equipment room so that a hose can service the entire room.

409.4.3 Emergency response units. Pools covered by this chapter shall be provided with first aid equipment, including a first aid kit. First aid equipment and kits shall be located in ~~an accessible location~~ to allow access.

504.1 Emergency shutoff switch. One emergency shutoff switch shall be provided to disconnect power to circulation and jet system pumps and air blowers. Provide access to emergency ~~Emergency~~ shutoff switches ~~shall be accessible~~. Such switches shall be located within sight of the spa and shall be located not less than 5 feet (1524 mm) but not greater than 10 feet (3048 mm) horizontally from the inside walls of the spa.

603.2 Class D-2 pools. Where a Class D-2 pool has a bather-~~accessible~~ depth greater than $4^1/_2$ feet (1372 mm), the floor shall have a distinctive marking at the $4^1/_2$ feet (1372 mm) water depth.

612.5.1 Water collection and treatment tank. Interactive water play features shall drain to a collection and treatment tank. The inside of the tank shall ~~be accessible~~ provide access for cleaning and inspection. The access hatch or lid shall be locked or require a tool to open.
The tank capacity shall be not less than 1000 gallons or ten times the number of gallons in a minute when all nozzles are operating simultaneously, whichever is greater. The volume water in the tank, at the design water level, shall not decrease more than 15% of that volume when all pumps and discharge piping fill with water to the discharge points of all nozzles.
Tanks shall be provided with a means to empty all water in the tank for the purposes of servicing or cleaning.

704.7.2 ~~Accessible~~ Access to pumps and motors. Pumps and motors shall be ~~accessible~~ provided access for inspection and service in accordance with the pump and motor manufacturer's instructions.

704.7.3 Pump shutoff valves. An ~~*accessible*~~ available means of ~~shut~~ shutting off ~~of~~ the suction and discharge piping for the pump shall be provided for maintenance and removal of the pump and be located with access.

1001.6 Access. Electrical components that require placement or servicing shall be ~~accessible~~ located with access.

Reason: This effort was started by the CACs in 2015/16 code change cycle, and continued in 2018/19. This proposal is to provide coordination with the action taken with -P84-15, M2-15, RB2-16, F12-16, CE137-16 Part 1, CE29-19 Part 1 and 2 . Because the term 'accessible' is most commonly understood as requiring access for persons with disabilities we are making the changes to delete the word accessible from the remaining codes and replace it with other words, defined terms or phrases that are not attributed to requiring access for the physically disabled. Many of the codes use the defined term 'access (to)' or 'ready access (to)' for access by maintenance and service personnel or fire departments. This proposal provides clarity and consistency in the remaining codes where those coordination modifications missed or came in as part of new code changes.

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Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no change to any of the requirements. This is only a clarification in terminology.

G1-21 Part VI

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The Committee agreed with the published reason statement. (11-0)

G1-21 Part VI

G7-21 Part I

Proposed Change as Submitted

Proponents: Marcelo Hirschler, GBH International, representing self (mmh@gbhint.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE FIRE SAFETY CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Add new definition as follows:

FIRE PERFORMANCE. Manner in which a material, product, or assembly responds to a particular fire exposure, including, but not limited to, ease of ignition, flame spread, heat release, mass loss, smoke generation, and fire resistance.

Reason: The term "fire performance" is used multiple times in the I codes, but it is not defined. It is an important concept that must not be confused with "fire resistance, which is one aspect of fire performance. This proposal recommends adding the same definition into the IBC and into the IFC. The term fire performance combines the concept of "fire resistance", which is defined in the IBC, and the concept of "reaction to fire", which is not defined in the I-codes, but the concept is used frequently. Fire resistance is defined in the IBC as: "That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use." In other words, fire resistance is the property of a material that prevents or retards fire from penetrating from one compartment to another. "Reaction to fire" is a term defined by the ASTM committee on fire standards as: "response of a material in contributing by its own decomposition to a fire to which it is exposed, under specified conditions." In other words, reaction to fire is what a material does when it is exposed to fire, in terms of igniting, spreading flame, releasing heat or smoke, or otherwise causing potential harm to people or products.

The term "fire resistance", which is associated with fire resistance ratings (typically determined by testing in accordance with ASTM E119 or UL 263) is used often in the codes and may be confused with "fire performance", and that is why this definition is needed.

Uses of the term "fire performance" in I-codes:

In the IBC: 802.1, 802.2, 802.3, 803.1, 806., and in the discussion about chapter 7.

In the IRC: 302.13,

In the IFC: 803.1, 805.3.2.2, 807.3

In the IEBC: Resource A

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This simply adds a definition.

G7-21 Part I

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee indicated that the definition is not needed, and the reason statement references chapter 8, which does not address fire resistance. The committee mentioned that fire performance is a broad concept, and the definition does not address it. (Vote: 11-2)

G7-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 202, 202 (New)

Proponents: Marcelo Hirschler, representing self (mmh@gbhint.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

FIRE PERFORMANCE . ~~Manner in which a material, product, or assembly responds to a particular fire exposure, including, but not limited to, ease of ignition, flame spread, heat release, mass loss, smoke generation, and fire resistance.~~Generic term incorporating fire resistance and reaction-to-fire.

REACTION-TO-FIRE . Contribution of a material or product as a result of exposure to a fire, in terms of heat or smoke.

Commenter's Reason: The term "fire performance" is used in both the IBC and IFC but it is not defined. It is used primarily associated with flame spread and heat release or smoke release, which are reaction to fire properties (one of the components of fire performance). The term "fire resistance" is defined in the IBC, correctly, as: "That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use." That means that fire resistance is associated with fire-resistance ratings (e.g. 1 hour ratings). However, the term "fire resistance" is used in both the IBC and the IFC in section 104.11, on "Alternative materials, design and methods of construction and equipment" but it does not really relate to fire resistance but to fire safety. The code says as follows:

"The material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code as it pertains to the following:

2.1. Quality.

2.2. Strength.

2.3. Effectiveness.

2.4. Fire resistance.

2.5. Durability.

2.6. Safety."
Clearly if a material burns twice as fast but does not change the fire resistance rating (because both the original material and the proposed replacement exhibit no hourly resistance rating, for example), the proposed replacement has poorer reaction-to-fire properties and it should not be accepted but section 104.11 says you only need to consider the fire resistance. That is wrong and needs to be fixed.

The ASTM committee on fire standards defines both terms and make the distinction. ICC should do so also.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This simply adds a definition.

Public Comment# 2277

G7-21 Part II

Proposed Change as Submitted

Proponents: Marcelo Hirschler, GBH International, representing self (mmh@gbhint.com)

2021 International Fire Code

Add new definition as follows:

FIRE PERFORMANCE. Manner in which a material, product, or assembly responds to a particular fire exposure, including, but not limited to, ease of ignition, flame spread, heat release, mass loss, smoke generation, and fire resistance.

Reason: The term "fire performance" is used multiple times in the I codes, but it is not defined. It is an important concept that must not be confused with "fire resistance, which is one aspect of fire performance. This proposal recommends adding the same definition into the IBC and into the IFC. The term fire performance combines the concept of "fire resistance", which is defined in the IBC, and the concept of "reaction to fire", which is not defined in the I-codes, but the concept is used frequently. Fire resistance is defined in the IBC as: "That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use." In other words, fire resistance is the property of a material that prevents or retards fire from penetrating from one compartment to another. "Reaction to fire" is a term defined by the ASTM committee on fire standards as: "response of a material in contributing by its own decomposition to a fire to which it is exposed, under specified conditions." In other words, reaction to fire is what a material does when it is exposed to fire, in terms of igniting, spreading flame, releasing heat or smoke, or otherwise causing potential harm to people or products.

The term "fire resistance", which is associated with fire resistance ratings (typically determined by testing in accordance with ASTM E119 or UL 263) is used often in the codes and may be confused with "fire performance", and that is why this definition is needed.

Uses of the term "fire performance" in I-codes:

In the IBC: 802.1, 802.2, 802.3, 803.1, 806., and in the discussion about chapter 7.

In the IRC: 302.13,

In the IFC: 803.1, 805.3.2.2, 807.3

In the IEBC: Resource A

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This simply adds a definition.

G7-21 Part II

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee stated that the reasons for disapproval were based on the disapproval of Part I by the IBC FS committee and the lack of demonstrated need in the IFC. (Vote: 13-0)

G7-21 Part II

Individual Consideration Agenda

Public Comment 1:

IFC: SECTION 202, (New)

Proponents: Marcelo Hirschler, representing self (mmh@gbhint.com) requests As Modified by Public Comment

Modify as follows:

2021 International Fire Code

FIRE PERFORMANCE . ~~Manner in which a material, product, or assembly responds to a particular fire exposure, including, but not limited to, ease of ignition, flame spread, heat release, mass loss, smoke generation, and fire resistance. resistance.~~ Generic term incorporating fire resistance and reaction-to-fire.

REACTION-TO-FIRE . Contribution of a material or product as a result of exposure to a fire, in terms of heat or smoke.

Commenter's Reason: The term "fire performance" is used in both the IBC and IFC but it is not defined. It is used primarily associated with flame spread and heat release or smoke release, which are reaction to fire properties (one of the components of fire performance). The term "fire resistance" is defined in the IBC, correctly, as: "That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use." That means that fire resistance is associated with fire-resistance ratings (e.g. 1 hour ratings). However, the term "fire resistance" is used in both the IBC and the IFC in section 104.11, on "Alternative materials, design and methods of construction and equipment" but it does not really relate to fire resistance but to fire safety. The code says as follows:

"The material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code as it pertains to the following:

2.1. Quality.

2.2. Strength.

2.3. Effectiveness.

2.4. Fire resistance.

2.5. Durability.

2.6. Safety."
Clearly if a material burns twice as fast but does not change the fire resistance rating (because both the original material and the proposed replacement exhibit no hourly resistance rating, for example), the proposed replacement has poorer reaction-to-fire properties and it should not be accepted but section 104.11 says you only need to consider the fire resistance. That is wrong and needs to be fixed.

The ASTM committee on fire standards defines both terms and make the distinction. ICC should do so also.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This simply adds a definition.

Public Comment# 2307

G10-21

Proposed Change as Submitted

Proponents: Jeffrey S. Grove, P.E. FSFPE, Jensen Hughes, representing Jensen Hughes (jgrove@jensenhughes.com)

THIS CODE CHANGE WILL BE HEARD BY THE MEANS OF EGRESS CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

Revise as follows:

[BE] FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as *corridors*, *stairways*, *ramps*, toilet rooms, elevator lobbies, mechanical rooms and closets.

Reason: Elevator lobbies are used in some buildings to provide the hoistway protection required by 3006.2. Additionally, fire service access elevator lobbies are required in certain high-rise buildings by IBC 403.6.1 and 3007.6. Occupant evacuation elevator lobbies may be provided in accordance with IBC 403.5.2 (exception 1) and 3008.6.
In uses for which the occupant load is calculated using the gross floor area (such as business or residential), the area of elevator lobbies must be included in the gross floor area. However, in uses for which the occupant load is calculated using the net floor area (such as assembly), it is not necessary to include the area of elevator lobbies in the net floor area. Elevator lobbies are only occupied on a transient basis as people move to or from their destination As such, the area of elevator lobbies should not be included in the net floor area, just like the area of stairs, corridors and bathrooms are currently excluded from the net floor area.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal is submitted to clarify requirements. No cost impact is anticipated.

G10-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved because an elevator lobby is typically part of the corridor and should not be part of a net floor area calculation. This will help with determination of the occupant load for a floor. (Vote: 8-6)

G10-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests Disapprove

Commenter's Reason: This public comment is to disapprove the proposal adding elevator lobbies to the net floor area definition. This proposal does not clarify requirements, it creates vague and unenforceable language, while providing a giant loophole when determining net floor area. While "some" elevator lobbies serve a transient purpose and are reasonable to exclude from net area when calculating occupant load, the boundary of the lobby may not be clear based on the lobby's relationship to adjacent spaces that should be assigned an occupant load.

At the committee action hearings, an example was given of the elevators opening directly onto an assembly pre-function space. For the purpose of assigning occupant load, where does the elevator lobby end and where does the assembly area begin? Another example given was the lobby that contains an assembly seating area, i.e. greater than 750 sf. Yet another example is the first-floor lobby to a mixed-use building. The elevator lobby can serve multiple occupancies, including assembly.

Elevator lobbies are not defined within the building code and the proponent does not provide direction on what extent of floor area can or cannot be included as part of an elevator lobby when excluding it from the net area calculation. Adding elevator lobbies to the definition of net area leaves the door open to the applicant on what areas to include. Leaving it out of the definition gives more flexibility to the code official.

Additionally, the committee's statement for approving this proposal was "an elevator lobby is typically part of the corridor and should not be part of a net floor area calculation." While for many buildings that may be the case, assembly areas in a sprinklered building do not require a corridor system.

The following images show examples of elevators that open to spaces where a clear delineation of what could be an elevator lobby does not exist. The images also show that many elevators do not open to a corridor as indicated as the reason for approval by the committee.

FIGURE 1

FIGURE 2

FIGURE 3

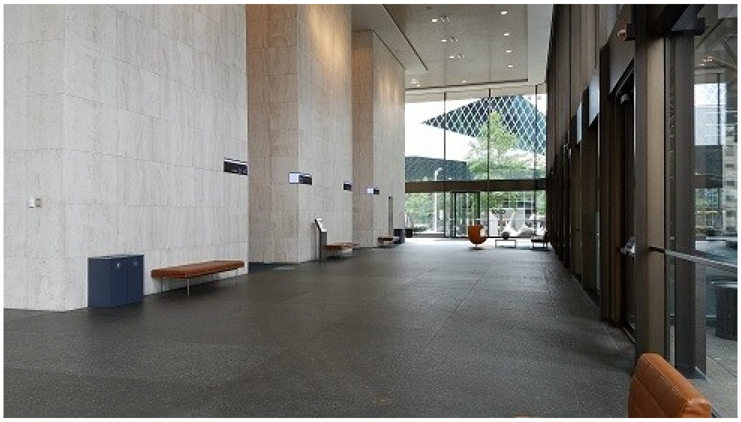

FIGURE 4

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change to code.

Public Comment# 2388

G12-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

Revise as follows:

[BG] HIGH-RISE BUILDING. A building with the floor of an occupied ~~floor~~ story located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

Reason: The intent of this proposal is to clarify that an occupied roof that is over 75' where the floor is below 75' does not make this building a high-rise. Also thinking into the future, changing an unoccupied roof to an occupied roof should not change the building requirements to this extent. An open to the air occupied roof does not increase the hazard the same as a story.
If you make this a high-rise what could be added is additional alarm systems requirements, additional requirements for sprinklers, additional special inspections, luminous egress markings in the stairways, a fire command center, standpipes, secondary water supply, smoke detection systems, separation between stairway enclosures, smokeproof enclosures, etc. A justification or need for these systems for just an occupied roof has not been demonstrated.

This would be consistent with the change to Section 503.1.4 –

503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504, provided the penthouses and other enclosed roof structures comply with Section 1511.

Exceptions:

1. The occupancy located on an occupied roof shall not be limited to the occupancies allowed on the story immediately below the roof where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Section 907.5 Sections 907.5.2.1 and 907.5.2.3 is provided in the area of the occupied roof. Emergency voice/alarm communication system notification per Section 907.5.2.2 shall also be provided in the area of the occupied roof where such system is required elsewhere in the building.

2. (no change to this exception)

A floor is a floor & a roof is a roof. Just because a roof is an "occupied" roof, does not make it a floor. The code has had provisions related to adequate egress from "occupied" roofs for years without classifying the roof as an occupancy for purposes of other code issues including height/area limitations, mixed uses, sprinklers, or type of construction.

The IBC currently requires a minimum of one standpipe hose connection needs to be extended to the roof (Section 905.4 – 2021 IBC).

It should be noted that there are new provisions in the 2015 IBC (Section 903.2.1.6) which addresses sprinkler protection due to an occupied roof and in the 2018 IBC (Section 503.1.4) which address occupied roofs based on the floor immediately below the roof. In both cases, if sprinkler protection is provided throughout the building, whether the roof is an occupied roof has no bearing on height/area limitations, occupancy separation requirements or the classification of the building as a high-rise.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The technical criteria for high-rises would not change. This is a clarification. The opposite interpretation could have a significant increase in building costs because of the additional system indicated in the reason.

Staff note: G12-21, G14-21, G15-21, G16-21 addresses requirements in a different or contradicting manner. G14-21, G15-21 and G16-21 addresses similar requirements in a different manner to those found in current IBC Section 503.1.4. The committee is urged to make their intentions clear with their actions on these proposals.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because some committee members felt that not including the occupied roof in the definition of high rise ignored the issue of the potential occupant load on the occupied roof. Some of the committee members felt that the safety for persons on the roof was addressed through other sections in the codes. See also the committee reason for G14, G15 and G16. (Vote: 10-4)

Staff Analysis: G12-21, G14-21, G15-21, G16-21 addresses requirements in a different or contradicting manner. G14-21, G15-21 and G16-21 addresses similar requirements in a different manner to those found in current IBC Section 503.1.4. The committee is urged to make their intentions clear with their actions on these proposals.

Individual Consideration Agenda

Public Comment 1:

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org); Marcin Pazera, representing PIMA (mpazera@pima.org); David Tyree, representing AWC (dtyree@awc.org) requests As Submitted

Commenter's Reason: NUGENT REASON:
This code change, along with G15-21 and G16-21, seeked to clarify an issue that remains unclear even with an ICC interpretation. That is that when using the definition of "HIG-RISE BUILDING," just WHERE is the 75 foot dimension to be measured to? The current definition of a high-rise building is:

HIGH-RISE BUILDING *- A building with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.*

There is no dissention on where the 75 foot measurement is to start – the lowest level of fire department access, e.g., the lowest point where the fire service can part a vehicle. But where TO STOP measuring the 75 feet appears to be the big question? The definition states that the distance is measured to an "occupiable floor." It seems to come down to - just what is a "floor?" While the term "floor" appears 1,062 time and the term "floors" appears 209 times, there is no definition of "floor" in the IBC.. That is what this code change is attempting to do. To revise the language within the definition to clearly state where the 75 foot dimension is measured to – replacing the ambiguous term "floor" to "story," which is a defined term in the IBC.

In the committee's reason statement for disapproval it states "… some committee members felt that not including the occupied roof in the definition of high rise ignored the issue of the potential occupant load on the occupied roof." We disagree with that statement, as was presented during the testimony for not only this code change but also for G15-21 and G16-21, over the past couple of code development cycles there has been a concerted effort to put in place numerous revisions to the IBC and IFC to address the whole "occupied roof" topic, with the majority geared to life safety, fire protection features and construction materials/methods.

In regard to the issue of building construction the IBC now in Section 503.1.4 states:

503.1.4 Occupied roofs*. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504, provided that the penthouses and other enclosed rooftop structures comply with Section 1511.*

The definition of "high-rise buildings" first appeared in each of the early 1980's and was based on the work done at the 1971 *International Symposium on Fire Safety in High-Rise Buildings* which was sponsored by the General Services Administration (GSA) with participants from not only the US but England, France, Canada and Sweden. They had to arrive at a term that all recognized, thus they used "floor." It was and is a term that is defined around the country in very similar terms.

In the IBC Section 201.4 specifically address terms that are not defined in an I-Code, it states "Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies." In looking at the Merriam-Webster website (https://www.merriam-webster.com/dictionary/floor), the word "floor" is defined as:

Definition of *floor* (Entry 1 of 2)

1 **:** the level base of a room

2 **a** **:** the lower inside surface of a hollow structure (such as a cave or bodily part)

b **:** a ground surface
// the ocean *floor*

3 **a** **:** a structure dividing a building into stories
also **:** STORY

b **:** the occupants of such a floor

4 **:** the surface of a structure on which one travels
// the *floor* of a bridge

5 **a** **:** a main level space (as in a stock exchange or legislative chamber) distinguished from a platform or gallery

b **:** the specially prepared or marked area on which indoor sports events take place

c **:** the members of an assembly
// took questions from the *floor*

d **:** the right to address an assembly
// the senator from Utah has the *floor*

6 **:** a lower limit **:** BASE

from the floor
: in field goals as opposed to free throws
// made 16 of 18 shots *from the floor*

— see also TAKE THE FLOOR

This code change just seeks to clarify that the term "floor" as used in the definition of high-rise building and in a multitude of other places in the IBC is referring to a horizontal plane that is located WITHIN the walls of a story of a building – not to a structure that is on the roof of a building. We are proposing to replace an undefined term with one that has an IBC definition – Story. Section 202 defines it as:***STORY.*** *That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above (see "Basement," "Building height," "Grade plane" and "Mezzanine"). A story is measured as the vertical distance from top to top of two successive tiers of beams or finished floor surfaces and, for the topmost story, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.* We wish to point out that the committee in its acceptance of G15-21 actually confirms that "story" would be the appropriate term for the definition. It is our opinion that through the committee's action for Approved as Modified, to have there be 2 separate thresholds that in fact they answered the question - the term "floor" is really a horizontal surface located WITHIN an interior space. The term by itself doesn't include an occupied roof. We do not believe that it was ever the intent that an occupied roof be used as the threshold for the determination of a high-rise building. The hazards associated with occupants within the exterior walls of a building are significantly different than those in spaces that outside of the exterior walls where hot gasses will not be confined.

PAZERA REASON:

Polyisocyanurate Insulation Manufacturers Association (PIMA) is generally supportive of improved fire safety provisions and requirements in the building code. This proposal provides an important clarification to the definition of "high-rise building" in Section 202 of the International Building Code (IBC). This change to "floor of an occupied story" provides a clear distinction between occupied floor and occupied roof. In the current definition (2021 IBC) it could be inferred that occupied roofs (located above an occupied space) could trigger reclassification of a building to a high-rise building, and thus trigger unnecessary or unwarranted upgrades. In our opinion, occupied roofs (open to the outdoor environment) do not carry the same fire safety risks as occupied spaces. This proposal aims to clarify this concept while maintaining current building code requirements. The opponents of this proposal argued that increased fire safety is necessary, however, they have failed to provide substantiating evidence to support such a request. PIMA requests approval as submitted of proposal number G12-21.

TYREE REASON:

This proposal by the BCAC is the correct way to best clarify the definition of HIGH-RISE BUILDING without creating such a distinctly different and contrary intent created by the definition change as was approved by G15. Disapproval of G15-21 is also recommended.

The modification spelled out in this proposal aligns with the language provided for in IBC Section 503.1.4 which states:**503.1.4 Occupied roofs.** A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504, provided that the penthouses and other enclosed rooftop structures comply with Section 1511.By changing the definition of HIGH-RISE BUILDING as approved by G15-21 the intent that occupying roofs should not trigger code provisions attributed to building height or number of stories has been circumvented. The change to the definition will now put into place requirements for sprinkler protection that were already covered by exception 1 from Section 503.1.4, as well as triggering the 8 Emergency Systems (Smoke detection, Fire alarm system, Standpipe system, Emergency voice/alarm communication system, Emergency communication coverage, Fire command center, Smoke removal, and Standby and emergency power) required by Section 403.4 without providing any justification that those systems are needed simply because one is adding as few as a couple of occupants to an area of the roof.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The technical criteria for high-rises would not change. This is a clarification. The opposite interpretation could have a significant increase in building costs because of the additional system indicated in the reason.

Public Comment# 2643

G15-21

Proposed Change as Submitted

Proponents: Stephen Thomas, Colorado Code Consulting, a Shums Coda Assoc Company, representing Colorado Chapter ICC (sthomas@coloradocode.net); Timothy Pate, representing Colorado Chapter Code Change Committee (tpate@broomfield.org)

2021 International Building Code

Revise as follows:

[BG] HIGH-RISE BUILDING. A building with an occupied floor or occupied roof located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

Reason: The existing language refers to a floor that is more than 75 feet above the lowest level of fire department vehicle access. It is our opinion that an occupied roof is also a floor. A floor is something you walk on and people walk on an occupied floor. Therefore, we are proposing to provide clarifying language to include occupied roofs above 75 feet to classify the building as a high-rise building. The presence of occupants and combustible furnishings add to the difficulty of performing ground-based fire fighting. It also limits the ability of the firefighters to perform rescue operations from the ground. By classifying an occupied roof over 57 feet, additional safety provisions are required in the building.
This proposal will have an impact on the application of the Existing Building Code. If someone wants to convert an existing roof to an occupied roof and the roof is more than 75 feet above the lowest level of fire department vehicle access, the building will need to be upgraded to comply with the high rise building provisions in IBC Section 403. The addition of floor area would make the building less code complying that it was prior to constructing the occupied roof.

Cost Impact: The code change proposal will increase the cost of construction
If a jurisdiction did not previously classify an occupied roof as a floor, the increased safety requirements for high-rise buildings will increase the cost of construction. However, if they are already looking at the occupied roof as an occupied floor, the cost of construction would not increase.

Staff note: G12-21, G14-21, G15-21, G16-21 addresses requirements in a different or contradicting manner. G14-21, G15-21 and G16-21 addresses similar requirements in a different manner to those found in current IBC Section 503.1.4. The committee is urged to make their intentions clear with their actions on these proposals.

G15-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal to add 'occupied roofs' to the definition of 'highrise' was approved due to the concern that occupants on the occupied roof need to be protected with elements other than just being open to the outside air. Fire department access to the roof is important for life safety. Concerns were raised that protection for occupied roofs were already addressed in other portions of the code, so having an occupied roof above the 75 foot height should not add the entire 'highrise' package of requirements - especially if the occupied roof was only a small portion of the overall roof. The proposal did not address the issue if a 'floor' is the floor of the story below the roof, a mezzanine in the top story, or what would be required for an occupied roof with elevated platforms on portions of the occupied roof. There was also a concern about the impact on existing building that wanted to add amenities on the roof. See also the Committee Action to G12, G14 and G16. (Vote: 10-4)

Staff Analysis: G12-21, G14-21, G15-21, G16-21 addresses requirements in a different or contradicting manner. G14-21, G15-21 and G16-21 addresses similar requirements in a different manner to those found in current IBC Section 503.1.4. The committee is urged to make their intentions clear with their actions on these proposals.

G15-21

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 202

Proponents: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov); Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

[BG] HIGH-RISE BUILDING . A building ~~with an occupied floor or occupied roof~~ where either of the following are located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access:1. An occupied floor.2. An occupied roof with an occupant load of 50 or more.

Commenter's Reason: G15-21 is intended to clarify whether an occupied roof can be considered an occupied floor for the purposes of triggering high rise provisions in Section 403. However, as written, **any** occupied roof located above the 75-foot threshold, regardless of size or occupant load, will trigger those requirements.
This public comment would provide the option to have smaller occupied roofs on tall buildings without the need to comply with high-rise regulations in Section 403by establishing an occupant load of 50 or more people on the occupied roof before a building would become a high rise.

At the Committee Action Hearings, several testifiers spoke in favor of G16-21, which would have established an occupant load trigger of 50. There was also testimony at the hearings that suggested an occupant load of 100 should be allowed. In our judgment, 50 occupants (which equates to a 750 square foot roof deck) is a good compromise between 1 occupant (too few) and 100 occupants (too many). A trigger of 50 occupants also corresponds to the threshold for determining assembly occupancies (Section 303.1.2, Item 1). We feel that once an assembly occupancy is on the occupied roof, that is a large enough number of people to justify treating the occupied roof the same as an occupied floor.

Occupants on smaller occupied roofs are at lower risk than those on the floor below because smoke will not accumulate on an occupied roof as it does inside of the building. Mid-rise buildings that are close to meeting the definition of a high rise building, will have the same level of notification and sprinkler protection (see Section 503.1.4, exception 1) as those inside the building and will only have 1 additional level of stairs to traverse than those on the floor below.

An example of where smaller occupied roofs could trigger high rise compliance is on a 7 story multi-family building with 6 units per floor. The elevation of the occupied roof slightly exceeds 75 feet to the lowest fire truck access. In this case, the occupants on the highest level of the building have access to 400 Sq. Ft. occupied roofs accessible only by the tenants of each dwelling unit. Each occupied roof will have an occupant load of 2 (400 Sq. Ft. divided by a 200 Sq. Ft. OLF) X 6 = 12 people. As approved, this building would have to comply with the high-rise provisions. If this public comment is approved, it would not be considered to be a high rise, because the total occupant load is less than 50. The building would still be protected by approved sprinkler and a fire alarm systems.

This public comment does not compromise the safety of building occupants and establishes a reasonable threshold for when to apply high rise provisions for occupied roofs.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
The current definition of High-Rise Building is measured from the lowest level of fire department vehicle access to the highest occupied floor. If approved, this code change will define some buildings with an occupied roof as High-Rise which under the current definition, would be considered to be mid-rise. High-Rise buildings are more expensive to build because of the added life safety systems required in Section 403.

If this is approved as modified, it will cause more buildings to have to comply with high-rise provisions which will in fact increase the cost of construction.

Public Comment# 2377

Public Comment 2:

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org); Marcin Pazera, representing PIMA (mpazera@pima.org); David Tyree, representing AWC (dtyree@awc.org) requests Disapprove

Commenter's Reason: NUGENT:
This proposal seeks to dramatically change the threshold for when a building would become classified as a “high-rise.” The current definition of a high-rise building has a single threshold - A building with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

This proposal seeks to change the definition to have 2 thresholds – buildings with:

· an occupied floor located more than 75 feet above the lowest level of fire department vehicle access.

· an occupied roof located more than 75 feet above the lowest level of fire department vehicle access.

We do wish to address the comments made by the proponents made during the public testimony. As reflected in the testimony and in the 2021 REPORT OF THE COMMITTEE ACTION HEARINGS, they stated this change was needed for the following reasons:

1. There are mixed interpretations on how to apply the definition as currently written – the biggest question is what constitutes an "occupied floor?"

It is our opinion that through the committee's action for Approved as Modified (10-4), the committee in fact answered that question by an overwhelming margin by expanding the definition of "high-rise building" to have 2 separate thresholds. To retain the term "occupied floor" and add "occupied roof" the committee made it clear that an "occupied floor" is going to be a horizontal element that is WITHIN the exterior walls of a building (aka – floor surface within a story), and that an "occupied roof" is going to be a horizontal element that is on top of the roof of a building.

Through their action, the committee essentially supports what is being proposed in Code Change G12-21 being put forth by the BCAC in which "floor" is proposed to be replaced by "story."

2. Concern that occupants on the occupied roof need to be protected with elements other than just being open to the outside air.

The logic appears to be that IF a building with an occupied roof is put into the high-rise category that the building will be provided with some heighten level of "protection" (aka – fire rated construction). But without a lot of other changes to the code – that is not true.

Take a fully sprinklered building with an occupied roof where the "height" of the building is 75 feet (measured from grade plane to the ROOF) – but where the distance from the lowest level of fire department access to the occupied roof is 78 ft. Yes the building would be a high-rise BUT given the building complies with the area limits, for many occupancies IBC Table 504.3 would allow the building to be of an unprotected construction - Type IIIB or IIB construction – which means there would no fire ratings on the structural elements per Table 601. And note that this allowable height even applies to buildings with Group A occupancies.

TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE[a]

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION									
		Type I		Type II		Type III		Type IV			
		A	B	A	B	A	B	A	B	C	HT
A, B, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	270	180	85	85
H-1, H-2, H-3, H-5	NS[c, d]	UL	160	65	55	65	55	120	90	65	65
	S										
H-4	NS[c, d]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	140	100	85	85
I-1 Condition 1, I-3	NS[d, e]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	180	120	85	85
I-1 Condition 2, I-2	NS[d, e, f]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85							
I-4	NS[d, g]	UL	160	65	55	65	55	65	65	65	65
	S	UL	180	85	75	85	75	180	120	85	85
R[h]	NS[d]	UL	160	65	55	65	55	65	65	65	65
	S13D	60	60	60	60	60	60	60	60	60	60
	S13R	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85

IS THIS BUILDING REALLY MORE PROTECTED???

No one will take the reduction for Type of Construction fire ratings allowed in 403.2.1 because there are no fire ratings to reduce. Because of this, sprinkler control valves won't be equipped with supervisory initiating devices or water-flow initiating devices.

The threshold for an occupied floor being 75' above fire department access fundamentally put in place a back-stop for buildings that had a "height" of more than 75 feet, which typically saw a high-rise building being of a "protected" type of construction. But if this code change is successful that will not be the case.

1.

Fire department access to the roof is important for life safety.

The logic associated with this comment appears to be that IF a building with an occupied roof is put into the high-rise category, there will then be improved fire department access that is not provided in a non-high-rise building. But that is not true. Just by putting a building with an occupied roof into the high-rise category, increased fire department access to the roof will not automatically improve. Other provisions of the code currently dictate that there must be exits from the roof, the number of exits, and the size/capacity of exits – all of which are used by the fire service for access. There is a general thinking that IF you have a high-rise building there will be fire service access elevators - but that is not true. Fire service access elevators are ONLY required when "… the occupied floor is more than 120 feet above the occupied floor more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access." So, a building having an occupied roof located 76 feet above the lowest level of fire department vehicle access will be a high-rise building but will not be required to have fire service access elevators.

In addition, we want to emphasize the comments that were made/raised by opponents to this code change during the code action hearing – these included:

· The fact that over the past couple of code development there has been a concerted effort to put in place numerous revisions made to the IBC and IFC to address the whole "occupied roof" topic, including many geared to life safety, fire protection features and construction materials/methods. And in fact, this proposal is contrary to the intent of the language provided for in the current IBC in Section 503.1.4 (to which there were no code changes) which states:

***503.1.4 Occupied roofs**. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504, provided that the penthouses and other enclosed rooftop structures comply with Section 1511.*

· NO statistics or technical data was provided to show that the current regulations do not already adequately address the hazards that an occupied roof presents when placed on a building that is not a high-rise building.

· NO WHERE in the proponent's reason statement nor in testimony was there a real discussion of the cost impact this will have if successful – new or/and existing construction. Just how much more will it cost to build a building that has an occupied roof (@75ft Above Fire Department Vehicle Access) as a high-rise than one that is not a high-rise? I think we all know that it would be significant. When asked specifically about the impact on existing building the commentors indicated that the issue can be addressed through revisions to the IEBC in Group B. BUT no one has presented the beginnings of what this would look like. Without fully understanding how this change will affect both new and existing building and the costs involved, moving forward with a stand-alone change for only new buildings totally ignores the full impact this change could have.

· The proposed code change treats a very small area of occupied roof the same as a very large, occupied roof, nor does it provide any differentiation based on how that occupied roof is being used. What if a 1,000sf occupied roof were constructed on a building that has roof with an area of 30,000 sf? Does the placement of a space that is 10% of the roof area warrant the pushing the whole building into a high-rise category? This logic totally flies in the face of the mixed occupancy philosophy in IBC Section 508 where a space that is 10% or less of the floor area is NOT considered a separate occupancy for applying the code provisions.

· And how about the question – just exactly WHERE do you measure the 75 foot dimension to? Is this now to the top of the "roof" or the top of the floor system that sits on top of the roof? What if there are multiple occupied roofs on a single roof – all at different elevations?

· And please note that in this code development cycle there is a code change (S10-21) - which was Approved as Modified (12-1) – that introduced some much-needed regulations on the constructability of occupied roof. It included restrictions on the types of materials that can be used for the construction of occupied roofs, and restrictions on the voids that are created between the roof and the occupied roof.

The committee erred by recommending As Submitted when the proponent provided no justification for triggering so many additional systems when only a single person may be occupying a roof. There are real costs that should have been more closely scrutinized considering the proponent did not speak to the significant costs associated with providing the additional emergency systems.

In summary, by changing the definition of HIGH-RISE BUILDING, as approved in this proposal, the intent that occupying roofs should not trigger code provisions attributed to building height or number of stories has been circumvented. The change to the definition by G15-21 will now put into place requirements for sprinkler protection that were already covered by exception 1 from Section 503.1.4, as well as triggering the following emergency systems: smoke detection, fire alarm system, standpipe system, emergency voice/alarm communication system, emergency communication coverage, fire command center, smoke removal, and standby and emergency power required by Section 403.4. These additional features will be triggered by providing an occupied roof that is designed for an occupant load as low as a single person. Instead of changing the definition, the proponent should have identified and substantiated the specific provisions that were lacking and then proposed those specific changes within IBC Section 503.1.4.

PAZERA:

This proposal adds “occupied roofs” to the definition for “high-rise building”, and thus unnecessarily expands the code requirements applicable to occupied roofs of all types and uses. Polyisocyanurate Insulation Manufacturers Association (PIMA) has number of concerns regarding the impacts this proposal will have on new but more importantly on existing buildings since this proposal significantly increases fire safety requirements for occupied roofs. The proposal impacts existing buildings and will likely require upgrades to comply with high-rise building provisions when the existing building is reclassified as a high-rise. This provision will be highly disruptive to building owners who will be burdened with extensive renovations in order to comply with high-rise building provisions. Fire safety concerns and fire safety risks for occupied roofs (open to the outdoor environment) are not equivalent to those in the occupied space (enclosed space). Enclosed spaces pose a more significant fire risk. Fire safety concerns for occupied roofs should be addressed through specific proposals that established requirements that are proportional to the fire safety risk. Treating any occupied roof as an occupied space ignores important differences in interior and exterior building locations and conditions. PIMA requests disapproval of proposal number G15-21.

TYREE:

This proposal is contrary to the intent of the language provided for in IBC Section 503.1.4 which states:

503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504, provided that the penthouses and other enclosed rooftop structures comply with Section 1511.

By changing the definition of HIGH-RISE BUILDING as approved in this proposal, the intent that occupying roofs should not trigger code provisions attributed to building height or number of stories has been circumvented. The change to the definition by G15-21 will now put into place requirements for sprinkler protection that were already covered by exception 1 from Section 503.1.4, as well as triggering the following emergency systems: smoke detection, fire alarm system, standpipe system, emergency voice/alarm communication system, emergency communication coverage, fire command center, smoke removal, and standby and emergency power) required by Section 403.4. These additional features will be triggered for a building designed to provide an occupied roof area to be used by just a single person. This interpretation will also throw many other questions into the mix. How do you classify the occupancy of occupied roof decks? Does the roof deck contribute to the building area? Does the height and area table (IBC Table 503) apply to the outdoor area? This is just the beginning.

If ever a evacuation of a high-rise roof built to modern codes has been hampered by the occupants or other fixtures on the roof, please identify those cases. The committee erred by recommending As Submitted when the proponent provided no justification for triggering so many additional systems when only a single person may be occupying a roof. There are real costs that should have been more closely scrutinized considering the proponent did not identify the significant costs associated with providing the additional systems.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The original proposal AS could have a significant increase in building costs because of the additional system indicated in the reason.

The disapproval of the original proposal as requested in this public comment will result in that the technical criteria for high-rises would not change.

Public Comment# 2669

G16-21

Proposed Change as Submitted

Proponents: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2021 International Building Code

Revise as follows:

[BG] HIGH-RISE BUILDING. A building with an occupied roof having an occupant load of 50 or more, or an occupied floor, located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

Reason: In an October, 2019 article titled 'Through the roof: Occupied roofs in the 2018 IBC', Kim Paarlberg writes that "What has not been clarified is if an occupied roof is considered an occupied floor when determining does or does not have to meet the high-rise provisions in the code (definition of "high-rise building" and Section 403)". This code change is intended to address this lack of clarity.
High-rise buildings utilizing the new regulations in the 2021 IBC for occupied roofs are gaining in popularity with building owners and designers. In the current definition of *High-rise building*, we measure from the lowest level of fire department vehicle access to the highest 'occupied floor' and if located more than 75 feet above this point then it is considered a *high-rise building.* What is not clear is if an occupied roof is considered the same as an occupied floor. This code change corrects this ambiguity by adding an occupied roof with an occupant load of 50 or more to the definition. The proposal includes a threshold of 50 people before the occupied roof is applicable to the definition because it was felt that less than 50 is not considered to be assembly and with less than 50 people, it would be manageable in terms of meeting a timed egress analysis to get the occupants to a safe location.

The standard for determining if a building should be provided with all the additional safety measures required for a high-rise building has historically been based on the location of the highest occupied floor. This is due to the limitations of most fire department ladder trucks to reach occupants on the upper portions of the building. Occupied roofs are not considered to be a 'Story' for determining the maximum height of a building but regardless, these areas are occupied and would not be within the reach limitations of a fire department ladder truck if located more than 75 feet above the lowest level of fire department vehicle access. Based on this concept, occupied roofs should be considered the same as any other occupied floor of a building.

Cost Impact: The code change proposal will increase the cost of construction
The current definition of High-Rise Building is measured from the lowest level of fire department vehicle access to the highest occupied floor. If approved, this code change will define some buildings with an occupied roof as High-Rise which under the current definition, would be considered to be mid-rise. High-Rise buildings are more expensive to build because of the added life safety systems required in Section 403.

Staff note: G12-21, G14-21, G15-21, G16-21 addresses requirements in a different or contradicting manner. G14-21, G15-21 and G16-21 addresses similar requirements in a different manner to those found in current IBC Section 503.1.4. The committee is urged to make their intentions clear with their actions on these proposals.

G16-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved as it could be read to apply to occupied roofs on any height building. There was also the question if someone could post an occupant load to limit the occupant load on the roof or if this needed to be the calculated occupant load. Concerns were raised that protection for occupied roofs were already addressed in other portions of the code, so having an occupied roof above the 75 foot height should not add the entire 'highrise' package of requirements - especially if the occupied roof was only a small portion of the overall roof. The proposal did not address the issue if a 'floor' is the floor of the story below the roof, a mezzanine in the top story, or what would be required for an occupied roof with elevated platforms on portions of the occupied roof. There was also a concern about the impact on existing building that wanted to add amenities on the roof. See also the Committee Action to G12, G14 and G15. (Vote: 9-4)

Staff Analysis: G12-21, G14-21, G15-21, G16-21 addresses requirements in a different or contradicting manner. G14-21, G15-21 and G16-21 addresses similar requirements in a different manner to those found in current IBC Section 503.1.4. The committee is urged to make their intentions clear with their actions on these proposals.

G16-21

<u>*Individual Consideration Agenda*</u>

Public Comment 1:

Proponents: David Tyree, representing AWC (dtyree@awc.org) requests As Submitted

Commenter's Reason: We are urging approval as submitted as proposed by WABO. G16-21 represents a common sense approach to handing issues related to occupants using the roof for other purposes and is the stated intent in Section 503.1.4. This proposal only goes further to clarify the intent of the language specified in IBC Section 503.1.4 which states:
503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504, provided that the penthouses and other enclosed rooftop structures comply with Section 1511.

By establishing an occupant load threshold of 50 occupants as specified in this proposal, it will clarify any misconceptions that this section would allow unsafe conditions to occur and specify a very limited number of occupants on the roof and providing the necessary fire safety requirements to safely protect those occupants.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Establishing a low threshold of occupants on the roof does not increase or decrease any costs associated with this clarification.

Public Comment# 2317

G20-21 Part I

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Add new definition as follows:

OCCUPIABLE ROOF. An exterior space on a roof that is designed for human occupancy, other than maintenance, and which is equipped with a means of egress system meeting the requirements of this code.

Revise as follows:

[BG] PENTHOUSE. An enclosed, unoccupiable ~~unoccupied~~ rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, *stairways,* and vertical *shaft* openings.

302.1 Occupancy classification. Occupancy classification is the formal designation of the primary purpose of the building, structure or portion thereof. Structures shall be classified into one or more of the occupancy groups specified in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure. An area, room or space that is intended to be occupied at different times for different purposes shall comply with all applicable requirements associated with such potential multipurpose. Structures containing multiple occupancy groups shall comply with Section 508 . Where a structure is proposed for a purpose that is not specified in this section, such structure shall be classified in the occupancy it most nearly resembles based on the fire safety and relative hazard. Occupiable ~~Occupied~~ roofs shall be classified in the group that the occupancy most nearly resembles, according to the fire safety and relative hazard, and shall comply with Section 503.1.4 .

1. Assembly (see Section 303): Groups A-1, A-2, A-3, A-4 and A-5.
2. Business (see Section 304): Group B.
3. Educational (see Section 305): Group E.
4. Factory and Industrial (see Section 306): Groups F-1 and F-2.
5. High Hazard (see Section 307): Groups H-1, H-2, H-3, H-4 and H-5.
6. Institutional (see Section 308): Groups I-1, I-2, I-3 and I-4.
7. Mercantile (see Section 309): Group M.
8. Residential (see Section 310): Groups R-1, R-2, R-3 and R-4.
9. Storage (see Section 311): Groups S-1 and S-2.
10. Utility and Miscellaneous (see Section 312): Group U.

503.1.4 Occupiable~~Occupied~~ roofs. A roof level or portion thereof shall be permitted to be used as an occupiable ~~occupied~~ roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the *story* immediately below the roof. The area of the occupiable ~~occupied~~ roofs shall not be included in the *building area* as regulated by Section 506. An occupiable ~~occupied~~ roof shall not be included in the *building height* or number of *stories* as regulated by Section 504, provided that the *penthouses* and other enclosed *rooftop structures* comply with Section 1511.

Exceptions:

1. The occupancy located on an occupiable ~~occupied~~ roof shall not be limited to the occupancies allowed on the *story* immediately below the roof where the building is equipped throughout with an *automatic sprinker system* in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Sections 907.5.2.1 and 907.5.2.3 is provided in the area of the occupiable ~~occupied~~ roof. *Emergency voice/alarm communication* system notification per Section 907.5.2.2 shall also be provided in the area of the occupiable ~~occupied~~ roof where such system is required elsewhere in the building.
2. Assembly occupancies shall be permitted on roofs of open parking spaces of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

503.1.4.1 Enclosures over occupiable ~~occupied~~ roof areas. Elements or structures enclosing the occupiable ~~occupied~~ roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupiable ~~occupied~~ roof.

Exception: *Penthouses* constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.

1004.7 Outdoor areas. *Yards*, patios, occupiable ~~occupied~~ roofs, *courts* and similar outdoor areas accessible to and usable by the building occupants shall be provided with *means of egress* as required by this chapter. The *occupant load* of such outdoor areas shall be assigned by the *building official* in accordance with the anticipated use. Where outdoor areas are to be used by persons in addition to the occupants of the building, and the path of egress travel from the outdoor areas passes through the building, *means of egress* requirements for the building shall be based on the sum of the *occupant loads* of the building plus the outdoor areas.

Exceptions:

1. Outdoor areas used exclusively for service of the building need only have one *means of egress*.
2. Both outdoor areas associated with Group R-3 and individual dwelling units of Group R-2.

1006.1 General. The number of *exits* or *exit access doorways* required within the *means of egress* system shall comply with the provisions of Section 1006.2 for spaces, including *mezzanines*, and Section 1006.3 for *stories* or occupiable ~~occupied~~ roofs.

1006.3 Egress from stories or occupiable ~~occupied~~ roofs. The *means of egress* system serving any *story* or occupiable ~~occupied~~ roof shall be provided with the number of separate and distinct *exits* or access to *exits* based on the aggregate *occupant load* served in accordance with this section.

1006.3.1 Occupant load. Where *stairways* serve more than one *story*, or more than one *story* and an occupiable ~~occupied~~ roof, only the *occupant load* of each *story* or occupiable ~~occupied~~ roof, considered individually, shall be used when calculating the required number of *exits* or access to *exits* serving that *story*.

1006.3.2 Path of egress travel. The path of egress travel to an *exit* shall not pass through more than one adjacent *story*.

Exception: The path of egress travel to an *exit* shall be permitted to pass through more than one adjacent *story* in any of the following:

1. In Group R-1, R-2 or R-3 occupancies, *exit access stairways* and *ramps* connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.
2. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility.
3. *Exit access stairways* and *ramps* within an *atrium* complying with Section 404.
4. *Exit access stairways* and *ramps* in *open parking garages* that serve only the parking garage.
5. *Exit access stairways* and *ramps* serving *open-air assembly seating* complying with the exit access travel distance requirements of Section 1030.7.
6. *Exit access stairways* and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
7. Exterior *exit access stairways* and *ramps* between occupiable ~~occupied~~ roofs.

1006.3.3 Egress based on occupant load. Each *story* and occupiable ~~occupied~~ roof shall have the minimum number of separate and distinct *exits*, or access to *exits*, as specified in Table 1006.3.3. A single *exit* or access to a single *exit* shall be permitted in accordance with Section 1006.3.4. The required number of *exits*, or *exit access stairways* or *ramps* providing access to *exits*, from any *story* or occupiable ~~occupied~~ roof shall be maintained until arrival at the *exit discharge* or a *public way*.

1006.3.4 Single exits. A single *exit* or access to a single *exit* shall be permitted from any *story* or occupiable ~~occupied~~ roof where one of the following conditions exists:

1. The *occupant load*, number of *dwelling units* and exit access travel distance do not exceed the values in Table 1006.3.4(1) or 1006.3.4(2).
2. Rooms, areas and spaces complying with Section 1006.2.1 with *exits* that discharge directly to the exterior at the *level of exit discharge*, are permitted to have one *exit* or access to a single *exit*.
3. Parking garages where vehicles are mechanically parked shall be permitted to have one *exit* or access to a single *exit*.
4. Group R-3 and R-4 occupancies shall be permitted to have one *exit* or access to a single *exit*.
5. Individual single-story or multistory *dwelling units* shall be permitted to have a single *exit* or access to a single *exit* from the *dwelling unit* provided that both of the following criteria are met:

    5.1. The *dwelling unit* complies with Section 1006.2.1 as a space with one *means of egress*.

5.2. Either the exit from the *dwelling unit* discharges directly to the exterior at the *level of exit discharge*, or the *exit access* outside the *dwelling unit's* entrance door provides access to not less than two *approved* independent *exits*.

1009.2.1 Elevators required. In buildings where a required accessible floor or occupiable ~~occupied~~ roof is four or more stories above or below a *level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *ramp* conforming to the provisions of Section 1012.

1011.12 Stairway to roof. In buildings four or more stories above grade plane, one *stairway* shall extend to the roof surface unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope).

Exception: Other than where required by Section 1011.12.1, in buildings without an occupiable ~~occupied~~ roof access to the roof from the top *story* shall be permitted to be by an *alternating tread device*, a ships ladder or a permanent ladder.

1011.12.2 Roof access. Where a *stairway* is provided to a roof, access to the roof shall be provided through a *penthouse* complying with Section 1511.2.

Exception: In buildings without an occupiable ~~occupied~~ roof, access to the roof shall be permitted to be a roof hatch or trap door not less than 16 square feet (1.5 m^2) in area and having a minimum dimension of 2 feet (610 mm).

1011.14 Alternating tread devices. *Alternating tread devices* are limited to an element of a *means of egress* in buildings of Groups F, H and S from a *mezzanine* not more than 250 square feet (23 m^2) in area and that serves not more than five occupants; in buildings of Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m^2) in area and for access to unoccupiable ~~unoccupied~~ roofs. *Alternating tread devices* used as a *means of egress* shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

1011.15 Ship's ladders. Ship's ladders are permitted to be used in Group I-3 as a component of a *means of egress* to and from control rooms or elevated facility observation stations not more than 250 square feet (23 m^2) with not more than three occupants and for access to unoccupiable ~~unoccupied~~ roofs. The minimum clear width at and below the *handrails* shall be 20 inches (508 mm). Ship's ladders shall be designed for the live loads indicated in Section 1607.17.

1011.16 Ladders. Permanent ladders shall not serve as a part of the *means of egress* from occupied spaces within a building. Permanent ladders shall be constructed in accordance with Section 306.5 of the International Mechanical Code and designed for the live loads indicated in Section 1607.17. Permanent ladders shall be permitted to provide access to the following areas:

1. Spaces frequented only by personnel for maintenance, repair or monitoring of equipment.
2. Nonoccupiable spaces accessed only by catwalks, crawl spaces, freight elevators or very narrow passageways.
3. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands.
4. Elevated levels in Group U not open to the general public.
5. Nonoccupiable ~~Nonoccupied~~ roofs that are not required to have *stairway* access in accordance with Section 1011.12.1.
6. Where permitted to access equipment and appliances in accordance with Section 306.5 of the International Mechanical Code.

1019.3 Occupancies other than Groups I-2 and I-3. In other than Group I-2 and I-3 occupancies, floor openings containing *exit access stairways* or *ramps* shall be enclosed with a shaft enclosure constructed in accordance with Section 713.

Exceptions:

1. *Exit access stairways* and *ramps* that serve or atmospherically communicate between only two adjacent stories. Such interconnected stories shall not be open to other stories.
2. In Group R-1, R-2 or R-3 occupancies, *exit access stairways* and *ramps* connecting four stories or less serving and contained within an individual dwelling unit or sleeping unit or live/work unit.
3. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility are not required to be enclosed.
4. *Exit access stairways* and *ramps* in buildings equipped throughout with an automatic sprinkler system in accordance with Section

903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the stairway or *ramp* and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.

5. *Exit access stairways* and *ramps* within an *atrium* complying with the provisions of Section 404.
6. *Exit access stairways* and *ramps* in *open parking garages* that serve only the parking garage.
7. *Exit access stairways* and *ramps* serving smoke-protected or *open-air assembly seating* complying with the exit access travel distance requirements of Section 1030.7.
8. *Exit access stairways* and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
9. Exterior *exit access stairways* or *ramps* between occupiable ~~occupied~~ roofs.

1104.4 Multistory buildings and facilities. At least one *accessible* route shall connect each accessible *story, mezzanine* and occupiable ~~occupied~~ roofs in multilevel buildings and *facilities*.

Exceptions:

1. An *accessible* route is not required to *stories, mezzanines* and occupiable ~~occupied~~ roofs that have an aggregate area of not more than 3,000 square feet (278.7 m^2) and are located above and below accessible levels. This exception shall not apply to:
   1.1. Multiple tenant facilities of Group M occupancies containing five or more tenant spaces used for the sales or rental of goods and where at least one such tenant space is located on a floor level above or below the accessible levels.
   1.2. *Stories* or *mezzanines* containing offices of health care providers (Group B or I).
   1.3. Passenger transportation facilities and airports (Group A-3 or B).
   1.4. Government buildings.
   1.5. Structures with four or more dwelling units.
2. *Stories*, *mezzanines* or occupiable ~~occupied~~ roofs that do not contain accessible elements or other spaces as determined by Section 1108 or 1109 are not required to be served by an accessible route from an *accessible* level.
3. In air traffic control towers, an *accessible route* is not required to serve the cab and the floor immediately below the cab.
4. Where a two-story building or facility has one *story* or *mezzanine* with an *occupant load* of five or fewer persons that does not contain *public use* space, that *story* or *mezzanine* shall not be required to be connected by an *accessible route* to the *story* above or below.

Reason: Over the last several cycles, code provisions have been added to address issues related to occupied/occupiable, vegetative and landscaped roofs. In some cases, the terms have been used interchangeably, in others applying to specific types of roof systems. With the increasing number of provisions, a definition is needed. A proposal last cycle (G7-19) attempted to add a definition for occupiable roof but was disapproved for several reasons including the fact it did not correlate with the fact the code uses "occupied roof" in some sections and "occupiable roof" in others.
This code proposal both adds a definition for "occupiable roof"and. changes terminology throughout the code to be consistent with use of "occupiable roof" rather than "occupied roof". The definition is intended to parallel the existing code definition for occupiable space:

[BG] OCCUPIABLE SPACE. A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged at labor, and which is equipped with means of egress and light and ventilation facilities meeting the requirements of this code.

The proposed definition is different in a few key ways: The laundry list of uses is left out, and the one clarification made that access for maintenance of rooftop mechanical equipment or other maintenance does not trigger assembly live load requirements or other provisions related to occupiable roofs. The references to light and ventilation are left out as occupiable roofs are exterior spaces. No mechanical ventilation is necessary, and the code does not require lighting for exterior spaces other than portions of the means of egress.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC) and the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire and life safety in new and existing buildings and facilities as well as the protection of life and property in wildland urban interface areas. In 2020 and 2021 the Fire-CAC held multiple virtual meetings that were open to any interested party. In addition, there were numerous virtual specific working group meetings that were also open to any interested parties, to develop, discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: FCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change is purely editorial and does not affect how occupiable roofs are designed or constructed.

Staff Note: G20-21, G21-21 and G22-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G20-21 Part I

Public Hearing Results

Committee Action: **As Modified**

Committee Modification:

OCCUPIABLE ROOF. An exterior space on a roof that is designed for human occupancy, other than maintenance or repair, and which is equipped with a means of egress system meeting the requirements of this code.

Committee Reason: The modification added 'repair' to the definition, which is consistent with other sections in the codes related to roof requirements. The definition was approved because it clarifies a 'occupiable roof' is for roofs for human occupancy on a regular basis. The term was also coordinated throughout the code. (Vote: 12-2)

Staff Analysis: G20-21, G21-21 and G22-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G20-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 202

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

OCCUPIABLE ROOF . An ~~exterior~~ uncovered space on a roof that is designed for human occupancy, other than maintenance or repair, and which is equipped with a means of egress system meeting the requirements of this code.

Commenter's Reason: This public comment is intended to address an ambiguity that is introduced by the proposed definition for occupiable roofs by clarifying that the main feature of an occupiable roof is that it is uncovered--no roof overhead. The same public comment is being submitted for Part II.
As proposed, "exterior" is very open to interpretation, which will lead to inconsistent application. For example, if an occupiable roof has some sort of roof or roof-like structure completely covering it but there are no walls, is that space "exterior?" Does it include areas under a pergola, a gazebo, or a patio cover? Does being inside or under these structures mean that you are still "exterior" to the roof? The City of Seattle has seen projects where the architect argued a "shade structure" is not a roof, and therefore, is allowed to cover the roof deck entirely and not create an additional story. This certainly violates the intent, if not the letter, of what an occupiable roof is supposed to be.

For this public comment, "uncovered" was chosen to replace "exterior" because that is the term used in the definition of "court" in Chapter 2. Essentially, a court is supposed to be open to the sky. When proposals to change the provisions for occupiable roofs are discussed, much of the discussion is about how open the space is, and how smoke does not accumulate. This seems to indicate the image people have of an occupiable roof is that it, like a court, is open to the sky.

The question then, is what about building elements or structures (guards, parapets, rooftop structures, wind screens, fences, etc.)--can they be placed around an occupiable roof? Our answer would be, yes, as long as they comply with the maximum height criteria in Section 503.1.4.1. These elements will not impede the flow of smoke upward and away from the occupiable roof.

A contributing factor to confusion is the current title of Section 503.1.4.1, "Enclosures **over** occupied roofs" [emphasis ours]. This again implies that a roof or roof-like structure can be placed above an occupiable roof. When the requirements for occupied roofs were first introduced into the code, two of the members of WABO's Technical Code Development Committee were involved in the discussions/negotiations. Our recollection is Section 503.1.4.1 was clearly intended to refer to vertical elements (walls or parapets) surrounding the occupied roofs, not roofs above the occupied roof, since the 48-inch height restriction was added to provide firefighters an escape route off the roof. Recognizing that section titles are editorial and determined by ICC Staff, we would recommend that Staff change the title to "Enclosure of occupiable roofs" or "Enclosures around occupiable roofs," to avoid confusion. No changes to the text of the section are necessary.

We believe this public comment provides an important clarification of the definition, and will lead to more consistent application of the code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The original cost impact statement indicated the change is editorial, and therefore, there is no change in the cost of construction. This public comment is a clarification of the original proposal, and does not change the cost impact.

Public Comment# 2445

G20-21 Part II

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian, representing FCAC (fcac@iccsafe.org)

2021 International Fire Code

Add new definition as follows:

OCCUPIABLE ROOF. An exterior space on a roof that is designed for human occupancy, other than maintenance, and which is equipped with a means of egress system meeting the requirements of this code.

Revise as follows:

903.2.1.6 Assembly occupancies on roofs. Where an ~~occupied~~ occupiable roof has an assembly occupancy with an *occupant load* exceeding 100 for Group A-2 and 300 for other Group A occupancies, all floors between the ~~occupied~~ occupiable roof and the *level of exit discharge* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

Exception: Open parking garages of Type I or Type II construction.

Reason: Over the last several cycles, code provisions have been added to address issues related to occupied/occupiable, vegetative and landscaped roofs. In some cases, the terms have been used interchangeably, in others applying to specific types of roof systems. With the increasing number of provisions, a definition is needed. A proposal last cycle (G7-19) attempted to add a definition for occupiable roof but was disapproved for several reasons including the fact it did not correlate with the fact the code uses “occupied roof” in some sections and “occupiable roof” in others.
This code proposal both adds a definition for “occupiable roof”and. changes terminology throughout the code to be consistent with use of “occupiable roof” rather than “occupied roof”. The definition is intended to parallel the existing code definition for occupiable space:

[BG] OCCUPIABLE SPACE. A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged at labor, and which is equipped with means of egress and light and ventilation facilities meeting the requirements of this code.

The proposed definition is different in a few key ways: The laundry list of uses is left out, and the one clarification made that access for maintenance of rooftop mechanical equipment or other maintenance does not trigger assembly live load requirements or other provisions related to occupiable roofs. The references to light and ventilation are left out as occupiable roofs are exterior spaces. No mechanical ventilation is necessary, and the code does not require lighting for exterior spaces other than portions of the means of egress.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC) and the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire and life safety in new and existing buildings and facilities as well as the protection of life and property in wildland urban interface areas. In 2020 and 2021 the Fire-CAC held multiple virtual meetings that were open to any interested party. In addition, there were numerous virtual specific working group meetings that were also open to any interested parties, to develop, discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: FCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change is purely editorial and does not affect how occupiable roofs are designed or constructed.

Staff Note: G20-21, G21-21 and G22-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G20-21 Part II

Public Hearing Results

Committee Action: **As Modified**

Committee Modification:

OCCUPIABLE ROOF. An exterior space on a roof that is designed for human occupancy, other than maintenance or repair, and which is equipped with a means of egress system meeting the requirements of this code.

Committee Reason: The committee stated that the reason for the approval of the modification was that the inclusion of the term repairs is important to the language of the definition. The reason for the approval of the proposal is that it provides a definition for a needed clarification of an occupiable roof. (Vote: 11-0)

Staff Analysis: G20-21, G21-21 and G22-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G20-21 Part II

Individual Consideration Agenda

Public Comment 1:

IFC: SECTION 202

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Fire Code

OCCUPIABLE ROOF . An ~~exterior~~ uncovered space on a roof that is designed for human occupancy, other than maintenance or repair, and which is equipped with a means of egress system meeting the requirements of this code.

Commenter's Reason: This public comment is intended to address an ambiguity that is introduced by the proposed definition for occupiable roofs by clarifying that the main feature of an occupiable roof is that it is uncovered--no roof overhead. The same public comment is being submitted for Part I.
As proposed, "exterior" is very open to interpretation, which will lead to inconsistent application. For example, if an occupiable roof has some sort of roof or roof-like structure completely covering it but there are no walls, is that space "exterior?" Does it include areas under a pergola, a gazebo, or a patio cover? Does being inside or under these structures mean that you are still "exterior" to the roof? The City of Seattle has seen projects where the architect argued a "shade structure" is not a roof, and therefore, is allowed to cover the roof deck entirely and not create an additional story. This certainly violates the intent, if not the letter, of what an occupiable roof is supposed to be.

For this public comment, "uncovered" was chosen to replace "exterior" because that is the term used in the definition of "court" in Chapter 2. Essentially, a court is supposed to be open to the sky. When proposals to change the provisions for occupiable roofs are discussed, much of the discussion is about how open the space is, and how smoke does not accumulate. This seems to indicate the image people have of an occupiable roof is that it, like a court, is open to the sky.

The question then, is what about building elements or structures (guards, parapets, rooftop structures, wind screens, fences, etc.)--can they be placed around an occupiable roof? Our answer would be, yes, as long as they comply with the maximum height criteria in Section 503.1.4.1. These elements will not impede the flow of smoke upward and away from the occupiable roof. We would note that the current title of Section 503.1.4.1 is "Enclosures over occupied roofs," which introduces confusion as to what is intended. In our reason statement for Part I, we have suggested ICC Staff change the title to "Enclosure of occupiable roofs" or "Enclosures around occupiable roofs."

We believe this public comment provides an important clarification of the definition, and will lead to more consistent application of the code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The original cost impact statement indicated the change is editorial, and therefore, there is no change in the cost of construction. This public comment is a clarification of the original proposal, and does not change the cost impact.

Public Comment# 2449

G34-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

SECTION 305
EDUCATIONAL GROUP E

305.2 Group E, day care facilities. This group includes buildings and structures or portions thereof occupied by more than five children older than $2^{1}/_{2}$ years of age who receive educational, supervision or *personal care services* for fewer than 24 hours per day.

305.2.1 Within places of religious worship. Rooms and spaces within *places of religious worship* providing such day care during religious functions shall be classified as part of the primary occupancy.

Revise as follows:

305.2.2 Five or fewer children. A facility having five or fewer children receiving such day care shall be classified as part of the primary occupancy. Such a facility, located within a dwelling unit that is within the scope of the International Residential Code, shall be permitted to be constructed in accordance with this code or the International Residential Code.

Delete without substitution:

~~**305.2.3 Five or fewer children in a dwelling unit.** A facility such as the above within a *dwelling unit* and having five or fewer children receiving such day care shall be classified as a Group R-3 occupancy or shall comply with the *International Residential Code*.~~

SECTION 308
INSTITUTIONAL GROUP I

308.5 Institutional Group I-4, day care facilities. Institutional Group I-4 occupancy shall include buildings and structures occupied by more than five persons of any age who receive *custodial care* for fewer than 24 hours per day by persons other than parents or guardians; relatives by blood, marriage or adoption; and in a place other than the home of the person cared for. This group shall include, but not be limited to, the following:

- Adult day care
- Child day care

308.5.1 Classification as Group E. A child day care facility that provides care for more than five but not more than 100 children $2^{1}/_{2}$ years or less of age, where the rooms in which the children are cared for are located on a *level of exit discharge* serving such rooms and each of these child care rooms has an *exit* door directly to the exterior, shall be classified as Group E.

308.5.2 Within a place of religious worship. Rooms and spaces within *places of religious worship* providing such care during religious functions shall be classified as part of the primary occupancy.

Revise as follows:

308.5.3 Five or fewer persons receiving care. A facility having five or fewer persons receiving *custodial care* shall be classified as part of the primary occupancy. Such a facility, located within a dwelling unit that is within the scope of the International Residential Code, shall be permitted to be constructed in accordance with this code or the International Residential Code.

Delete without substitution:

~~**308.5.4 Five or fewer persons receiving care in a dwelling unit.** A facility such as the above within a *dwelling unit* and having five or fewer persons receiving *custodial care* shall be classified as a Group R-3 occupancy or shall comply with the *International Residential Code*.~~

SECTION 310
RESIDENTIAL GROUP R

Revise as follows:

~~310.4.1~~ 310.1.1 Care facilities within a dwelling. Care facilities for five or fewer persons receiving careor a day care that are located within a ~~single-family~~ dwelling unit ~~are permitted to comply~~ that is within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code.* ~~provided~~ Facilities constructed using the *International Residential Code* shall be protected by an *automatic sprinkler system* ~~is~~ installed in accordance with Section 903.3.1.3 or Section P2904 of the *International Residential*

Code.

Reason: The purpose of this change is to remove a technical glitch for where Group R-2 townhouses or apartments may also have a small day care facility. Day care facilities can occur in apartments, townhouses and single family homes. By allowing for 5 or fewer to match the main occupancy, this would still allow for those Group R-3 as a classification in single-family, duplex and Group R-3 townhouses – which is permitted in the current text. This change will also allow for similar facilities in apartments or Group R-2 townhouses. The literal text in 305.2.3 and 308.5.4 says a day care in a dwelling unit make this an R-3 even though the building may be Group R-2.
For facilities that meet the scoping of the IRC (single family, duplex and townhouse), the day care and small care facilities can continue to be constructed under the IRC.

The move of 310.4.1 is because this is no longer just a Group R-3 consideration.

This is one of a group of proposals intended to coordinate the scoping items in IBC Section 101.2 and IRC 101.2. While the proposals work together, then also work separately. The proposal for coordination will be in Group B.

This proposal is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is basically a coordination item for what facilities can use IRC. This should not change construction requirements.

G34-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved by the committee, however, they felt that the general intent for coordination with the IRC scoping was good, but some testifiers were confused on the limits. There was a concern that this could be read to allow for multiple care facilities in an apartment building, or dwelling units in a school. (Vote: 14-0)

G34-21

Individual Consideration Agenda

Public Comment 1:

IBC: 305.2.2, 308.5.3, 310.1.1

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

305.2.2 Five or fewer children . A facility having five or fewer children receiving such day care shall be classified as part of the primary occupancy. Such a facility, located within a ~~dwelling unit~~ detached one- or two- family dwelling or townhouse that is within the scope of the International Residential Code, shall be permitted to be constructed in accordance with this code or the International Residential Code.

308.5.3 Five or fewer persons receiving care . A facility having five or fewer persons receiving *custodial care* shall be classified as part of the primary occupancy. Such a facility, located within a ~~dwelling unit~~ detached one- or two- family dwelling or townhouse that is within the scope of the International Residential Code, shall be permitted to be constructed in accordance with this code or the International Residential Code.

310.1.1 Care facilities within a dwelling . Care facilities for five or fewer persons receiving careor a day care that are located within a ~~dwelling unit~~ detached one- or two- family dwelling or townhouse that is within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code.* Care facilities ~~Facilities~~ constructed in accordance with ~~using~~

the *International Residential Code* shall be protected by an *automatic sprinkler system* installed in accordance with ~~Section 903.3.1.3 or~~ Section P2904 of the *International Residential Code*.

Commenter's Reason: The original proposal intended to allow small daycare, adult care or custodial care facilities serving five or fewer persons to be classified as part of the primary occupancy of a building housing such a facility, and to note that where they are contained in buildings falling within the scope of the International Residential Code they are permitted to be constructed either per the IBC or IRC.
The concern from the IBC-General Committee, and those in opposition, was the lack of clarity in how the proposal language was structured. As written, the proposal caused some confusion. Some felt the proposal expanded the scope of IRC to include apartment buildings, and that it could be argued a dwelling unit in an apartment building is within the scope of the IRC. Also, some felt the proposal language implied that dwelling units can be included in Group E facilities.
The revised language for this public comment aims to address the concerns of the committee and clarify the original intent of the proposal by explicitly referring to care facilities located within detached one and two-family dwellings or townhouses, which are the types of residential buildings covered by the IRC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is basically a coordination item for what facilities can use IRC. This should not change construction requirements.

Public Comment# 2671

G36-21

Proposed Change as Submitted

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

Revise as follows:

[F] TABLE 307.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c j, m, n~~, p~~]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds(cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds(cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds(cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	SeeNote q	NA	NA	See Note q	NA	NA	See Note q	NA
Combustible fiber[q]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled~~[e]~~		(1,000)			(1,000)			(200)	
Combustible liquid~~[c, i]~~	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
Cryogenic flammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Cryogenic inert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
Cryogenic oxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, l]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2	NA	NA	1,000[d,e]	NA	NA	1,000[d,e]	NA	NA
	Liquefied			(150)[d,e]	NA		(150)[d,e]	NA		
Flammable liquid~~[e]~~ ,o	IA	H-2 or H-3	NA	30[d, e]	NA	NA	30[d]	NA	NA	10[d]
	IB and IC			120[d, e]			120[d]			30[d]
Flammable liquid, combination (IA, IB, IC)~~[e]~~,o	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	5[d, e]	(5)[d, e]		1[d]	(1)[d]		1[d]	(1)[d]
	II	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	III	H-3	125[d, e]	(125)[d, e]		125[d]	(125)[d]		25[d]	(25)[d]
	IV	NA	NL	NL		NL	NL		NL	NL

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE			USE-CLOSED SYSTEMS			USE-OPEN SYSTEMS	
			Solid pounds(cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds(cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds(cubic feet)	Liquid gallons (pounds)
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1^{g}	$(1)^{e, g}$	NA	0.25^{g}	$(0.25)^{g}$	NA	0.25^{g}	$(0.25)^{g}$
	3^{k}	H-2 or H-3	$10^{d, e}$	$(10)^{d, e}$		2^{d}	$(2)^{d}$		2^{d}	$(2)^{d}$
	2	H-3	$250^{d, e}$	$(250)^{d, e}$		250^{d}	$(250)^{d}$		50^{d}	$(50)^{d}$
	1	NA	$4{,}000^{e, f}$	$(4{,}000)^{e, f}$		$4{,}000^{f}$	$(4{,}000)^{f}$		$1{,}000^{f}$	$(1{,}000)^{f}$
Oxidizing gas	Gaseous	H-3	NA	NA	$1{,}500^{d,e}$	NA	NA	$1{,}500^{d,e}$	NA	NA
	Liquefied			$(150)^{d, e}$	NA		$(150)^{d,e}$	NA		
Pyrophoric	NA	H-2	$4^{e, g}$	$(4)^{e, g}$	$50^{e, g}$	1^{g}	$(1)^{g}$	$10^{e, g}$	0	0
Unstable (reactive)	4	H-1	$1^{e, g}$	$(1)^{e, g}$	$10^{e, g}$	0.25^{g}	$(0.25)^{g}$	$2^{e, g}$	0.25^{g}	$(0.25)^{g}$
	3	H-1 or H-2	$5^{d, e}$	$(5)^{d, e}$	$50^{d, e}$	1^{d}	$(1)^{d}$	$10^{d, e}$	1^{d}	$(1)^{d}$
	2	H-3	$50^{d, e}$	$(50)^{d, e}$	$750^{d, e}$	50^{d}	$(50)^{d}$	$750^{d, e}$	10^{d}	$(10)^{d}$
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	$5^{d, e}$	$(5)^{d, e}$	NA	5^{d}	$(5)^{d}$	NA	1^{d}	$(1)^{d}$
	2	H-3	$50^{d, e}$	$(50)^{d, e}$		50^{d}	$(50)^{d}$		10^{d}	$(10)^{d}$
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; NA = Not Applicable; UD = Unclassified Detonable.

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the quantity specified for storage.

c. For hazardous materials in Group B higher education laboratory occupancies, See Section 428 and Chapter 38 of the International Fire Code.
~~The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited provided the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.~~

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.

~~i. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 605.4.2 of the International Fire Code.~~

j. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

k. A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.

l. Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.

m. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

n. For ~~storage and display quantities~~ oxidizers, unstable (reactive) materials, and water reactive materials stored or displayed in Group M occupancies ~~and storage quantities~~ or stored in Group S occupancies, see section 414.2.5.1 ~~complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2)~~.

o. For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 414.2.5.2. ~~Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.~~

~~p. The following shall not be included in determining the maximum allowable quantities:~~

~~1. Liquid or gaseous fuel in fuel tanks on vehicles.~~

2. ~~Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with the *International Fire Code.*~~

3. ~~Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code.*~~

4. ~~Liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code.*~~

5. ~~Alcohol-based hand rubs classified as Class I or II liquids in dispensers that are installed in accordance with Sections 5705.5 and 5705.5.1 of the International Fire Code. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents.~~

q. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

[F] TABLE 307.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD[a, c, ~~f,~~ h, i]

MATERIAL	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
	Solid pounds[d, e, f]	Liquid gallons (pounds)[d, e, f]	Gas cubic feet at NTP (pounds)[d]	Solid pounds[d]	Liquid gallons (pounds)[d]	Gas cubic feet at NTP (pounds)[d]	Solid pounds[d]	Liquid gallons (pounds)[d]
Corrosives	5,000	500	Gaseous 810[e]	5,000	500	Gaseous 810[e]	1,000	100
			Liquefied (150)			Liquefied (150)		
Highly Toxic	10	(10)	Gaseous 20[g]	10	(10)	Gaseous 20[g]	3	(3)
			Liquefied (4)[g]			Liquefied (4)[g]		
Toxic	500	(500)	Gaseous 810[e]	500	(500)	Gaseous 810[e]	125	(125)
			Liquefied (150)[e]			Liquefied (150)[e]		

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the quantity specified for storage.

c. For hazardous materials in Group B higher education laboratory occupancies, See Section 428 and Chapter 38 of the International Fire Code.
~~In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.~~

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. For corrosive, highly toxic and toxic materials, stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.
~~For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2).~~

g. Allowed only where stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.

h. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

[F] 307.1.1 Occupancy Exemptions~~Uses other than Group H.~~ Storage, use and handling of hazardous materials in accordance with Table 307.1.1 shall not be counted as contributing to Maximum Allowable Quantities and shall not cause classification of an occupancy to be Group H. Such storage, use and handling shall comply with applicable provisions of the International Fire Code.
~~An occupancy that stores, uses or handles *hazardous materials* as described in one or more of the following items shall not be classified as Group H, but shall be classified as the occupancy that it most nearly resembles.~~

~~1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *International Fire Code*.~~

~~2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.~~

~~3. Closed piping system containing *flammable or combustible liquids* or gases utilized for the operation of machinery or equipment.~~

~~4. Cleaning establishments that utilize *combustible liquid* solvents having a *flash point* of 140°F (60°C) or higher in closed systems employing equipment *listed* by an *approved* testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both.~~

~~5. Cleaning establishments that utilize a liquid solvent having a *flash point* at or above 200°F (93°C).~~

~~6. Liquor stores and distributors without bulk storage.~~

~~7. Refrigeration systems.~~

8. ~~The storage or utilization of materials for agricultural purposes on the premises.~~
9. ~~Stationary storage battery systems installed in accordance with the *International Fire Code.*~~
10. ~~*Corrosive* personal or household products in their original packaging used in retail display.~~
11. ~~Commonly used *corrosive* building materials.~~
12. ~~Buildings and structures occupied for *aerosol product* storage, aerosol cooking spray products or plastic aerosol 3 products shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code.*~~
13. ~~Display and storage of nonflammable solid and nonflammable or noncombustible liquid *hazardous materials* in quantities not exceeding the maximum allowable quantity per *control area* in Group M or S occupancies complying with Section 414.2.5.~~
14. ~~The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial *explosive* devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*.~~
15. ~~Stationary fuel cell power systems installed in accordance with the *International Fire Code*.~~
16. ~~Capacitor energy storage systems in accordance with the *International Fire Code.*~~
17. ~~Group B *higher education laboratory* occupancies complying with Section 428 and Chapter 38 of the International Fire Code.~~
18. ~~Distilling or brewing of beverages conforming to the requirements of the *International Fire Code.*~~
19. ~~The storage of beer, distilled spirits and wines in barrels and casks conforming to the requirements of the *International Fire Code.*~~

Add new text as follows:

TABLE 307.1.1 HAZARDOUS MATERIAL EXEMPTIONS[a]

Material Classification	Occupancy or Application	Exemption
Combustible fiber	Baled Cotton	Densely packed baled cotton shall not be classified as combustible fiber, provided that the bales comply with the packing requirements of ISO 8115
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging
	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Explosives	Groups B, F, M and S	Storage of special industrial explosive devices are not limited
	Groups M and R-3	Storage of black powder, smokeless propellant, and small arms primers are not limited
Flammable and combustible liquids and gases	Aerosols	Buildings and structures occupied for aerosol product storage, aerosol cooking spray products or plastic aerosol 3 products shall be classified as Group S-1
	Alcoholic beverages	The quantity of alcoholic beverages in liquor stores and distributors without bulk storage is not limited
		The quantity of alcoholic beverages in distilling or brewing of beverages is not limited
		The storage quantity of beer, distilled spirits and wines in barrels and casks is not limited
		The quantity of alcoholic beverages in retail and wholesale sales occupancies is not limited. To qualify for this allowance, beverages shall be packaged in individual containers not exceeding 1.3 gallons
	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F (60°C) is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both
		The quantity of combustible liquid solvents having a flash point at or above 200°F (93°C) is not limited
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code is not limited
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code is not limited
	Fuel oil	The quantity of fuel oil storage complying with Section 603.3.2 of the International Fire Code is not limited
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes. Such buildings and areas shall comply with Section 416
	Hand sanitizer	The quantity of alcohol-based hand rubs classified as Class I or II liquids in dispensers installed in accordance with Sections 5705.5 and 5705.5.1 of the International Fire Code is not limited. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
		The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50

Highly toxic and toxic materials	Retail and wholesale sales occupancies	percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Any	Agricultural materials	The quantity of agricultural materials stored or utilizated for agricultural purposes on the premises is not limited
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited
		The quantity of hazardous materials in stationary fuel cell power systems is not limited
		The quantity of hazardous materials in capacitor energy storage systems is not limited
	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited. To qualify for this allowance, such systems shall comply with Section 608 of the International Fire Code and Chapter 11 of the International Mechanical Code

a. Exempted materials and conditions listed in this table are required to comply with applicable provisions of the *International Fire Code.*

Revise as follows:

[F] 414.1 General. ~~The provisions of Sections 414.1 through 414.6 shall apply to buildings~~
Buildings and structures occupied for the manufacturing, processing, dispensing, use or storage of *hazardous materials* shall comply with Sections 414.1 through 414.6.

Exception: Exemptions listed in Table 307.1.1 shall not be required to comply with Section 414.

[F] 415.1 General. Occupancies classified as Group H-1, H-2, H-3, H-4 and H-5 in accordance with Section 307 shall comply with ~~The provisions of~~ Sections 415.1 through 415.11 ~~shall apply to the storage and use of hazardous materials in excess of the maximum allowable quantities per *control area* listed in Section 307.1~~.

2021 International Fire Code

Revise as follows:

5001.1 Scope.
Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, other than those materials and conditions listed in Table 5001.1, including those materials regulated elsewhere in this code, except that where specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1. In retail or wholesale sales occupancies, medicines, foodstuff, cosmetics and commercial or institutional products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
2. Alcoholic beverages in retail or wholesale sales occupancies, provided that the liquids are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. Application and release of pesticide and agricultural products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications where applied in accordance with the manufacturer's instructions and label directions.
4. The off-site transportation of hazardous materials where in accordance with Department of Transportation (DOTn) regulations.
5. Building materials not otherwise regulated by this code.
6. Refrigeration systems (see Section 608).
7. Stationary storage battery systems regulated by Section 1207.
8. The display, storage, sale or use of fireworks and *explosives* in accordance with Chapter 56.
9. *Corrosives* utilized in personal and household products in the manufacturer's original consumer packaging in Group M occupancies.
10. The storage of beer, distilled spirits and wines in barrels and casks.
11. The use of wall-mounted dispensers containing alcohol-based hand rubs classified as Class I or II liquids where in accordance with

Section 5705.5.

12. Specific provisions for flammble liquids in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.
13. Storage and use of fuel oil in tanks and containers connected to oil-burning equipment. Such storage and use shall be in accordance with Section 605. For abandonment of fuel oil tanks, Chapter 57 applies.
14. Storage and display of aerosol products complying with Chapter 51.
15. Storage and use of *flammable* or *combustible liquids* that do not have a fire point when tested in accordance with ASTM D92, not otherwise regulated by this code.
16. *Flammable* or *combustible liquids* with a *flash point* greater than 95°F (35°C) in a water-miscible solution or dispersion with a water and inert (noncombustible) solids content of more than 80 percent by weight, which do not sustain combustion, not otherwise regulated by this code.
17. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 607 and NFPA 30.

Add new text as follows:

TABLE 5001.1 HAZARDOUS MATERIAL EXEMPTIONS[a]

Material Classification	Occupancy or Application	Exemption
Combustible fiber	Baled Cotton	Densely packed baled cotton shall not be classified as combustible fiber, provided that the bales comply with the packing requirements of ISO 8115
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging
	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Explosives	Groups B, F, M and S	Storage of special industrial explosive devices are not limited
	Groups M and R-3	Storage of black powder, smokeless propellant, and small arms primers are not limited
Flammable and combustible liquids and gases	Aerosols	Buildings and structures occupied for aerosol product storage, aerosol cooking spray products or plastic aerosol 3 products shall be classified as Group S-1
	Alcoholic beverages	The quantity of alcoholic beverages in liquor stores and distributors without bulk storage is not limited
		The quantity of alcoholic beverages in distilling or brewing of beverages is not limited
		The storage quantity of beer, distilled spirits and wines in barrels and casks is not limited
		The quantity of alcoholic beverages in retail and wholesale sales occupancies is not limited. To qualify for this allowance, beverages shall be packaged in individual containers not exceeding 1.3 gallons
	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F (60°C) is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both
		The quantity of combustible liquid solvents having a flash point at or above 200°F (93°C) is not limited
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code is not limited
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code is not limited
	Fuel oil	The quantity of fuel oil storage complying with Section 603.3.2 of the International Fire Code is not limited
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes. Such buildings and areas shall comply with Section 416
	Hand sanitizer	The quantity of alcohol-based hand rubs classified as Class I or II liquids in dispensers installed in accordance with Sections 5705.5 and 5705.5.1 of the International Fire Code is not limited. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
		The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50

Highly toxic and toxic materials	Retail and wholesale sales occupancies	percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Any	Agricultural materials	The quantity of agricultural materials stored or utilizated for agricultural purposes on the premises is not limited
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited
		The quantity of hazardous materials in stationary fuel cell power systems is not limited
		The quantity of hazardous materials in capacitor energy storage systems is not limited
	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited. To qualify for this allowance, such systems shall comply with Section 608 of the International Fire Code and Chapter 11 of the International Mechanical Code

a. Exempted materials and conditions listed in this table are required to comply with applicable provisions of the *International Fire Code*.

Revise as follows:

TABLE 5003.1.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, j, m, n, ~~p~~]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note q	NA	NA	See Note q	NA	NA	See Note q	NA
Combustible fibers[q]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled[o]		(1,000)			(1,000)			(200)	
Combustible liquid[c, ~~i~~]	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
CryogenicFlammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
CryogenicInert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
CryogenicOxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, l]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2	NA	NA	1,000[d, e]	NA	NA	1,000[d, e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d, e]	NA		
Flammable liquid[~~e~~ o]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	30[d]	NA	NA	10d
	IB and IC			120[d, e]			120[d]			30d
Flammable liquid, combination (IA, IB, IC)[o]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	5[d, e]	(5)[d, e]		1[d]	(1)[d]		1[d]	(1)[d]
	II	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	III	H-3	125[d, e]	(125)[d, e]		125[d]	(125)[d]		25[d]	(25)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE Solid pounds (cubic feet)	STORAGE Liquid gallons (pounds)	STORAGE Gas (cubic feet at NTP)	USE-CLOSED SYSTEMS Solid pounds (cubic feet)	USE-CLOSED SYSTEMS Liquid gallons (pounds)	USE-CLOSED SYSTEMS Gas (cubic feet at NTP)	USE-OPEN SYSTEMS Solid pounds (cubic feet)	USE-OPEN SYSTEMS Liquid gallons (pounds)
Oxidizer	4	H-1	1^{g}	(1)$^{e, g}$	NA	0.25^{g}	(0.25)^{g}	NA	0.25^{g}	(0.25)^{g}
	3^{k}	H-2 or H-3	10$^{d, e}$	(10)$^{d, e}$		2^{d}	(2)^{d}		2^{d}	(2)^{d}
	2	H-3	250$^{d, e}$	(250)$^{d, e}$		250^{d}	(250)^{d}		50^{d}	(50)^{d}
	1	NA	4,000$^{e, f}$	(4,000)$^{e, f}$		4,000^{f}	(4,000)^{f}		1,000^{f}	(1,000)^{f}
Oxidizing gas	Gaseous	H-3	NA	NA	1,500^{d,e}	NA	NA	1,500^{d,e}	NA	NA
	Liquefied			(150)$^{d, e}$	NA		(150)$^{d, e}$	NA		
Pyrophoric	NA	H-2	4$^{e, g}$	(4)$^{e, g}$	50$^{e, g}$	1^{g}	(1)^{g}	10$^{e, g}$	0	0
Unstable (reactive)	4	H-1	1$^{e, g}$	(1)$^{e, g}$	10$^{e, g}$	0.25^{g}	(0.25)^{g}	2$^{e, g}$	0.25^{g}	(0.25)^{g}
	3	H-1 or H-2	5$^{d, e}$	(5)$^{d, e}$	50$^{d, e}$	1^{d}	(1)^{d}	10$^{d, e}$	1^{d}	(1)^{d}
	2	H-3	50$^{d, e}$	(50)$^{d, e}$	750$^{d, e}$	50^{d}	(50)^{d}	750$^{d, e}$	10^{d}	(10)^{d}
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5$^{d, e}$	(5)$^{d, e}$	NA	5^{d}	(5)^{d}	NA	1^{d}	(1)^{d}
	2	H-3	50$^{d, e}$	(50)$^{d, e}$		50^{d}	(50)^{d}		10^{d}	(10)^{d}
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NA = Not Applicable, NL = Not Limited, UD = Unclassified Detonable.

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

c. For hazardous materials in Group B higher education laboratory occupancies, See Section 428 of the International Building Code and Chapter 38.
~~The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuff or consumer products and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.~~

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an approved automatic sprinkler system.

h. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB or Class IC flammable liquids.

~~i. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 605.4.2.~~

j. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.

k. A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed where such materials are necessary for maintenance purposes, operation or sanitation of equipment where the storage containers and the manner of storage are approved.

l. Net weight of pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks including packaging shall be used.

m. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

n. For ~~storage and display quantities~~ oxidizers, unstable (reactive) materials, and water reactive materials stored or displayed in Group M occupancies ~~and storage quantities~~ or stored in Group S occupancies , see Section ~~complying with~~ Section 5003.11~~, see Table 5003.11.1~~.

o. For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 5704.3.6

~~Densely-packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.~~

~~p. The following shall not be included in determining the maximum allowable quantities:~~

~~1. Liquid or gaseous fuel in fuel tanks on vehicles.~~

2. ~~Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with this code.~~
3. ~~Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code*.~~
4. ~~Liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code*.~~
5. ~~Alcohol-based hand rubs classified as Class I or II liquids in dispensers that are installed in accordance with Sections 5705.5 and 5705.5.1. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents.~~

q. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.8.2.

TABLE 5003.1.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD[a, ~~e, f~~, h, i]

MATERIAL	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
	Solid pounds[d, e, f]	Liquid gallons (pounds)[d, e, f]	Gas cubic feet at NTP (pounds)[d]	Solid pounds[d]	Liquid gallons (pounds)[d]	Gas cubic feet at NTP (pounds)[d]	Solid pounds[d]	Liquid gallons (pounds)[d]
Corrosives	5,000	500	Gaseous 810[e] Liquefied (150)	5,000	500	Gaseous 810[e] Liquefied (150)	1,000	100
Highly toxics	10	(10)	Gaseous 20[g] Liquefied (4)[g]	10	(10)	Gaseous 20[g] Liquefied (4)[g]	3	(3)
Toxics	500	(500)	Gaseous 810[e] Liquefied (150)[e]	500	(500)	Gaseous 810[e] Liquefied (150)[e]	125	(125)

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

~~c. In retail and wholesale sales occupancies, the quantities of medicines, foodstuff or consumer products and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.~~

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, gas cabinets or exhausted enclosures. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. For corrosive, highly toxic and toxic materials stored or displayed in Group M occupancies or stored in Group S occupancies, See Section 5003.11.1.

~~For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 5003.11, see Table 5003.11.1.~~

g. Allowed only where stored in approved exhausted gas cabinets or exhausted enclosures.

h. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

Reason: This proposal attempts to clean up what has become a colossal mess of special exceptions to hazardous materials regulations and Group H occupancy classification and clarify that the special exceptions generally fall into two categories: 1) Outright exclusions to Group H with no quantity limit, or 2) Major increases of MAQ amounts beyond what is provided in the general application MAQ tables. The first group has appeared in a list of exceptions to Group H in IBC Section 307.1.1, and these materials/conditions were generally considered to be exempt from ever being Group H or having to comply with any of the general hazardous materials regulations in the IBC or IFC. The second group clearly gets its own MAQ allowances, but were not specifically exempted from having to follow general hazardous materials safety requirements that are otherwise applicable to quantities that do not exceed MAQ amounts.
Even in the original Group H requirements, and particularly footnotes to the MAQ tables, the "special conditions" were somewhat haphazardly organized, and the situation has only gotten worse over the past three-plus decades.

Trying to pull all of this information together into a more organized presentation was a massive undertaking and in some cases involved interpreting intent of provisions for which application wasn't 100-percent clearly conveyed by existing text. Being involved in this topic for more than 30 years, I feel reasonably confident that my understanding of how the provisions apply is accurate, and certainly, there was no intent to deliberately gore someone's ox. My advice to anyone who is impacted by these portions of the codes is to read the rewrite closely to make sure that there were no unintended consequences from the work that was done. Given the scope of this project and less 3rd party review of the proposal prior to submittal than I would have preferred, it is certainly possible that mistakes may have been made, and in such cases, I will be happy to work on a floor modification for committee consideration to fix these. Note that, for the new Table 307.1.1 and the companion IFC table, I included an extra column showing the original source location for each row/exemption to assist reviewers. It is intended that this information will not be carried into the final version that appears in the code, but may be useful for staff to retain for inclusion in the commentary books.

TABLE 307.1.1

HAZARDOUS MATERIAL EXEMPTIONS[a]

Material Classification	Occupancy or Application	Exemption	2021 Source (column to be deleted prior to publication)
Combustible fiber	Baled Cotton	Densely packed baled cotton shall not be classified as combustible fiber, provided that the bales comply with the packing requirements of ISO 8115	Table 307.1(1) note "o"
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited	Section 307.1.1 Item 11
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging	Section 307.1.1 Item 10
	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.	Table 307.1(2) note "c"
Explosives	Groups B, F, M and S	Storage of special industrial explosive devices are not limited	Section 307.1.1 Item 14
	Groups M and R-3	Storage of black powder, smokeless propellant, and small arms primers are not limited	Section 307.1.1 Item 14
Flammable and combustible liquids and gases	Aerosols	Buildings and structures occupied for aerosol product storage, aerosol cooking spray products or plastic aerosol 3 products shall be classified as Group S-1	Section 307.1.1 Item 12
	Alcoholic beverages	The quantity of alcoholic beverages in liquor stores and distributors without bulk storage is not limited	Section 307.1.1 Item 6
		The quantity of alcoholic beverages in distilling or brewing of beverages is not limited	Section 307.1.1 Item 18
		The storage quantity of beer, distilled spirits and wines in barrels and casks is not limited	Section 307.1.1 Item 19
		The quantity of alcoholic beverages in retail and wholesale sales occupancies is not limited. To qualify for this allowance, beverages shall be packaged in individual containers not exceeding 1.3 gallons	Table 307.1(1) note "c"

	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F (60°C) is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both	Section 307.1.1 Item 4
		The quantity of combustible liquid solvents having a flash point at or above 200°F (93°C) is not limited	Section 307.1.1 Item 5
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited	Section 307.1.1 Item 3
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited	Table 307.1(1) note "p" #1 & 2
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code is not limited	Table 307.1(1) note "p" #3
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code is not limited	Table 307.1(1) note "p" #4
	Fuel oil	The quantity of fuel oil storage complying with Section 603.3.2 of the International Fire Code is not limited	Table 307.1(1) note "i"
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes. Such buildings and areas shall comply with Section 416	Section 307.1.1 Item 1
	Hand sanitizer	The quantity of alcohol-based hand rubs classified as Class I or II liquids in dispensers installed in accordance with Sections 5705.5 and 5705.5.1 of the International Fire Code is not limited. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents	Table 307.1(1) note "p" #5
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.	Table 307.1(1) note "c"
Highly toxic and toxic materials	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-	Table 307.1(2) note "c"

		miscible liquids with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.	
Any	Agricultural materials	The quantity of agricultural materials stored or utilizated for agricultural purposes on the premises is not limited	Section 307.1.1 Item 8
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited	Section 307.1.1 Item 9
		The quantity of hazardous materials in stationary fuel cell power systems is not limited	Section 307.1.1 Item 15
		The quantity of hazardous materials in capacitor energy storage systems is not limited	Section 307.1.1 Item 16
	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited. To qualify for this allowance, such systems shall comply with Section 608 of the International Fire Code and Chapter 11 of the International Mechanical Code	Section 307.1.1 Item 7

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The revision is intended to be a reorganization and edit that should not affect the cost of construction.

G36-21

Public Hearing Results

Committee Action: **As Modified**

Committee Modification:

2021 International Building Code

[F] TABLE 307.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c j, m, n]

Portions of table not shown remain unchanged.

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	Solid pounds(cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds(cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds(cubic feet)	Liquid gallons (pounds)
Combustible liquid [o]	II	H-2 or H-3		120[d, e]			120[d]			30[d]
	IIIA	H-2 or H-3	NA	330[d, e]	NA	NA	330[d]	NA	NA	80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]

TABLE 307.1.1 HAZARDOUS MATERIAL EXEMPTIONS[a]

Portions of table not shown remain unchanged.

Material Classification	Occupancy or Application	Exemption
Explosives	Groups B, F, M and S	Storage of special industrial explosive devices is ~~are~~ not limited
	Groups M and R-3	Storage of black powder, smokeless propellant, and small arms primers is ~~are~~ not limited
Flammable and combustible liquids and gases	Fuel oil	The quantity of fuel oil storage complying with Section 605.4.2 ~~603.3.2~~ of the International Fire Code is not limited
Any	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited~~. To qualify for this allowance, such systems shall comply with Section 608 of the International Fire Code and Chapter 11 of the International Mechanical Code~~

2021 International Fire Code

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter. This chapter shall apply to all hazardous materials~~, other than those materials and conditions listed in Table 5001.1,~~ including those materials regulated elsewhere in this code, except that where specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed. *(balance unchanged)*

TABLE 5003.1.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD [a, c, j, m, n, p]
Portions of table not shown remain unchanged.

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible fibers[q]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled~~[e]~~		(1,000)			(1,000)			(200)	
Combustible liquid~~[e]~~ [o]	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]

p. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

TABLE 5003.1.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD[a, c, h, i, j]
Portions of table not shown remain unchanged.

c. For hazardous materials in Group B higher education laboratory occupancies, See Section 428 of the International Building Code and Chapter 38.

j. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

TABLE ~~5001.1~~ 5003.1.1(5) HAZARDOUS MATERIAL EXEMPTIONS[a]
Portions of table not shown remain unchanged.

Material Classification	Occupancy or Application	Exemption
Explosives	Groups B, F, M and S	Storage of special industrial explosive devices is ~~are~~ not limited
	Groups M and R-3	Storage of black powder, smokeless propellant, and small arms primers is ~~are~~ not limited
Flammable and combustible liquids and gases	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F (60°C) is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers ~~constructed in accordance with Section 707~~ or 1-hour horizontal assemblies , or both, constructed in accordance with ~~Section 711, or both~~ the International Building Code
		The quantity of combustible liquid solvents having a flash point at or above 200°F (93°C) is not limited
	Fuel oil	The quantity of fuel oil storage complying with Section 605.4.2 ~~603.3.2 of the International Fire Code~~ is not limited
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes. Such buildings and areas shall comply with Chapter 24~~Section 416~~
	Hand sanitizer	The quantity of alcohol-based hand rubs classified as Class I or II liquids in dispensers installed in accordance with Sections 5705.5 and 5705.5.1 ~~of the International Fire Code~~ is not limited. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents
Any	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited. ~~To qualify for this allowance, such systems shall comply with Section 608 of the International Fire Code and Chapter 11 of the International Mechanical Code~~

a. Exempted materials and conditions listed in this table are required to comply with ~~applicable~~ provisions of ~~the *International Fire Code*~~ this code that are not based on exceeding maximum allowable quantities in Section 5003.

Committee Reason: This proposal clarifies and cleans up the group H occupancy exemptions and applicability of the hazardous materials provisions of the IFC. The new IBC Table 307.1.1 is a better and more comprehensive approach than the current list found in IBC Section 307.1.1. This proposal along with the F197-21 revising roof top storage are necessary fixes to better clarify the application of the hazardous materials requirements. The modifications further coordinate footnotes amongst the tables, clarifies references and fixes redundant text. Additionally, the proposed table explaining the exceptions to requirements for IFC Chapter 50 has been more appropriately placed within Section 5003 as Table 5003.1.1(5). Section 5003 is the more appropriate location as that is where the maximum allowable quantity (MAQ) information is found. Appropriate references were made in Tables 5003.1.1(1) and 5003.1.1(2) through footnotes. (Vote: 13-0)

G36-21

Individual Consideration Agenda

Public Comment 1:

IBC: TABLE 307.1.1; IFC: TABLE 5003.1.1(5)

Proponents: Michael O'Brian, representing FCAC (fcac@iccsafe.org); Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

TABLE 307.1.1 HAZARDOUS MATERIAL EXEMPTIONS[a]

Portions of table not shown remain unchanged.

Material Classification	Occupancy or Application	Exemption
Flammable and combustible liquids and gases	Alcoholic beverages	The storage quantity of beer~~, distilled spirits and wines in barrels and casks~~ is not limited.
		The storage quantity of distilled spirits and wines in barrels and casks when such storage is in compliance with Chapter 40 of the International Fire Code is not limited
Any	Energy storage	~~The quantity of hazardous materials in stationary storage battery~~ Energy storage systems ~~is not limited~~ installed and maintained in accordance with Chapter 12 of the International Fire Code.

a. Exempted materials and conditions listed in this table are required to comply with applicable provisions of the *International Fire Code*.

2021 International Fire Code

TABLE 5003.1.1(5) HAZARDOUS MATERIAL EXEMPTIONS[a]

Portions of table not shown remain unchanged.

Material Classification	Occupancy or Application	Exemption
Flammable and combustible liquids and gases	Alcoholic beverages	The storage quantity of beer~~, distilled spirits and wines in barrels and casks~~ is not limited.
		<u>The storage quantity of distilled spirits and wines in barrels and casks when such storage is in compliance with Chapter 40 is not limited</u>
Any	Energy storage	~~The quantity of hazardous materials in stationary storage battery~~ <u>Energy storage</u> systems ~~is not limited~~ <u>installed and maintained in accordance with Chapter 12</u>

a. Exempted materials and conditions listed in this table are required to comply with provisions of this code that are not based on exceeding maximum allowable quantities in Section 5003.

Commenter's Reason: The purpose of this modification is to replace "battery storage" with "energy storage" in both the IBC and IFC tables to correlate with the new terminology current utilized in the codes and to eliminate a reference to "is not limited" which does not apply. The proposal also correlates the storage of distilled spirits and wines exemption with the applicable Chapter. There are no technical changes.
This Public Comment is submitted by the ICC Fire Code Action Committee (FCAC) and the Building Code Action Committee (BCAC)

The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire and life safety in new and existing buildings and facilities as well as the protection of life and property in wildland urban interface areas. In 2020 and 2021 the Fire-CAC held multiple virtual meetings that were open to any interested party. In addition, there were numerous virtual specific working group meetings that were also open to any interested parties, to develop, discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: FCAC https://www.iccsafe.org/products-and-services/i-codes/code-development/cs/fire-code-action-committee-fcac/.

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC https://www.iccsafe.org/content/building-code-action-committee-bcac/.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There is no cost impact since this is just an editorial modification.

Public Comment# 2516

G38-21

Proposed Change as Submitted

Proponents: Stephen Thomas, Colorado Code Consulting, a Shums Coda Assoc Company, representing Colorado Chapter ICC (sthomas@coloradocode.net)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

Revise as follows:

[F] 307.1.1 Uses other than Group H. An occupancy that stores, uses or handles *hazardous materials* as described in one or more of the following items shall not be classified as Group H, but shall be classified as the occupancy that it most nearly resembles.

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *International Fire Code*.
2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.

3. Closed piping system containing *flammable or combustible liquids* or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize *combustible liquid* solvents having a *flash point* of 140°F (60°C) or higher in closed systems employing equipment *listed* by an *approved* testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both.
5. Cleaning establishments that utilize a liquid solvent having a *flash point* at or above 200°F (93°C).
6. Liquor stores and distributors without bulk storage.
7. Refrigeration systems.
8. The storage or utilization of materials for agricultural purposes on the premises.
9. Stationary storage battery systems installed in accordance with the *International Fire Code*.
10. *Corrosive* personal or household products in their original packaging used in retail display.
11. Commonly used *corrosive* building materials.
12. Buildings and structures occupied for *aerosol product* storage, aerosol cooking spray products or plastic aerosol 3 products shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code*.
13. Display and storage of nonflammable solid and nonflammable or noncombustible liquid *hazardous materials* in quantities not exceeding the maximum allowable quantity per *control area* in Group M or S occupancies complying with Section 414.2.5.
14. The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial *explosive* devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*.
15. Stationary fuel cell power systems installed in accordance with the *International Fire Code*.
16. Capacitor energy storage systems in accordance with the *International Fire Code*.
17. Group B *higher education laboratory*occupancies complying with Section 428 and Chapter 38 of the International Fire Code.

~~18.~~ ~~Distilling or brewing of beverages conforming to the requirements of the *International Fire Code*.~~

~~19.~~ 18. The storage of beer~~, distilled spirits~~ and wines in barrels and casks conforming to the requirements of the *International Fire Code*.

Reason: These two items were added to the 2021 IFC and IBC by the Fire Code Committee. We believe that the classification of occupancies should have been heard by the IBC General Committee. Distilleries can be a very hazardous occupancy depending on the size of the facility. We would agree that a small craft distillery may not be a major hazard. However, the change did not address that. It just lumped all these types of facilities in the same group. Therefore, a major manufacturer of distilled spirits with hundreds of thousands of gallons of flammable liquids would not be classified as a Group H occupancy. There have been fires at these facilities that have had a major impact on the local community and the owners. We believe that facilities that have amounts of flammable liquids in excess of the maximum allowable quantities.

Cost Impact: The code change proposal will increase the cost of construction
A facility classified as a Group H occupancy has higher levels of life-safety provisions that will increase the cost of construction when not classified as a Group F-1 & S-1 occupancies.

G38-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved based upon the specific decision in 2018 to permit these exceptions to Group H Occupancy classifications within the IBC for the 2021 code. The IFC would still apply from an operational standpoint. (Vote: 10-4)

G38-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Brad Emerick, representing Colorado Chapter of the ICC and City and County of Denver requests As Submitted

Commenter's Reason: SUMMARY

The rationale for this proposal is simply that a Maximum Allowable Quantity (MAQ) needs to be re-established for distilleries at which they will be classified as "H" Occupancies and comply with the corresponding construction and separation requirements in the IBC. Alcohol distilleries produce, dispense and store (in bulk) Flammable Liquids; i.e., alcohol beverages with a Closed Cup Flash Point equal to or less than 100°F (corresponds to an alcohol concentration of 17.74% or more in water). There have been many fires and explosions at distilleries resulting in death, severe body burns and extensive property damage (partial list provided in detailed discussion below). The language adopted in 2018 erased the long-standing MAQ threshold and now prevents distilleries from being classified as an "H" occupancy regardless of the quantity and type of HazMat.

Please vote to overturn the committee and approve this proposal as submitted.

HISTORY

A series of code changes meant to provide consistent interpretation and regulation of small distilleries was adopted in 2018 for the 2021 codes. Unfortunately the language codified an incorrect code interpretation. The facilities and facility-operations listed under moderate- and low-hazard factory (F) and storage (S) occupancies [2021 IBC Sections 306 and 311] are supposed to be classified as F or S when they are not classified as "H" (this is stated in those sections and confirmed by ICC staff interpretation). The 2018 code proposal was based on the misinterpretation that the listed facilities are required to be classified as F or S regardless of the quantity and type of HazMat. Though it appears the intent was to help regulate small craft distilleries, the language did not distinguish between them and very large ones producing and storing tens of thousands of gallons of alcohol.

If you're interested in researching the history further, the 2018 code proposal that removed HazMat quantity thresholds for all distilleries was F276-18. The reason statement clearly states the misinterpretation. It's clear from the testimony video of the 2018 Committee Action Hearing (CAH) there was confusion between distilleries and breweries, and between distilleries in general and storage of spirits in wooden barrels and casks. Only four public comments were published by ICC in 2018. They were submitted by fire protection engineers and architects extremely familiar with distilleries and all of them requested the 2018 proposal be overturned. It's clear from the testimony video of the 2018 Public Comment Hearing that the building code ramifications - especially separation - were not recognized. Please also review the recording of the 2021 CAH related to this proposal. This was the first time any of the building code ripple effects were mentioned - and they still were not discussed.

DISCUSSION

First, distilleries are different from breweries and wineries. The hazards are very different. Ethyl alcohol (ethanol) is created by fermentation in breweries (beer) and wineries (wine). Alcohol beverages in these facilities rarely exceed concentrations of 17.7% alcohol by volume (ABV). Distilleries remove water from beer and wine to concentrate the ethanol. Alcohol beverages in distilleries get as high as 95% ABV. As the concentration of alcohol increases the Closed Cup Flash Point of the alcohol-water mixture decreases. Flammable Liquids are defined as having a Flash Point below 100°F. An ethanol-water mixture with an ABV of 17.7% has a Flash Point of 100°F so all concentrations higher than 17.7% are Flammable Liquids.

There have been a several points made in the 2018 CAH, 2018 PCH and 2021 CAH listed below with their counter points:

[1]

Separation is still required [between areas producing, storing, handling and dispensing flammable liquids and other occupancies].

Actually because the code (that this proposal is trying to correct) mandates all distilleries be classified as S1's and F1's, and prevents classification as H, IBC Section 508.3 Nonseparated Occupancies specifically allows for no physical separation. This means active flammable liquid distilling areas and bulk storage areas do not have to be physically separated from assembly, mercantile, office, etc., areas no matter how much flammable liquid is present or its state (distilling vaporizes flammable liquids - way above their flash point temperatures). This is probably the most serious unintended consequence of precluding all distilleries from being classified as H occupancies.

[2]

Distilleries with materials having hazards other than Flammable Liquid still have to comply with IBC for those materials.

Actually because the code (that this proposal is trying to correct) mandates all distilleries be classified as S1's and F1's, and prevents classification as H, and there is no language stating what HazMat is or is not to be regulated in a distillery, there are no applicable H regulations in the IBC. The IFC does not assign Occupancy Groups. So what happens when the quantities of condensed cleaning solutions classified as Corrosives exceed the MAQ per control area? The fire code has no provision for this and without being classified as an H, neither does the building code.

[3]

The new criteria is more conservative because it requires all distilleries to be sprinklered.

Actually this is a red herring. The MAQ for Class 1B and Class 1C Flammable Liquids in a nonsprinklered building is 120 gallons. There are a hundred distilleries in Colorado and only a tiny fraction of them produce, handle and store less than 120 gallons. The vast majority have to be sprinklered already.

[4]

All of the impacts of the 2018 code changes affecting distilleries were discussed.

Actually none of the building code impacts were discussed and it's clear many of them were not even known.

[5]

What is the risk - have there even been any accidents in distilleries?

Dalkita Architecture is a leading educator on distillery regulations and put together a partial list of small-distillery accidents that have occurred over the last ten years (following list includes two in 2021). There are many more major fires at large facilities - listed in appendix to DISCUS Recommended Fire Code Protection Practices for Distilled Spirits Beverage Facilities (please Google Heaven Hills Fire, Jim Beam Fire, Oldbury Gin Fire):

Wigle distillery, Pittsburgh - 1 hospitalized

BJ Hookers Distillery, Harris County TX - 1 air lifted to hospital

Island Beach Distillery, Lacey Township, NJ - 1 taken to burn center

Silver Trails Distillery, Marshal County KY - 1 dead, 1 with over a year in recovery

Full Throttle Saloon, Sturgis SD - burned to the ground

Twister Distillery, Moore, OK - 1 hospitalized

Alchemical Solutions, Ashland OR - Neighboring residents experienced smoke related health problems

Tuthilltown Spirits, Gardiner, NY - Destroyed building, no injuries

Elkins Park Distillery, Estes Park, CO - 3 injured, 1 air lifted to burn center, 1 taken by ambulance; 3 months later one is learning to walk again; severe building damageNOCO Distillery, Ft. Collins, CO - flashed over when FD arrived; "thank god our tasting room was closed"

[6]

Homemade stills would not be permitted under the fire code.

Actually there is no listing for stills and many of the small craft distillers start out with versions made at home from other containers like stainless steel milk storage tanks. A couple of these are included in the accidents listed above. One saving grace is none of these failed in a crowded room as would be allowed now in the 2021 code with nonseparated occupancies.

[7]

No regulations were reduced or lost with the code changes that now prohibit distilleries from being classified as an H occupancy.

Actually the 17 items listed below in the building code were directly affected by precluding distilleries from being classified as H occupancies. <u>None of them</u> were ever discussed in the 2018 CAH or PCH. This list was introduced in testimony in the 2021 CAH but no discussion took place. In addition it's not clear how distilleries with quantities of HazMat exceeding the MAQ per Control Area are supposed to be regulated in the fire code. It used to be that a room, space or building was either a Control Area or an H Occupancy. What are the regulations for rooms, spaces and buildings now if they exceed the MAQ and cannot be classified as H? It also used to be in the fire code that only distilled spirits stored in wooden barrels were exempt from IFC Chapters 50 (HazMat) and 57 (Flammable/Combustible Liquids) - now all spirit-storage containers of any material (270 gallon plastic totes?) are exempt in direct conflict with NFPA 30.

== Distilleries with any quantity of HazMat in excess of the MAQ per Control Area can now be anchor buildings attached to covered mall buildings [IBC 202].

== The open space around covered mall buildings can now be reduced for any quantity of HazMat in excess of the MAQ per Control Area [IBC 402.2].

== Atriums are now permitted in distilleries with any quantity of HazMat in excess of the MAQ per Control Area [IBC 404.1 & 712.1.7].

== A manual emergency alarm was required for storage in distilleries with any quantity of HazMat in excess of the MAQ per Control Area – now unlimited quantities of HazMat can be stored in a distillery without one because they're required to be classified as S1's [IBC 415.5].

== 25% of the perimeter wall of distilleries with any quantity of HazMat in excess of the MAQ per Control Area larger than 1,000 sf were required to be an exterior wall to facilitate fire department breaching if necessary – this is no longer required [IBC 415.6].

== distilleries with any quantity of HazMat in excess of the MAQ per Control Area had to be separated from every other occupancy; not true for S1's and F1's [IBC 508.3]

== distillery production areas with any quantity of HazMat in excess of the MAQ per Control Area were not permitted in Live/Work units – now unlimited quantities of Flammable Liquids can be in production in a Live Work unit (direct contradiction to TTB requirements) [IBC 508.5.2].

== distilleries with any quantity of HazMat in excess of the MAQ per Control Area were prohibited above horizontal building separations – now an unlimited quantity of distillery HazMat storage is allowed [IBC 510.2].

== The fire resistance rating of the exterior walls of distilleries with any quantity of HazMat in excess of the MAQ per Control Area was required to be increased one hour higher than for S1's and F1's [IBC 705.5].

== The area of exterior openings were limited for distilleries with any quantity of HazMat in excess of the MAQ per Control Area - now it is unlimited [IBC 705.8].

== Openings were required to be protected in distilleries with any quantity of HazMat in excess of the MAQ per Control Area with a fire separation distance less than 15'; unprotected openings are permitted for S1's and F1's down to a fire separation distance of 3' <u>regardless</u> of the quantity or type of HazMat [IBC 705.8].

== Fire dampers on duct penetrations of fire barriers and fire partitions was required for all distilleries with any quantity of HazMat in excess of the MAQ per Control Area but not all S1's and F1's [IBC 717.5.2 & 717.5.4].

== The width of stairways in S1's and F1's can be 33% narrower than was permitted for distilleries with any quantity of HazMat in excess of the MAQ per Control Area [IBC 1005.3.1].

== The width of other egress components in S1's and F1's is 25% narrower than was permitted for distilleries with any quantity of HazMat in excess of the MAQ per Control Area [IBC 1005.3.2].

== Doors were required to be side-hinged, pivoted or balanced, and swing in the direction of egress in distilleries with any quantity of HazMat in excess of the MAQ per Control Area – not so for F1's and S1's [IBC 1010.1.2 & 1010.1.2.1].

== Doors had to have panic hardware in distilleries with any quantity of HazMat in excess of the MAQ per Control Area [IBC 1010.2.9].

== Access to two exits is required at a lower occupant load was required in distilleries with any quantity of HazMat in excess of the MAQ per Control Area [IBC 1006.2.1].

== Maximum exit access travel distance was reduced in distilleries with any quantity of HazMat in excess of the MAQ per Control Area [IBC 1017.2].

So rolling all this up, an open flame, homemade still with hundreds of gallons of a Class 1B Flammable Liquid heated above its flashpoint can be displayed in the middle of an open nightclub, with an atrium, attached to a covered mall building with none of the additional fire separation distance limitations, exterior wall ratings and egress requirements required for H occupancies. Prohibiting an entire industry from being classified as an H occupancy regardless of the quantities of HazMat is dangerous – and contradicts longstanding building code intent and precedent.

Please support this proposal to at least allow very large distilleries to be regulated as H occupancies until the building code provisions can be discussed and modified as appropriate.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
This proposal allows distilleries to be classified in correct Occupancy Classification when warranted (reestablishes longstanding precedent prior to the 2021 codes).

G40-21

Proposed Change as Submitted

Proponents: William Koffel, representing Self (wkoffel@koffel.com)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

Revise as follows:

[F] 307.3.1 Occupancies containing explosives not classified as H-1. The following occupancies containing *explosive* materials shall be classified as follows:

1. Division 1.3 *explosive* materials that are used and maintained in a form where either confinement or configuration will not elevate the hazard from a mass fire to mass *explosion* hazard shall be allowed in H-2 occupancies.
2. <u>Division 1.4 explosive materials that are used and maintained in a form that only pose a minor explosion hazard shall be allowed in H-3 occupancies.</u>

~~2~~ <u>3.</u> Articles, including articles packaged for shipment, that are not regulated as a Division 1.4 *explosive* under Bureau of Alcohol, Tobacco, Firearms and Explosives regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles shall be allowed in H-3 occupancies.

Reason: The FCAC Working Group 6.1 on Hazardous Materials discussed that Table 307.1(1) identified the occupancy for Division 1.4 explosive materials as Group H-3. However the language within Section 307.3 and the exceptions in Section 307.3.1 do not clearly link to that occupancy classification.
The IFC Commentary states that:
There are certain explosive materials that pose a hazard level less than that anticipated for a Group H-1 occupancy. A Group H-2 classification is permitted for Division 1.3 explosive materials used or maintained under conditions where the hazard level will not rise from that of a mass fire hazard to a mass explosion hazard. A Group H-3 occupancy classification is permitted for packaged and unpackaged articles not regulated as Division 1.4 explosives by the Bureau of Alcohol, Tobacco and Firearms, as well as unpackaged articles used in process operations, provided there is no concern regarding the propagation of a detonation or deflagration between the articles during process operations.

The proposed Item 2 is intended to correlate Table 307.1(1) with this section consistent with guidance provided in the IFC Commentary.

It should be noted that while Koffel Associates provides consulting services to the American Pyrotechnics Association, the proposal was not submitted on their behalf. The proposal was prepared based upon a commitment made to the Working Group to proposal a solution to the conflict.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Whereas the proposal clarifies the intent of the Code, there should be no impact on the cost of construction.

G40-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as it appropriately correlates with the occupancy classifications for explosives. The language is consistent with the definition for 1.4 explosives but could be simplified to remove the duplicative language. (Vote: 14-0)

G40-21

Individual Consideration Agenda

Public Comment 1:

IBC: [F] 307.3.1

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

[F] 307.3.1 Occupancies containing explosives not classified as H-1 . The following occupancies containing *explosive* materials shall be classified as follows:

1. Division 1.3 *explosive* materials that are used and maintained in a form where either confinement or configuration will not elevate the hazard from a mass fire to mass *explosion* hazard shall be allowed in H-2 occupancies.
2. Division 1.4 explosive materials ~~that are used and maintained in a form that only pose a minor explosion hazard~~ shall be allowed in H-3 occupancies.
3. Articles, including articles packaged for shipment, that are not regulated as a Division 1.4 *explosive* under Bureau of Alcohol, Tobacco, Firearms and Explosives regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles shall be allowed in H-3 occupancies.

Commenter's Reason: The added text was not necessary since Division 1.4 explosives are always considered to be a minor explosion hazard, by definition. From IBC Chapter 2, Explosives 1.4 are "Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package." The added text suggests that Division 1.4 explosives might be used or maintained in such a way that they are not a minor explosion hazard, which does not appear to be possible for a material classified in 1.4.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Editorial clarification.

Public Comment# 2979

G42-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

SECTION 308
INSTITUTIONAL GROUP I

Revise as follows:

308.2.4 Five or fewer persons receiving custodial care. A facility with five or fewer persons receiving *custodial care* shall be classified as Group R-2 or Group R-3 based on the primary occupancy of the building. ~~or shall comply~~ Such a facility, located within a dwelling unit that is within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code*. ~~provided~~ Facilities constructed using the International Residential Code shall be protected by an *automatic sprinkler system* ~~is~~ installed in accordance with Section 903.3.1.3 or Section P2904 of the International Residential Code.

308.3.2 Five or fewer persons receiving medical care. A facility with five or fewer persons receiving *medical care* shall be classified as Group R-2 or Group R-3 , based on the primary occupancy of the building. ~~or shall comply~~ Such a facility, located within a dwelling unit that is within the scope of the I*nternational Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code*. ~~provided~~ Facilities constructed using the *International Residential Code* shall be protected by an automatic sprinkler system ~~is~~ installed in accordance with Section 903.3.1.3 or Section P2904 of the International Residential Code.

SECTION 310
RESIDENTIAL GROUP R

Revise as follows:

~~310.4.1~~ 310.1.1 Care facilities within a dwelling. Care facilities for five or fewer persons receiving medical care or custodial care that are located within a ~~single-family~~ dwelling unit ~~are permitted to comply~~ that is within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code*. ~~provided~~ Facilities constructed using the International Residential Code shall be protected by an *automatic sprinkler system* ~~is~~ installed in accordance with Section 903.3.1.3 or Section P2904 of the International Residential Code.

Reason: The intent of this proposal is to clarify the allowance for when a care facility fits into the residential requirements in the IBC or IRC. Sticking with the current intent in the codes, these facilities should be permitted in a home environment – be it detached single family, townhouse or apartment – thus the reference to Group R-3 and R-2. The IRC reference allows for the facility to use IRC if the dwelling unit it is in is scoped to the IRC.

The relocation of Section 310.4.1 is because this is no longer just a Group R-3 consideration.

This proposal does not change what facilities can currently be constructed under the IRC, however, in the past there has been arguments that these facilities should not be permitted under the IRC. A facility of 5 or fewer persons could be in a detached dwelling, a townhouse or an apartment building. The Fair Housing Act does not allow for family to be defined by blood or marriage. Multiple court cases have confirmed that people have the right to live in a home environment instead of an institutional facility if they so choose. If this is a business, this small group home is most likely operating as a family; and would fall below the licensure rules of most states. However, in most cases, this will be couple with foster children or someone taking care of a friend who needs assistance - not a business. The IBC does not typically go into issues on licensure or who is paying what – we look at the use of the space.

This is one of a group of proposals intended to coordinate the scoping items in IBC Section 101.2 and IRC 101.2. While the proposals work together, then also work separately. The proposal for coordination will be in Group B.

This proposal is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification of use group, not a change to construction requirements.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved by the committee, however, they felt that the general intent for coordination with the IRC scoping was good, but some testifiers were confused on the limits. There was a concern that this could be read to allow for a large assisted living or nursing home to be constructed as individual dwelling units under the IRC. (Vote: 14-0)

G42-21

Individual Consideration Agenda

Public Comment 1:

IBC: 308.2.4, 308.3.2, 310.1.1

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

308.2.4 Five or fewer persons receiving custodial care . A facility with five or fewer persons receiving *custodial care* shall be classified as Group R-2 or Group R-3 based on the primary occupancy of the building. Such a facility, located within a ~~dwelling unit~~ detached one- or two- family dwelling or townhouse that is within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code.* Facilities constructed in accordance with ~~using~~ the International Residential Code shall be protected by an *automatic sprinkler system* installed in accordance with ~~Section 903.3.1.3 or~~ Section P2904 of the International Residential Code.

308.3.2 Five or fewer persons receiving medical care . A facility with five or fewer persons receiving *medical care* shall be classified as Group R-2 or Group R-3, based on the primary occupancy of the building. Such a facility, located within a ~~dwelling unit~~ detached one- or two- family dwelling or townhouse that is within the scope of the I*nternational Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code*. Facilities constructed in accordance with~~using~~ the *International Residential Code* shall be protected by an automatic sprinkler system installed in accordance with ~~Section 903.3.1.3 or~~ Section P2904 of the International Residential Code.

310.1.1 Care facilities within a dwelling . Care facilities for five or fewer persons receiving medical care or custodial care that are located within a ~~dwelling unit~~ detached one- or two- family dwelling or townhouse that is within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or with the *International Residential Code.* Facilities constructed in accordance with ~~using~~ the International Residential Code shall be protected by an *automatic sprinkler system* installed in accordance with ~~Section 903.3.1.3 or~~ Section P2904 of the International Residential Code.

Commenter's Reason: The original proposal intended to allow small daycare, adult care or custodial care facilities serving five or fewer persons to be classified as part of the primary occupancy of a building housing such a facility, and to note that where they are contained in buildings falling within the scope of the International Residential Code they are permitted to be constructed either per the IBC or IRC.
The concern from the IBC-General Committee, and those in opposition, was the lack of clarity in how the proposal language was structured. As written, the proposal caused some confusion. Some felt the proposal expanded the scope of IRC to include apartment buildings, and that it could be argued a dwelling unit in an apartment building is within the scope of the IRC. Also, some felt the proposal language implied that dwelling units can be included in Group-I facilities.
The revised language for this public comment aims to address the concerns of the committee and clarify the original intent of the proposal by explicitly referring to care facilities located within detached one and two-family dwellings or townhouses, which are the types of residential buildings covered by the IRC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is a clarification of use group, not a change to construction requirements.

Public Comment# 2675

G44-21 Part I

Proposed Change as Submitted

Proponents: Dan Willham, Fairfax County, representing Fairfax County (daniel.willham@fairfaxcounty.gov)

THIS IS A 4 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. PART III WILL BE HEARD BY THE PLUMBING CODE COMMITTEE. PART IV WILL BE HEARD BY THE PROPERTY MAINTENANCE/ZONING CODE COMMITTEE.SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Revise as follows:

310.2 Residential Group R-1. Residential Group R-1 occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily *transient* in nature, including:

- *Boarding houses* (*transient*) with more than 10 occupants
- *Congregate living facilities* (*transient*) with more than 10 occupants
- Hotels (*transient*)
- Motels (*transient*)

420.2 Separation walls. Walls separating *dwelling units* in the same building, walls separating *sleeping units* in the same building , walls separating *dwelling units* from sleeping units in the same building, and walls separating *dwelling* or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *fire partitions* in accordance with Section 708.

420.3 Horizontal separation. Floor assemblies separating *dwelling units* in the same buildings, floor assemblies separating *sleeping units* in the same building , floor assemblies separating *dwelling units* from sleeping units in the same building, and floor assemblies separating dwelling or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *horizontal assemblies* in accordance with Section 711.

716.2.6.1 Door closing. *Fire doors* shall be latching and self- or automatic-closing in accordance with this section.

Exceptions:

1. *Fire doors* located in common walls separating *dwelling units* or *sleeping units* in Group R-1 shall be permitted without automatic- or *self-closing* devices.
2. The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I emergency recall operation.

1010.1.2 Egress door types. Egress doors shall be of the side-hinged swinging door, pivoted door, or *balanced door* types.

Exceptions:

1. *Private garages*, office areas, factory and storage areas with an *occupant load* of 10 or less.
2. Group I-3 occupancies used as a place of detention.
3. Critical or intensive care patient rooms within suites of health care facilities.
4. Doors within or serving a single *dwelling unit* in Groups R-2 and R-3.
5. In other than Group H occupancies, revolving doors complying with Section 1010.3.1.
6. In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies complying with Section 1010.3.3.
7. *Power-operated* doors in accordance with Section 1010.3.2.
8. Doors serving a bathroom within an individual *dwelling unit* or *sleeping unit* in Group R-1.
9. In other than Group H occupancies, manually operated horizontal sliding doors are permitted in a *means of egress* from spaces with an *occupant load* of 10 or less.

1103.2.11 Residential Group R-1. Buildings of Group R-1 containing not more than five *dwelling units* and *sleeping units* in aggregate for rent or hire that are also occupied as the residence of the proprietor are not required to comply with this chapter.

E104.2.1 Transient lodging. In *transient lodging* facilities, *dwelliing units* or *sleeping units* with accessible communication features shall be provided in accordance with Table E104.2.1. Units required to comply with Table E104.2.1 shall be dispersed among the various classes of units.

Reason: This change corrects discrepancies inadvertently created by past code changes. The description for R-1 occupancies used to only read "R-1 Residential occupancies where the occupants are primarily transient in nature ..." It did not mention sleeping units. The definition for *sleeping units* was added to the code to coordinate with the Fair Housing Act Guidelines (see code change E70-00) and did not involve the descriptions for residential occupancies in Chapter 3. Sleeping units was added to the descriptions of R-1 (2006 IBC) and R-2 (2003 IBC), in changes that do not appear in any code change proposal; these changes are also not marked as changes by bars in the margins. They appear to possibly have been made by the code correlation committee. However, no correction was made to the description of R-1, which, like R-2 occupancies, can also include both dwelling and sleeping units. This has left an apparent gap in the code for transient residential occupancies with dwelling units. This change resolves that by adding "or more than two dwelling units" to the description of R-1. Similar to the wording for the description for R-2, "or more than two dwelling units" avoids including R-3 residential occupancies and one- and two-family dwellings regulated under the IRC. This change also coordinates the references to sleeping units throughout the codes for R-1 occupancies to also include dwelling units. While doing this, a couple of instances of dwelling units for R-2 (without the mention of sleeping units) were found and also corrected to include sleeping units to coordinate with the description of R-2 occupancies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification and coordination of the code which will not affect construction cost.

G44-21 Part I

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: This proposal was approved because it would address in the code requirements the extended stay hotels that include dwelling units, not just sleeping units. (Vote: 14-0)

G44-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: 202 (New), 310.2, 310.3

Proponents: Andrew Klein, representing Airbnb (andrew@asklein.com); John Catlett, representing BOMA International (catlettcodeconsulting@gmail.com) requests Disapprove

Commenter's Reason: The stated reason for the proposal is “an apparent gap in the code for transient residential occupancies with dwelling units.” However, as noted during debate over an identical proposal in 2018, it threatens to have the unintended consequence of undermining the growing popularity of the short-term rental (STR) economy – including short-term rentals offered by individuals in their primary or secondary residences. This use has proven to be a boon to property owners, local businesses, and communities (in the form of tax revenue). Where desired, jurisdictions have imposed STR-specific regulations—such as registration and insurance requirements—and/or applied existing codes to STR activity.
There are many forms of short-term rental activity that could be affected by this proposal. For example, “managed home sharing” has emerged where primary residents offer their home to STR guests, with permission and operational support of the landlord. This model provides tenants with more affordable rent, while embracing flexibility for a generation of renters that have increasingly variable work and travel lifestyles, particularly in the wake of the COVID-19 pandemic. Depending on the program, managed models can also provide landlords with oversight, transparency, insurance, and even a cut of the STR revenue that they can use to improve the community for all residents. In such cases, a majority of primary tenants may leverage short-term rentals to augment their income and the code should support this and other responsible short-term rental activity.

In addition, it is worth reiterating that the IBC has traditionally distinguished R-1 occupancies, like hotels, from vacation timeshare properties, which are categorized as R-2, and lodging houses with 5 or fewer guest rooms and boarding houses with 10 or fewer occupants, which are classified as R-3.

For these reasons and others, the ICC overwhelmingly decided at the last cycle in Richmond that a building which essentially looks and functions as a multifamily Group R-2 occupancy does not warrant a change of occupancy.

The proposal seeks to solve the problem stated by the proponent but in the process creates ambiguity for code officials regarding multifamily buildings where short term rental activity takes place, but is not the primary use. Furthermore, Part 4 modified definitions so that they are no longer unique—a traditional apartment complex would now be defined as both an apartment and motel/hotel.

Airbnb is committed to work with stakeholders to solve the stated problem. In fact, we attempted to propose an alternative that would address the gap cited by the proponent while avoiding any unintended consequences. However, this alternative was deemed out of scope by the ICC. As a result, we are willing to work to address the proponent's concern in the next cycle.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change to code.

Public Comment# 2705

G44-21 Part II

Proposed Change as Submitted

Proponents: Daniel Willham, Fairfax County, representing Fairfax County (daniel.willham@fairfaxcounty.gov)

2021 International Fire Code

Revise as follows:

308.4.1 Group R-2 dormitories. Candles, incense and similar open-flame-producing items shall not be allowed in *dwelling units* or *sleeping units* in Group R-2 dormitory occupancies.

403.9.1.1 Evacuation diagrams. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each hotel or motel *dwelling unit* or *sleeping unit*.

907.2.8.1 Manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-1 occupancies.

Exceptions:

1. A manual fire alarm system is not required in buildings not more than two stories in height where all individual *dwelling units*, *sleeping units*, and contiguous attic and crawl spaces to those units are separated from each other and public or common areas by not less than 1-hour *fire partitions* and each individual *dwelling unit* and *sleeping unit* has an *exit* directly to a *public way*, *egress court* or yard.
2. Manual fire alarm boxes are not required throughout the building where all of the following conditions are met:
    - 2.1. The building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
    - 2.2. The notification appliances will activate upon sprinkler water flow.
    - 2.3. Not fewer than one manual fire alarm box is installed at an *approved* location.

907.2.8.2 Automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed throughout all interior *corridors* serving *dwelling units* or *sleeping units*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior *corridors* serving *dwelling units* or *sleeping units* and where each *dwelling unit* or *sleeping unit* has a *means of egress* door opening directly to an *exit* or to an exterior *exit access* that leads directly to an *exit*.

907.2.11.1 Group R-1. Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In every room in the path of the *means of egress* from the sleeping area to the door leading from the *dwelling unit* or *sleeping unit*.
3. In each story within the *dwelling unit* or *sleeping unit*, including *basements*. For *dwelling units* or *sleeping units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

TABLE 907.5.2.3.2 VISIBLE ALARMS

AGGREGATE NUMBER OF DWELLING UNITS AND SLEEPING UNITS	SLEEPING ACCOMMODATIONS WITH VISIBLE ALARMS
6 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1,000	5% of total
1,001 and over	50 plus 3 for each 100 over 1,000

1103.7.5.1 Group R-1 hotel and motel manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in existing Group R-1 hotels and motels more than one story in height or with more than 20 *dwelling units* or *sleeping units* in aggregate.

Exceptions:

1. A manual fire alarm system is not required in buildings less than two stories in height where all *dwelling units*, *sleeping units*, attics and crawl spaces are separated by 1-hour *fire-resistance-rated* construction and each *sleeping unit* has direct access to a *public way*, *egress court* or yard.
2. A manual fire alarm system is not required in buildings not more than three stories in height with not more than 20 *dwelling units or sleeping units* in aggregate and equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
3. Manual fire alarm boxes are not required throughout the building where the following conditions are met:

    3.1. The building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.

    3.2. The notification appliances will activate upon sprinkler water flow.

    3.3. Not less than one manual fire alarm box is installed at an *approved* location.

1103.7.5.1.1 Group R-1 hotel and motel automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed in existing Group R-1 hotels and motels throughout all interior *corridors* serving sleeping rooms not equipped with an *approved*, supervised *automatic sprinkler system* installed in accordance with Section 903.

Exception: An automatic smoke detection system is not required in buildings that do not have interior *corridors* serving *dwelling units* or *sleeping units* and where each *dwelling unit* or *sleeping unit* has a *means of egress* door opening directly to an *exit* or to an exterior *exit access* that leads directly to an *exit*.

1103.7.5.2 Group R-1 boarding and rooming houses manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in existing Group R-1 boarding and rooming houses.

Exception: Buildings less than two stories in height where all *dwelling units*, *sleeping units*, attics and crawl spaces are separated by 1-hour *fire-resistance-rated* construction and each *dwelling unit* or *sleeping unit* has direct access to a *public way*, *egress court* or yard.

1103.7.5.2.1 Group R-1 boarding and rooming houses automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed in existing Group R-1 boarding and rooming houses throughout all interior *corridors* serving *dwelling units* or *sleeping units* not equipped with an *approved*, supervised sprinkler system installed in accordance with Section 903.

Exception: Buildings equipped with single-station smoke alarms meeting or exceeding the requirements of Section 907.2.11.1 and where the fire alarm system includes not less than one manual fire alarm box per floor arranged to initiate the alarm.

1104.5 Illumination emergency power. Where *means of egress* illumination is provided, the power supply for *means of egress* illumination shall normally be provided by the premises' electrical supply. In the event of power supply failure, illumination shall be automatically provided from an emergency system for the following occupancies where such occupancies require two or more *means of egress*:

1. Group A having 50 or more occupants.

    Exception: Assembly occupancies used exclusively as a place of worship and having an *occupant load* of less than 300.

2. Group B buildings three or more stories in height, buildings with 100 or more occupants above or below a *level of exit discharge* serving the occupants or buildings with 1,000 or more total occupants.
3. Group E in interior *exit access* and *exit stairways* and *ramps*, *corridors*, windowless areas with student occupancy, shops and laboratories.
4. Group F having more than 100 occupants.

    Exception: Buildings used only during daylight hours and that are provided with windows for natural light in accordance with the *International Building Code*.

5. Group I.
6. Group M.

    Exception: Buildings less than 3,000 square feet (279 m^2) in gross sales area on one story only, excluding mezzanines.

~~7. Group R-1.~~

~~**Exception:** Where each *sleeping unit* has direct access to the outside of the building at grade.~~

~~8.~~ 7. Groups R-1 and R-2.

Exception: Where each *dwelling unit* or *sleeping unit* has direct access to the outside of the building at grade.

2021 International Property Maintenance Code

Revise as follows:

[F] 704.6.1.1 Group R-1. Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In every room in the path of the means of egress from the sleeping area to the door leading from the *dwelling unit* or *sleeping unit*.
3. In each story within the *dwelling unit* or *sleeping unit*, including *basements*. For *dwelling units* or *sleeping units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

2021 International Building Code

Revise as follows:

[F] 403.4.7 Smoke removal. To facilitate smoke removal in post-fire salvage and overhaul operations, buildings and structures shall be equipped with natural or mechanical *ventilation* for removal of products of combustion in accordance with one of the following:

1. Easily identifiable, manually operable windows or panels shall be distributed around the perimeter of each floor at not more than 50-foot (15 240 mm) intervals. The area of operable windows or panels shall be not less than 40 square feet (3.7 m^2) per 50 linear feet (15 240 mm) of perimeter.

    Exceptions:

    1. In Group R-1 occupancies, each *dwelling unit, sleeping unit* or suite having an *exterior wall* shall be permitted to be provided with 2 square feet (0.19 m^2) of venting area in lieu of the area specified in Item 1.
    2. Windows shall be permitted to be fixed provided that glazing can be cleared by fire fighters.

2. Mechanical air-handling equipment providing one exhaust air change every 15 minutes for the area involved. Return and exhaust air shall be moved directly to the outside without recirculation to other portions of the building.
3. Any other *approved* design that will produce equivalent results.

Reason: This change corrects discrepancies inadvertently created by past code changes. The description for R-1 occupancies used to only read "R-1 Residential occupancies where the occupants are primarily transient in nature ..." It did not mention sleeping units. The definition for *sleeping units* was added to the code to coordinate with the Fair Housing Act Guidelines (see code change E70-00) and did not involve the descriptions for residential occupancies in Chapter 3. Sleeping units was added to the descriptions of R-1 (2006 IBC) and R-2 (2003 IBC), in changes that do not appear in any code change proposal; these changes are also not marked as changes by bars in the margins. They appear to possibly have been made by the code correlation committee. However, no correction was made to the description of R-1, which, like R-2 occupancies, can also include both dwelling and sleeping units. This has left an apparent gap in the code for transient residential occupancies with dwelling units. This change resolves that by adding "or more than two dwelling units" to the description of R-1. Similar to the wording for the description for R-2, " or more than two dwelling units" avoids including R-3 residential occupancies and one- and two-family dwellings regulated under the IRC. This change also coordinates the references to sleeping units throughout the codes for R-1 occupancies to also include dwelling units. While doing this, a couple of instances of dwelling units for R-2 (without the mention of sleeping units) were found and also corrected to include sleeping units to coordinate with the description of R-2 occupancies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification and coordination of the code which will not affect construction cost.

G44-21 Part II

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The committee stated that the reason for the approval was that it closes a gap in the requirements by including the proposed terms in various sections throughout the code. (Vote: 13-0)

G44-21 Part II

Individual Consideration Agenda

Public Comment 1:

Proponents: Andrew Klein, representing Airbnb (andrew@asklein.com) requests Disapprove

Commenter's Reason: The stated reason for the proposal is “an apparent gap in the code for transient residential occupancies with dwelling units.” However, as noted during debate over an identical proposal in 2018, it threatens to have the unintended consequence of undermining the growing popularity of the short-term rental (STR) economy – including short-term rentals offered by individuals in their primary or secondary residences. This use has proven to be a boon to property owners, local businesses, and communities (in the form of tax revenue). Where desired, jurisdictions have imposed STR-specific regulations—such as registration and insurance requirements—and/or applied existing codes to STR activity.
There are many forms of short-term rental activity that could be affected by this proposal. For example, “managed home sharing” has emerged where primary residents offer their home to STR guests, with permission and operational support of the landlord. This model provides tenants with more affordable rent, while embracing flexibility for a generation of renters that have increasingly variable work and travel lifestyles, particularly in the wake of the COVID-19 pandemic. Depending on the program, managed models can also provide landlords with oversight, transparency, insurance, and even a cut of the STR revenue that they can use to improve the community for all residents. In such cases, a majority of primary tenants may leverage short-term rentals to augment their income and the code should support this and other responsible short-term rental activity.

In addition, it is worth reiterating that the IBC has traditionally distinguished R-1 occupancies, like hotels, from vacation timeshare properties, which are categorized as R-2, and lodging houses with 5 or fewer guest rooms and boarding houses with 10 or fewer occupants, which are classified as R-3.

For these reasons and others, the ICC overwhelmingly decided at the last cycle in Richmond that a building which essentially looks and functions as a multifamily Group R-2 occupancy does not warrant a change of occupancy.

The proposal seeks to solve the problem stated by the proponent but in the process creates ambiguity for code officials regarding multifamily buildings where short term rental activity takes place, but is not the primary use. Furthermore, Part 4 modified definitions so that they are no longer unique—a traditional apartment complex would now be defined as both an apartment and motel/hotel.

Airbnb is committed to work with stakeholders to solve the stated problem. In fact, we attempted to propose an alternative that would address the gap cited by the proponent while avoiding any unintended consequences. However, this alternative was deemed out of scope by the ICC. As a result, we are willing to work to address the proponent’s concern in the next cycle.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No change to code.

Public Comment# 2987

G44-21 Part III

Proposed Change as Submitted

Proponents: Daniel Willham, Fairfax County, representing Fairfax County (daniel.willham@fairfaxcounty.gov)

2021 International Plumbing Code

Revise as follows:

TABLE 403.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a] (See Sections 403.1.1 and 403.2)
Portions of table not shown remain unchanged.

NO.	CLASSIFICATION	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 424.2)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410)	OTHER
			MALE	FEMALE	MALE	FEMALE			
7	Residential	Hotels, motels, boarding houses (transient)	1 per *dwelling* or sleeping unit		1 per *dwelling* or sleeping unit		1 per *dwelling* or sleeping unit	—	1 service sink
		Dormitories, fraternities, sororities and boarding houses (not transient)	1 per 10		1 per 10		1 per 8	1 per 100	1 service sink
		Apartment house	1 per dwelling or *sleeping* unit		1 per dwelling or *sleeping* unit		1 per dwelling or *sleeping* unit	—	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units
		Congregate living facilities with 16 or fewer persons	1 per 10		1 per 10		1 per 8	1 per 100	1 service sink
		One- and two-family dwellings and lodging houses with five or fewer guestrooms	1 per dwelling unit		1 per dwelling unit		1 per dwelling unit	—	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per dwelling unit
		Congregate living facilities with 16 or fewer persons	1 per 10		1 per 10		1 per 8	1 per 100	1 service sink

a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by the *International Building Code*.

b. Toilet facilities for employees shall be separate from facilities for inmates or care recipients.

c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted provided that each patient sleeping unit has direct access to the toilet room and provision for privacy for the toilet room user is provided.

d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.

e. For business and mercantile classifications with an occupant load of 15 or fewer, service sinks shall not be required.

f. The required number and type of plumbing fixtures for outdoor public swimming pools shall be in accordance with Section 609 of the International Swimming Pool and Spa Code.

606.2 Location of shutoff valves. Shutoff valves shall be installed in the following locations:

1. On the fixture supply to each plumbing fixture other than bathtubs and showers in one- and two-family residential *occupancies*, and other than in individual dwelling or sleeping units that are provided with unit shutoff valves in hotels, motels, boarding houses and similar *occupancies*.
2. On the water supply pipe to each sillcock.
3. On the water supply pipe to each appliance or mechanical equipment.

Reason: This change corrects discrepancies inadvertently created by past code changes. The description for R-1 occupancies used to only read "R-1 Residential occupancies where the occupants are primarily transient in nature ..." It did not mention sleeping units. The definition for *sleeping units* was added to the code to coordinate with the Fair Housing Act Guidelines (see code change E70-00) and did not involve the descriptions for residential occupancies in Chapter 3. Sleeping units was added to the descriptions of R-1 (2006 IBC) and R-2 (2003 IBC), in changes that do not appear in any code change proposal; these changes are also not marked as changes by bars in the margins. They appear to possibly have been made by the code correlation committee. However, no correction was made to the description of R-1, which, like R-2 occupancies, can also include both dwelling and sleeping units. This has left an apparent gap in the code for transient residential occupancies with dwelling units. This change resolves that by adding "or more than two dwelling units" to the description of R-1. Similar to the wording for the description for R-2, " or more than two dwelling units" avoids including R-3 residential occupancies and one- and two-family dwellings regulated under the IRC. This change also coordinates the references to sleeping units throughout the codes for R-1 occupancies to also include dwelling units. While doing this, a couple of instances of dwelling units for R-2 (without the mention of sleeping units) were found and also corrected to include sleeping units to coordinate with the description of R-2 occupancies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification and coordination of the code which will not affect construction cost.

G44-21 Part III

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The Committee agreed with the published reason statement. (14-0)

G44-21 Part III

Individual Consideration Agenda

Public Comment 1:

Proponents: Andrew Klein, representing Airbnb (andrew@asklein.com) requests Disapprove

Commenter's Reason: The stated reason for the proposal is “an apparent gap in the code for transient residential occupancies with dwelling units.” However, as noted during debate over an identical proposal in 2018, it threatens to have the unintended consequence of undermining the growing popularity of the short-term rental (STR) economy – including short-term rentals offered by individuals in their primary or secondary residences. This use has proven to be a boon to property owners, local businesses, and communities (in the form of tax revenue). Where desired, jurisdictions have imposed STR-specific regulations—such as registration and insurance requirements—and/or applied existing codes to STR activity.
There are many forms of short-term rental activity that could be affected by this proposal. For example, “managed home sharing” has emerged where primary residents offer their home to STR guests, with permission and operational support of the landlord. This model provides tenants with more affordable rent, while embracing flexibility for a generation of renters that have increasingly variable work and travel lifestyles, particularly in the wake of the COVID-19 pandemic. Depending on the program, managed models can also provide landlords with oversight, transparency, insurance, and even a cut of the STR revenue that they can use to improve the community for all residents. In such cases, a majority of primary tenants may leverage short-term rentals to augment their income and the code should support this and other responsible short-term rental activity.

In addition, it is worth reiterating that the IBC has traditionally distinguished R-1 occupancies, like hotels, from vacation timeshare properties, which are categorized as R-2, and lodging houses with 5 or fewer guest rooms and boarding houses with 10 or fewer occupants, which are classified as R-3.

For these reasons and others, the ICC overwhelmingly decided at the last cycle in Richmond that a building which essentially looks and functions as a multifamily Group R-2 occupancy does not warrant a change of occupancy.

The proposal seeks to solve the problem stated by the proponent but in the process creates ambiguity for code officials regarding multifamily buildings where short term rental activity takes place, but is not the primary use. Furthermore, Part 4 modified definitions so that they are no longer unique—a traditional apartment complex would now be defined as both an apartment and motel/hotel.

Airbnb is committed to work with stakeholders to solve the stated problem. In fact, we attempted to propose an alternative that would address the gap cited by the proponent while avoiding any unintended consequences. However, this alternative was deemed out of scope by the ICC. As a result, we are willing to work to address the proponent’s concern in the next cycle.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change to code.

Public Comment# 2988

G44-21 Part IV

<u>Proposed Change as Submitted</u>

Proponents: Daniel Willham, Fairfax County, representing Fairfax County (daniel.willham@fairfaxcounty.gov)

2021 International Zoning Code

Revise as follows:

MOTEL, HOTEL. Any building containing six or more <u>*dwelling units* or</u> *sleeping* units <u>in aggregate</u> intended or designed to be used, or that are used, rented or hired out to be occupied, or that are occupied for sleeping purposes by guests.

TABLE 801.2.1 OFF-STREET PARKING SCHEDULE

USE	NUMBER OF PARKING SPACES REQUIRED
Assembly	1 per 300 gross square feet
Dwelling unit	2 per dwelling unit
Health club	1 per 100 gross square feet
Hotel/motel	1 per dwelling or sleeping unit plus1 per 500 square feet of common area
Industry	1 per 500 square feet
Medical office	1 per 200 gross square feet
Office	1 per 300 gross square feet
Restaurant	1 per 100 gross square feet
Retail	1 per 200 gross square feet
School	1 per 3.5 seats in assembly rooms plus1 per faculty member
Warehouse	1 per 500 gross square feet

For SI: 1 square foot = 0.0929 m^2.

Reason: This change corrects discrepancies inadvertently created by past code changes. The description for R-1 occupancies used to only read "R-1 Residential occupancies where the occupants are primarily transient in nature ..." It did not mention sleeping units. The definition for *sleeping units* was added to the code to coordinate with the Fair Housing Act Guidelines (see code change E70-00) and did not involve the descriptions for residential occupancies in Chapter 3. Sleeping units was added to the descriptions of R-1 (2006 IBC) and R-2 (2003 IBC), in changes that do not appear in any code change proposal; these changes are also not marked as changes by bars in the margins. They appear to possibly have been made by the code correlation committee. However, no correction was made to the description of R-1, which, like R-2 occupancies, can also include both dwelling and sleeping units. This has left an apparent gap in the code for transient residential occupancies with dwelling units. This change resolves that by adding "or more than two dwelling units" to the description of R-1. Similar to the wording for the description for R-2, " or more than two dwelling units" avoids including R-3 residential occupancies and one- and two-family dwellings regulated under the IRC. This change also coordinates the references to sleeping units throughout the codes for R-1 occupancies to also include dwelling units. While doing this, a couple of instances of dwelling units for R-2 (without the mention of sleeping units) were found and also corrected to include sleeping units to coordinate with the description of R-2 occupancies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification and coordination of the code which will not affect construction cost.

G44-21 Part IV

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The committee agreed that adding "dwelling unit" to the definition of hotel (R-1) and related table in the IZC, which like R-2 occupancies can also include both dwelling and sleeping units, appropriately correlated the requirements between I-codes. (Vote: 11-0)

G44-21 Part IV

Individual Consideration Agenda

Public Comment 1:

IZC: SECTION 202, TABLE 801.2.1

Proponents: Andrew Klein, representing Airbnb (andrew@asklein.com); John Catlett, representing BOMA International (catlettcodeconsulting@gmail.com) requests Disapprove

Commenter's Reason: The stated reason for the proposal is “an apparent gap in the code for transient residential occupancies with dwelling units.” However, as noted during debate over an identical proposal in 2018, it threatens to have the unintended consequence of undermining the growing

popularity of the short-term rental (STR) economy – including short-term rentals offered by individuals in their primary or secondary residences. This use has proven to be a boon to property owners, local businesses, and communities (in the form of tax revenue). Where desired, jurisdictions have imposed STR-specific regulations—such as registration and insurance requirements—and/or applied existing codes to STR activity.
There are many forms of short-term rental activity that could be affected by this proposal. For example, "managed home sharing" has emerged where primary residents offer their home to STR guests, with permission and operational support of the landlord. This model provides tenants with more affordable rent, while embracing flexibility for a generation of renters that have increasingly variable work and travel lifestyles, particularly in the wake of the COVID-19 pandemic. Depending on the program, managed models can also provide landlords with oversight, transparency, insurance, and even a cut of the STR revenue that they can use to improve the community for all residents. In such cases, a majority of primary tenants may leverage short-term rentals to augment their income and the code should support this and other responsible short-term rental activity.

In addition, it is worth reiterating that the IBC has traditionally distinguished R-1 occupancies, like hotels, from vacation timeshare properties, which are categorized as R-2, and lodging houses with 5 or fewer guest rooms and boarding houses with 10 or fewer occupants, which are classified as R-3.

For these reasons and others, the ICC overwhelmingly decided at the last cycle in Richmond that a building which essentially looks and functions as a multifamily Group R-2 occupancy does not warrant a change of occupancy.

The proposal seeks to solve the problem stated by the proponent but in the process creates ambiguity for code officials regarding multifamily buildings where short term rental activity takes place, but is not the primary use. Furthermore, Part 4 modified definitions so that they are no longer unique—a traditional apartment complex would now be defined as both an apartment and motel/hotel. It also creates a conflict in the number of parking spaces required.

Airbnb is committed to work with stakeholders to solve the stated problem. In fact, we attempted to propose an alternative that would address the gap cited by the proponent while avoiding any unintended consequences. However, this alternative was deemed out of scope by the ICC. As a result, we are willing to work to address the proponent's concern in the next cycle.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change to code.

Public Comment# 2707

G47-21

Proposed Change as Submitted

Proponents: Paul Armstrong, representing IFAI

2021 International Building Code

Revise as follows:

3105.3 Awnings and canopy materials. *Awnings* and *canopies* shall be provided with an *approved* covering that complies with one of the following:

1. The fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.
2. Has a *flame spread index* not greater than 25 when tested in accordance with ASTM E84 or UL 723.
3. Meets all of the following criteria when tested in accordance with NFPA 286:

   3.1. During the 40 kW exposure, flames shall not spread to the ceiling.

   3.2. Flashover, as defined in NFPA 286, shall not occur.

   3.3. The flame shall not spread to the outer extremity of the sample on any wall or ceiling.

   3.4. The peak heat release rate throughout the test shall not exceed 800 kW.

4. All fabric shall be flame -resistant in accordance with the provisions set forth in SFM 19 CCR 1237. Tops and sidewalls shall be made from either fabric that has been treated with an approved exterior chemical process by an approved applicator, or from approved inherently flame-resistant fabric.

Exception: The fire propagation performance and *flame spread index* requirements shall not apply to awnings installed on detached one- and two-family dwellings.

SECTION D105
EXCEPTIONS TO RESTRICTIONS IN FIRE DISTRICT

Revise as follows:

D105.1 General. The preceding provisions of this appendix shall not apply in the following instances:

1. Temporary buildings used in connection with duly authorized construction.
2. A *private garage* used exclusively as such, not more than one *story* in height, nor more than 650 square feet (60 m^2) in area, located on the same lot with a *dwelling*.
3. Fences not over 8 feet (2438 mm) high.
4. Coal tipples, material bins and trestles of Type IV construction.
5. Water tanks and cooling towers conforming to Sections 1510.3 and 1510.4.
6. *Greenhouses* less than 15 feet (4572 mm) high.
7. Porches on dwellings not over one *story* in height, and not over 10 feet (3048 mm) wide from the face of the building, provided that such porch does not come within 5 feet (1524 mm) of any property line.
8. Sheds open on a long side not over 15 feet (4572 mm) high and 500 square feet (46 m^2) in area.
9. One- and two-family *dwellings* where of a type of construction not permitted in the fire district can be extended 25 percent of the floor area existing at the time of inclusion in the fire district by any type of construction permitted by this code.
10. Wood decks less than 600 square feet (56 m^2) where constructed of 2-inch (51 mm) nominal wood, pressure treated for exterior use.
11. Wood *veneers* on *exterior walls* conforming to Section 1404.5.
12. Exterior plastic *veneer* complying with Section 2605.2 where installed on *exterior walls* required to have a *fire-resistance rating* not less than 1 hour, provided that the exterior plastic *veneer* does not exhibit sustained flaming as defined in NFPA 268.
13. Awnings complying with Section 3105.

Add new standard(s) as follows:

SFM

California State Fire Marshal
1131 S Street
Sacramento , CA 95814
USA

SFM 19 CCR 1237
Awning Fabric Flame Testing

Reason: This code change proposal is really in two parts. In the first part, the Industrial Fabric Association International membership has found that most of it's members use either NFPA 701 or the California State Fire Marshal's provisions for flame-resistance testing for awning materials. While many of the new fabric materials are inherently flame-resistance, it is time to recognize those materials that have already been tested and approved by the California State Fire Marshal's office.
The second part is to clarify the application of Appendix D Fire Districts in regards to awnings vs canopies. The provisions of Appendix D are intended to be applied to Canopies only in Section D102.2.8. Awnings have been included in many jurisdictions and this proposal will clarify that awnings that comply with IBC Section 3105 are allowed in identified Fire Districts. There is no change intended in the current application of the provisions of Appendix D.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal recognizes existing practice as such would not be an increase or decrease in cost of construction.

Staff Analysis: A review of the standard proposed for inclusion in the code, SFM 19 CCR 1237, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2021.

G47-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved for the following reasons. The proposed standard is not extensive enough to ensure proper testing for awing materials. The proponent should compare this option to the other three to see if this is truly another option. It was not clear how the applicators would be approved. (Vote: 12-2)

G47-21

Individual Consideration Agenda

Public Comment 1:

IBC: D102.2.8, D105.1

Proponents: Paul Armstrong, representing IFAI (paul@7arms.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

D102.2.8 Permanent canopies . Permanent canopies are permitted to extend over adjacent open spaces provided that all of the following are met:

1. The canopy frame and its supports shall be of noncombustible material, *fire-retardant-treated wood*, Type IV construction or of 1-hour fire-resistance-rated construction.

   ~~**Exception:** Any textile covering for the canopy shall be flame resistant as determined by tests conducted in accordance with NFPA 701 after both accelerated water leaching and accelerated weathering.~~

2. Textile canopy coverings shall be tested in accordance with NFPA 701.

~~2.~~ 3. Any canopy covering, other than textiles, shall have a *flame spread index* not greater than 25 when tested in accordance with ASTM E84 or UL 723 in the form intended for use.

~~3.~~ 4. The canopy shall have one long side open.

~~4.~~ 5. The maximum horizontal width of the canopy shall be not greater than 15 feet (4572 mm).

~~5.~~ 6. The *fire resistance* of *exterior walls* shall not be reduced.

D105.1 General . The preceding provisions of this appendix shall not apply in the following instances:

1. Temporary buildings used in connection with duly authorized construction.
2. A *private garage* used exclusively as such, not more than one *story* in height, nor more than 650 square feet (60 m^2) in area, located on the same lot with a *dwelling*.
3. Fences not over 8 feet (2438 mm) high.
4. Coal tipples, material bins and trestles of Type IV construction.
5. Water tanks and cooling towers conforming to Sections 1510.3 and 1510.4.
6. *Greenhouses* less than 15 feet (4572 mm) high.
7. Porches on dwellings not over one *story* in height, and not over 10 feet (3048 mm) wide from the face of the building, provided that such porch does not come within 5 feet (1524 mm) of any property line.
8. Sheds open on a long side not over 15 feet (4572 mm) high and 500 square feet (46 m^2) in area.
9. One- and two-family *dwellings* where of a type of construction not permitted in the fire district can be extended 25 percent of the floor area existing at the time of inclusion in the fire district by any type of construction permitted by this code.
10. Wood decks less than 600 square feet (56 m^2) where constructed of 2-inch (51 mm) nominal wood, pressure treated for exterior use.
11. Wood *veneers* on *exterior walls* conforming to Section 1404.5.
12. Exterior plastic *veneer* complying with Section 2605.2 where installed on *exterior walls* required to have a *fire-resistance rating* not less than 1 hour, provided that the exterior plastic *veneer* does not exhibit sustained flaming as defined in NFPA 268.
13. Awnings complying with Section 3105.

Commenter's Reason: The revision to Appendix Chapter D, Section D102.2.8 is intended to clarify the application of Item 1 to apply to the supporting canopy frame and supports specifically. Then the exception is deleted and moved in part to a new item 2 for textile coverings. The removal of the added conditions of testing after the accelerated water leaching and weathering is due to the increased protection of NFPA 701 and the fact that there are very few testing agencies that can test a full sized sample after both conditions are met.
The revision adding new item 13 to Section D105.1 recognizes that there is a misperception that the provisions apply to awnings.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
Fabric companies will be able to find many more testing agencies who can provide NFPA 701 testing.

Public Comment# 2870

G50-21

Proposed Change as Submitted

Proponents: Alex Miear, representing Code Consultants, Inc. (CCI) (alexm@codeconsultants.com)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

SECTION 402
COVERED MALL AND OPEN MALL BUILDINGS

Revise as follows:

[F] 402.5 Automatic sprinkler system. *Covered* and *open mall buildings* and buildings connected shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, which shall comply with all of the following:

1. The *automatic sprinkler system* shall be complete and operative throughout occupied space in the *mall building* prior to occupancy of any of the tenant spaces. Unoccupied tenant spaces shall be similarly protected unless provided with *approved* alternative protection.
2. Sprinkler protection for the *mall* of a *covered mall building* shall be independent from that provided for tenant spaces or *anchor buildings*.
3. Sprinkler protection for the tenant spaces of an *open mall building* shall be independent from that provided for *anchor buildings*.
4. Sprinkler protection shall be provided beneath exterior circulation balconies located adjacent to an *open mall*.
5. Where tenant spaces are supplied by the mall ~~same~~ system, they shall be independently controlled.

   Exception: An *automatic sprinkler system* shall not be required in spaces or areas of *open parking garages* separated from the covered or *open mall building* in accordance with Section 402.4.2.3 and constructed in accordance with Section 406.5.

2021 International Fire Code

Revise as follows:

914.2.1 Automatic sprinkler system. Covered and open mall buildings and buildings connected shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, which shall comply with the all of the following:

1. The *automatic sprinkler system* shall be complete and operative throughout occupied space in the mall building prior to occupancy of any of the tenant spaces. Unoccupied tenant spaces shall be similarly protected unless provided with *approved* alternative protection.
2. Sprinkler protection for the mall of a covered mall building shall be independent from that provided for tenant spaces or anchor buildings.
3. Sprinkler protection for the tenant spaces of an open mall building shall be independent from that provided for anchor buildings.
4. Sprinkler protection shall be provided beneath exterior circulation balconies located adjacent to an open mall.
5. Where tenant spaces are supplied by the ~~same~~ mall system, they shall be independently controlled.

Exception: An *automatic sprinkler system* shall not be required in spaces or areas of open parking garages separated from the covered or open mall in accordance with Section 402.4.2.3 of the International Building Code and constructed in accordance with Section 406.5 of the International Building Code.

Reason: Prior to the 2012 IBC (where the code was expanded to provide more distinction between the covered mall building requirements and the open mall building requirements), the mall sprinkler requirements read as follows:

-402.9 (2) - Sprinkler protection for the mall shall be independent from that provided for tenant spaces or anchors. Where tenant spaces are supplied by the same system, they shall be independently controlled.
Item 5 in the 2018 IBC (which originated in the 2012 IBC) is the last sentence of Item 2 in the 2009 IBC.

The 2012 Code change resulted in this sentence becoming its own line item, but when it's not coupled with the preceding sentence in Item 2 of the 2009 IBC, the meaning of the requirement changes (i.e. Item 5 read on its own could be interpreted to require individual control valves for tenants supplied by a common system). However, this was never the intent of this requirement.

As is evident by the 2009 IBC language, the intent of the requirement is to mandate tenant control valves if the tenant sprinkler system supplied by the mall system. Further, the 2009 IBC / 2012 IBC code change documentation does not present this as a technical change (tenant control valves for tenants supplied by a common tenant system is not mentioned anywhere in the code change reasoning for the change). The 2012 IBC Item 5 is not identified with a black line in the margin, which indicates this change was intended to simply be a formatting change and not a technical change to the 2009 IBC requirements. In summary, when Item 5 was formatted in the 2012 IBC as an independent statement, the logic of the 2009 IBC statement was lost.

Replacing the word “same” with “mall” in Item 5 corrects the inadvertent technical change.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change does not alter the technical requirements and does not impact the cost of construction.

G50-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The committee stated that the reason for the approval was based on the improvement of the code language and intent with the replacement of the word "same" with "mall" in the proposal. (Vote: 14-0)

G50-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com) requests Disapprove

Commenter's Reason: There is apparently a discrepancy in the intended application of this section. In contrast to the proponent's reason statement, it is my recollection that the intent of the code has always been to disallow the use of the mall system to supply tenant spaces as a measure of ensuring that either the tenant or mall system could be serviced without losing protection throughout the entire structure, which would result from a single system supplying both spaces. I believe that this redundancy was part of the original BCMC mall protection recommendations as a condition of allowing mall structures into the code with a variety of relaxations vs. what would have otherwise been required (I'll look into verifying this before the public comment hearing). The reference to tenant spaces being supplied by the same system was, as I recall, intended to allow for systems in individual tenant spaces to be serviced independently based on each space having a separate control valve, but still, only having supply piping in common with other tenant spaces and not the mall system.
In summary, I believe that this proposal changes the code in a way that is not consistent with the code's intent, and it results in diminished safety.

Although I am a consultant to NFSA, this proposal was developed on my own, and it is not submitted on NFSA's behalf.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change to code.

Public Comment# 2980

G54-21

Proposed Change as Submitted

Proponents: Jeff Perras, representing Code Red Consultants, LLC (jeffp@crcfire.com)

2021 International Building Code

SECTION 403
HIGH-RISE BUILDINGS

Revise as follows:

403.2.1.1 Type of construction. The following reductions in the minimum *fire-resistance rating* of the *building elements* in Table 601 shall be permitted as follows:

1. For buildings not greater than 420 feet (128 m) in *building height*, the *fire-resistance rating* of the *building elements* in Type IA construction shall be permitted to be reduced to the minimum *fire-resistance ratings* for the *building elements* in Type IB.

   Exception: The required *fire-resistance rating* of columns supporting floors shall not be reduced.

2. In other than portions of a building containing Group F-1, H-2, H-3, H-5, M and S-1 occupancies, the *fire-resistance rating* of the *building elements*in Type IB construction shall be permitted to be reduced to the *fire-resistance ratings* in Type IIA.
3. The *building height* and *building area* limitations of a building containing *building elements* with reduced *fire-resistance ratings* shall be permitted to be the same as the building without such reductions.

Reason: It is common place for a high-rise building to have retail spaces on the First Floor. Simply having these spaces in limited areas of the building should not preclude the entire building from taking this reduction. The commentary for this section, which has remained consistent since at least the 1993 BOCA commentary, states that this reduction is not permitted for moderate-hazard buildings because of their customary higher fuel loads. This proposed change maintains the intent of the code by requiring areas of the building containing these moderate hazards to be constructed of Type IB and allowing other areas to utilize the reduction.

Cost Impact: The code change proposal will decrease the cost of construction
The cost of construction will be reduced by allowing more buildings, or portions thereof, to qualify for this construction type reduction.

G54-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because the proposal could be read to allow for different ratings in parts of the building, including a reduction of supporting construction. The result could be a random mix of construction types in a building. (Vote: 14-0)

G54-21

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 403, 403.2.1.1

Proponents: Jeff Perras, representing Code Red Consultants, LLC (jeffp@crcfire.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

SECTION 403
HIGH-RISE BUILDINGS

403.2.1.1 Type of construction . The following reductions in the minimum *fire-resistance rating* of the *building elements* in Table 601 shall be permitted as follows:

1. For buildings not greater than 420 feet (128 m) in *building height*, the *fire-resistance rating* of the *building elements* in Type IA construction shall be permitted to be reduced to the minimum *fire-resistance ratings* for the *building elements* in Type IB.

   Exception: The required *fire-resistance rating* of columns supporting floors shall not be reduced.

2. In other than ~~portions of a building~~ stories containing and located below Group F-1, H-2, H-3, H-5, M and S-1 occupancies, the *fire-resistance rating* of the *building elements* in Type IB construction shall be permitted to be reduced to the *fire-resistance ratings* in Type IIA.
3. The *building height* and *building area* limitations of a building containing *building elements* with reduced *fire-resistance ratings* shall be permitted to be the same as the building without such reductions.

Commenter's Reason: Multiple concerns were raised during the hearing regarding the complexity of only requiring portions of a building to be of Type IB construction. This modification will require the entire story containing these occupancies, as well as all stories below, to be of Type IB construction. This concept is similar to the podium building allowance in Section 510.2.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
The cost of construction will be reduced by allowing more buildings, or portions thereof, to qualify for this construction type reduction.

Public Comment# 2845

G64-21

Proposed Change as Submitted

Proponents: Jeffrey S. Grove, P.E. FSFPE, Jensen Hughes, representing Jensen Hughes (jgrove@jensenhughes.com)

2021 International Building Code

SECTION 405
UNDERGROUND BUILDINGS

Revise as follows:

405.5.1 Control system. A smoke control system is required on all floor levels for human occupancy located more than 30 feet below the lowest level of exit discharge. The smoke control system is required to control the migration of products of combustion in accordance with Section 909 and the provisions of this section. ~~Smoke control shall restrict movement of smoke to the general area of fire origin and maintain *means of egress* in a usable condition.~~

Reason: For underground buildings required to comply with Section 405, the provisions of Section 405.5.1 do not clearly indicate whether smoke control is required to be provided on individual floor levels located 30 feet or less below the finished floor of the lowest level of exit discharge. As currently worded, this section could be interpreted to require all levels below the finished floor of the lowest level of exit discharge be provided with floor level smoke control whenever any one or more levels is located more than 30 feet below the finished floor of the lowest level of exit discharge. The proposed change is to clarify that smoke control is only required on the specific level(s) that are located more than 30 feet below the finished floor of the lowest level of exit discharge. Floors that are less than that do not require smoke control.

The existing text requires the “means of egress” be maintained in a usable condition. By definition, “means of egress” includes the “exit access.” As the majority of a given floor level is would be considered exit access (e.g., rooms, open spaces, corridors, etc.), the current language is not feasible in many cases. Essentially, it requires all rooms/spaces to be maintained in a usable condition since they are all part of the exit access.

The purpose of Section 909, as identified in Section 909.1, is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. As such, the last line in the code section has been deleted.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification for existing code language.

G64-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because of the deletion of the last sentence. This sentence provides guidance for smoke control systems in underground buildings. (Vote: 14-0)

G64-21

Individual Consideration Agenda

Public Comment 1:

IBC: 405.5.1

Proponents: Jeffrey Grove, representing Jensen Hughes (jgrove@jensenhughes.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

405.5.1 Control system . A smoke control system is required on all floor levels for human occupancy located below the lowest level of exit discharge. The smoke control system is required to control the migration of products of combustion in accordance with Section 909 and the provisions of this section. Smoke control shall restrict movement of smoke to the general area of fire origin ~~and maintain *means of egress* in a usable condition~~.

Commenter's Reason: For underground buildings required to comply with Section 405, the provisions of Section 405.5.1 do not clearly indicate whether smoke control is required to be provided on individual floor levels located 30 feet or less below the finished floor of the lowest level of exit discharge. The Committee indicated that, where the Underground Building provisions are applicable and at least one story is located more than 30 feet below the lowest level of exit discharge, the intent is for smoke control to be provided on all floor levels located below the lowest level of exit discharge. As currently worded, this section could be interpreted to only require levels located more than 30 feet below the finished floor of the lowest level of exit discharge to be provided with floor level smoke control.
The proposed change is to clarify that for Underground Buildings with one or more floor levels located more than 30 feet below the lowest level of exit discharge, smoke control is required on all levels located below the finished floor of the lowest level of exit discharge.

For example, if Levels B1, B2, and B3 are all below the finished floor of the lowest level of exit discharge, but only Level B3 is more than 30 feet below, floor level smoke control is required to be provided on Levels B1, B2, and B3.

The existing text requires the “means of egress” be maintained in a usable condition. By definition, “means of egress” includes the “exit access.” As the majority of a given floor level would be considered exit access (e.g., rooms, open spaces, corridors, etc.), the current language is not feasible in many cases. Essentially, it requires all rooms/spaces to be maintained in a usable condition since they are all part of the exit access. This proposal deletes the latter portion of the last sentence of Section 405.5.1, as the section still requires compliance with Section 909, whose purpose, as identified in Section 909.1, is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is a clarification for existing code language.

Public Comment# 2787

G66-21

Proposed Change as Submitted

Proponents: Matt Frommer, Southwest Energy Efficiency Project, representing Southwest Energy Efficiency Project (mfrommer@swenergy.org)

2021 International Building Code

Add new definition as follows:

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, *EVSE*, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

ELECTIC VEHICLE (EV)-CAPABLE SPACE. A designated parking space that is provided with conduit sized for a minimum 40-amp, 208/240-Volt dedicated branch circuit from a building electrical panelboard to within 3' of the parking space and with sufficient physical space in the same building electrical panelboard to accommodate a 40-amp, dual-pole circuit breaker.

ELECTIC VEHICLE (EV)-READY SPACE. A parking space that is provided with one minimum 40-amp, 208/240-Volt dedicated branch circuit for *electric vehicle supply equipment* that is terminated at a receptacle, junction box or *electric vehicle supply equipment* located within 3 feet (915 mm) of the parking space.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)-INSTALLED SPACE. A designated parking space with dedicated *electric vehicle supply equipment* located within 3 feet (915 mm) of the parking space.

ELECTRIC VEHICLE (EV) FAST-CHARGER. *Electric vehicle supply equipment* with a minimum power output of 25 kW.

SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

Delete and substitute as follows:

~~**406.2.7 Electric vehicle charging stations and systems.** Where provided, electric vehicle charging systems shall be installed in accordance with NFPA 70. Electric vehicle charging system equipment shall be *listed* and labeled in accordance with UL 2202. Electric vehicle supply equipment shall be *listed* and labeled in accordance with UL 2594. Accessibility to *electric vehicle charging stations* shall be provided in accordance with Section 1108.~~

406.2.7 Electric Vehicle (EV) Charging Infrastructure. Where parking is provided, *EV* charging infrastructure shall be provided in accordance with this section and installed in accordance with the National Electrical Code (NFPA 70). Where more than one parking facility is provided on a *site*, the number of *EV-capable, EV-ready*, and *EVSE-installed spaces* shall be calculated separately for each parking facility. When more than 10 parking spaces are added to an existing building, only the new parking spaces are subject to these requirements. *EVSE-installed spaces* may be used to meet requirements for *EV-ready* and *EV-capable spaces. EV-ready spaces* are permitted to be used to meet requirements for *EV-capable spaces.*

Exception: Parking facilities with fewer than 10 spaces.

Add new text as follows:

406.2.7.1 New Parking Facilities for Commercial Buildings.
New parking facilities shall be provided with *EV* charging infrastructure in accordance with Table 406.2.7.1. Calculations for the number of spaces shall be rounded up to the nearest whole number. *EVSE* serving *EVSE-installed spaces* shall be capable of supplying current at a minimum of 6.2 kW. All *EV-capable, EV-ready*, and *EVSE-installed spaces* are to be included in the calculation for the number of minimum vehicle spaces required.

Exception: The number of *EVSE-installed spaces* serving occupancies other than Group R-2 shall be permitted to be reduced by up to five for each parking space equipped with an *electric vehicle fast-charger* .

TABLE 406.2.7.1 EV CHARGING INFRASTRUCTURE

OCCUPANCY	EVSE-INSTALLED SPACES	EV-READY SPACES	EV-CAPABLE SPACES
Group R-2	2%	18%	N/A
All other occupancies	2%	N/A	8%

406.2.7.2 Identification.
Construction documents shall designate all *EV-capable, EV-ready*, and *EVSE-installed spaces* and indicate the locations of conduit and termination points serving them. The circuit breakers or circuit breaker spaces reserved for the *EV-capable, EV-ready*, and *EVSE-installed spaces* shall be clearly identified in the panelboard. The conduit for *EV-capable spaces* shall be clearly identified at both the panelboard and the termination point at the parking space.

Reason: Electric Vehicles (EVs) have emerged as a key climate strategy to reduce greenhouse gas (GHG) emissions from the transportation sector, the largest source of carbon pollution in the U.S. Interest in EVs has grown alongside greater model availability and increased vehicle range, and there are now well over 1.5 million EVs on the road in the U.S. Most industry experts agree that we are entering a big market transformation from gas-powered vehicles to electric.
This transformation is being accelerated by state and federal policy – over a dozen countries plus California and Massachusetts have announced plans to ban the sale of gasoline and diesel vehicles by 2035 or 2040. Twelve other states have adopted California's Zero-Emission Vehicle (ZEV) Standards requiring an increasing percentage of new vehicle sales to be electric each year and at least 3 others – Nevada, New Mexico, and Minnesota – plan to adopt the ZEV Standards in 2021. New buildings constructed with the 2024 IBC will only be 10 years old by the time all new vehicle sales are electric in these states. These government commitments have encouraged the biggest global auto manufacturers to electrify their vehicle models. By 2022, the U.S. market will have a selection of over 100 electric models including over 20 electric SUV and pickup truck models. The auto industry is investing $435 billion in electric transportation over the next decade. **Figure 1: Automaker Commitments to Electric Vehicles.**

Automaker	Electrification Commitment
Audi	20 new EV models by 2025. 800,000 EV sales annually (1/3 of all sales).
BMW	25 electrified vehicle models by 2025. 15 - 25% of annual sales are electric.
Ford	40 EVs by 2022: 16 BEVs, 24 PHEVs
General Motors	20 electric cars by 2023
Honda	2/3 of all sales to be electric by 2030. Every model to have EV option by 2022.
Hyundai Motor Group	44 EV models by 2025
Nissan	8 new EVs by 2022. EVs make up 20-30% of US sales by 2025.
Tesla	Sold 500,000 EVs in 2020.
Toyota	Half of sales are electric by 2025. Every model to have electric or hybrid option.
Volkwagen Group	70 new electric models by 2028. 1 million EVs sold by end of 2023.
Volvo	50% of sales are electric by 2025 (5 new BEVs by 2021)

Based on a 2019 survey, 63% of Americans are interested in EVs and 31% would consider one for their next vehicle purchase. However, the lack of access to EV charging stations continues to be a critical barrier to EV adoption. More specifically, there are significant financial and logistical hurdles for residents of multi-family dwellings and commercial building tenants to install EV charging stations.

A lack of pre-existing EV charging infrastructure, such as electrical panel capacity, raceways, and pre-wiring can make the installation of a new charging station cost-prohibitive for a potential EV-owner, so it's essential this equipment be included in building codes. The installation of an EV charging station is up to six times less expensive when the infrastructure is installed during the initial construction phase as opposed to retrofitting existing buildings to accommodate the new electrical equipment. In the absence of safe and convenient EV charging infrastructure, EV drivers are forced to improvise, running extension cords across sidewalks and parking lots to recharge their vehicles. By requiring EV charging infrastructure near the parking space, the IBC will address a critical safety hazard while giving consumers more choice of which vehicle they drive.

Over 40 municipalities around the country have already adopted EV infrastructure requirements for new residential and commercial buildings including Atlanta, Seattle, Denver, Boston, Fort Collins, New York, Sedona, Honolulu, Chicago, and Tucson. The absence of EV infrastructure requirements in the ICC model has created a patchwork of definitions and requirements with no common standards. For this reason, a group of EV advocates and energy efficiency experts proposed a set of residential and commercial EV infrastructure requirements (CE-217 Parts 1 and 2) in the 2021 IECC code development process.

At the ICC hearings in Albuquerque in 2019, the Commercial IECC Committee voted 8-3 to include CE-217 Part 2, EV infrastructure requirements for new commercial buildings, in the 2021 IECC model code. CE-217 Part 2 was later approved by 82% of the ICC governmental voting members. These governmental members are adopting and implementing the model codes in their communities and the 2021 IECC vote demonstrated overwhelming support for EV charging infrastructure requirements in the code.

After the vote, the National Association of Homebuilders and the American Gas Association appealed the decision on the grounds that the proposal was outside the scope and intent of the IECC. Ultimately, the ICC Appeals Board sided with the appellants and encouraged the ICC and the code proponents to find a more appropriate location for these requirements in the code. The IBC is a better location for EV charging infrastructure and many local governments have chosen to put EV requirements in this section of the code.

New residential and commercial buildings are constructed to last for 100 years or more, and so it is critical that charging infrastructure is incorporated at the pre-construction stage to ensure that new buildings can accommodate the charging needs of future EV-owners. Governments and automakers around the world have announced plans to move toward 100% electric transportation over the next two decades. It's time for the 2024 IBC model code to support the transition by including EV charging infrastructure requirements for new commercial buildings.

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3. Chicago EV-Ready Building Codes Fact Sheet (2020). drive.google.com/file/d/1UTKLna78y3eSaLaWUCbE_TIpFpOwxxVI/view?usp=sharing
4. Plug-In Electric Vehicle Infrastructure Cost Analysis Report for CALGreen Nonresidential Update (Energy Solutions, 2019). caletc.com/wp-content/uploads/2019/10/CALGreen-2019-Supplement-Cost-Analysis-Final-1.pdf
5. Tesla Model Ordinance Related to EV Charging Infrastructure (2018). drive.google.com/file/d/1xRDa-oj0pyUbUgIg9mRUEjO2sSJxZW5M/view?usp=sharing
6. SWEEP blog: Cracking the Code on EV-Ready Building Codes (2018). www.swenergy.org/cracking-the-code-on-ev-ready-building-codes

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal will increase the cost of initial construction, but provide long-term savings for EV owners and commercial building owners through the avoided costs of installing EV charging infrastructure during a stand-alone retrofit.

The installation of EV charging infrastructure is four to six times less expensive when included during the initial construction phase as opposed to a retrofit. Several factors contribute to higher costs:

Demolition and repair of surface parking.
Breaking and repairing walls.
Longer conduit runs (also referred to as raceways) – Removing and repairing 100 - 300 linear feet of surface parking to add conduit can cost $11,500 to $32,000 in demolition and repair costs.
Upgrading electric service panels.
Soft costs: permits, plans, inspections, and project management.

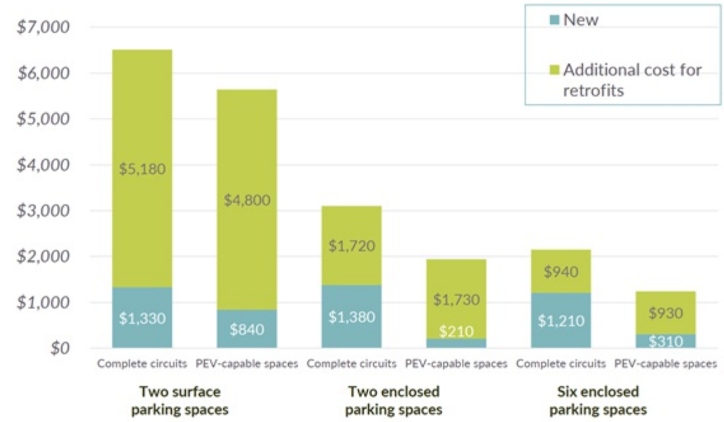
Given the momentum toward widespread EV adoption, the cost to pre-wire new buildings with EV charging infrastructure should be compared to the cost of installing the same equipment at a later date during a retrofit, rather than the cost of avoiding such equipment altogether.One study analyzed the cost implications of California's EV infrastructure building codes, which have been in place for 5 years, and found that each EV-Capable parking space installed in a multi-unit dwelling during new construction saves $2,040 - $4,635 over the retrofit scenario. Multiply those savings by the number of new EV charging stations required to provide charging access for millions of MUD residents and the potential savings amounts to billions of dollars that can be spent elsewhere in the economy.
Denver's EV infrastructure building code proposal included the following cost estimates for EV-Capable and EV-Ready parking spaces during new construction and stand-alone retrofit:

EV Infrastructure Requirement	During New Construction	During Retrofit	Savings
EV-Capable (panel capacity + raceway)	$300 per space	$2,500 per space	$2,200 per space
EV-Ready (full circuit)	$1,300 per space	$6,300 per space	$5,000 per space

These costs are highly dependent on the parking lot configuration, design, and number of EV-Capable or EV-Ready parking spaces. For their code update, the City of Oakland developed a detailed cost- effectiveness report with a range of cost savings estimates for different parking scenarios:

Figure 4.

Cost Savings for the City of Oakland (2020)



Definitions: “Complete circuits” = EV-Ready parking space, “PEV-capable space” = EV-Capable parking space.

The cost of EV-Capable infrastructure also varies by building size. A report prepared for the California Electric Transportation Commission measured the cost impact of a 10% EV-Capable parking requirement for small, medium, and large office and retail buildings, including cost estimates for alterations and additions. Larger buildings with more parking spaces reported a lower cost per EV-Capable parking space with economies of scale, but across all building sizes, the cost to install EV-Capable infrastructure during new construction is four to six times less expensive than during a stand-alone retrofit.

Figure 5. Estimated Cost of Installing EV Capable Parking per EV Capable Parking Space. Refer to Table 7 in the report for a more detailed breakdown of the costs by type of expense.

	Potential CALGreen 2019 Supplement - 10% of parking spaces		
	New Construction	Alterations & Additions	Stand-Alone Retrofit
Small Office/ Retail Surface Parking	$905	$925 to $1,178	$5,540
Medium Office/ School Surface Parking	$901	$928 to $1,322	$4,155
Large Office/ Retail/ Hospital Enclosed Parking	$739	$741 to $1,052	$2,779

The EV infrastructure costs may seem high, but the overall impact on building costs is low. An analysis done by the California Air Resources Board in 2018, examined the costs of adding EV Ready requirements for new multi-family developments. It found that adding panel capacity and conduit during new construction would add between 0.1% and 0.2% to the total building cost.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved for several reasons. There are requirements in the definitions - these need to be removed. The requirement is disproportionate for EV equipment in Group R-2 facilities. There are goverment incentives to provide these systems - the proponent said there were not. Adding these systems is a business decision, and should not be a requirement. These requirements are better located in land use ordinances, Zoning or the IgCc. The proposal was not coordinated with the EV requirements in the IBC Section 1108. (Vote: 11-3)

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 202, 406.2.7, 406.2.7.1, TABLE 406.2.7.1, 406.2.7.2, 406.2.7.1 (New), 406.2.7.2 (New), 406.2.7.3 (New), 1107.1, 1107.2, 1107.2.1

Proponents: Matthew Frommer, representing Southwest Energy Efficiency Project (mfrommer@swenergy.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

ELECTRIC VEHICLE (EV) . An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, *EVSE*, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

ELECTIC VEHICLE (EV)-CAPABLE SPACE . A vehicular ~~designated~~ parking space that is provided with the infrastructure necessary for the future installation of an *EVSE* – such as conduit, raceways, electrical capacity, or signage – or reserved physical space for such infrastructure. ~~conduit sized for a minimum 40-amp, 208/240-Volt dedicated branch circuit from a building electrical panelboard to within 3' of the parking space and with sufficient physical space in the same building electrical panelboard to accommodate a 40-amp, dual-pole circuit breaker.~~

[BG] ELECTRIC VEHICLE CHARGING STATION . One or more vehicle spaces served by an electric vehicle charging system.

~~**ELECTRIC VEHICLE (EV) FAST-CHARGER .** *Electric vehicle supply equipment* with a minimum power output of 25 kW.~~

ELECTIC VEHICLE (EV)-READY SPACE . A vehicle parking space that is provided with an electric circuit capable of supporting an installed EVSE ~~one minimum 40-amp, 208/240-Volt dedicated branch circuit for electric vehicle supply equipment that is terminated at a receptacle, junction box or electric vehicle supply equipment located within 3 feet (915 mm) of the parking space~~.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) . The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)-INSTALLED SPACE . A vehicle ~~designated~~ parking space that is provided with a dedicated EVSE ~~with dedicated electric vehicle supply equipment located within 3 feet (915 mm) of the parking space.~~

406.2.7 Electric Vehicle (EV) Charging Infrastructure . Where provided, electric vehicle charging infrastructure shall be installed in accordance with NFPA 70. Electric vehicle charging infrastructure shall be listed and labeled in accordance with UL 2202. *EVSE* shall be listed and labeled in accordance with UL 2594. Accessibility to *EVSE* shall be provided in accordance with Section 1108. Where parking is provided, *EV* charging infrastructure shall be provided in accordance with Sections 406.2.7.1 through 406.2.7.3. For Group R-2 occupancies, 20 percent of the total parking spaces shall be EV-ready spaces. ~~this section~~ ~~and~~ ~~installed in accordance with the National Electrical Code (NFPA 70).~~ Where more than one parking facility is provided on a *site*, the number of ~~*EV-capable,*~~ *EV-ready*~~, and~~ ~~*EVSE-installed*~~ *spaces* shall be calculated separately for each parking facility. Where ~~When more than~~ 10 or more parking spaces are added to an existing building, only the ~~new~~ parking spaces being added are subject to these requirements. *EVSE-installed spaces* ~~may~~ arepermitted to be used to meet requirements for *EV-ready* and *EV-capable* ~~spaces.~~ ~~spaces.~~ *spaces. EV-ready* spaces are permitted to be used to *meet requirements for EV-capable spaces.*

Exception: *Parking facilities with fewer than 10 spaces.*

~~**406.2.7.1 New Parking Facilities for Commercial Buildings.**~~ **.** ~~New parking facilities shall be provided with *EV* charging infrastructure in accordance with Table 406.2.7.1. Calculations for the number of spaces shall be rounded up to the nearest whole number. *EVSE* serving *EVSE-installed spaces* shall be capable of supplying current at a minimum of 6.2 kW. All *EV-capable, EV-ready,* and *EVSE-installed spaces* are to be included in the calculation for the number of minimum vehicle spaces required.~~

~~**Exception:** The number of *EVSE-installed spaces* serving occupancies other than Group R-2 shall be permitted to be reduced by up to five for each parking space equipped with an *electric vehicle fast-charger.*~~

~~TABLE 406.2.7.1 EV CHARGING INFRASTRUCTURE~~

~~OCCUPANCY~~	~~EVSE-INSTALLED SPACES~~	~~EV-READY SPACES~~	
~~Group R-2~~	~~2%~~	~~18%~~	~~N/A~~
~~All other occupancies~~	~~2%~~	~~N/A~~	~~8%~~

~~**406.2.7.2 Identification** . Construction documents shall designate all *EV-capable, EV-ready,* and *EVSE-installed spaces* and indicate the locations of conduit and termination points serving them. The circuit breakers or circuit breaker spaces reserved for the *EV-capable, EV-ready,* and *EVSE-installed spaces* shall be clearly identified in the panelboard. The conduit for *EV-capable spaces* shall be clearly identified at both the panelboard and the termination point at the parking space.~~

406.2.7.1 EV-capable spaces . Where provided, *EV-capable spaces* shall be provided with electrical infrastructure that meets the following requirements:

1. Conduit or approved wiring that is continuous between a junction box or outlet located within 3 feet (914 mm) of the parking space and an electrical panel serving the area of the parking space,
2. The electrical panel to which the conduit connects shall have sufficient dedicated physical space for a dual-pole, 40-amp breaker,
3. The conduit shall be sized and rated to accommodate a 40-amp, 208/240-volt branch circuit and have a minimum nominal trade size of 1 inch,
4. The electrical junction box and the electrical panel directory entry for the dedicated space in the electrical panel shall have labels stating “For future electric vehicle charging”.

406.2.7.2 EV-ready spaces . The branch circuit serving *EV-Ready Spaces* shall meet the following requirements:

1. A minimum 40-amp, 208/240-Volt dedicated branch circuit that terminates at a receptacle, junction box or *EVSE* located within 3 feet (914 mm) of the parking space,
2. The electrical panel directory shall designate the branch circuit as “For electric vehicle charging” and the junction box or receptacle shall be labelled “For electric vehicle charging”.

406.2.7.3 EVSE-installed spaces . Where provided, the *EVSE* serving *EVSE-installed spaces* shall be capable of supplying not less than 6.2 kW to an *electric vehicle* and shall be located within 3 feet (914 mm) of the parking space.

1107.1 General . Electrical vehicle charging stations shall comply with Section 1107.2. Fuel-dispensing systems shall comply with Section 1107.3.

1107.2 Electrical vehicle charging stations . Electrical vehicle charging stations infrastructure shall comply with Sections 1107.2.1 and 1107.2.2.

Exception: Electrical vehicle charging stations provided to serve Group ~~R-2,~~ R-3 and R-4 occupancies are not required to comply with this section.

1107.2.1 Number of accessible vehicle spaces . Not less than 5 percent of vehicle spaces on the site served by electrical vehicle charging systems, but not fewer than one for each type of electric vehicle charging systems, shall be accessible.

Commenter's Reason: The purpose of this public comment is to address the feedback from the Committee Action Hearing and simplify the code language to provide more clarity and avoid any redundancies.
CAH Comment #1: *“There are requirements in the definitions - these need to be removed.”*

The public comment removes the requirements from the definition section and adds them to Section 406.

CAH Comment #2: *“The requirement is disproportionate for EV equipment in Group R-2 facilities.”*

The public comment removes the Electric Vehicle (EV) charging infrastructure requirements for nonresidential occupancies and focuses on multi-unit dwellings (MUDs) to address the most critical barriers to EV adoption – the exorbitant costs and logistical challenges of retrofitting MUDs with EV charging infrastructure. According to the ICCT, 92% of charging ports used in metropolitan areas across the U.S. are located at the residence, but MUD residents are often left out. Such discrepancies are appearing in the data. For example, in California, the largest EV market in the U.S., nearly 50% of residents live in MUDs, yet only 20% of all EVs in the state are located at these residences, indicating a significant gap in access to EVs depending on one’s living situation.

The public comment creates mandatory requirements for new MUD buildings to improve equity and access across all income levels and housing situations, save consumers money on installation costs, and improve safety for residents by eliminating the need for long extension cords to charge EVs. Many analysts expect the U.S. to exceed a 20% EV penetration by 2030. Our model building codes should be updated to prepare new MUD buildings for an electric transportation future with a minimum 20% EV-Ready spaces. In addition, an electrical panel sized to deliver EV-Ready service for 20% of parking spaces is sufficient future-proofing for a post-2030 scenario where builders and property owners will likely install more sophisticated load management systems to distribute the electricity across a greater number of EVs based on the vehicle charging needs. These requirements are meaningful without being too stringent or prescriptive. If implemented, they will provide the electrical infrastructure to facilitate the future installation of EV charging stations without selecting a "winning" EV charging station technology, giving the industry plenty of room to innovate in the future.

Importantly, this proposal provides standard definitions for all three infrastructure types – EV-Capable Space, EV-Ready Space, and EVSE-Installed Space – and a Table to give local jurisdictions the flexibility to add occupancies types and adjust the percentages to increase the stringency.

CAH Comment #3: *"There are government incentives to provide these systems - the proponent said there were not."*

The public comment removes the requirements for EVSE-Installed Spaces, but maintains the definition to give local jurisdictions the option to incorporate such requirements as they see fit.

While it is true there are government incentives to support the deployment of EV charging stations, it's important to note that most of these programs are limited to the EV charging station hardware and do not apply to the electrical infrastructure required to provide electrical service to the parking space, known in the industry as "make-ready infrastructure". For example, Green Mountain Power's EV charger incentive program in Vermont provides $600 for a Level 2 charging station, but does not include incentives to offset the cost of infrastructure upgrades (pre-wiring, panel capacity, conduit), which in a MUD, can be up to $5,540 per parking space. Such programs are common and while they do increase access to EV charging, they do not address the exorbitant cost of installing EV infrastructure during a stand-alone retrofit versus new construction. In contrast, the modified G66 proposal requires builders to install the EV infrastructure between the electrical panel and the parking space to give future residents the option to install an EV charging station at low cost.

In addition, the majority of state-funded EV charging incentive programs are funded by the $3 billion Volkswagen Settlement from 2016, which is a finite funding source. For example, Utah received $35 million from the VW settlement fund and used about $3.8 million to build EV charging stations at public facilities, office buildings, and universities. However, as of May 2021, the state's Department of Environmental Protection had awarded all of its VW settlement funds and does not currently have a plan or policy to replenish program funding.

CAH Comment #4: *"Adding these systems is a business decision, and should not be a requirement."*

The public comment removes the requirements for business occupancy types and focuses on multifamily residential buildings. Local jurisdictions have the option to adjust EV infrastructure requirements for other commercial occupancy types.

CAH Comment #5: *"These requirements are better located in land use ordinances, Zoning or the IgCc."*

While many local jurisdictions have added EV infrastructure parking requirements through local ordinance, we strongly believe this belongs in the model building code, the guiding document for designers and builders. The lack of direction on EV charging infrastructure from the ICC has resulted in a patchwork of over 50 locally-developed EV infrastructure requirements with different definitions and technical specifications, which has only confused and frustrated builders and customers, and in some cases resulted in poor code language. This proposal would provide a set of standard definitions for EV infrastructure and require 20% of parking spaces in MUDs to be EV-Ready, a minimum requirement that has been adopted by numerous local governments and states over the last 5-6 years, and exceeded by dozens of others.

While the IgCC may be a potential alternative for EV infrastructure parking requirements, relatively few jurisdictions have adopted the 2018 IgCC, limiting its impact on new buildings. In order to match EV market growth projections while improving equity and access to more residents and lowering the costs of installation for generations to come, these EV charging infrastructure requirements should be implemented in the 2024 IBC model code.

CAH Comment #6: *"The proposal was not coordinated with the EV requirements in the IBC Section 1108."*

Section 1108 doesn't include any reference to EV charging infrastructure, but Section 1107 does. This public comment includes modifications to Section 1107 to remove the exemption for R-2 occupancies.

Bibliography:

1. https://energyinnovation.org/wp-content/uploads/2020/09/Increasing-Electric-Vehicle-Charging-at-Multi-Unit-Dwellings_FINAL3.pdf
2. https://apnews.com/article/electric-vehicles-technology-business-d874b87e8b7f9e2aa25330b31040c8d4#:~:text=DETROIT%20(AP)%20%E2%80%94%20Ford%20expects,from%20this%20year%20to%20202
3. https://about.bnef.com/blog/electric-vehicle-sales-set-to-rise-faster-than-ever-but-more-policy-action-needed-to-get-on-track-for-net-zero/
4. https://greenmountainpower.com/rebates-programs/electric-vehicles/in-home-ev-charger/
5. https://deq.utah.gov/air-quality/electric-vehicle-supply-equipment-awards
6. https://www.swenergy.org/transportation/electric-vehicles/building-codes

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
The public comment will reduce the cost of construction compared to the original proposal by removing EV charging infrastructure requirements for all commercial buildings and instead, focusing on multi-unit dwellings (R-2 occupancies). The public comment does not affect the cost per parking space estimates from the Cost Impact statement in the original proposal.

Public Comment 2:

IBC: SECTION 202, SECTION 406, 406.2.7 (New), 406.2.8 (New), APPENDIX P (New), SECTION P101 (New), P101.2 (New), SECTION P102 (New), P102.1 (New), SECTION P103 (New), 406.2.7, 406.2.7.1, TABLE 406.2.7.1, 406.2.7.2

Proponents: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

ELECTRIC VEHICLE (EV) . An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, *EVSE*, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) . The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

406.2.7 Electric vehicle charging stations and systems . Where provided, electric vehicle charging systems shall be installed in accordance with NFPA 70. Electric vehicle charging system equipment shall be *listed* and labeled in accordance with UL 2202. Electric vehicle supply equipment shall be *listed* and labeled in accordance with UL 2594. Accessibility to *electric vehicle charging stations* shall be provided in accordance with Section 1108.

406.2.8 EVSE-Installed spaces at buildings . Where 25 or more parking spaces and lighting for parking areas are installed at buildings, at least one parking space shall be an EVSE-installed space rated at 208 Volts or greater and 40 Amps or greater. Where more than one parking facility is provided on a *site*, the number of EVSE-installed spaces shall be calculated separately for each parking facility. Where 25 or more parking spaces and lighting are added to an existing parking area or *site*, only the new parking spaces being added are subject to these requirements.

APPENDIX P
ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

SECTION P101
GENERAL

P101.2 Purpose . The purpose of this appendix is to supplement the *International Building Code* and require the installation of electric vehicle charging infrastructure.

P101.2 Scope . The provisions of this appendix shall be applicable for new construction of parking facilities where electric vehicle charging infrastructure is required.

SECTION P102
DEFINITIONS

P102.1 General . The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

ELECTIC VEHICLE (EV)-CAPABLE SPACE . A designated parking space that is provided with conduit sized for a minimum 40-amp, 208/240-Volt dedicated branch circuit from a building electrical panelboard to ~~within 3' of~~ the parking space and with sufficient physical space in the same building electrical panelboard to accommodate a 40-amp, dual-pole circuit breaker.

ELECTRIC VEHICLE (EV) FAST-CHARGER . *Electric vehicle supply equipment* with a minimum power output of not less than 25 kW.

ELECTIC VEHICLE (EV)-READY SPACE . A parking space that is provided with one minimum 40-amp, 208/240-Volt dedicated branch circuit for *electric vehicle supply equipment* that is terminated at a receptacle, junction box or *electric vehicle supply equipment* ~~located within 3 feet (915 mm) of the parking space space.~~ .

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)-INSTALLED SPACE . A designated parking space with dedicated *electric vehicle* *supply equipment*. ~~located within 3 feet (915 mm) of the parking space.~~

SECTION P103
INFRASTRUCTURE

~~406.2.7~~ P103.1 Electric Vehicle (EV) Charging Infrastructure . Where parking is provided,*EV* charging infrastructure shall be provided in accordance with this section and installed in accordance with the National Electrical Code (NFPA 70). Where more than one parking facility is provided on a *site*, the number of *EV-capable, EV-ready,* and *EVSE-installed spaces* shall be calculated separately for each parking facility. ~~When more than 10 parking spaces are added to an existing building, only the new parking spaces are subject to these requirements.~~ *EVSE-installed spaces* ~~may~~ shall be permitted to be used to meet requirements for *EV-ready* and *EV-capable spaces*. *EV-ready spaces* are permitted to be used to meet requirements for *EV-capable spaces*.

Exception: Parking facilities with fewer than 10 spaces.

~~406.2.7.1~~ P103.1.1 ~~New~~ Parking Facilities for Commercial Buildings. . ~~New~~ parking facilities shall be provided with *EV* charging infrastructure in accordance with Table ~~406.2.7.1~~ P103.1.1. ~~Calculations for the number of spaces shall be rounded up to the nearest whole number.~~ *EVSE* serving *EVSE-installed spaces* shall be capable of supplying current at a minimum of 6.2 kW. ~~All *EV-capable, EV-ready,* and *EVSE-installed spaces* are to be included in the calculation for the number of minimum vehicle spaces required.~~

Exception: ~~The~~ For other than Group R-2 occupancies, the number of *EVSE-installed spaces* serving occupancies ~~other than Group R-2~~ shall be permitted to be reduced by up to five for each parking space equipped with an *electric vehicle fast-charger*.

TABLE ~~406.2.7.1~~ P103.1.1 EV CHARGING INFRASTRUCTURE

OCCUPANCY	EVSE-INSTALLED SPACES	EV-READY SPACES	EV-CAPABLE SPACES
Group R-2	2%	18%	N/A
All other occupancies	2%	N/A	8%

~~**406.2.7.2**~~ **P103.1.2 Identification .** ~~Construction documents shall designate all *EV-capable, EV-ready,* and *EVSE-installed spaces* and indicate the locations of conduit and termination points serving them.~~ The circuit breakers or circuit breaker spaces reserved for the *EV-capable, EV-ready,* and *EVSE-installed spaces* shall be ~~clearly~~ identified in the panelboard. The conduit for *EV-capable spaces* shall be ~~clearly~~ identified at both the panelboard and the termination point at the parking space.

Commenter's Reason: The revised text addresses the concerns of the committee by removing requirements from the definitions and by removing any disproportionate requirements for R-2 buildings.
In addition, the requirement is only for new buildings with a significant number of parking spaces and lighting, so that the incremental cost of installing a Level 2 (208/240 Volt) EV charging station is minimized. A parking lot or garage with lighting will already have panel space, conduits, raceways, and wiring for the lighting that is likely to be rated at 277 Volts, single phase.

The original language is moved to a new Appendix to allow jurisdictions the flexibility to adopt more stringent requirements if they choose.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
At new buildings with at least 25 parking spaces and lighting for the parking area (parking lot or garage), it is estimated that the cost to install one Level 2 charging station and associated wiring will be around $1,000 to $1,500.

Public Comment# 2509

Public Comment 3:

Proponents: Sharon Bonesteel, representing salt river project (sharon.bonesteel@srpnet.com) requests As Submitted

Commenter's Reason: All of the major automakers have announced their plans for electrifying their offerings in the next 5 years, give or take. To build facilities now that we expect to last 30 years and not plan to accommodate electric vehicle charging is short sighted. If yours is a small rural community, then you can delete this in your local adoptions, but cities and towns require standard requirements, language and definitions for their EV ready communities of the not so distant future.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
While the net change will increase the cost of construction, the net savings to the EV owner will be significant.

Public Comment# 2942

G67-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

Revise as follows:

406.3.1 Classification. *Private garages* and carports shall be classified as Group U occupancies. ~~Each *private garage* shall be not greater than 1,000 square feet (93 m^2) in area. Multiple *private garages* are permitted in a building where each *private garage* is separated from the other*private garages* by 1-hour *fire barriers* in accordance with Section 707, or 1-hour *horizontal assemblies* in accordance with Section 711, or both.~~

Add new text as follows:

406.3.2 Allowable Area.
Each private garage shall be not greater than 1,000 square feet (93 m^2) in area. Multiple private garages are permitted in a building where each private garage is separated from the other private garages by 1-hour fire barriers in accordance with Section 707, or 1-hour horizontal assemblies in accordance with Section 711, or both. Where located in a mixed occupancy building, the allowable area of the building shall be determined by including the area of the private garages as part of the area for one of the other occupancies.

Reason: This proposal is to re-instate a provision that G59-12 incidentally removed. Item 1 of Section 406.3.2 of the 2012 IBC provided a path to include the area of a private garage as part of the major occupancy of the building. This allowed for attached private garages in buildings where they are commonly located to not cause a significant reduction in the allowable area of the entire building. G59-12 removed that provision without providing another measure to address it. Not allowing this often creates an unnecessary and significant reduction in the allowable area of the building. For instance, where located in a Group B or M, as the private garage is classified as a U, the allowable area of the non-sprinklered building is 5,500 instead of 9,000. Section 406.3.2, which does address other occupancies, would require compliance with 508 and therefore require a 2-hour fire barrier to allow minimal additional area.
This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will decrease the cost of construction
This proposal will result in a reduction in cost of construction in cases where it will allow for a larger building without having to go to a more restrictive type of construction, or other method of area increase.

G67-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this was a good idea to allow for private garages in small business occupancies, however the proposal was disapproved because there was a concern that someone would put multiple private garages in a mixed use building as a way to exceed the area limitations permitted for Group U or S-2. (Vote: 14-0)

G67-21

Individual Consideration Agenda

Public Comment 1:

IBC: 406.3.2

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

406.3.1 Classification . *Private garages* and carports shall be classified as Group U occupancies.

406.3.2 Allowable Area . Each private garage shall be not greater than 1,000 square feet (93 m^2) in area. Multiple private garages are permitted in a building where each private garage is separated from the other private garages by 1-hour fire barriers in accordance with Section 707, or 1-hour horizontal assemblies in accordance with Section 711, or both. Where located in a mixed occupancy building, the allowable area of the building shall be determined by including the area of the private garages as part of the area for ~~one of~~ the ~~other occupancies~~ <u>occupancy served by the private garage</u>.

Commenter's Reason: The proposed modification is to address the concerns of the committee. This should stop garages not related to specific occupancies from being combined into a larger building. The intent is to recognize that private garages with one-hour fire resistance rated separation every 1,000 sq.ft. offers equivalent or better protection to that provided for group separation provided by Section 508. For that reason, it is reasonable to allow for the private garage area to be included in the area limitation of the occupancy served.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
This proposal will result in a reduction in cost of construction in cases where it will allow for a larger building without having to go to a more restrictive type of construction, or other method of area increase.

Public Comment# 2682

G68-21

Proposed Change as Submitted

Proponents: Ali Fattah, City of San Diego Development Services Department, representing City of San Diego Development Services Department (afattah@sandiego.gov)

2021 International Building Code

SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

Revise as follows:

406.3.1 Classification. *Private garages* and carports shall be classified as Group U occupancies. ~~Each~~ A *private garage* shall be not greater than ~~1,000~~ 3,000 square feet ~~(93 m)~~ (279 m^2) in area. ~~Multiple *private garages* are permitted in a building where each *private garage* isseparated from the other *private garages* by 1-hour *fire barriers* in accordance with Section 707, or 1-hour *horizontal assemblies* in accordance with Section 711, or both.~~ *Private garages* shall be atmospherically separated from enclosed parking garages *or open parking garages.*

Add new text as follows:

406.3.1.1 Multiple private garages.
Multiple *private garages* are permitted in a building where each *private garage* has a floor area not greater than 1,000 square feet (93 m^2) and is separated from the other parking garages or *private garages* by 1-hour *fire barriers* in accordance with Section 707, or 1-hour *horizontal assemblies* in accordance with Section 711, or both.

Revise as follows:

406.6.2 Ventilation. A mechanical *ventilation* system and exhaust system shall be provided in accordance with Chapters 4 and 5 of the International Mechanical Code.

~~**Exception**~~ **Exceptions:**

1. Mechanical *ventilation* shall not be required for enclosed parking garages that are accessory to one- and two-family *dwellings.*
2. Mechanical *ventilation* shall not be required for enclosed private garages that have a floor area of 3,000 square feet (279 m^2) or less.

Reason: The proposed code change is submitted to address what may have been an error in the adoption of a reduction to the permitted area for private garages when amendments to the 2012 IBC were debated, and ultimately approved in Portland. While not apparent then, code application for projects today reveals that what seemed to be a benign code change is placing significant burdens on small residential mixed-use projects and small non-residential projects incorporating private garages for their tenants. The code change did not consider the impacts on covered common parking areas that the IBC does not exclude from a Group U private garage classification (see figures 1, 2 below).
Reason for code change: Many urban Cities in the United States, like San Diego, are working to solve housing affordability issues and encourage infill development to eliminate blight. Frequently these projects are proposed on constrained sites and on sites that previously accommodated one or two single family dwellings with alley access from a 15 ft or 20 ft wide alley; some alleys are 10 ft wide but they are less common. Additionally, and to encourage walkable communities zoning regulations require some street frontage of non-residential space so a token office or small retail space are incorporated. The proposed code change seeks to permit small projects to incorporate private garages classified as Group U that have an area up to 3,000 sq ft as was the case prior to publication of the 2015 IBC. This code change will provide the following benefit:

- Will allow configurations with Group U private garages accessed by common driveways that are located below upper levels of the building.
- Will allow small parking garages to serve a mixed use building without classifying the garage as Group S-2 public or open garages. This will reduce the cost of construction and the need for mechanical ventilation or non-combustible construction.
- If constructed with non rated construction, this code change may lessen fire separation burdens on the alley side where FSD may be 10 feet to the center line of a 20 ft alley, since many projects are of Type VB construction.
- Will prevent gaming of the system where the common driveway is classified as Group S-2 and the private garages as Group U with separation only provided between group U private garages. Table 508.4 does not require a separation between Group S-2 and U since it does not expect both to be located in the same building or even parking area.
- Will prevent the need to divide up a small garage with fire barriers to satisfy the 1,000 sq ft area limit and require the installation of overhead rolling fire doors that will not be maintained.

Many of the proposed private garages need to exceed 1,000 sq ft to accommodate accessible parking, spaces with required electric vehicle chargers as well as residential and non-residential parking.

- We see project configurations with attached private garages in 4- or 5-unit buildings that have private vehicular entry doors and are served by drive aisles that are covered by the building above. The garage area is also about 1,800 to 3,000 sq ft. The area of the drive aisle which is under the building above is also classified as Group U and is additive to the Group U area. When designed to comply with the 2021 IBC these projects need to be divided by 1 or more fire barriers and the fire barriers require one or more roll up fire doors to accommodate drive aisles passing through or need to be placed in front of the attached private garages. An unnecessary level of complexity and a reliance on homeowners to maintain fire doors associated with unit garages make the regulations ineffective.

- When parking requirements for residential and non-residential uses are compounded with required accessible parking spaces for both residential and non-residential uses as well as spaces for electric vehicle charging systems a small project has no room for the placement of the 1-hour fire barriers and as a result another option is necessary. Vehicle stacker lifts are becoming popular to accommodate small garages however accessible and EV parking cannot be stacked and drive aisles and turning spaces are also needed to access all three types of spaces. The attached Figure 1 shows a mixed use 2 story building with two R-3 dwellings above a Group B and private garage for the use of residential and non-residential tenants.
- Consistent application of the code is not possible since a garage classified as Group S-2 does not require a separation from a private garage classified as Group U so applicant have separated private garages from one another with a 1-hour fire barrier and classified the drive aisle as Group S-2 with entry points of the drive aisle providing ventilation. The Figure 2 attached shows a garage/driveway covered by an R-2 building above.

The main reason that a Group U parking garage is desirable are the two following requirements:

1. Mechanical ventilation is not required for private garages but is required for public garages if not complying as open parking garages (IMC Section 404.1).
2. Exterior wall opening area limitations applicable to S-2 enclosed parking garages are significantly more onerous than for Group U, since the latter have no limit at FSD of 10 ft (due to IBC Table 705.5 allowance for zero fire resistance for exterior wall in zero rated type B construction per IBC 705.8.1 Exc 2). Only open parking garages get this benefit, group U private garages do not require openness to omit ventilation.

Code Change G59-12: The proposed code change provides a necessary update to the IBC to correct inadvertent issues that resulted from the adoption of G59-12 attached which was submitted by the Building Code Action Committee. The code changes revised Section 406 to complete regulations for private garages that somehow during the drafting of the 2000 IBC omitted necessary requirements for carports and the code change added definitions for private garages. Additionally, then Section 406.3.2 was deleted to not allows area increases to the then permitted 3,000 sq ft area limit. Section 406.3.1 was also revised to require a 1-hour fire barrier to separate private garages from one-another and most likely the building configuration envisioned was exterior driveways open to the sky providing access to a series of side by side double or tandem private garages that either had direct/indirect access to dwelling units.

- The code changed lowered the area threshold to 1,000 from the 3,000 sq ft that has existed since the publication of the 1967 UBC but did not provide justification for why it was necessary to reduce the area from a fire risk perspective.
- The justification also discussed the area limit in the context of natural ventilation openings and cited Section 402.2 of the International Mechanical code that requires “The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.” exterior openings. Furthermore, an additional general requirement in the charging Section 401.2 to the chapter 4 requires that “Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403.”
- If mechanical ventilation is not present the IMC requires natural ventilation for all uses and occupancies including private garages, and as a result there was no reason to reduce the area of garages due to ventilation concerns.

The proposed code change results in an option to allow a larger private garage that has been 3,000 sq ft for more than 45 years with no known issues due CO exposure or fire hazards. Additionally, auto emissions have improved significantly over the past 50 years and the prevalence of electric vehicles and hybrid vehicles further reduces vehicle emissions. Hazards in garages due to CO occur during long term exposure and where there is a constant flow of motor vehicles like in the case for example of below ground garages in regional shopping malls. The hazards are primarily to the parking toll taker when not automated.

Mixed use residential buildings are always protected at least with an NFPA 13-R system and the garages are protected with an NFPA 13 compliant system and this code change reasonably reinstates regulations that have existed for decades without lessening fire safety even with the increased hazards due to plastics in vehicles and difficulties in fighting fire in electric and hybrid vehicles due to batteries.

We request that the General Committee vote to approve this code change.

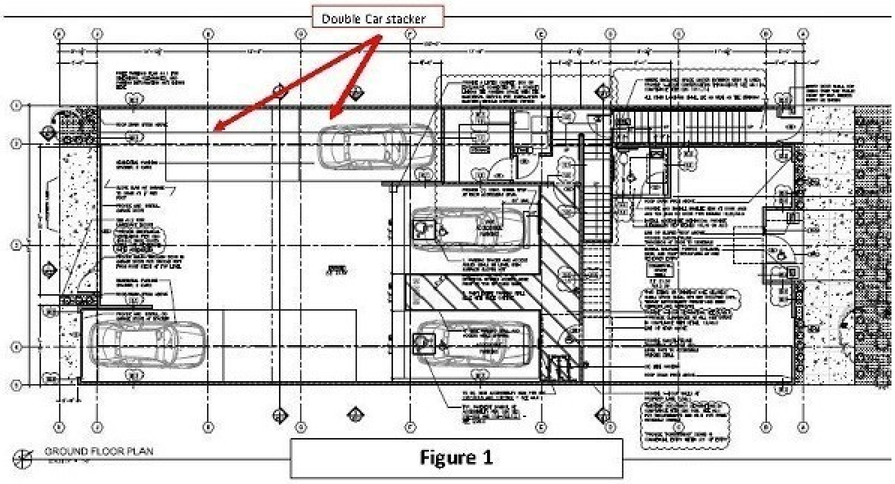


Figure 1

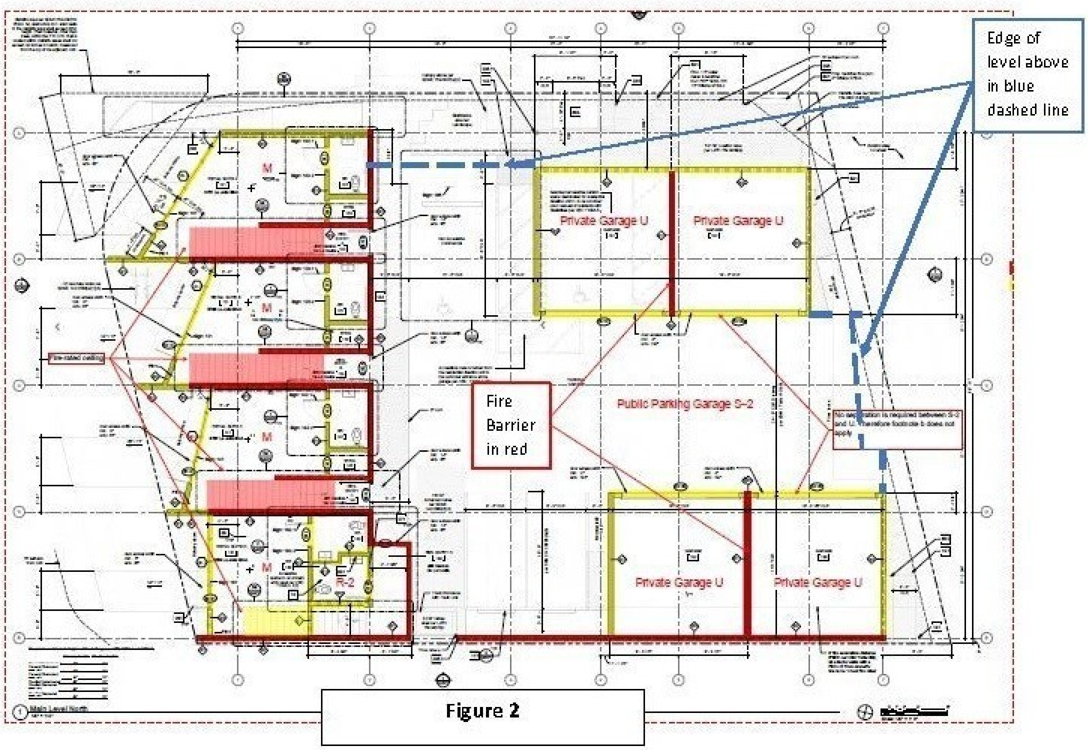


Figure 2

Cost Impact: The code change proposal will decrease the cost of construction
The proposal may reduce the need for mechanical ventilation systems in the garages and will reduce the need for fire barriers and opening protectives within them. The proposal also makes the projects more feasible.

G68-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because the committee found the language confusing. The exception for ventilation is unclear - is it for when the single private garage is area up to 3,000 sq.ft. for where multiple private garages are an aggregate for up to 3,000 sq.ft.? Otherwise this seems to be a total exception for the entire requirement. The phrase "atmospherically separated" is confusing - does this require smoke tight walls or something less - specific criteria is needed. There was no technical criteria showing that these size garages do not need ventilation. (Vote: 14-0)

Individual Consideration Agenda

Public Comment 1:

IBC: 406.3.1, 406.6.2

Proponents: Ali Fattah, representing City of San Diego Development Services Department (afattah@sandiego.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

406.3.1 Classification . *Private garages* and carports shall be classified as Group U occupancies. A *private garage* shall be not greater than 3,000 square feet (279 m^2) in area. ~~*Private garages* shall be atmospherically separated from enclosed parking garages *or open parking* garages.When located in a building that includes other garages, communicating openings shall not be permitted between *private garage* and other garages.~~

406.6.2 Ventilation. A mechanical *ventilation* system and exhaust system shall be provided in accordance with Chapters 4 and 5 of the International Mechanical Code.

Exceptions:

1. Mechanical *ventilation* shall not be required for enclosed parking garages that are accessory to one- and two-family *dwellings*.
2. Mechanical *ventilation* shall not be required for enclosed private garages that have a floor area of 3,000 square feet (279 m^2) or less, or within each individual *private parking garage* complying with Section 406.3.1.1.

Commenter's Reason: We request approval as modified through public comment by the Governmental Voting Members of ICC as modified through this public comment. Please overturn the committee action for disapproval to help us achieve the difficult 2/3 threshold necessary to overturn the committee decision so that this public comment can be considered. When you consider our testimony and potential opponents you can then form your opinion and vote accordingly.

This public comment is submitted after considering the insightful feedback provided by several members of the General Committee and comments made at the hearing by speakers in support and opposition to the code change. The public comment addresses the following issues raised.

- The public comment clarifies that when private garages are located in the same building as other garages, that communicating openings shall not be permitted between private garages when multiple private garages are permitted in the same building, or between private garages and enclosed garages or open parking garages. This corrects and oversight in code change G59-12.
- That mechanical ventilation is not required for private garages when one private garage is proposed or or within each garage when multiple private garages are permitted.
- To reaffirm that ventilation is required, however that it is proposed that mechanical ventilation is being exempted.
- Adequate justification was not provided in code change G59-12 (www.iccsafe.org/wp-content/uploads/02_IBC-G1.pdf) to substantiate the documented hazard that necessitated the drastic floor area reduction to 1,000 sq ft

This public comment is necessary due to a procedural error on the part of proponent to not raise a point of order when new material was added in the rebuttal phase of the CAH due to the mistaken belief that re-rebuttal was to follow. Some issues raised by the committee were reasonable and the public comment we believe addresses the issues.

- Three speakers in opposition represented the Air Movement and Control Association (AMCA), one speaker represented Broan Nutone.
- One of the speakers in opposition reminded the General Committee of their prior disapproval of of G98-15 (https://www.iccsafe.org/wp-content/uploads/IBC-General.pdf) which was somewhat out of context since that code change proposed to add an exception to increase the floor area to 3,000 sq ft for a private garage that is accessory to an R-3 occupancy;
  - The report of the committee hearing (https://www.iccsafe.org/wp-content/uploads/2015-Report-of-the-Committee-Action-Hearing-Results.pdf) stated that the CRC has no limit and that this should be regulated in the CRC. This also points to a flaw in the original code change, CO does not know it is in a house built under the IRC or IBC when accessory to an R-3 occupancy.

None of the speakers in opposition spoke in opposition to the code change due to fire protection reasons and focused mainly on the CO hazards. ASHREA and many organizations have researched the hazards in parking garages and determined that two important variables must be present: concentration and duration of exposure. A 3,000 sq ft garage will park approximately 9 or 10 motor vehicles that are associated with tenant spaces in the building. And unlike a garage with many simultaneous idling motor vehicles, like say a regional shopping center when leaving a cinema or waiting at a fast food drive through, small garages do not have all the cars moving simultaneously and the duration they are in the garage idling is short since the travel distance out may/in be about 50 to 80 feet at most. Furthermore due to the size of the garage it is not expected that a parking attendant will be present so it is very unlikely that the exposure to constant CO will be 8 or more hours in a day as was in the ASHREA study (https://www.aivc.org/sites/default/files/airbase_13671.pdf). Additionally, ASHRAE 62.1: TABLE 6.2.2.1 includes ventilation rates for when mechanical ventilation is required reflective of lower emissions in todays vehicles when compared to what the model codes addressed.

The public comment also addresses an oversight that G59-12 did not address which is to prohibit communicating openings between private garages. A fire barrier can have a held open door and can allow a large private garage with fire doors across he drive aisle bisected with fire barriers. This addresses one of the conditions highlighted in the figures provided to the committee.

The public comment also addresses a concern raised by the committee and speakers in opposition regarding the exemption from mechanical ventilation that it should apply to a single 3,000 sq ft garage and individual garages when multiple private garages are provided.

The public comment addresses communicating openings in lieu of atmospheric separation since the committee and speakers in opposition stated that the separation could be a sheet of plastic. A restriction on communicating openings is proposed in like fashion to Section 915.1.4 or similar. We request that ICC Governmental Voting members support overturning the committee decision for disapproval so that you can consider the corrections made to the proposal that are in response to their reason for disapproval. The Committee disapproval did not invalidate the concept of the code change and did not consider the qualitative technical justification presented. We have referenced an article from ASHREA to help quantitatively justify the lack of a CO exposure hazard in a small garage that is not occupied by a person working in the garage and where multiple idling motor vehicles are not likely. This is an issue in 1,000 sq ft private garages addressed the vehicular entry opening and other openings required by IBC Ch 12 as well as the movement of cars that provide for air movement. Fewer motor vehicles, fewer motor vehicles moving concurrently and shorter duration of movement will result in less concentration of CO and therefore a lesser need to mechanically introduce air movement to reduce CO concentration.

- The AMCA speakers also stated that in addition to CO that mechanical ventilation is necessary since garages also include other hazardous fumes due to fuel and oil, however IMC Section 404 only requires ventilation systems in enclosed parking to operate intermittently to reduce the concentration of CO through air movement by mechanical means.

As the original reason statement clarifies, and based on exhaustive research that spanned decades since publication of the 2015 IBC no issues were presented as to why the hazards of CO are significant in small private garages that can be 55 ft deep by 55 ft wide and will park perhaps 9 or 10 motor vehicles when accessible parking spaces and EVCS are included (unless car stackers are used) [assuming a typical 8 ft by 18 ft standard parking stalls and 20 ft backup space]. CO is a significant exposure when many cars are idling concurrently and when an occupant is exposed to the CO for 8 or more hours. This is precisely why for decades, during a period when exhaust emissions were more polluting than they are today, that legacy codes exempted private parking garages. Code editions following the 2021 IBC unnecessarily burden small projects based on no demonstrable hazard documented in the record of code change G59-12 that necessitated this code change. The reason statement for the original code change provides a detailed and comprehensive justification for the code change. The code requirements we are seeking to modify are negatively impacting the affordability of infill residential and mixed use development.

It is worth noting that G68-21 seeks to accomplish some of the same objectives in G67-21 in addition to allowing natural ventilation through openness following the rational used in G59-12 to also not require mechanical ventilation.

Bibliography:

- Code Change G59-12 (www.iccsafe.org/wp-content/uploads/02_IBC-G1.pdf)
- Code Change G98-15 (https://www.iccsafe.org/wpcontent/uploads/IBC-General.pdf)
- ASHREA Article ASHREA study (https://www.aivc.org/sites/default/files/airbase_13671.pdf)

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
This code change reduces the need to classify small garages as S-2 and to not require mechanical ventilation in private garages that never required mechanical ventilation even in periods when vehicular tail emissions were worst and prior to the prevalence of alternative fuel clean vehicles.

Public Comment# 2821

G74-21

Proposed Change as Submitted

Proponents: Christopher Athari, Hoover Treated Wood Products, representing Hoover Treated Wood Products (cathari@frtw.com)

2021 International Building Code

SECTION 410
STAGES, PLATFORMS AND TECHNICAL PRODUCTION AREAS

Revise as follows:

410.2.1 Stage construction. *Stages* shall be constructed of materials as required for floors for the type of construction of the building in which such *stages* are located.

Exception: *Stages* need not be constructed of the same materials as required for the type of construction provided that the construction complies with one of the following:

1. *Stages* of Type IIB or IV construction with a nominal 2-inch (51 mm) wood deck, provided that the *stage* is separated from other areas in accordance with Section 410.2.4.
2. Stages are permitted to be constructed of fire-retardant-treated wood for Types I, II, and IV construction, provided that the stage is separated from other areas in accordance with Section 410.2.4.
~~2.~~ 3. In buildings of Type IIA, IIIA and VA construction, a fire-resistance-rated floor is not required, provided that the space below the *stage* is equipped with an *automatic sprinkler system* or *fire-extinguishing system* in accordance with Section 903 or 904.
~~3.~~ 4. In all types of construction, the finished floor shall be constructed of wood or *approved* noncombustible materials. Openings through stage floors shall be equipped with tight-fitting, solid wood trap doors with *approved* safety locks.

Reason: By allowing the use of fire-retardant-treated wood (FRTW) while maintaining the required separation, stages could provide improved fire resistance compared to the untreated wood currently permitted by Exception 1 for Types IIB and IV construction, for instance. Furthermore, FRTW is already allowed in permanent platforms for Types I, II, and IV construction (IBC Section 410.3).

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal does not change the original 3 options currently available. It adds a 4th option.

G74-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because the text could be read to allow for a much larger area rather than just the stage itself. This would allow for stages of fire retardant treated wood in Type 1 construction. A direct correlation for stage and platform fire hazards is not correct, so the construction requirements should not be the same. (Vote: 12-2)

G74-21

Individual Consideration Agenda

Public Comment 1:

IBC: 410.2.1

Proponents: Mike Eckhoff, representing Hoover Treated Wood Products, Inc. (meckhoff@frtw.com); Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

410.2 Stages . *Stage* construction shall comply with Sections 410.2.1 through 410.2.7.

410.2.1 Stage construction . *Stages* shall be constructed of materials as required for floors for the type of construction of the building in which such *stages* are located.

Exception: *Stages* need not be constructed of the same materials as required for the type of construction provided that the construction complies with one of the following:

1. *Stages* of Type IIB or IV construction with a nominal 2-inch (51 mm) wood deck, provided that the *stage* is separated from other areas in accordance with Section 410.2.4.
2. In buildings of Type IIA, IIIA and VA construction, a fire-resistance-rated floor is not required, provided that the space below the *stage* is equipped with an *automatic sprinkler system* or *fire-extinguishing system* in accordance with Section 903 or 904.
3. In all types of construction, the finished floor shall be constructed of wood or *approved* noncombustible materials. Openings through stage floors shall be equipped with tight-fitting, solid wood trap doors with *approved* safety locks.
4. Stages constructed of fire-retardant-treated wood complying with Section 2303.2 are permitted in Type I and II construction, provided that the stage is separated from other areas in accordance with Section 410.2.4.

Commenter's Reason: This new proposal language addresses the following concerns raised by the committee.
Concerning Types I and II construction: Including these types of construction is a natural extension of the exceptions already permitted in the IBC. Imagine a theater that uses steel columns as the load bearing supports for either of these two types of construction, where the floor-to-ceiling height is greater than 20 feet. The nonbearing walls and the roof could then be constructed of fire-retardant-treated wood (FRTW) per IBC 603.1#1. By disallowing this proposed language, the code would still allow the exterior nonbearing walls and the roof to be constructed of FRTW but not the stage itself. This scenario would make no sense.

Concerning the possibility of construction beyond the stage itself, one concern mentioned during testimony was fly galleries. This is not an issue. The exception in 2021 IBC 410.2.2 states that “Floors of fly galleries and catwalks shall be constructed of any *approved* material.” Also, given that the charging language in 410.2.1 mentions “floors,” it’s clear that the focus of this proposal is on the stage itself and not other elements of above-stage construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal does not change the original three exceptions currently available; it merely adds a fourth exception.

Public Comment# 2884

G83-21

Proposed Change as Submitted

Proponents: Andrew Bevis, National Fire Sprinkler Association, representing National Fire Sprinkler Association; Jeffrey Hugo, representing NFSA (hugo@nfsa.org)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

SECTION 410
STAGES, PLATFORMS AND TECHNICAL PRODUCTION AREAS

Revise as follows:

[F] 410.6 Automatic sprinkler system. Buildings and structures that contain s*tages s*hall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the *stage*. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such *stages*.

Exceptions:

1. Sprinklers are not required under *stage* areas less than 4 feet (1219 mm) in clear height that are utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X *gypsum board* not less than $^5/_8$-inch (15.9 mm) in thickness.
2. Sprinklers are not required for *stages* 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. Sprinklers are not required within portable orchestra enclosures on *stages*.

2021 International Fire Code

914.6 Stages. Stages shall comply with Sections 914.6.1 and 914.6.2.

Revise as follows:

914.6.1 Automatic sprinkler system. Buildings and structures that contain stages shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages.

Exceptions:

1. Sprinklers are not required under stage areas less than 4 feet (1219 mm) in clear height utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X gypsum board not less than $^5/_8$ inch (15.9 mm) in thickness.
2. Sprinklers are not required for stages 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. Sprinklers are not required within portable orchestra enclosures on stages.

Reason: This change clarifies Section 410.1 requirement for application, "...to all parts of the buildings and structures..." Section 410.6 leaves the user with the possibility to interpret that only requires stages to be protected and the rest of the building unprotected. The commentary supports this by allowing a limited area system for the stage. The "tradeoffs" or exceptions in Section 410.6 could not or should not apply, unless the whole building is sprinklered throughout. Sections 410.2.1 and 410.5.3.2 require the entire building to be sprinklered.

Cost Impact: The code change proposal will increase the cost of construction
Additionally, most assembly or educational occupancies where stages would be located, would normally be protected anyhow.

G83-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee stated that the reason for the disapproval was that the way it is written it is a far too reaching a requirement that would be for any occupancy that has any stage, it would then require the entire building regardless of size or occupancy to be provided with an automatic sprinkler system. (Vote: 14-0)

G83-21

Individual Consideration Agenda

Public Comment 1:

IBC: [F] 410.6; IFC: 914.6.1

Proponents: Andrew Bevis, representing National Fire Sprinkler Association requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

SECTION 410
STAGES, PLATFORMS AND TECHNICAL PRODUCTION AREAS

[F] 410.6 Automatic sprinkler system . ~~Buildings and structures that contain stages~~ *Stages s*hall be equipped ~~throughout~~ with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the *stage*. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such *stages*.

Exceptions:

1. In buildings that are sprinklered throughout in accordance with 903.3.1.1, ~~Sprinklers~~ sprinklers are not required under *stage* areas less than 4 feet (1219 mm) in clear height that are utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X *gypsum board* not less than $^{5}/_{8}$-inch (15.9 mm) in thickness.
2. In buildings that are sprinklered throughout in accordance with 903.3.1.1, ~~Sprinklers~~ sprinklers are not required for *stages* 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. In buildings that are sprinklered throughout in accordance with 903.3.1.1, ~~Sprinklers~~ sprinklers are not required within portable orchestra enclosures on *stages*.

2021 International Fire Code

914.6 Stages . Stages shall comply with Sections 914.6.1 and 914.6.2.

914.6.1 Automatic sprinkler system . ~~Buildings and structures that contain contain stages~~ Stages shall be equipped ~~throughout~~ with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages.

Exceptions:

1. In buildings that are sprinklered throughout in accordance with 903.3.1.1, ~~Sprinklers~~ sprinklers are not required under stage areas less than 4 feet (1219 mm) in clear height utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X gypsum board not less than $^{5}/_{8}$ inch (15.9 mm) in thickness.
2. In buildings that are sprinklered throughout in accordance with 903.3.1.1, ~~Sprinklers~~ sprinklers are not required for stages 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. In buildings that are sprinklered throughout in accordance with 903.3.1.1, ~~Sprinklers~~ sprinklers are not required within portable orchestra enclosures on stages.

Commenter's Reason: The committee stated, in its reasoning statement for disapproval, that the proposal was far too reaching in its requirement to protect the entire building when the structure contains a stage. This statement is moot, as stages are generally found in assembly and educational occupancies. This public comment was revised to address the point of being "far too reaching." Per the requirements of the Section 903.2.1 and 903.2.3, the majority of these buildings will already be protected. So, the exceptions or tradeoffs are justified when the building is fully sprinklered. Also, there is already an exception provided in the current language that exempts stages 1,000 square feet and less. These two points keep this proposal from being "far too reaching."

Proposal G85-21 was approved by the committee. This proposal removed the requirements for standpipes from stages. This provides a lower level of protection at the stage area. Additionally, as stated in the original reason statement, the "tradeoffs" or exceptions in Section 410.6 could not or should not apply, unless the whole building is sprinklered throughout. Sections 410.2.1 and 410.5.3.2 require the entire building to be sprinklered. Finally, Section 410.1 clarifies that the requirements of this section applies, "...to all parts of the buildings and structures..." Section 410.6 leaves the user with the possibility to interpret that only requires stages to be protected and the rest of the building unprotected.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

While this will increase the cost of construction in the rare cases that a building would have a stage but not a sprinkler system throughout the rest of the building, most of these occupancies where stages exist will already be provided with sprinkler systems and those costs would already be factored in the construction of the building.

Public Comment# 2365

G84-21

Proposed Change as Submitted

Proponents: William Conner, representing American Society of Theatre Consultants (bill@bcaworld.com)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

SECTION 410
STAGES, PLATFORMS AND TECHNICAL PRODUCTION AREAS

Revise as follows:

[F] 410.6 Automatic sprinkler system. *Stages* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the *stage*. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such *stages*.

Exceptions:

1. Sprinklers are not required under *stage* areas less than 4 feet (1219 mm) in clear height that are utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X *gypsum board* not less than $^5/_8$-inch (15.9 mm) in thickness.
2. Sprinklers are not required for *stages* 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. Sprinklers are not required within portable orchestra enclosures on *stages*.
4. Sprinklers are not required under catwalks and galleries under the maximum widths as permitted by NFPA 13.

2021 International Fire Code

Revise as follows:

914.6.1 Automatic sprinkler system. Stages shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages.

Exceptions:

1. Sprinklers are not required under stage areas less than 4 feet (1219 mm) in clear height utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X gypsum board not less than $^5/_8$ inch (15.9 mm) in thickness.
2. Sprinklers are not required for stages 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. Sprinklers are not required within portable orchestra enclosures on stages.
4. Sprinklers are not required under catwalks and galleries under the maximum widths as permitted by NFPA 13.

Reason: This is common practice on most projects. Catwalks under 48" open on both sides or 36" when against a wall like ducts do not require sprinklers under them. This change clarifies that.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
No significant change.

G84-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The committee stated that the reason for the approval was based on the addition of the language of the new exception. The exception helps clarify the code by placing a pointer directly to NFPA 13 for the allowance. (Vote: 13-1)

G84-21

Individual Consideration Agenda

Public Comment 1:

IBC: [F] 410.6; IFC: 914.6.1

Proponents: Andrew Bevis, representing National Fire Sprinkler Association requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

SECTION 410
STAGES, PLATFORMS AND TECHNICAL PRODUCTION AREAS

[F] 410.6 Automatic sprinkler system . *Stages* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the *stage*. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such *stages*.

Exceptions:

1. Sprinklers are not required under *stage* areas less than 4 feet (1219 mm) in clear height that are utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X *gypsum board* not less than $^5/_8$-inch (15.9 mm) in thickness.
2. Sprinklers are not required for *stages* 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. Sprinklers are not required within portable orchestra enclosures on *stages*.
4. Sprinklers are not required under catwalks and galleries ~~under the maximum widths as permitted by NFPA 13.~~ where they are permitted to be omitted in accordance with Section 903.3.1.1

2021 International Fire Code

914.6.1 Automatic sprinkler system . Stages shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages.

Exceptions:

1. Sprinklers are not required under stage areas less than 4 feet (1219 mm) in clear height utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X gypsum board not less than $^5/_8$ inch (15.9 mm) in thickness.
2. Sprinklers are not required for stages 1,000 square feet (93 m^2) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
3. Sprinklers are not required within portable orchestra enclosures on stages.
4. Sprinklers are not required under catwalks and galleries ~~under the maximum widths as permitted by NFPA 13.~~ where they are permitted to be omitted in accordance with Section 903.3.1.1

Commenter's Reason: This language is misleading and confusing. Bringing installation requirements out of the standards and into the codes is a bad practice. NFPA 13 already clearly addresses when sprinklers are not required under obstructions. This proposal leaves the user with the possibility to incorrectly interpret that sprinklers may be omitted from under other similar obstructions that NFPA 13 would require to be protected.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is already a NFPA 13 requirement. This simply cleans up the language.

Public Comment# 2458

G92-21

Proposed Change as Submitted

Proponents: William Koffel, representing Semiconductor Industry Association (wkoffel@koffel.com)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

SECTION 415
GROUPS H-1, H-2, H-3, H-4 AND H-5

[F] 415.11 Group H-5. In addition to the requirements set forth elsewhere in this code, Group H-5 shall comply with the provisions of Sections 415.11.1 through 415.11.12 and the *International Fire Code*.

[F] 415.11.1.5 Shafts and openings through floors. Elevator hoistways, vent *shafts* and other openings through floors shall be enclosed where required by Sections 712 and 713. Mechanical, duct and piping penetrations within a *fabrication area* shall not extend through more than two floors. The *annular space* around penetrations for cables, cable trays, tubing, piping, conduit or ducts shall be sealed at the floor level to restrict the movement of air. The *fabrication area*, including the areas through which the ductwork and piping extend, shall be considered to be a single conditioned environment.

Add new text as follows:

<u>415.11.1.5.1</u> <u>Quantity Limits</u>.
<u>The use and storage quantity limits for hazardous materials and hazardous production materials (HPMs) for connected levels shall be aggregated based upon the overall area. The quantity in any single area shall not exceed limits stipulated in Table 415.11.1.1.1 for a single fabrication area in Group H-5.</u>

Reason: The Code is not clear how to apply the quantity limits when multiple levels of a fabrication area are connected. The proposed language allows for the areas on the different levels to be aggregated but the limits within any single area shall not exceed the requirements of Table 415.11.1.1.1. In other words, one cannot use the aggregated area to allow a higher concentration in any single area.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This language as been approved by the SIA Codes Committee and represents how the current code is being applied. As such, there should be no impact on the cost of construction.

G92-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This new proposed section is basically adjusting the quantity limits which is better addressed in IBC Table 415.11.1.1.1. The language in 415.11.1.5 currently states "single conditioned environment" which does not appear to make the connection to the concept of a multi-level fabrication area. (Vote: 13-1)

G92-21

Individual Consideration Agenda

Public Comment 1:

Proponents: William Koffel, representing Semiconductor Industry Association (wkoffel@koffel.com) requests As Submitted

Commenter's Reason: Section 415.11.1.5 allows for what is commonly referred to as a "flow through Fab." The section allows for limited openings within a multi-story fabrication area extending through not more than two stories. The penetrations are limited to mechanical, duct, and piping penetrations. The annular space around such penetrations are sealed to restrict the movement of air but not necessarily by an assembly have a fire protection rating. What the section does not address is how to calculate the allowable quantities of HPM that are permitted within the flow through Fab. See Figure 1.

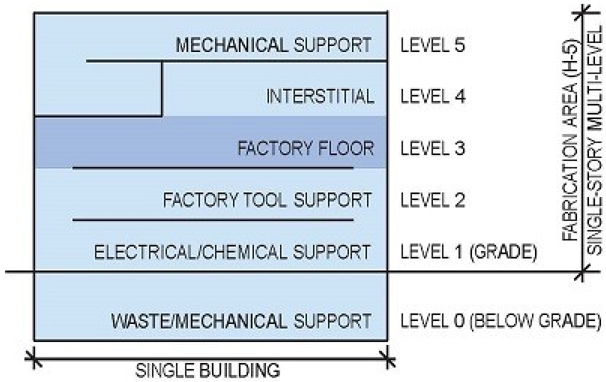


FIGURE 1: SINGLE-STORY MULTIPLE-LEVEL FABRICATION (H-5 OCCUPANCY)

Quantity limits in a fabrication area are calculated differently than most other Group H occupancies. The quantity limits are based upon the density limits in Table 415.11.1.1.1, not an absolute quantity within a control area. In this instance, if the areas shown as Level 1, Level 2 and Level 3 were distributed in a building and all at the same level, one could use the cumulative area to calculate the quantity limits within the fabrication area. However, when built as shown in Figure 1, with limited openings between the two stories, the Code is not clear as to how to calculate the quantity limits. The proposed language indicates that the quantity limits, using the appropriate density, would be calculated for each level independently. This would result in the same quantity limit as if the fabrication area were located all on one level. It should be noted, that the additional restriction for applying the quantity limits in this manner is that all three levels need to be conditioned the same and as required for a fabrication area.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal and public comment intend to clarify current code text.

Public Comment# 2843

G99-21 Part II

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Building Code

Add new text as follows:

SECTION 429
INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF)

429.1 General.
Information technology equipment facilities (ITEF) shall be classified as industrial occupancies in accordance with Section 1103 of the *International Mechanical Code* and shall comply with Sections 429.1 through 429.9.

429.2 Refrigerants.
Refrigerants used to cool ITE processes shall be limited to Groups A1 and A2L except where *approved*.

429.3 Fire Protection.
ITEF shall comply with NFPA 75.

429.4 Design and construction.
ITEF shall comply with Sections 429.4.1 and 429.4.2.

429.4.1 Separation.
ITEF shall be separated from other occupancies by fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both.

> **Exception:** Computer rooms less than 500 square feet (46 m^2) in area in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

429.4.2 Combustible materials in concealed spaces.
Other than combustible materials permitted for exposed use within plenums complying with Section 602 of the International Mechanical Code, combustible materials shall not be permitted in concealed spaces of ITEF.

429.5 Electrical.
All electrical equipment other than *information technology equipment* shall conform to Class 1, Division 2, of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the *lower flammability limit* (LFL) upon release to the space.

429.6 Ventilation.
Ventilation in ITE spaces shall be activated by refrigerant detection systems in accordance with of Chapter 11 of the *International Mechanical Code*. *Recirculated air* sufficient to fully disperse refrigerant within the ITE space without supply or exhaust air complies with this requirement.

429.7 Refrigerant detection.
ITEF shall be provided with refrigerant detection that complies with Sections 429.7.1 and 429.7.2, and Section 608.9 of the *International Fire Code*.

429.7.1 System activation.
Activation of a refrigerant gas detection alarm shall result in the following:

1. Initiation of distinct audible and visible alarm signals both inside and outside of the ITEF.
2. Automatic activation of the mechanical ventilation system.

429.7.2 Failure of the refrigerant detection system.
Failure of the refrigerant detection system shall automatically activate the mechanical ventilation system and cause a trouble signal to sound at an approved location.

429.8 Standby power.
Mechanical ventilation and refrigerant detection systems shall be provided with a *standby power system* in accordance with Section 2702.

429.9 Common path of egress travel.
ITEF shall comply with Section 1006.2.2.3.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 75-2020 Standard for the Fire Protection of Information Technology Equipment

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

- **Sec. 429.3 Fire Protection** references NFPA 75.

- **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

- **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under abnormal operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

- **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

- **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

- **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

- **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part II

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved. There were 7 proposed modifications to this proposal and the testifiers did not agree on a resolution, so the interested parties should go back and work together on a clean set of requirements. The correct occupancy for these facilities needs to be defined. The requirements should work within the current parameters for fire suppression protection. How NFPA 75 is incorporated needs to be clarified. (Vote: 13-0)

G99-21 Part II

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 429, 429.1 (New), 429.2 (New), 429.3 (New), 429.4 (New), 429.5 (New), 429.6 (New), 429.7 (New), 429.8 (New), 429.9 (New), 429.9.1 (New), 429.9.2 (New), 429.10 (New)

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com); Joe Hale, representing 2020 Engineering, LLC (joehale@2020mep.com); Dennis Julian, representing Digital Realty Director of Design (djulian@digitalrealty.com); Kevin Dalton, NTT Global Data Centers Americas, representing NTT Global Data Centers Americas (kdalton@ragingwire.com); Alan French, representing QTS Data Centers - Alan French (alan.french@qtsdatacenters.com); Barry Greive, representing Target Corp (barry.greive@target.com); Paul Wicoff, representing Burr Computer Environments, Inc. (paul.wicoff@bcei.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

SECTION 429
INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF)

429.1 General . *Information technology equipment facilities* (ITEF) provided with independent air-handling systems for the cooling of *information technology equipment* shall comply with Sections 429.1 through 429.10.

429.2 Occupancy classification . ITEF with independent air-handling systems for the cooling of *information technology equipment* shall be classified as Group F-1 occupancies.

429.3 Refrigerants . Refrigerants used to cool ITE processes shall be limited to Groups A1 and A2L.

429.4 Separation . ITEF shall be separated from other occupancies by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

429.5 Combustible materials in concealed spaces . Other than combustible materials permitted for exposed use within plenums complying with Section 602 of the International Mechanical Code, combustible materials shall not be permitted in concealed spaces of ITEF.

429.6 Electrical . All electrical equipment other than *information technology equipment* shall conform to Class 1, Division 2, of NFPA 70 where the quantity of any Group A2L, refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.

429.7 Elevated Temperatures . Open flame-producing devices or continuously operating hot surfaces over 1290 °F (700 °C) shall not be permanently installed in the room where Group A2L refrigerants are used.

429.8 Circulation airflow system .
An ITEF using Group A2L refrigerants shall be provided with a circulation airflow system designed to reduce the concentration levels of released refrigerant by atmospheric mixing within the ITEF.

429.9 Refrigerant detection . Where the quantity of any Group A2L refrigerant in a single independent circuit could exceed 25 percent of the lower flammable limit (LFL) upon release to the space, the ITEF shall be provided with the following:

1. Refrigerant detection that complies with Section 608.9 of the International Fire Code.
2. Leak detection for individual refrigeration circuits activated in accordance the with manufacturer's instructions. Such leak detectors shall be permitted to control the shut-off of one or more circuits.

429.9.1 Leak detector activation . Activation of an individual refrigerant circuit leak detector shall result in the following:

1. Initiation of distinct audible and visible alarms both inside and outside each entrance to the ITEF.
2. Automatic activation of the ITEF circulation airflow system.
3. Automatic shut-off of compressors in the leaking circuit.

429.9.2 Failure of the refrigerant detection system . Failure of the refrigerant detection system shall automatically activate the ITEF circulation airflow system and activate a trouble signal to sound at an *approved* location.

429.10 Standby power . A standby power system in accordance with Section 2702 shall be provided for ITEFs, including refrigerant detection systems and circulation airflow systems, where the quantity of any Group A2L refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.

Commenter's Reason: Because of changes to US EPA and State of California environmental regulations roughly 70 percent of the data center cooling industry is transitioning to mildly flammable A2L refrigerants before year 2025 and there are **no** workable code requirements to regulate these unique building uses.
We are developing the 2024 codes. Data center uses **must** be addressed now.

Data Centers, or Information technology equipment facilities (ITEF), are critical infrastructure. Emergency services, government, aviation, transportation, electronic communications, banking, business operations - virtually all rely on dependable data processing and storage. These facilities must be capable of continuity of operations and the code must facilitate their safe operation.

When the industry begins using A2L refrigerants in ITEF cooling an additional, albeit small, hazard has been created, necessitating new code requirements for ITEFs. If these new code requirements are not adopted code officials will have no requirements or guidance to regulate ITEFs that meet the unique needs of ITEFs, including:

- No general automatic shutdown of refrigeration equipment – needed to prevent rapid temperature rise which can destroy data processing.

- No automatic exhaust ventilation - needed because of contaminants in make-up air.

- No limit on the total amount of refrigerant within the space – needed because ITEFs can be very large buildings with very intensive cooling needs. Limits are instead applied on releasable quantities of refrigerant in independent circuits.

This code change and public comment provides requirements for the safe use of ITEFs consistent with the direction of the General Code Committee. By section, those requirements are:

429.1 General: ITEFs that are cooled by extension of the building's comfort cooling system must meet the safety requirements for comfort cooling refrigeration; the size of the space will automatically be constrained by the capacity of the comfort cooling system, which is regulated by other sections of the mechanical code. This keeps smaller computer rooms accessory to other uses from having to comply with SE. 429.

Where ITEFs are cooled with an independent system only for the purpose of ITE cooling, meaning likely cooled with A2L refrigerants, proposed Sec. 429 provides requirements for the safe use of ITEF spaces.

429.2 Occupancy classification: The committee, in their discussions of Part III and Part IV of G99, indicated their preference to have ITEFs classified as F-1 occupancies. This comment adopts that position for ITEFs which are cooled specifically for equipment operational purposes and not human comfort. These are likely to be cooled with A2L refrigerants.

429.3 Refrigerants: Refrigerants for ITEFs are limited to nonflammable A1s and mildly flammable A2Ls. There is no significant history in the industry of the use of more flammable or hazardous refrigerants so limiting ITEF cooling to A1 and A2L refrigerant is not a burden. The code official always can accept alternate refrigerants if the permit applicant can demonstrate an equivalent level of protection.

429.4 Separation: ITEFs not cooled as a byproduct of the building's comfort cooling system are required to have a complete fire separation from adjacent spaces.

429.5 Combustible materials in concealed spaces: Combustible materials in concealed spaces must be plenum rated. This accommodates needed cabling runs for the information technology equipment while keeping out other non-plenum rated combustibles.

429.6 Electrical: This section requires electrical equipment serving locations which may have A2L gases to comply with National Electrical Code provisions for hazardous locations where there is a possibility of exceeding 25 percent of the lower flammable limit. This public comment recognizes the relatively new clarification, via the approval of M74-21, that A2Ls are not a subclass of A2 refrigerants by specifically requiring A2Ls to comply. Other refrigerant groups are deleted to be consistent with the limitation in Sec 429.3.

429.7 Elevated Temperatures: This section is consistent with the requirements approved by the Mechanical Code Committee for Group A2L refrigeration machinery rooms in M78-21 Part I.

429.8 Circulation airflow system: This section provides for atmospheric mixing within the space to disperse leaked A2L refrigerant, which is required upon leak detection. The circulation airflow system will, per Sec. 429.9.1 (2), activate when a circuit leak detector activates, which should keep the leaked refrigerant below 25 percent of the lower flammable limit.

The circulation airflow system is intended to forestall automatic exhaust ventilation, thereby protecting the ITEF environment from make-up air which is likely to be contaminated with particulates or humidity.

If the circulation airflow system fails to keep refrigerant concentrations below 25 percent of the lower flammable limit by atmospheric mixing, refrigerant detectors required by reference to IFC Sec. 608.9 will automatically shut-off all refrigeration equipment, just as is currently required for flammable refrigerants.

429.9 Refrigerant detection:

This public comment requires leak detection for the individual refrigeration circuits of equipment using Group A2L refrigerants where a leak could exceed 25% of the lower flammable limit, which enables (requires) the compressors in leaking circuits to be shut-off while permitting normally operating equipment to continue to operate.

This is consistent with the most recent draft of the applicable UL CSA Standard, 60335 Part 2-40, which only requires compressor shutdown for leaking equipment. There are multiple technological leak detection approaches available, so this comment is drafted in performance language to afford design flexibility. Leak detectors are permitted to control the shut-off of multiple circuits because a single cooling unit may have multiple independent circuits. A leak detector can therefore enable shut-off of all possibly leaking circuits in a cooling unit.

Because rapid heat rise threatens data processing operations it is important let normally operating equipment continue to operate for business continuity. Fans are better left running to disperse leaked refrigerant and to help maintain the thermal conditioning of the space. This means leak detection and mitigation must be provided for each independent circuit in addition to the refrigerant detection already required by IFC Sec. 608.9.1.

Refrigerant detection should only be provided where there is the potential of exceeding 25% of LFL because of the threat of false positives in the detection system. A false positive that triggers automatic shut-off of all refrigerant equipment can threaten literally any system that relies upon continuity of operations, like 911 call centers, hospitals, and other critical life safety operations.

Belts and suspenders are very helpful when wrapped around your neck.

429.10 Standby power: This section guarantees that, where the quantity of A2L refrigerants that can be released exceeds 25 percent of the lower flammable limit, critical fire safety features have power in the event of disruption of the building's primary power source.

Deleted sections:

Old 429.3 Fire Protection. The reference to NFPA 75 was deleted. This means that ITEFs that comply with Sec. 429 must comply with fire protection requirements based upon their classification as an F-1 Occupancy. ITEFs not regulated by Section 429 will need to comply with the fire protection requirements of the main use with which they are associated.

Old 429.10 Common path of egress travel was deleted as unnecessary given the classification of ITEFs as F-1 occupancies which already have relatively conservative common path of egress travel provisions. Additionally, the proposed change and public comment in Part VII requires not less than two exit or exit access doorways in ITEFs larger than 1,000 square feet which will also limit the common path of egress travel.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
An unavoidable increase in data center construction cost will occur as these facilities are designed and constructed to comply with Federal and California environmental regulations for low GWP refrigerants.

Public Comment# 2483

G99-21 Part VII

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Building Code

Revise as follows:

1010.2.9.1 Refrigeration machinery room. Refrigeration machinery rooms <u>and information technology equipment facilities </u>larger than 1,000 square feet (93 m^2) shall have not less than two exit or exit access doorways that swing in the direction of egress travel and shall be equipped with *panic hardware* or *fire exit hardware*.

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
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PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part VII

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved as the committee felt that the special exit criteria for information technology equipment facilities should not be grouped with refrigeration machinery rooms. While these facilities always have to be cooled, the equipment could be in a separate room. There should also be an equipment size limit. (Vote: 13-1)

G99-21 Part VII

Individual Consideration Agenda

Public Comment 1:

IBC: 1010.2.9.1, 1010.2.9.2 (New)

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

1010.2.9.1 Refrigeration machinery room . Refrigeration machinery rooms ~~and information technology equipment facilities~~ larger than 1,000 square feet (93 m^2) shall have not less than two exit or exit access doorways that swing in the direction of egress travel and shall be equipped with *panic hardware* or *fire exit hardware*.

<u>**1010.2.9.2** **Information technology equipment facilities.** . *Information technology equipment facilities* larger than 1,000 square feet (93 m) shall have not less than two exit or exit access doorways that swing in the direction of egress travel and shall be equipped with *panic hardware* or *fire exit hardware.*</u>

Commenter's Reason: The Means of Egress Code committee said that requirements for information technology equipment facilities (ITEFs) should be in their own subsection within Sec. 1010.2.9 rather than added to Section 1010.2.9.1 for refrigeration machinery rooms. This public comment provides the committee’s preferred solution.
ITEFs can have the same refrigerant considerations as machinery rooms because of the intensive cooling needs of the information technology equipment, which is why it is appropriate to apply comparable egress requirements.

Note that Section 1010.2.9.1 for refrigeration machinery rooms is <u>**not**</u> being deleted. Stricken text is only applicable to the text added in the original code change: *“… and information technology equipment facilities.*”

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
Additional egress doors may be required for these facilites.

G99-21 Part IX

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Fire Code

Revise as follows:

608.9.1 Refrigerants other than ammonia. A detector, or a sampling tube that draws air to a detector, shall be provided at an *approved* location where refrigerant from a leak is expected to accumulate. The system shall be designed to initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an *approved* location where the concentration of refrigerant detected exceeds the lesser of the following:

1. The corresponding TLV-TWA values shown in the *International Mechanical Code* for the refrigerant classification.
2. Twenty-five percent of the lower flammable limit (LFL).

Detection of a refrigerant concentration exceeding the upper detection limit or 25 percent of the lower flammable limit (LFL), whichever is lower, shall stop refrigerant equipment in the machinery room in accordance with Section 608.10.1.

> **Exception:** Automatic shut off shall not be required for refrigeration equipment in *information technology equipment facilities* that comply with Section 429 of the *International Building Code* and Section 1104.2.2.3 of the *International Mechanical Code*.

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum*." A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under abnormal operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in

Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part IX

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved based upon the actions taken on other parts of this proposal. In addition, there was concern that this proposal will be reducing necessary safety factors with removal of automatic shutoffs through the proposed exception. (Vote: 14-0)

G99-21 Part IX

Individual Consideration Agenda

Public Comment 1:

IFC: 608.9.1

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com); Paul Wicoff, representing Burr Computer Environments, Inc. (paul.wicoff@bcei.com); Joe Hale, representing 2020 Engineering, LLC (joehale@2020mep.com); Dennis Julian, representing Digital Realty Director of Design (djulian@digitalrealty.com); Kevin Dalton, representing NTT Global Data Centers Americas (kdalton@ragingwire.com); Alan French, representing QTS Data Centers - Alan French (alan.french@qtsdatacenters.com) requests As Modified by Public Comment

Modify as follows:

2021 International Fire Code

608.9.1 Refrigerants other than ammonia . A detector, or a sampling tube that draws air to a detector, shall be provided at an *approved* location where refrigerant from a leak is expected to accumulate. The system shall be designed to initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an *approved* location where the concentration of refrigerant detected exceeds the lesser of the following:

1. The corresponding TLV-TWA values shown in the *International Mechanical Code* for the refrigerant classification.

2. Twenty-five percent of the lower flammable limit (LFL).

Detection of a refrigerant concentration exceeding the upper detection limit or 25 percent of the lower flammable limit (LFL), whichever is lower, shall stop refrigerant equipment in the machinery room in accordance with Section 608.10.1.

Exception: ~~Automatic~~ Manual shut off ~~shall not be required for~~ of refrigeration equipment shall be permitted in *information technology equipment facilities* that comply with Section 429 of the *International Building Code* ~~and Section 1104.2.2.3 of the *International Mechanical Code*~~.

Commenter's Reason: ITEF (data center) functionality is absolutely dependent upon refrigeration equipment keeping the information technology equipment within normal operating temperature ranges.
The risk of false-positive, or unintentional shut-off of refrigeration equipment in data centers because of a faulty refrigerant detector can create much broader, and more significant, life-safety hazards than those mitigated by automatic shut-off.

A false positive by a faulty detector, if permitted to automatically shut-down refrigeration equipment, and subsequent loss of processing capability, could compromise any system using the data center, such as 911 call systems, fire, EMS, and police dispatch systems, hospitals, hazardous weather alerts, utility grids, etc. Of course an unintentional ITEF shut-down also can compromise financial systems, which can have its own safety impacts.

It is much safer to permit data center staff to manually shut-off equipment once processing operations have been transferred to redundant facilities. Data centers are secured facilities, continuously staffed with trained technicians so knowledgeable parties will control shut-off upon alarm.

Note that proposed Section 429 of the IBC limits refrigerant types in ITEFs to A1 (nonflammable) and A2L (mildly flammable). Section 429 also requires 1-hour fire separations, limits combustibles in plenums, limits hot surfaces and flame-producing devices, and requires NFPA 70 Class 1, Division II compliance, atmospheric mixing to disperse refrigerant, and standby power where any independent refrigeration circuit could exceed 25% of the lower flammable limit upon release to the space.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There will be no appreciable cost difference.

Public Comment# 2774

G99-21 Part X

<u>Proposed Change as Submitted</u>

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Mechanical Code

Add new definition as follows:

<u>**COMPUTER ROOM.** A room or portions of a *building* used primarily to house *information technology equipment (ITE)* and serving an *ITE* load less than or equal to10 kW or 20 W/ft^2 (215 W/m^2) or less of conditioned floor area.</u>

<u>**DATA CENTER.** A room or *building*, or portions thereof, used primarily to house *information technology equipment (ITE)* and serving a total *ITE* load greater than 10 kW and 20 W/ft^2 (215 W/m^2) of conditioned floor area.</u>

<u>**INFORMATION TECHNOLOGY EQUIPMENT (ITE).** Computers, data storage, servers, and network communication equipment.</u>

<u>**INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF).** *Data centers* and *computer rooms* used primarily to house *information technology equipment*.</u>

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

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PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
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NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

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· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

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· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

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USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part X

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal has been disapproved because definitions should not be included in code language that does not currently exist. (Vote: 11-0)

G99-21 Part X

Individual Consideration Agenda

Public Comment 1:

IMC: SECTION 202

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com) requests As Modified by Public Comment

Modify as follows:

2021 International Mechanical Code

~~**COMPUTER ROOM.** A room or portions of a *building* used primarily to house *information technology equipment (ITE)* and serving an *ITE* load less than or equal to10 kW or 20 W/ft^2 (215 W/m^2) or less of conditioned floor area.~~

~~**DATA CENTER.** A room or *building*, or portions thereof, used primarily to house *information technology equipment (ITE)* and serving a total *ITE* load greater than 10 kW and 20 W/ft^2 (215 W/m^2) of conditioned floor area.~~

INFORMATION TECHNOLOGY EQUIPMENT (ITE) . Computers, data storage, servers, and network communication equipment.

INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF) . *Data centers* and *computer rooms* used primarily to house *information technology equipment*.

Commenter's Reason: The mechanical code currently does not assign an occupancy classification to data centers or information technology

equipment facilities (ITEFs), nor does it define these facilities, making it difficult to apply appropriate safety requirements. You cannot adequately regulate something if you do not first define it.
Not having definitions and use specific code requirements historically has not been a problem because ITEFs have had their data processing equipment cooled with nonflammable A1 refrigerants. Unfortunately, because of changes to US EPA and State of California environmental regulations – effective in 2025 – the data center cooling industry is transitioning to mildly flammable A2L refrigerants.

Because the industry will be introducing A2L refrigerants in ITEF cooling an additional, albeit small, hazard has been created, necessitating new code requirements for ITEFs. Those new requirements are proposed in the Part XII code change and public comment. Those new requirements rely upon the definitions proposed in this public comment.

The IBC General Code Committee and Fire Code Committee already added the same proposed definitions to the IBC and IFC, respectively.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There is no cost associated with these definitions.

Public Comment# 2487

Public Comment 2:

Proponents: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests As Submitted

Commenter's Reason: These definitions are consistent with definitions found in ASHRAE Standard 90.1 for Commercial Buildings and ASHRAE Standard 90.4 for Data Centers, and will be consistent with the definitions approved for G99-21 Part I, Part VI, and Part VIII.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal only updates definitions and has no impact on construction costs.

Public Comment# 2513

G99-21 Part XII

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Mechanical Code

Add new text as follows:

1104.2.3 Industrial occupancies and information technology equipment facilities.
This section applies only to industrial occupancies classified as *information technology equipment facilities* that comply with Section 429 of the *International Building Code*. Where a machinery room would otherwise be required by Section 1104.2, a machinery room shall not be required where all of the following conditions are met:

1. Refrigerants used to cool *ITE* processes are limited to Groups A1 and A2L except where approved.
2. The space containing the *ITE* processes is separated from other occupancies in accordance with Section 429 of the *International Building Code*.
3. Access is restricted to authorized personnel.
4. Where other than Group A1 refrigerants are used, refrigerant detectors are installed as required in accordance with Section 608.9 of the *International Fire Code* for machinery rooms except that any stoppage of refrigeration equipment shall be by manual means.
5. All electrical equipment other than *information technology equipment* shall conform to Class 1, Division 2, of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS
Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part XII

Public Hearing Results

Committee Action: **Disapproved**

Committee Modification:

Committee Reason: This proposal has been disapproved by the committee because the solution already exists for circuits in ASHRAE Section 7.6 and conflicts with Group A2L. (Vote: 11-0)

G99-21 Part XII

Individual Consideration Agenda

Public Comment 1:

IMC: 1104.2.3

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Ben Dolcich, representing Vertiv (ben.dolcich@vertiv.com) requests As Modified by Public Comment

Modify as follows:

2021 International Mechanical Code

1104.2.3 ~~Industrial occupancies and information~~ <u>Information</u> technology equipment facilities .
This section applies only to ~~industrial occupancies classified as~~ *information technology equipment facilities* that comply with Section 429 of the *International Building Code*. Where a machinery room would otherwise be required by Section 1104.2, a machinery room shall not be required

where all of the following conditions are met:

1. Refrigerants used to cool *ITE* processes are limited to Groups A1 and A2L ~~except where approved~~.
2. The space containing the *ITE* processes is separated from other occupancies in accordance with Section 429 of the *International Building Code* by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both, of the *International Building Code*.
3. Access is restricted to authorized personnel.
4. Where ~~other than Group A1~~ Group A2L refrigerants are used, refrigerant and leak detectors are installed as required in accordance with Section 429.9 of the *International Building Code* ~~608.9 of the *International Fire Code* for machinery rooms except that any stoppage of refrigeration equipment shall be by manual mean.~~.
5. All electrical equipment other than *information technology equipment* ~~shall conform~~ conforms to Class 1, Division 2, of NFPA 70 where the quantity of ~~any~~ Group A2L ~~A2, B2, A3 or B3~~ refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
6. Open flame-producing devices or continuously operating hot surfaces over 1290 °F (700 °C) are not permanently installed in the room where Group A2L refrigerants are used.

Commenter's Reason: Roughly 70 percent of the data center cooling industry is being forced to transition to A2L refrigerants before year 2025 and there are **no** workable code requirements to regulate these unique building uses.
We are developing the 2024 codes. Data center uses **must** be addressed now.

The Mechanical Code Committee reason for disapproval is flawed as it relied upon false claims made by competing interests about the content of ASHRAE 15 and UL 60335 2-40 to come to its decision. ASHRAE 15 has no occupancy classifications applicable to information technology equipment facilities (ITEFs). It similarly has no requirements specific to these unique uses. The same is true for UL 60335 2-40.

By disapproving the G99 Part XI change the Mechanical Code Committee declined to assign a Section 1103.2 occupancy classification to ITEFs. This means this new proposed section is needed even more critically so that the code will have **any** requirements specific to ITEFs, which:

· are not cooled for human comfort,

· should not be exhaust ventilated to protect against atmospheric contaminants in make-up air,

· will typically have large quantities of refrigerants to address large spaces with high thermal loads,

· should, in the event of a refrigerant leak, have a compressor and circuit specific shut-down of refrigeration equipment instead a general shut-down to protect the ITEF from thermal overload and destruction of data

By section item number, the rationale for the code change and this public comment are:

Item 1: Refrigerants for ITEFs are limited to nonflammable A1s and mildly flammable A2Ls. There is no significant history in the industry of the use of more flammable or hazardous refrigerants so limiting ITEF cooling to A1 and A2L refrigerant is not a burden. The code official always can accept alternate refrigerants if the permit applicant can demonstrate an equivalent level of protection.

Item 2: The Mechanical Code Committee indicated that the separation requirements for ITEF spaces should be better defined so provisions to construct ITEF separations compliant with requirements for 1-hour fire barriers and 1-hour horizontal assemblies are provided.

Item 3: Secured access is consistent with both ASHRAE and IMC requirements for industrial occupancies which are also permitted to not have refrigeration machinery rooms.

Item 4: The Fire Code Committee was concerned with a broad exception to automatic shutoffs for leaking refrigeration equipment. To address the committee's concern, a public comment to Part II of this code change provides requirements for leak detection and automatic shut-off of individual circuits in IBC Section 429.9. Also, by IBC Section 429.9's secondary reference to IFC Section 608.9, detection of A2L refrigerant over 25% of the lower flammable limit will trigger general shut-off of equipment and exhaust ventilation.

As such, instead of repeating requirements, this public comment proposes to maintain automatic shutoff for compressors in individual circuits of leaking A2L systems by reference to the building code. This permits normally operating equipment to continue to operate.

Because rapid heat rise threatens data processing operations it is important let normally operating equipment continue to operate for business continuity. This means leak detection and mitigation will need to be provided for each independent circuit.

Item 5: This section requires electrical equipment serving locations which may have flammable A2L gases to comply with National Electrical Code provisions for hazardous locations where there is a possibility of exceeding 25 percent of the lower flammable limit. This comment recognizes the new clarification, via the approval of M74-21, that A2Ls are not a subclass of A2 refrigerants by specifically requiring A2Ls to comply. Other refrigerant groups are deleted to be consistent with the limitation in Item 1.

Item 6: Additionally, in M78-21, the Mechanical Committee prohibited open flame producing devices and continuously operating hot surfaces over 1290 °F in A2L machinery rooms. Those requirements are duplicated here.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
Adoption of these provisions will forestall the need for a machinery room in the regulated uses which should decrease the cost of construction.

The requirements for a new Section 429 in the International Building Code is addressed in G99-21 Part II. This section references those requirements. The membership is asked to consider coordination in there review.

Public Comment# 2488

NOTE: G99-21 PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G99-21 Part I

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

THIS IS A 12 PART CODE CHANGE. PART I THROUGH V WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART VI AND VII WILL BE HEARD BY THE MEANS OF EGRESS CODE COMMITTEE. PART VIII AND IX WILL BE HEARD BY THE FIRE CODE COMMITTEE.PART X AND XII WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE.SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Add new definition as follows:

COMPUTER ROOM. A room or portions of a *building* used primarily to house *information technology equipment* (ITE) and serving an ITE load less than or equal to10 kW or 20 W/ft^2 (215 W/m^2) or less of conditioned floor area.

DATA CENTER. A room or *building*, or portions thereof, used primarily to house *information technology equipment* (ITE) and serving a total ITE load greater than 10 kW and 20 W/ft^2 (215 W/m^2) of conditioned floor area.

INFORMATION TECHNOLOGY EQUIPMENT (ITE). Computers, data storage, servers, and network communication equipment.

INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF). *Data centers* and *computer rooms* used primarily to house *information technology equipment.*

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part I

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved because these definitions are an important part of the package for these types of facilities. There was concerned raised about the differences between the four definitions and that there were requirements in the definitions - this could be simplified. (Vote: 8-5)

G99-21 Part I

G99-21 Part III

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Building Code

Revise as follows:

306.3 Low-hazard factory industrial, Group F-2. Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials that during finishing, packing or processing do not involve a significant fire hazard <u>and information technology equipment facilities</u> shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

- Beverages: up to and including 16-percent alcohol content
- *Brick* and masonry
- Ceramic products
- Foundries
- Glass products
- Gypsum
- Ice
- <u>*Information technology equipment facilities*</u>
- Metal products (fabrication and assembly)

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
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NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and*

ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum*." A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

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· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

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Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and

California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part III

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the committee felt that this was was the wrong classification for informational technology equipment facilities - these are not manufacturing. In addition, this type of facility does not fit with the other items in the description of Group F-2. (Vote: 13-0)

G99-21 Part III

Individual Consideration Agenda

Public Comment 1:

Proponents: Dennis Julian, representing Digital Realty Director of Design (djulian@digitalrealty.com) requests As Submitted

Commenter's Reason: I support the proposed changes

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change in cost expected

NOTE: G99-21 PART IV DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G99-21 Part IV

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Building Code

Revise as follows:

311.3 Low-hazard storage, Group S-2. Storage Group S-2 occupancies include, among others, buildings housing information technology equipment facilities, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

- Asbestos
- Beverages up to and including 16-percent alcohol
- Cement in bags
- Chalk and crayons
- Dairy products in nonwaxed coated paper containers
- Dry cell batteries
- Electrical coils
- Electrical motors
- Empty cans
- Food products
- Foods in noncombustible containers
- Fresh fruits and vegetables in nonplastic trays or containers
- Frozen foods
- Glass
- Glass bottles, empty or filled with noncombustible liquids
- *Gypsum board*
- Inert pigments
- Information technology equipment facilities
- Ivory
- Meats
- Metal cabinets
- Metal desks with plastic tops and *trim*
- Metal parts
- Metals
- Mirrors
- Oil-filled and other types of distribution transformers
- Public parking garages, open or enclosed
- Porcelain and pottery
- Stoves
- Talc and soapstones
- Washers and dryers

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
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PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

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PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved as the committee felt that informational technology equipment facilities are not low hazard since that have many combustible elements. These items are too flamable to be considered a Group S-2. (Vote: 13-0)

G99-21 Part IV

NOTE: G99-21 PART V DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G99-21 Part V

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Building Code

Revise as follows:

TABLE 509.1 INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
<u>*Information Technology Equipment Facilities*</u>	<u>1 hour or provide automatic fire-extiguishing system</u>
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In *ambulatory care facilities*, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.

For SI: 1 square foot = 0.0929 m^2, 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m^3.

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully

mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water.*"

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part V

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because there was no size limit for the information technology equipment facilities in the incidental use tables. There was also a conflict with Section 509.4.2 in the terminology for sprinklers versus suppression. (Vote: 13-0)

G99-21 Part V

NOTE: G99-21 PART VI DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G99-21 Part VI

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Building Code

Revise as follows:

TABLE 1004.5 MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

Portions of table not shown remain unchanged.

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR[a]
Business areas	150 gross
Information Technology Equipment Facilities	300 gross
Concentrated business use areas	See Section 1004.8

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. Floor area in square feet per occupant.

1004.8 Concentrated business use areas. The*occupant load* factor for concentrated business use shall be applied to telephone call centers, trading floors, electronic data ~~processing~~ entry centers and similar business use areas with a higher density of occupants than would normally be expected in a typical business occupancy environment. Where approved by the *building official*, the *occupant load* for concentrated business use areas shall be the actual *occupant load*, but not less than one occupant per 50 square feet (4.65 m^2) of gross occupiable floor space.

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water.*"

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under abnormal operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part VI

Public Hearing Results

Committee Action: **As Modified**

Committee Modification:

TABLE 1004.5 MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR[a]
Business areas	150 gross
~~*Information Technology Equipment Facilities*~~	~~300 gross~~
Concentrated business use areas	See Section 1004.8
Information Technology Equipment Facilities	300 gross

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. Floor area in square feet per occupant.

Committee Reason: The modification moved Information Technology Equipment Facilities out from under business, which is a more appropriate location. The proposal was approved as it separated data entry from equipment facilities. The coordinates with the action on G99-21 Part 1. (Vote: 14-0)

G99-21 Part VI

NOTE: G99-21 PART VIII DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G99-21 Part VIII

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Fire Code

Add new definition as follows:

COMPUTER ROOM. A room or portions of a *building* used primarily to house *information technology equipment (ITE)* and serving an *ITE* load less than or equal to10 kW or 20 W/ft2 (215 W/m2) or less of conditioned floor area.

DATA CENTER. A room or *building*, or portions thereof, used primarily to house *information technology equipment (ITE)* and serving a total *ITE* load greater than 10 kW and 20 W/ft^2 (215 W/m^2) of conditioned floor area.

INFORMATION TECHNOLOGY EQUIPMENT (ITE). Computers, data storage, servers, and network communication equipment.

INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF). *Data centers* and *computer rooms* used primarily to house *information technology equipment.*

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

PART I - IBC DEFINITIONS

Using common definitions for information technology equipment, data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*. They are consistent with definitions used in the ASHRAE 90.4 *Energy Standard for Data Centers* as well as NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*. It is likely that the definitions of data centers and computer rooms will be added to future editions of the IECC.The definitions for computer rooms and data centers are based ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

· **Sec. 429.1 General** classifies ITE facilities as industrial occupancies to align with Sec. 1103 of the IMC. Per the IMC, which is consistent with ASHRAE 15, an industrial occupancy is "*that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process or store goods such as chemicals, food, ice, meat or petroleum.*" A change has been proposed for the IMC and to ASHRAE 15 to specifically include ITE facilities in this classification.

· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under <u>abnormal</u> operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
P ART II- In some facilities there may be an additional cost; in others there may be less cost. It will be very building specific.
PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part VIII

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: This proposal was approved to be consistent with Part I. Additionally if the other portions are placed within the code these definitions will be critical. It was noted that NFPA 75 does not appear to be consistent with these definitions. (Vote: 10-4)

G99-21 Part VIII

NOTE: G99-21 PART XI DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G99-21 Part XI

Proposed Change as Submitted

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com); Lee Kaiser, ORR Protection, representing NFPA 75 Technical Committee (ELT-AAA) (lkaiser@orrprotection.com)

2021 International Mechanical Code

Revise as follows:

1103.2 Occupancy classification. Locations of refrigerating systems are described by*occupancy* classifications that consider the ability of people to respond to potential exposure to refrigerants. Where *equipment* or *appliances*, other than piping, are located outside a building and within 20 feet (6096 mm) of any building opening, such *equipment* or *appliances* shall be governed by the *occupancy* classification of the building. *Occupancy* classifications shall be defined as follows:

1. Institutional *occupancy* is that portion of premises from which occupants cannot readily leave without the assistance of others because they are disabled, debilitated or confined. Institutional occupancies include, among others, hospitals, nursing homes, asylums and spaces containing locked cells.
2. Public assembly *occupancy* is that portion of premises where large numbers of people congregate and from which occupants cannot quickly vacate the space. Public assembly occupancies include, among others, auditoriums, ballrooms, classrooms, passenger depots, restaurants and theaters.
3. Residential *occupancy* is that portion of premises that provides the occupants with complete independent living facilities, including permanent provisions for living, sleeping, eating, cooking and sanitation. Residential occupancies include, among others, dormitories, hotels, multiunit apartments and private residences.
4. Commercial *occupancy* is that portion of premises where people transact business, receive personal service or purchase food and other goods. Commercial occupancies include, among others, office and professional buildings, markets (but not large mercantile occupancies) and work or storage areas that do not qualify as industrial occupancies.
5. Large mercantile *occupancy* is that portion of premises where more than 100 persons congregate on levels above or below street level to purchase personal merchandise.
6. Industrial *occupancy* is that portion of premises that is not open to the public, where access by authorized persons is controlled, and that is used to house *information technology equipment* such as *computer rooms* or *data centers* or for the manufacture, ~~process~~ processing or ~~store~~ storage of goods such as chemicals, food, ice, meat or petroleum.
7. Mixed *occupancy* occurs where two or more occupancies are located within the same building. Where each *occupancy* is isolated from the rest of the building by tight walls, floors and ceilings and by self-closing doors, the requirements for each *occupancy* shall apply to its portion of the building. Where the various occupancies are not so isolated, the *occupancy* having the most stringent requirements shall be the governing *occupancy*.

Reason: General information -

This is several proposals across multiple codes and standards to propose requirements appropriate to the unique characteristics of facilities housing computer rooms and data centers or *Information technology equipment* (ITE).Computer rooms and data centers are mission critical applications. All aspects of our public infrastructure, transportation, our education system, our healthcare system, our national defense, our banking, our public safety systems, our process for writing codes - our lives - are wholly dependent on the efficient real-time processing of data. The ITE used to perform this function must be 100% reliable.
For these reasons ITE facilities are secured spaces, atmospherically and physically, with tightly controlled access.

Because access to ITE facilities is restricted, and because ITE facilities are only accessed by technicians performing periodic process maintenance, the occupant load of these spaces is intermittent or sparse.

Like many process industries, ITE facilities have specific environmental process constraints if they are to function properly:

- ITE needs to be continuously cooled to protect the data and sometimes the best way to cool the equipment is to cool the room.
- ITE is extremely sensitive to humidity and atmospheric contaminants; it can ruin equipment and thereby data. Ideally, ITE facilities bring in no outside air or moisture into ITE spaces; ventilation for refrigerants within ITE facilities is solely to reduce refrigerant concentration by fully mixing refrigerant into the atmosphere of the space.
- Alternative methods of fire suppression may be most suitable.

Until recently ITE facilities used nonflammable A1 refrigerants, but separate rule makings by the California Air Resources Board and the US Environmental Protection Agency now require refrigerants to meet Global Warming Potential (GWP) values that are much lower than currently possible with commercially available A1 refrigerants.

For this reason the ITE facilities cooling industry is adopting the use of A2L refrigerants which perform well, which are environmentally friendlier and which have much lower GWP values, but which are mildly flammable.

Adoption of A2L refrigerant necessitates ITE facility code requirements that provide the right protection for the unique industrial process being protected.

Requirements addressing ITE facilities must be flexible and performance oriented to address the many potential configurations of these spaces, from small computer rooms within much larger uses, or as one use in multiple occupancies, to unlimited area data centers that occupy millions of square feet of land, (https://www.analyticsvidhya.com/blog/2020/09/8-largest-data-centers-world-2020/).

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2019 *Energy Standard for Data Centers* except that the definition of computer rooms was modified to clarify that computer rooms are not primarily used for any other purpose than to house *information technology equipment*. This modification is necessary to distinguish computer rooms (data processing) from rooms where occupants use computers (data entry).

PART II -IBC Section 429 (New)

See the general reason.

NFPA 75, *The Standard for the Protection of Information Technology Equipment* is proposed as the appropriate reference to assure:

- The need for appropriate fire protection is met regardless of the configuration of the ITE facility.
- The fire protection package appropriately considers the unique environmental needs of the ITE facility.

NFPA 75 benefits from the involvement of subject matter experts in the design, operation and fire protection of these unique industrial processes.

NFPA 75 is realistic and flexible; it requires a documented risk assessment of the ITE facility to serve as the basis for a fire protection approach that is "*permitted to be determined based on an evaluation of fire risks and hazards associated with the* ITE *and services provided and the business continuity planning and disaster restoration capabilities of the* ITE *specific to the* ITE."

NFPA 75 also anticipates that alternative methods of fire suppression may be most suitable to protect data processing capacity and provides references to those NFPA standards that address such systems. It sets forth *"the minimum requirements for the protection of* ITE *equipment and* ITE *areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water*."

In addition to the reference to NFPA 75 for performance design provisions, this proposal provides simple prescriptive requirements consistent with the treatment of locations classified as controlled access, industrial occupancies by ASHRAE 15 *Safety Standard for Refrigeration Systems* and the International Mechanical and Fire Codes.

By section, this proposal does the following:

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· **Sec. 429.2 Refrigerants** limits refrigerants to nonflammable or mildly flammable refrigerants, but also provides clarification that the AHJ can approve other refrigerants on an individual basis.

· **Sec. 429.3 Fire Protection** references NFPA 75.

· **Sec. 429.4 Design and construction** requires a minimum of a one-hour fire separation between the ITE facility and adjacent occupancies, but reasonably provides flexibility for small spaces in fully sprinklered buildings. It also requires materials in concealed spaces, such as below a raised floor or above a suspended ceiling to be those permissible for use in a plenum.

· **Sec. 429.5 Electrical** requires compliance for non-IT equipment with Class 1, Division 2, of NFPA 70 (Class I – Flammable gases or vapors may be present; Division 2 – Ignitable concentrations of hazards exist under abnormal operation conditions) requirements where the code official has approved a refrigerant other than a Group A1 or A2L.

· **Sec. 429.6 Ventilation** requires mechanical ventilation of the ITE space to be triggered by refrigerant detection in accordance with the IMC and its secondary reference to the IFC Sec. 608.9. It also permits required ventilation to mix leaked refrigerant in the ITE space without exhausting the space or bringing in make-up air, thereby protecting the ITE from airborne contaminants and undesirable humidity.

· **Sec. 429.7 Refrigerant detection** references the IFC for refrigerant detection provisions and assures the appropriate initiation of measures to address an unintended leak of refrigerant or failure of the detection system.

· **Sec. 429.8 Standby power** ensures that active detection and protection measures are always available.

· **Sec. 429.9 Common path of egress travel** requires ITEF to comply with the same means of egress requirements as those specified in Section 1006.2.2.3 for refrigerated rooms or spaces. All portions of an ITEF must be within 150 feet of an exit or exit access doorway where such facilities are not protected by an approved automatic sprinkler system.

PART III - IBC Section 306.3 Group F-2

It is proposed to add Information Technology Equipment Facilities (data centers and computer rooms) to the F-2 occupancy group as they are industrial applications not currently addressed by the code with any specificity.

A separate code change proposes to add a section in Chapter 4 to address Information Technology Equipment Facilities (ITEF), but the correct occupancy group should be established.

ITEFs are buildings and spaces that are not open to the public, where access by authorized persons is controlled, and that are used to store and process electronic information or data. They are accessed only by IT maintenance technicians and have low or only intermittent occupant loads

USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new A2L (mildly flammable) refrigerants.

PART IV - IBC Section 311.3 Group S-2

Information technology equipment facilities are unique low hazard and low occupancy uses where data is stored and processed in racked equipment. While there are some moderate hazards specific to ITE facilities under abnormal operational conditions, those hazards are anticipated and mitigated by the codes:

- ITE facilities must be cooled for ITE performance. Potential hazards from flammable refrigerants are managed by compliance with the refrigerant safety provisions of the IMC, the IFC and ASHRAE 15 thereby assuring that leaked flammable refrigerants are detected and managed appropriately.
- IMC Section 1104.2.2 requires that the electrical equipment and appliances in ITE facilities must conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
- Cabling in underfloor and above ceiling plenum areas of ITE facilities is required to comply with IMC Section 602.2.1.1 and electrical equipment exposed in plenums must comply with IMC Sec. 602.2.1.4.

PART V - IBC Table 509.1 Incidental Uses

Information technology equipment (ITE) facilities -data centers and computer rooms - are cooled for industrial process reasons so that the ITE can operate as needed. This means these facilities can have a significant refrigerant load, just like a refrigerant machinery room, without necessarily having a machinery room. Refrigerant machinery rooms already are identified in Table 509.1 as needing either a one-hour separation or automatic sprinkler system protection. ITE facilities should meet the same standard, except that ITE facilities may need alternative fire protection methods for ITE.

PART VI - IBC Table 1004.5 Occupant Load Factor

The original proponent of Section 1004.8 (Group A, 2015: E9-15) included the section as part of a successful effort to increase the Table 1004.5 occupant load factor (OLF) for the typical business use from 100 to 150 SF gross per occupant. Section 1004.8 was added to ensure that the newly less stringent OLF was not applied inappropriately to business use areas known to have a higher density of occupants.

Data centers and computer rooms do not have a higher density of occupants, but typically have very low or intermittent occupancy loads, being occupied by only IT staff who periodically perform equipment maintenance functions. For this proposal, 300 SF gross OLF was selected as a conservative and appropriate OLF because the footprint of racks of *information technology equipment* are comparable to footprint of the racks of shelving in storage and stock areas of mercantile uses, even though such mercantile areas would be far more frequently occupied.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical. USEPA and California regulations require transition to lower global warming potential refrigerants, which in turn requires changes in provisions in model codes and standards related to the safe use of new refrigerants. Using common definitions for data centers and computer rooms will foster uniformity of application between codes and related standards. These definitions have been proposed for use by the building, fire, and mechanical codes as well as ASHRAE 15, the *Safety Standard for Refrigeration Systems*.

PART VII - IBC Section 1010.2.9.2 ITEF exits

Information technology equipment (ITE) facilities (computer rooms and data centers) are cooling intensive spaces because of equipment process needs and have similar exiting concerns to refrigeration machinery rooms because of hazards related to refrigerants.

A separate code change proposal will add ITE facilities (computer rooms and data centers) to the IMC's industrial occupancy classification in recognition of the process cooling needs unique to ITE facilities. This change will permit computer rooms and data centers that comply with new IMC Section 1104.2.3 to have space cooling without requiring a refrigeration machine room per Section 1104.2.2.

PART VIII - IFC Definitions

See the commentary to IBC Definitions above.

PART IX - IFC Section 609.8.1

See the general reason above.

Separate proposals for Chapter 11 of the IMC and Chapter 4 of the IBC apply occupancy specific requirements to ITE facilities. Those proposals:

- limit refrigerants to nonflammable Group A1 and mildly flammable Group A2L refrigerants
- require electrical equipment conformance with the Class I, Division 2, hazardous location classification requirements of NFPA 70, and
- reference NFPA 75, *The Standard for the Protection of Information Technology Equipment* to assure appropriate fire protection is provided regardless of the configuration of the ITE facility and the fire protection package appropriately considers the unique environmental needs of the ITE facility.
- require ITE facilities to be separated from adjacent uses by fire barriers and horizontal assemblies.

Given the other fire safety provisions proposed to apply to ITE facilities, and in recognition that stopping the cooling of an ITE space could jeopardize the data and data processes, automatic stopping of cooling is inadvisable.

Required detection and alarms will inform the facility manager and fire officials of the potential hazard, thereby providing an opportunity for data backup and potential purging of the ITE facility atmosphere.

PART X - IMC Definitions

See the commentary to IBC Definitions above.

PART XI - IMC Occupancy classification.

This proposed change clarifies that data centers and computer rooms, which are cooled solely for the process loads associated with *information technology equipment*, are industrial occupancies.

Per Sec. 1103.2 (6), key features of an industrial occupancy are that it is that portion of a premises that is not open to the public and where access by authorized persons is controlled, both of which are characteristic of data centers and computer rooms.

Industrial occupancies also are defined by the processing of "goods." For data centers and computer rooms the 'goods' being processed is data or electronic information.

It is worth noting that no other occupancy classification specifically addresses any of the characteristics of data centers and computer rooms. The catchall provision in the Commercial occupancy classification for "*work or storage areas that do not qualify as industrial occupancies*," is not appropriate as space cooling in commercial occupancies is intended for comfort cooling, not for process cooling and occupant loads for industrial applications are very low, with restricted access, compared to commercial occupancies that may have no restrictions on access.

Data centers and computer rooms have significant cooling needs for process purposes; keeping ITE cool enough is mission critical.

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The definitions for computer rooms and data centers are based upon ASHRAE Standard 90.4-2019 *Energy Standard for Data Centers.*

Appropriately classifying data centers and computer rooms will facilitate the drafting of requirements for the IMC that address the unique circumstances of these occupancies.

PART XII - IMC 1104.2.3 ITEF

See the general reason above.

Currently Sec 1106.3 requires that machinery rooms for Group A2L refrigerants must either conform to Class I, Division 2, hazardous location classification requirements of NFPA 70 **OR** provide provide emergency exhaust ventilation (Sec 1106.4). This proposal allows Group A2L to be used without NFPA 70 compliance and without exhaust ventilation in deference to the ITE environmental needs. A separate proposal to add requirements for ITE facilities in Chapter 4 of the building code clarifies that emergency ventilation for ITE facilities is only required to mix the atmosphere within the ITE space so that leaked refrigerant is fully dispersed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PART I, VIII and X - The definitions are to information only and will not add any additional construction requirements.
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PART III - This is a clarification.
PART IV- This is a clarification.
PART V - There may additional costs to provide 1 hour separation for the space where the building does not have a fire sprinkler or fire extinguishing system.
PART VI - Means of egress systems will be 'right sized' for data centers and computer rooms.
PART VII - There may be a minimal increase for exit access doors in certain circumstances.

PART IX- Manual controls for refrigeration equipment shut-off should be less expensive than automatic controls.
PART XI -This proposal will match the space use with the correct requirements which will tend to lower construction costs.

PART XII - Having use specific requirements for ITE facilities should minimize costs by avoiding requirements that do not fit the condition.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 75-20, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G99-21 Part XI

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal has been disapproved because industrial is not an occupancy classification. The committee also had concerns regarding merging spaces with correct requirements. (Vote: 11-0)

G99-21 Part XI

G100-21 Part II

Proposed Change as Submitted

Proponents: Chad Sievers, representing NYS Dept. of State (chad.sievers@dos.ny.gov); Kevin Duerr-Clark, representing New York State Department of State (kevin.duerr-clark@dos.ny.gov)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. PART III WILL BE HEARD BY THE PROPERTY MAINTENANCE/ZONING CODE COMMITTEE.SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Fire Code

Add new definition as follows:

LIVE FIRE TRAINING BUILDING. A *building* in which live fire training, fire, rescue, hazmat, and/or other related training evolutions are conducted on a repetitive basis. This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers, as defined in NFPA 1402, and their associated systems, appliances, and props.

Add new text as follows:

SECTION 322
LIVE FIRE TRAINING BUILDINGS

322.1 Live fire training buildings.
Live fire training buildings shall be designed, constructed, and maintained in accordance with the applicable provisions of NFPA 1402 and with this code where NFPA 1402 so requires.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 1402-2019 Standard on Facilities for Fire Training and Associated Props

Reason: Live fire training facilities contain unique types of buildings/structures that are purposely designed to not meet building codes. NFPA 1402 provides for the necessary design and construction provisions of these types of buildings and gives the code enforcement community the tools necessary to properly regulate them. The scope of the standards acknowledges that building codes and gas codes do not address the unique and specific requirements for these specialized types of facilities. It is not the intent of this proposal to capture buildings that are designed, constructed, and maintained to the International Building Code and Fire Code already, such as a B or A occupancy where instruction on fire practices takes place, rather, to capture those buildings not clearly covered by the Codes that would typically require variances or modifications of code language to be compliant.
This is a multi part proposal that will propose parallel modifications to the International Building Code, International Fire Code, Existing Building Code, and Property Maintenance Code in order to address the design, modification, and maintenance of these types of facilities.

Cost Impact: The code change proposal will increase the cost of construction
This proposal may increase the cost of construction or the cost may remain the same, depending on how the enforcement community has previously enforced the provisions of the code on these types of buildings. Some already enforce these additional standards, others may enforce nothing, treating these buildings as outside the scope. In the second scenario, the cost may increase in order to ensure compliance with the new standards.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 1402-2019, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G100-21 Part II

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee stated that the reasons for disapproval were based on the conflicts in the proposal with the existing IBC and

IFC sections and that there are no design load requirements in the proposed referenced standard. (Vote: 10-2)

G100-21 Part II

Individual Consideration Agenda

Public Comment 1:

IFC: SECTION 202, 322.1

Proponents: Chad Sievers, representing NYS Dept. of State (chad.sievers@dos.ny.gov); Kevin Duerr-Clark, representing New York State Department of State (kevin.duerr-clark@dos.ny.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Fire Code

LIVE FIRE TRAINING BUILDING . A *building* in which live fire trainin~~g, fire, rescue, hazmat, and/or other related training~~ evolutions are conducted on a repetitive basis. This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers, as defined in NFPA 1402~~, and their associated systems, appliances, and props~~.

322.1 Live fire training buildings . Live fire training buildings <u>and any appurtenances connected or attached to such buildings or structures</u> shall be designed, constructed, and maintained in accordance with the applicable provisions of NFPA 1402,~~and with~~ this code,~~where~~ and the International Building Code~~ where NFPA 1402 so requires~~.

Commenter's Reason: The definition of “Live Fire Training Building” was modified to ensure only buildings where live fire training exercises are conducted are captured. The “associated systems, appliances and props” was also removed from the definition and the term “appurtenances” was added to the section to ensure the intent is not to capture stand-alone props that may be co-located at the same facility such as a gas-fired car prop but to capture gas-fired props used to simulate fire in or on the structure. Furthermore the requirement that the building still had to be constructed following the applicable provisions of the IBC was added.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
This proposal may increase the cost of construction or the cost may remain the same, depending on how the enforcement community has previously enforced the provisions of the code on these types of buildings. Some already enforce these additional standards, others may enforce nothing, treating these buildings as outside the scope. In the second scenario, the cost may increase in order to ensure compliance with the new standards.

Public Comment# 2517

G100-21 Part I

Proposed Change as Submitted

Proponents: Kevin Duerr-Clark, representing New York State Department of State (kevin.duerr-clark@dos.ny.gov); Chad Sievers, representing NYS Dept. of State (chad.sievers@dos.ny.gov)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. PART III WILL BE HEARD BY THE PROPERTY MAINTENANCE/ZONING CODE COMMITTEE.SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Add new definition as follows:

LIVE FIRE TRAINING BUILDING. A *building* in which live fire training, fire, rescue, hazmat, and/or other related training evolutions are conducted on a repetitive basis . This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers, as defined in NFPA 1402, and their associated systems, appliances, and props.

Add new text as follows:

SECTION 429
LIVE FIRE TRAINING BUILDINGS

429.1 Live fire training buildings.
Live fire training buildings shall be designed and constructed in accordance with the applicable provisions of NFPA 1402 and with this code where NFPA 1402 so requires.

Revise as follows:

312.1 General. Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy. Group U shall include, but not be limited to, the following:

Agricultural buildings
Aircraft hangars, accessory to a one- or two-family residence (see Section 412.4)
Barns
Carports
Communication equipment structures with a *gross floor area* of less than 1,500 square feet (139 m^2)
Fences more than 7 feet (2134 mm) in height
Grain silos, accessory to a residential occupancy
Live fire training buildings (see Section 429)
Livestock shelters
Private garages
Retaining walls
Sheds
Stables
Tanks
Towers

Add new text as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 1402-2019 Standard on Facilities for Fire Training and Associated Props

Reason: Live fire training facilities contain unique types of buildings/structures that are purposely designed to not meet building codes. NFPA 1402 provides for the necessary design and construction provisions of these types of buildings and gives the code enforcement community the tools necessary to properly regulate them. The scope of the standards acknowledges that building codes and gas codes do not address the unique and specific requirements for these specialized types of facilities. It is not the intent of this proposal to capture buildings that are designed, constructed, and maintained to the International Building Code and Fire Code already, such as a B or A occupancy where instruction on fire practices takes place, rather, to capture those buildings not clearly covered by the Codes that would typically require variances or modifications of code language to be compliant.

This is a multi part proposal that will propose parallel modifications to the Building Code, Fire Code, Existing Building Code, and Property Maintenance Code in order to address the design, modification, and maintenance of these types of facilities.

Cost Impact: The code change proposal will increase the cost of construction
This proposal may increase the cost of construction or the cost may remain the same, depending on how the enforcement community has previously enforced the provisions of the code on these types of buildings. Some already enforce these additional standards, others may enforce nothing, treating these buildings as outside the scope. In the second scenario, the cost may increase in order to ensure compliance with the new standards.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 1402-2019, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G100-21 Part I

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved as the committee felt several items needed to be considered. What is the separation requirements for other uses/buildings, including classrooms in the same facilities? NFPA 1402 seems to regulate prop, but that was not included in the proposal - what props should be included. There is additional correlation needed for how these facilities should be constructed since NFPA 1402 sends you back to the code for construction requirements. Since the requirements in NFPA 1402 seem to be minimal, maybe they should be added to the code instead of a reference. (Vote: 13-1)

G100-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 202, 429.1

Proponents: Chad Sievers, representing NYS Dept. of State (chad.sievers@dos.ny.gov); Kevin Duerr-Clark, representing New York State Department of State (kevin.duerr-clark@dos.ny.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

LIVE FIRE TRAINING BUILDING . A *building* in which live fire training~~, fire, rescue, hazmat, and/or other related training~~ evolutions are conducted on a repetitive basis. This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers, as defined in NFPA 1402~~, and their associated systems, appliances, and props~~.

429.1 Live fire training buildings . *Live fire training buildings* <u>and any appurtenances connected or attached to such buildings or structures</u> shall be designed and constructed in accordance with the applicable provisions of NFPA 1402 and with this code~~ where NFPA 1402 so requires~~.

Commenter's Reason: The definition of “Live Fire Training Building” was modified to ensure only buildings where live fire training exercises are conducted are captured. The “associated systems, appliances and props” was also removed from the definition and the term “appurtenances” was added to the section to ensure the intent is not to capture stand-alone props that may be co-located at the same facility such as a gas-fired car prop but to capture gas-fired props used to simulate fire in or on the structure. Furthermore the requirement that the building still had to be constructed following the applicable provisions of the IBC was added.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
This proposal may increase the cost of construction or the cost may remain the same, depending on how the enforcement community has previously enforced the provisions of the code on these types of buildings. Some already enforce these additional standards, others may enforce nothing, treating these buildings as outside the scope. In the second scenario, the cost may increase in order to ensure compliance with the new standards.

Public Comment# 2387

NOTE: G100-21 PART III DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G100-21 Part III

Proposed Change as Submitted

Proponents: Chad Sievers, representing NYS Dept. of State (chad.sievers@dos.ny.gov); Kevin Duerr-Clark, representing New York State Department of State (kevin.duerr-clark@dos.ny.gov)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. PART III WILL BE HEARD BY THE PROPERTY MAINTENANCE/ZONING CODE COMMITTEE.SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Property Maintenance Code

Add new definition as follows:

LIVE FIRE TRAINING BUILDING. A *building* in which live fire training, fire, rescue, hazmat, and/or other related training evolutions are conducted on a repetitive basis. This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers, as defined in NFPA 1402, and their associated systems, appliances, and props.

Add new text as follows:

310
LIVE FIRE TRAINING BUILDINGS

310.1 Live fire training buildings.
Live fire training buildings shall be maintained in accordance with the applicable provisions of NFPA 1402 and with this code where NFPA 1402 so requires.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

1402-2019	Standard on Facilities for Fire Training and Associated Props

Reason: Live fire training facilities contain unique types of buildings/structures that are purposely designed to not meet building codes. NFPA 1402 provides for the necessary design and construction provisions of these types of buildings and gives the code enforcement community the tools necessary to properly regulate them. The scope of the standards acknowledges that building codes and gas codes do not address the unique and specific requirements for these specialized types of facilities. It is not the intent of this proposal to capture buildings that are designed, constructed, and maintained to the International Building Code, Property Maintenance Code, and Fire Code already, such as a B or A occupancy where instruction on fire practices takes place, rather, to capture those buildings not clearly covered by the Codes that would typically require variances or modifications of code language to be compliant.
This is a multi part proposal that will propose parallel modifications to the Fire Code, Existing Building Code, and International Building Code in order to address the design, modification, and maintenance of these types of facilities.

Cost Impact: The code change proposal will increase the cost of construction
This proposal may increase the cost of construction or the cost may remain the same, depending on how the enforcement community has previously enforced the provisions of the code on these types of buildings. Some already enforce these additional standards, others may enforce nothing, treating these buildings as outside the scope. In the second scenario, the cost may increase in order to ensure compliance with the new standards.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 1402-2019, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G100-21 Part III

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that these types of inspections were performed by the Fire Code Official. Further, the committee agreed that the determination of requirements for fire training buildings was by jurisdiction and should therefore not be in a model code. (Vote 9-2)

G100-21 Part III

G101-21

Proposed Change as Submitted

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Building Code

Add new definition as follows:

MODULAR ROOM. An occupiable prefabricated structure, consisting of walls and a ceiling, with or without an integrated floor, designed and intended for use as an office or privacy space, which may include integral electrical wiring, ventilation, and furnishings.

SLEEP POD. A modular room that is designed and used for sleeping purposes.

Add new text as follows:

SECTION 429
MODULAR ROOMS AND SLEEP PODS

429.1 General.
Modular rooms and *sleep pods* shall comply with Sections 429.2 through 429.5.5 and other applicable requirements in the code. *Modular rooms* and *sleep pods* shall comply with one of the following:

1. *Modular rooms* 100 square feet (9.3 m^2) or less in floor area and 8 feet (2438 mm) or less in height.
2. *Sleep pods* 36 square feet (3.3 m^2) or less in floor area, 8 feet (2438 mm) or less in height and 4 feet (1219 mm) or less in width.

Modular rooms and sleep pods exceeding these dimensions shall comply with all applicable requirements in this code.

429.2 Listing.
Modular rooms and *sleep pods* shall be *listed* and *labeled* in accordance with UL 962 and installed in accordance with the *listing* and the manufacturer's instructions. *Modular rooms* and *sleep pods* shall be marked with the following ratings:

1. Wall and ceiling interior finish ratings as established in accordance with Chapter 8.
2. Plastic material ratings as established in accordance with Chapter 26.

429.3 Locations.
Modular rooms and *sleep pods* shall only be installed in *approved* locations and shall not obstruct required *means of egress*.

429.4 Elevation change.
Modular rooms and *sleep pods* with integral floors shall be permitted to have an elevation change measured from the finished floor that is a maximum of 5 inches (127 mm) higher than the floor of the existing structure outside the modular booth provided a sign is installed on each side of the door warning about the elevation change, and a distinctive marking stripe is installed across the threshold having a width of not less than 1 inch (25 mm) but not more than 2 inches (51 mm).

429.5 Sleep pods.
The installation of *sleep pods* shall comply with Sections 429.5.1 through 429.5.5.

429.5.1 Locations.
Where *approved*, *sleep pods* shall be permitted to be installed in all occupancies. Individual *sleep pods* exceeding the dimensions in Section 429.1 shall be treated as *sleeping units* and shall only be installed in locations in which *sleeping units* are allowed.

429.5.2 Multiple sleep pod installations.
The installation of more than one sleep pod in a room or space shall comply with the following:

1. The area in which sleep pods are installed shall not exceed 10 percent of the building area of the story in which they are located.
2. A maximum of four sleep pods can be located adjacent to each other, and each group of sleep pods shall be separated from other groups by a minimum of 10 feet (3048 mm).
3. Stacking of sleep pods shall only be done in accordance with the manufacturer's instructions and the listing.

Exception:
Installations exceeding these limitations shall be permitted based on an approved risk assessment of the installation.

429.5.3 Fire suppression.
Sleep pods shall be installed in rooms or spaces equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

429.5.4 Smoke detection.
An *automatic smoke detection system* complying with Section 907 shall be provided in the rooms or spaces in which *sleep pods* are located. The system shall activate the occupant notification system in accordance with Section 907.5.

429.5.5 Smoke alarms.
Smoke alarms shall be provided in sleep pods in accordance with Section 907.2.11. Where multiple sleep pods are located in the same room or space, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate alarms in all of the sleep pods in the group that is installed in accordance with Section 429.5.2.

Reason: Modular rooms and sleep pods are becoming increasingly popular, and are showing up in a variety of different occupancies. This proposal provides a means for building officials to approve these installations and allow the use of these prefabricated structures.
This proposal treats modular rooms and sleep pods, such as those shown in the attached pictures, as products that can be installed in a building, and not as building construction, while not losing applicable code requirements. The proposal covers:

Section 429.1 places limitations on the size of modular rooms and sleep pods that are more appropriate for listed products. Modular rooms and sleep pods that exceed these size limitations will not fall under Section 429, and will be addressed with other building code requirements, including internal wirings, lighting, and other construction.

Section 429.2 - The UL 962 listing covers the fabrication and safety of the modular room. UL 962 includes requirements for insulation, finish materials, internal wiring, lighting, ventilation, and other construction features. Markings are to be provided on the listed products to document the Chapter 8 and 26 ratings, such as the ASTM E84 (UL 723) flame spread and smoke developed indexes. This makes it easy to determine their suitability for use in the specific areas of the building.

Section 429.3 allows the building official to approve the installation locations, to make sure the means of egress is not compromised and other code requirements are not adversely impacted.

Section 429.4 addresses potential tripping hazards, and is based on Section 3.1.3, Item D in ICC ES AC519, “Enclosed Booths for Installation Inside New and Existing Buildings”.

Section 429.5 includes additional requirements that are applicable to sleep pods, a type of modular room that are showing up in occupancies such as airports and office buildings. The proposal provides protection for these products by requiring the room or space in which they are installed to be provided with fire suppression and fire detection, smoke alarms in the units, and addresses multiple sleep pod installations.

These come in a variety of forms. For some examples see these links:

- https://www.sleepinginairports.net/blog/airport-sleeping-pods.htm
- https://www.aviationpros.com/airports/press-release/12339876/dubai-airports-airport-sleep-lounge-sleep-n-fly-opens-at-dxb
- https://www.flightcentre.com.au/travel-news/destinations/airport-sleeping-options
- https://www.pinterest.com/pin/340584790540317201/
- https://dickinsonstatenews.com/dickinson-state-is-making-life-a-little-easier-for-parents-of-young-children/

Cost Impact: The code change proposal will increase the cost of construction
The cost of these construction will increase since these products are not currently regulated.

G101-21

Public Hearing Results

This proposal includes the following errata

Chapter 35:

UL 962 -2014 Includes all amendments and changes through Revision Page(s) , January 12, 2021 - UL Standard for Safety Household and Commercial Furnishings

Review of the standard is as follows:

Appears to be written in enforceable language. Does not appear to require proprietary materials or agencies. Promulgation by a consensus process stated in preface

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved. The referenced standard, UL962, was not provided to the committee. What is required for risk assessment? It is not clear if modular rooms and sleep pods were considered rooms or furniture. The 5 inch step up permitted is an issue for accessibility requirements. If the sleep pods are stacked, there is an egress issue that is not currently addressed. There was concern that these would be permitted in all occupancies. Criteria is needed for what would be an approved location. The installation limits in Section 429.5.2 is unclear and does not address modular rooms, only sleep pods. There is a concern about seismic anchorage if the sleep pods are stacked. There is a concern about fire alarm notification in the enclosed sleep pods and modular rooms. Do these need to be sprinklered? (Vote: 13-0)

G101-21

Individual Consideration Agenda

Public Comment 1:

IBC: 429.1, 429.4, 429.5, 429.5.1, 429.5.2, 429.5.3, 429.5.4, 429.5.5, [F] 903.3.3 (IFC: 903.3.3), UL Chapter 35

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

MODULAR ROOM . An occupiable prefabricated structure , consisting of walls and a ceiling, with or without an integrated floor. It is typically intended for use as an indoor privacy space, and may include integral electrical wiring, ventilation, and furnishings.

SLEEP POD . A *modular room* that is designed and used for sleeping purposes.

SECTION 429
MODULAR ROOMS AND SLEEP PODS

429.1 General . Modular rooms and sleep pods installed in indoor locations shall comply with Sections 429.2 through 429.5 ~~429.5.5 and other applicable requirements in the code~~. Modular rooms and sleep pods shall ~~comply with one of the following:~~ not exceed the following dimensions:

1. Modular rooms 100 square feet (9.3 m^2) or less in floor area and 8 feet (2438 mm) or less in height.
2. Sleep pods 36 square feet (3.3 m^2) or less in floor area, 8 feet (2438 mm) or less in height and 4 feet (1219 mm) or less in width.

~~Modular rooms and sleep pods exceeding these dimensions shall comply with all applicable requirements in this code.~~

Exceptions:

1. Precast concrete construction in accordance with Chapter 17 and Chapter 19 shall not be required to comply with this section.
2. *Modular rooms* constructed under an off-site or modular construction program approved by the Building Official shall not be required to comply with this section.

429.2 Listing . Modular rooms and sleep pods shall be listed and labeled in accordance with UL 962 and installed in accordance with the listing and the manufacturer's instructions. Modular rooms and sleep pods shall be marked with the following ratings:

1. Wall and ceiling interior finish ratings as established in accordance with Chapter 8.
2. Plastic material ratings as established in accordance with Chapter 26.

429.3 Locations . Modular rooms and sleep pods shall only be installed in approved locations and shall not obstruct required means of egress.

~~**429.4 Elevation change .** *Modular rooms* and *sleep pods* with integral floors shall be permitted to have an elevation change measured from the finished floor that is a maximum of 5 inches (127 mm) higher than the floor of the existing structure outside the modular booth provided a sign is installed on each side of the door warning about the elevation change, and a distinctive marking stripe is installed across the threshold having a width of not less than 1 inch (25 mm) but not more than 2 inches (51 mm).~~

~~**429.5 Sleep pods .** The installation of *sleep pods* shall comply with Sections 429.5.1 through 429.5.5.~~

~~**429.5.1 Locations** .~~ ~~Where *approved, sleep pods* shall be permitted to be installed in all occupancies. Individual *sleep pods* exceeding the dimensions in Section 429.1 shall be treated as *sleeping units* and shall only be installed in locations in which *sleeping units* are allowed.~~

~~**429.5.2 Multiple sleep pod installations**~~ **.** ~~The installation of more than one sleep pod in a room or space shall comply with the following:~~

1. ~~The area in which sleep pods are installed shall not exceed 10 percent of the building area of the story in which they are located.~~
2. ~~A maximum of four sleep pods can be located adjacent to each other, and each group of sleep pods shall be separated from other groups by a minimum of 10 feet (3048 mm).~~
3. ~~Stacking of sleep pods shall only be done in accordance with the manufacturer's instructions and the listing.~~

~~**Exception:**~~
~~Installations exceeding these limitations shall be permitted based on an approved risk assessment of the installation.~~

~~**429.5.3 Fire suppression**~~ **.** ~~*Sleep pods* shall be installed in rooms or spaces equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.~~

~~**429.5.4 Smoke detection**~~ **.** ~~An *automatic smoke detection system* complying with Section 907 shall be provided in the rooms or spaces in which *sleep pods* are located. The system shall activate the occupant notification system in accordance with Section 907.5.~~

429.4 **Fire alarm notification .** Where modular rooms or sleep pods are provided in areas with occupant notification systems, the required audible and visible signal shall be extended into the interior of these units in accordance with Section 907.5.

429.5 ~~**429.5.5**~~ **Smoke alarms .** Smoke alarms shall be provided in sleep pods in accordance with Section 907.2.11. Where multiple sleep pods are located in the same room or space, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate alarms in all of the sleep pods in the room or space ~~group that is installed in accordance with Section 429.5.2~~.

Exception: Smoke alarms are not required where smoke detection systems complying with Section 907.4 provide alarm notification in the sleep pods.

[F] 903.3.3 Obstructed locations . Automatic sprinklers shall be installed with regard to obstructions that will delay activation or obstruct the water distribution pattern and shall be in accordance with the applicable automatic sprinkler system standard that is being used. Automatic sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, modular rooms, sleep pods, or equipment that exceeds 4 feet (1219 mm) in width. Not less than a 3-foot (914 mm) clearance shall be maintained between automatic sprinklers and the top of piles of combustible fibers.

Exception: Kitchen equipment under exhaust hoods protected with a fire-extinguishing system in accordance with Section 904.

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062

UL 962 - 2014 Household and Commercial Furnishings - with Revisions through 2020

Commenter's Reason: At the committee action hearings there was strong support for the concept of covering modular rooms and sleep pods, but concerns with how the original proposal was crafted. This public comment addressed the major concerns raised including the following:

1. Clarified that the requirements do not cover precast concrete construction in accordance with Chapter 17 and Chapter 19, including units used in detention facilities.
2. Clarified that the requirements do not cover off-site or modular construction where the program is approved by the Building Official.
3. Deleted the confusing reference to elevation change for door sills.
4. Deleted criteria for the percentage of floor area that can be devoted for sleep pod installation.
5. Removed occupancy criteria for acceptable sleep pod installation. The 429.3 criteria allows the building official to evaluate and approve the intended locations.
6. Removed the criteria for sleep pods to only be provided in rooms containing automatic sprinklers.
7. Removed unnecessary criteria related to the maximum number and stacking of sleep pods. Existing Code requirements address these concerns.
8. Clarified that where alarm notification is provided in the room or area in which the units are installed, that it shall extend into the privacy room and sleep pod, since the sound insulation in these units would typically obstruct the notification.
9. Added references to modular rooms and sleep pods to the Section 903.3.3 obstructed location section.
10. Added the referenced standard that was provided to the committee, UL 962, into Chapter 35.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
Since modular rooms and sleep pods are not currently covered by the Code the public comment could increase the cost to install these products in a building.

G102-21

Proposed Change as Submitted

Proponents: Tom Hardiman, representing Modular Building Institute (tom@modular.org)

2021 International Building Code

Add new definition as follows:

OFF-SITE CONSTRUCTION. A modular building, modular component, panelized system or tiny house which is designed and constructed in compliance with Section 429 of this code and is wholly or in substantial part fabricated or assembled in manufacturing plants for installation - or assembly and installation - on a separate building site and has been manufactured in such a manner that all parts or processes cannot be inspected at the installation site without disassembly, damage to, or destruction thereof.

Add new text as follows:

SECTION 429
OFF-SITE CONSTRUCTION

429.1 General.
This section applies to off-site construction and shall govern the requirements for planning, design, fabrication, assembly, inspection and regulatory compliance.

429.2 Construction.
In addition to other applicable requirements in this code, off-site construction shall be constructed in accordance with ICC 1200.

429.3 Regulatory Compliance.
In addition to other applicable requirements in this code, off-site construction shall be inspected and regulated in accordance with ICC 1205.

Add new standard(s) as follows:

ICC

International Code Council, Inc.
500 New Jersey Ave NW 6th Floor
Washington, DC 20001

ICC 1200-2021	Standard for Off-Site Construction: Planning, Design, Fabrication and Assembly
ICC 1205-2021	Standard for Off-Site Construction: Inspection and Regulatory Compliance

Reason: Interest in off-site construction including modular and panelized systems and tiny houses is growing. Off-site construction has been identified as a solution for multiple societal and industry challenges including affordability, sustainability, job site safety, and the availability of skilled workers. However, many segments of the building industry including code officials, building owners, designers and contractors are often unfamiliar with these processes. While all off-site construction projects (with the exception of manufactured housing covered under the U.S. Department of Housing and Urban Development's Manufactured Home Construction and Safety Standards) must meet the requirements of the code in place at the final project site, the translation between code requirements and the off-site construction process is not always clear. To facilitate enhanced understanding of the off-site construction process, assure off-site projects maintain the requirements in code and are implemented in an efficient manner for both AHJs and manufacturers, the International Code Council (ICC) and the Modular Building Institute (MBI) initiated a joint project to write standards for the planning, design, fabrication, assembly, inspection and regulatory compliance of off-site and modular construction in February 2019.
A standard development committee was created by the ICC Board of Directors in July 2019, and the first meeting of that committee was in October of 2019. The scope of standard ICC 1200 is to provide minimum requirements to safeguard the public health, safety, general welfare and address societal and industry challenges in multiple facets of the off-site construction process including: planning, designing, fabricating, transporting and assembling commercial and residential building elements. The scope of standard ICC 1205 is to provide minimum requirements for the inspection and regulatory compliance of off-site construction.

Off-site (or modular) construction entails the planning, design, fabrication and assembly of building elements at a location other than the location where they were fabricated. Large components of a structure can be assembled in a factory-like setting and transported to the building site for final assembly. Subsequently, the finished construction is required to comply with the model building code adopted by the local authority having jurisdiction. These standards provide planning and preparation requirements such as: the role of the architect/modular manufacturer/construction manager/general contractor, location of plant vs construction site, engagement early on in the process, material procurement and lead times, and change orders. These standards also provide for requirements for a controlled manufacturing environment, supply chain integration, structural modular vs non-structural modular (e.g. bathroom pods), the fabrication process and on-site assembly such as: staging area for construction materials, foundation, placing modules, structural connections, utilities (PMG), weather considerations, finishing mate lines, inspection, approval and regulatory compliance of off-site residential and commercial construction components and their assembly and completion at the final building site such as: permitting; in-plant and on-site final inspections; third party inspections; the role of Industrialized Building Departments, state modular programs and the Authority Having Jurisdiction.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal outlines off-site construction methods that may be unfamiliar to inexperienced industry participants and offers a model regulatory process to address state and local needs.

Staff Analysis: A review of the standard proposed for inclusion in the code, ICC 1200-2021 and ICC 1205-2021, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G102-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved. The definition for off-site construction included modular buildings and components. Modular units are typically regulated by state specific requirements. The definition for off-site construction includes tiny houses. Tiny houses are not address by the code, but are in Appendix Q. This blanket exception for tiny houses is too broad. Would this cause a conflict with the tiny house emergency escape and rescue openings? The definition of off-site construction is too broad - it could be read to include items such as prefabricated trusses, the modular units and sleep pods in G101-21 or precast panels. (Vote: 13-1)

G102-21

Individual Consideration Agenda

Public Comment 1:

IBC: 429.1, 429.3

Proponents: Tom Hardiman, representing Modular Building Institute (tom@modular.org); Lakisha Woods, representing National Institute of Building Sciences (lwoods@nibs.org); Jeffrey Brown, representing Virginia Department of Housing and Community Development (jeff.brown@dhcd.virginia.gov); Norman Wang, representing Maryland Dept of Labor (norman.wang1@maryland.gov); Dave Walsh, representing Marriott International (david.walsh@marriott.com); Jon Hannah-Spacagna, representing Modular Building Institute (jon@modular.org); Matthew Laase, representing Jackson|Main Architecture (matt.laase@jacksonmain.com); Michelle Benoit, representing Modular Building Institute (michelleb@proveng.com); Suzie Hall, representing The Cornerstone Collective (suzie@thecornerstonecollective.net) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

OFF-SITE CONSTRUCTION. . A modular building, modular component, panelized system or tiny house which is designed and constructed in compliance with Section 429 of this code and is wholly or in substantial part fabricated or assembled in manufacturing plants for installation - or assembly and installation - on a separate building site and has been manufactured in such a manner that all parts or processes cannot be inspected at the installation site without disassembly, damage to, or destruction thereof.

SECTION 429
OFF-SITE CONSTRUCTION

429.1 General . ~~This section~~ <u>The provisions of Sections 429.1 through 429.3</u> applies to off-site construction and shall govern the requirements for planning, design, fabrication, assembly, inspection and regulatory compliance.

<u>**Exception:** Structural, load-bearing, or lateral load-resisting members or assemblies fabricated and inspected in accordance with Section 1704.2.5.</u>

429.2 Construction . In addition to other applicable requirements in this code, off-site construction shall be constructed in accordance with ICC 1200.

429.3 Regulatory Compliance . In addition to other applicable requirements in this code, off-site construction shall be inspected and regulated in accordance with ICC 1205 unless otherwise required by the state law of the jurisdiction having authority.

,

ICC 1200-2021	Standard for Off-Site Construction: Planning, Design, Fabrication and Assembly

,

ICC 1205-2021	Standard for Off-Site Construction: Inspection and Regulatory Compliance

Commenter's Reason: The ICC's Committee Action Hearings provided beneficial feedback relative to the development of the two new standards for offsite construction (ICC 1200 and 1205). At the time of the hearing, the standards had not yet been finalized, allowing the standards work group to incorporate the feedback from the committee directly into the standards. The changes to the standards based on committee feedback are as follows:

1) Remove all references to "tiny homes." Several committee members raised concerns about the inclusion of tiny homes and potential conflicts within Appendix Q. Rather than exempting tiny homes from the standard, the standards working group removed specific references to tiny homes, allowing each state to address whether tiny homes should be included in their program. This also eliminates any potential conflicts with Appendix Q.

2) Incorporated language in the standard providing the AHJ the option to exempt "listed and labeled modular components" to address concerns and a related proposal for UL listed components such as medical headwalls.

For anyone who wants to look at the revisions to ICC 1200 and 1205, the link to the OSMC committee webpage is: https://www.iccsafe.org/products-and-services/standards/is-osmc/. Drafts that were approved by the ballot are in the Administrative section. These standards will by finalized and published by the time of the public comment hearings.

To address the other committee concerns raised, we have modified our original proposal to provide greater flexibility for states with existing programs and for prefabricated components inspected in accordance with Section 1704.2.5 of the IBC. We addressed concerns specific to the proposed floor modification that was made (Smith 1) exempting fabricated items complying with section 1704.2.5 of the IBC and have added that exception into Section 429.1.This standard does not cover other common prefabricated components such as roof trusses, as those products do not incorporate concealed elements and can be readily inspected on site or need only the special inspection of the fabricator's shop required per Chapter 17 of the IBC and not the additional procedures, inspections and AHJ oversight required under ICC 1200 and ICC 1205. This standard also does not change the fact that any building component will still need to be constructed in accordance with all applicable building codes in the jurisdiction where the building will be located.

This standard provides a consistent path for AHJs to review and inspect offsite constructed building components, a process gaining rapidly in popularity due to the labor shortages and massive infrastructure demands. This standard has been well vetted as evidenced by the number and diversity of co-proponents to this comment and should be incorporated into the main body of the codes rather than as an appendix as suggested by two committee members. By modifying the proposal to provide state programs the option of using the standard or their existing program, we have eliminated the need for an appendix while providing much needed guidance to those states with no program in place.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal outlines off-site construction methods that may be unfamiliar to inexperienced industry participants and offers a model regulatory process to address state and local needs.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standard ICC 1200 and ICC 1205, must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

Public Comment# 2744

G103-21

Proposed Change as Submitted

Proponents: Eric Bressman, representing Ankrom Moisan Architects (ericb@ankrommoisan.com)

2021 International Building Code

Revise as follows:

503.1 General. Unless otherwise specifically modified in Chapter 4 and this chapter, *building height*, number of *stories* and *building area* shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter. *Building height*, number of *stories* and *building area* provisions shall be applied independently. For the purposes of determining area ~~limitations,~~ and height limitations ~~and type of construction~~, each portion of a building separated by one or more *fire walls* complying with Section 706 shall be considered to be a separate building.

602.1 General. Buildings and structures erected or to be erected, altered or extended in height or area shall be classified in one of the five *construction types* defined in Sections 602.2 through 602.5. The *building elements* shall have a *fire-resistance rating* not less than that specified in Table 601 and *exterior walls* shall have a *fire-resistance rating* not less than that specified in Table 705.5. Where required to have a *fire-resistance rating* by Table 601, *building elements* shall comply with the applicable provisions of Section 703.2. The protection of openings, ducts and air transfer openings in *building elements* shall not be required unless required by other provisions of this code.

> **Exception:** Each portion of a building separated by one or more fire walls complying with Section 706 shall be considered separate buildings and shall be permitted to be of different construction types.

Reason: The reference to type of construction is out of context in Chapter 5, which is specifically addressing building height and area. The provision allowing buildings to be constructed of varying types should be included in Chapter 6 where all of the types are defined and the charging language implies that a building may only be of a single construction type.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This amendment does not change any Code requirement. It is only moving it to a more logical location in the Code.

G103-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The current code language is clear on the requirements.
(Vote: 10-4)

G103-21

Individual Consideration Agenda

Public Comment 1:

IBC: 503.1, 602.1

Proponents: Eric Bressman, representing Ankrom Moisan Architects (ericb@ankrommoisan.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

503.1 General . Unless otherwise specifically modified in Chapter 4 and this chapter, *building height*, number of *stories* and *building area* shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter. *Building height*, number of *stories* and *building area* provisions shall be applied independently. For the purposes of determining area and height limitations, each portion of a building separated by one or more *fire walls* complying with Section 706 shall be considered to be a separate building.

602.1 General . Buildings and structures erected or to be erected, altered or extended in height or area shall be classified in one of the five *construction types* defined in Sections 602.2 through 602.5. The *building elements* shall have a *fire-resistance rating* not less than that specified in Table 601 and *exterior walls* shall have a *fire-resistance rating* not less than that specified in Table 705.5. Where required to have a *fire-resistance rating* by Table 601, *building elements* shall comply with the applicable provisions of Section 703.2. The protection of openings, ducts and air transfer openings in *building elements* shall not be required unless required by other provisions of this code.

> **Exception:**~~Each~~ For the purposes of determining construction type, each portion of a building separated by one or more fire walls complying with Section 706 shall be considered separate buildings and shall be permitted to be of different construction types.

Commenter's Reason: At the hearings, one of the comments by a committee member was that this was 'a solution looking for a problem'. I don't believe that to be the case and that this change will help better organize where end users go to find appropriate information. The concern brought forth by FEMA regarding the seismic considerations was not documented in the public records of the hearings, but has been addressed by the attached change to the proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This change includes no material change to existing code requirements. Therefore it has no cost impact.

Public Comment# 2391

G104-21

Proposed Change as Submitted

Proponents: Larry Sherwood, on behalf of Sustainable Energy Action Committee, representing Interstate Renewable Energy Council (Larry@irecusa.org); Benjamin Davis, CA Solar & Storage Association, representing CA Solar & Storage Association (ben@calssa.org); Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA), representing SEIA (joecainpe@gmail.com); Kevin Reinertson, Riverside County Fire Dept., representing California Fire Chiefs Association FPO (kevin.reinertson@fire.ca.gov)

2021 International Building Code

Revise as follows:

503.1 General. Unless otherwise specifically modified in Chapter 4 and this chapter, *building height*, number of *stories* and *building area* shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter. *Building height*, number of *stories* and *building area* provisions shall be applied independently. For the purposes of determining area limitations, height limitations and type of construction, each portion of a building separated by one or more *fire walls* complying with Section 706 shall be considered to be a separate building.

Exceptions:

1. Rooftop-mounted photovoltaic (PV) panel systems shall not constitute an additional story or additional floor area and shall be permitted to exceed the height limit of a building where one of the following conditions are met:

   1.1. For all occupancies, the highest point of the PV panel system shall meet the lower of the following values:

   1.1.1. 3 feet (915 mm) above the allowable building height.

   1.1.2. 3 feet (915 mm) above the roof of the building immediately below.

   1.2. For installations on low-slope roofs (roof slope < 2:12) in other than Group R-3 and R-4 occupancies, the highest point of the PV panel system shall meet the lower of the following values:

   1.2.1. 10 feet (3050 mm) above the allowable building height.

   1.2.2. 10 feet (3050 mm) above the roof of the building immediately below.

2. Photovoltaic (PV) support structures installed on the roof of an open parking structure shall not constitute an additional story or additional floor area and shall be permitted to exceed the height limit of a building where all the following conditions are met (see Figure 503.1):

   2.1. The area within the perimeter of PV support structures has maximum rectangular dimension of 40 feet by 150 feet (12 195 mm by 45 720 mm).

   2.2. The distance between PV support structures is a minimum of 10 feet (3050 mm) clear.

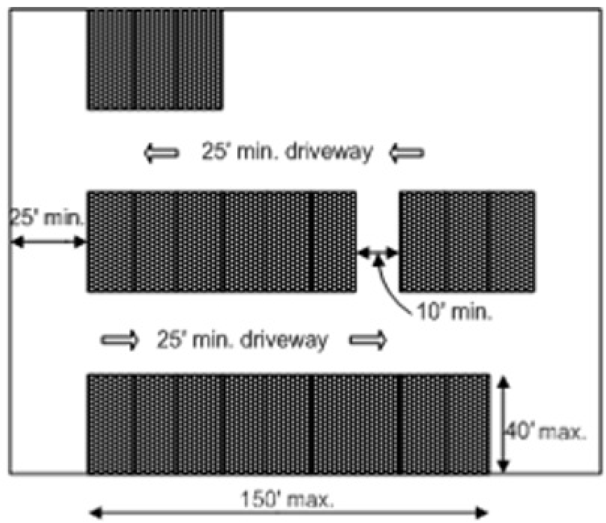
   2.3. The driveway aisle separating PV support structures has a minimum width of 25 feet (7620 mm) clear.

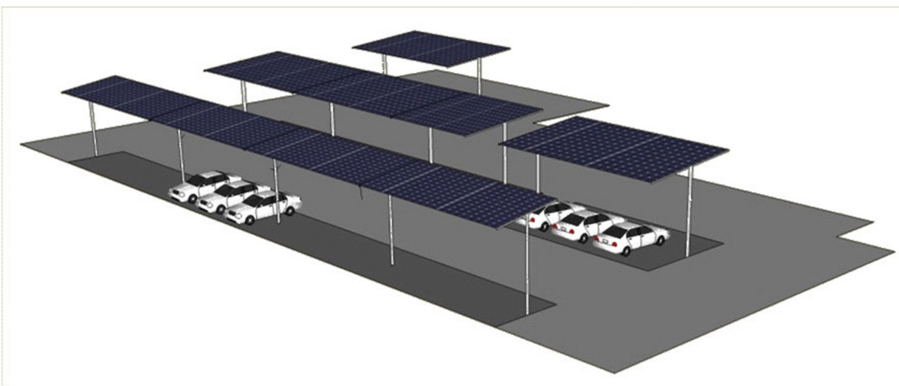
   2.4. PV support structures are used only for parking purposes with no storage.

   2.5. PV support structures are completely open on all sides, other than necessary structural supports, with no interior partitions.

Add new text as follows:

Figure 503.1 Location of PV Support Structures on Open Parking Structures.





Reason: The primary objective of this proposal is to provide exceptions to clarify that elevated PV support structures can be installed on top of a multi-story parking garage under certain conditions without impacting restrictions on number of stories, height or area. Likewise, under certain conditions, rooftop-mounted PV systems do not cause a building to be noncompliant with these provisions.
The exceptions in this proposal are similar to exceptions that have existed in the California Building Code for several cycles, with support of the fire service and without any compromises in safety to the building or fire fighters. These exceptions will not impact the ability to fight fires on top of buildings.

Without the exceptions proposed here, rooftop solar structures can be interpreted to constitute an additional story of the building, increase the overall building height or where there is a use underneath such as elevated PV support structures, increase the floor area of the building. As a result, solar installations may not be allowed in buildings that are built to the maximum height, story or floor area. The proposed code revision provides an exemption for photovoltaic systems from these code restrictions.

Exception 1: This amendment allows solar PV systems to be installed above the maximum building height specified by code with limitation. This amendment will make it feasible to install rooftop solar PV systems on top of buildings that are built to the maximum height which is especially common in existing buildings. It will also make it practical for PV panels to be installed above the roof with the required tilt angle and be at a height that avoids interference with vents and equipment on the roof. **Exception 2:** The amendment allows solar PV panel installations over parking stalls to be installed without being considered a story or floor area, these restrictions may prevent solar PV systems from being installed in buildings that have the maximum number of stories or floor area which is especially common in existing buildings. The exception requires minimum spacing between solar PV panel structures to allow fire access and provide a fire break.

This proposal was prepared by the Sustainable Energy Action Committee (SEAC), a forum for all stakeholders (including, but not limited to, AHJs, designers, engineers, contractors, first responders, manufacturers, suppliers, utilities, and testing labs) to collaboratively identify and find solutions for issues that affect the installation and use of solar energy systems, energy storage systems, demand response, and energy efficiency. The purpose is to facilitate the deployment and use of affordable, clean and renewable energy in a safe, efficient, and sustainable manner.

All recommendations from SEAC are approved by diverse stakeholders through a consensus process.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
It encourages the use of solar without adversely impacting safety.

Staff Note: This proposal addresses similar requirements in a different manner to those found in current code section IBC Section 1511.2.1 and

311.3.4 and IFC Section 1205. The committee is urged to make their intentions clear with their actions on these proposals.

G104-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The code change proposal is different than the requirements in California. The language needs to be cleaned up. (Vote: 14-0)

Staff Analysis: This proposal addresses similar requirements in a different manner to those found in current code section IBC Section 1511.2.1 and 311.3.4 and IFC Section 1205. The committee is urged to make their intentions clear with their actions on these proposals.

G104-21

Individual Consideration Agenda

Public Comment 1:

IBC: 503.1

Proponents: Larry Sherwood, representing Interstate Renewable Energy Council (larry@irecusa.org); Kevin Reinertson, representing California Fire Chiefs Association FPO (kevin.reinertson@fire.ca.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

503.1 General . Unless otherwise specifically modified in Chapter 4 and this chapter, *building height*, number of *stories* and *building area* shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter. *Building height*, number of *stories* and *building area* provisions shall be applied independently. For the purposes of determining area limitations, height limitations and type of construction, each portion of a building separated by one or more *fire walls* complying with Section 706 shall be considered to be a separate building.

Exceptions:

1. Other than structural requirements, ~~Rooftop~~ rooftop-mounted photovoltaic (PV) panel systems with no use underneath shall not constitute an additional story or additional floor area and shall be permitted to exceed the height limit of a building where one of the following conditions are met:

   1.1. For all occupancies, the highest point of the PV panel system shall meet the lower of the following values:

   1.1.1. 3 feet (915 mm) above the allowable building height.

   1.1.2. 3 feet (915 mm) above the roof of the building immediately below.

   1.2. For installations on low-slope roofs (roof slope < 2:12) in other than Group R-3 and R-4 occupancies, the highest point of the PV panel system shall meet the lower of the following values:

   1.2.1. 10 feet (3050 mm) above the allowable building height.

   1.2.2. 10 feet (3050 mm) above the roof of the building immediately below.

2. Other than structural requirements, photovoltaic ~~Photovoltaic~~ (PV) support structures installed on the roof of an open parking structure shall not constitute an additional story or additional floor area and shall be permitted to exceed the height limit of a building where all the following conditions are met (see Figure 503.1):

   2.1. The area within the perimeter of PV support structures has maximum rectangular dimension of 40 feet by 150 feet (12 195 mm by 45 720 mm).

   2.2. The distance between PV support structures is a minimum of 10 feet (3050 mm) clear.

   2.3. The driveway aisle separating PV support structures has a minimum width of 25 feet (7620 mm) clear.

2.4. PV support structures are used only for parking purposes with no storage.
2.5. PV support structures are completely open on all sides, other than necessary structural supports, with no interior partitions.

Commenter's Reason:
As a direct result of public testimony, co-proponents have made two specific changes in this public comment. Both changes bring the exceptions in this proposal into closer alignment with the exceptions to Section 503.1 in the California Building Code.

The first change is to add in two locations, at the beginning of each exception, the words "Other than structural requirements …" This change is made at the request of representatives of the FEMA committee. The changes are consistent with language in the 2019 California Building Code Section 503.1, Exceptions 1 and 2.

The second change is an improvement in direct response to public testimony and Committee discussion regarding number of stories. The co-proponents have added the words "… with no use underneath …" to clarify that Exception 1 (including both conditions 1.1 and 1.2) apply only to rooftop-mounted PV panel systems that serve only to produce power, with no secondary use. The change is consistent with language in the 2019 California Building Code Section 503.1, Exception 1.

Public testimony regarding fire-resistive construction is addressed in a separate public comment by the same co-proponents.

The co-proponents would like to reiterate that these exceptions have existed in the California Building Code (with the two changes in this public comment) for several cycles. These provisions have been used by California cities and counties by industry, building owners, building departments, and fire departments, without questions or concerns that have come to the attention of the co-proponents. All stakeholders have been able to utilize these technical requirements without issues, and without any proposed modifications to the language for multiple cycles.

This public comment was prepared by the Sustainable Energy Action Committee (SEAC), a forum for all stakeholders (including, but not limited to, AHJs, designers, engineers, contractors, first responders, manufacturers, suppliers, utilities, and testing labs) to collaboratively identify and find solutions for issues that affect the installation and use of solar energy systems, energy storage systems, demand response, and energy efficiency. The purpose is to facilitate the deployment and use of affordable, clean and renewable energy in a safe, efficient, and sustainable manner.

All recommendations from SEAC are approved by diverse stakeholders through a consensus process.

Bibliography: None

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
It encourages solar without adversely affecting safety.

Public Comment# 2783

Public Comment 2:

IBC: 602.1

Proponents: Larry Sherwood, representing Interstate Renewable Energy Council (larry@irecusa.org); Kevin Reinertson, representing California Fire Chiefs Association FPO (kevin.reinertson@fire.ca.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

602.1 General . Buildings and structures erected or to be erected, altered or extended in height or area shall be classified in one of the five *construction types* defined in Sections 602.2 through 602.5. The *building elements* shall have a *fire-resistance rating* not less than that specified in Table 601 and*exterior walls* shall have a *fire-resistance rating* not less than that specified in Table 705.5. Where required to have a *fire-resistance rating* by Table 601, *building elements*shall comply with the applicable provisions of Section 703.2. The protection of openings, ducts and air transfer openings in *building elements* shall not be required unless required by other provisions of this code.

Exception: Noncombustible structural members supporting *photovoltaic (PV) panels* are not required to meet the *fire resistance rating* for the following:

1. Rooftop-mounted *photovoltaic panel systems* with no use underneath.
2. Photovoltaic (PV) support structures with noncombustible framing that have sufficient uniformly distributed and unobstructed openings throughout the top of the array to allow heat and gases to escape, as determined by the *building official.*
3. Photovoltaic (PV) support structures installed on the roof of an open parking structure where all the following conditions are met (see

Figure 503.1):

3.1. The area within the perimeter of PV support structures has maximum rectangular dimension of 40 feet by 150 feet (12 195 mm by 45 720 mm).

3.2. The distance between PV support structures is a minimum of 10 feet (3050 mm) clear.

3.3. The driveway aisle separating PV support structures has a minimum width of 25 feet (7620 mm) clear.

3.4. PV support structures are used only for parking purposes with no storage.

3.5. PV support structures are completely open on all sides, other than necessary structural supports, with no interior partitions.

Commenter's Reason:
During the Committee Action Hearing, we heard public testimony that expressed steel industry members are concerned with whether the structural elements supporting the PV system are required to be protected with the same fire-resistive construction as the building below. During public testimony, co-proponents made a commitment to respond to this concern. As noted during the Committee Action Hearing, this public comment is necessary to provide clarity for exceptions to fire-resistance for structural elements supporting PV panel systems.

This public comment provides a direct response to the concerns of steel industry members, by incorporating new exceptions to IBC Section 602.1 that correlate with exceptions found in California Building Code Section 602.1 for several cycles.

Although the language in this public comment is not identical to language found in the California Building Code, the technical requirements are the same. The exceptions are edited to use IBC defined terms and to be appropriate for a nationwide use, rather than just in California.

This public comment maintains fire safety for the building as well as for firefighters.

This public comment was prepared by the Sustainable Energy Action Committee (SEAC), a forum for all stakeholders (including, but not limited to, AHJs, designers, engineers, contractors, first responders, manufacturers, suppliers, utilities, and testing labs) to collaboratively identify and find solutions for issues that affect the installation and use of solar energy systems, energy storage systems, demand response, and energy efficiency. The purpose is to facilitate the deployment and use of affordable, clean and renewable energy in a safe, efficient, and sustainable manner.

All recommendations from SEAC are approved by diverse stakeholders through a consensus process.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
It encourages solar energy without adversely impacting safety.

Public Comment# 2791

G105-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

Revise as follows:

503.1.4.1 Enclosures over occupied roof areas. Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

~~**Exception:**~~ **Exceptions:**

1. Penthouses constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.
2. Required guards shall be permitted to be greater than 48 inches (1219 mm) above the surface of the occupied roof where the roof deck is located more than 75 feet (22 860 mm) above the level of fire department vehicle access.

Reason: The limit on the guard height was based on fire department access to the roof. Once the roof deck is higher than fire ladder access, this is no longer justification for this limitation. There has been concerns that higher guards are needed on higher roofs to prevent people from jumping off the roof deck and/or to allow for wind breaks to limit items blowing off the roof deck and falling on people below.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This allows additional design options for guards around roof decks.

G105-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as submitted. The proposal will allow for what is currently done. The committee recommend the section title be reviewed to read "enclosures around and over roof areas" to better match the provision. (Vote: 9-5)

G105-21

Individual Consideration Agenda

Public Comment 1:

IBC: 503.1.4.1

Proponents: David Renn, City and County of Denver, representing Code Change Committee of ICC Colorado Chapter (david.renn@denvergov.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

503.1.4.1 Enclosures over occupied roof areas . Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches

(1220 mm) above the surface of the occupied roof.

Exceptions:

1. Penthouses constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.
2. Required guards shall be permitted to be greater than 48 inches (1219 mm) above the surface of the occupied roof where the roof deck is located more than 75 feet (22 860 mm) above the highest level of fire department vehicle access.

Commenter's Reason: The reason statement for the original proposal indicates that the guard height limitation is not needed where the roof deck is higher than fire ladder access, which is 75' above the level of fire department access; however, the original proposal does not address which level of fire department vehicle access is to be used to determine the height of the roof deck. This public comment modification requires that the highest level of fire department access is to be used for this height. By using the highest level of fire department access, this new exception is only allowed if the roof deck is more than 75' above all levels of fire department access. This is needed since the fire department access adjacent to the occupied roof could be higher than access away from the occupied roof, which could create on unsafe condition where a higher guard would prevent access to the roof from a ladder. For example, if the lowest level of fire department access is 80' from the roof deck, but the level of fire department access adjacent to the roof is 73', using the lowest level would allow the exception to be used and a taller guard height could prohibit ladder access that would otherwise be possible.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
As stated in original proposal, this allows for design options for guards around roof decks. Since these options are not required (i.e. they are allowed by exception), the cost of construction for minimum code requirements does not increase or decrease.

Public Comment# 2496

Public Comment 2:

IBC: 503.1.4.1

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

503.1.4.1 Enclosures over occupied roof areas . Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

Exceptions:

1. Penthouses constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.
2. Required guards shall be permitted to be greater than 48 inches (1219 mm) above the surface of the occupied roof where the roof deck is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

Commenter's Reason: We agree with the intent of this proposal, that in tall buildings, the 48" limitation is not necessary. However, we believe the originally proposed text is ambiguous. What fire department access is used to determine the 75' threshold? We believe it is much clearer to tie it to the trigger for high rise buildings, which uses lowest fire department vehicle access as the datum. Note that because of other proposals in this cycle that may change the definition of high rise buildings as related to occupied/occupiable roofs, we have not proposed to refer directly to high rise buildings.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The public comment does not change the original cost impact statement: "This allows additional design options for guards around roof decks."

Public Comment# 2343

Public Comment 3:

IBC: 503.1.4.1

Proponents: Jonathan Siu, representing Self; Lee Kranz, representing Myself (lkranz@bellevuewa.gov); Micah Chappell, representing Seattle Department of Construction and Inspections (micah.chappell@seattle.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

503.1.4.1 Enclosures over occupied roof areas . Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

Exceptions:

1. Penthouses constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.
2. ~~Required guards~~ Elements or structures enclosing the occupied roof areas shall be permitted to be greater than 48 inches (1219 mm) above the surface of the occupied roof where the roof deck is located more than 75 feet (22 860 mm) above the level of fire department vehicle access.

Commenter's Reason: The proposed Exception 2 to Section 503.1.4.1 takes an important step forward, but does not go far enough. As written, the new exception only applies to "required guards." This public comment would expand the application of the exception to any element or structure that encloses the occupied roof.
The reason statement for the original proposal states there is no justification for the restriction on guard heights once the roof deck is higher than fire ladder access. We agree. However, the current (2021) code text is not just about guards, and even the reason statement refers to items that are not "required guards." The language in Section 503.1.4.1 was deliberately crafted to be broad, so it would encompass any elements that might extend upward at the perimeter of the roof such as walls, parapets, rooftop structures (some of which are exempted in Exception 1), and wind screens ("wind breaks" in the reason statement).

This public comment would allow any of these elements or structures to extend above the roof level, once the occupied roof is above fire department ladder reach.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The original proposal stated this will not change the cost of construction. This public comment does not change that.

Public Comment# 2439

G106-21 Part I

Proposed Change as Submitted

Proponents: Lee Kranz, City of Bellevue, WA, representing Myself (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE MEANS OF EGRESS COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the *story* immediately below the roof. The area of the occupied roofs shall not be included in the *building area* as regulated by Section 506. An occupied roof shall not be included in the *building height* or number of *stories* as regulated by Section 504, provided that the *penthouses* and other enclosed *rooftop structures* comply with Section 1511.

Exceptions:

1. The occupancy located on an occupied roof shall not be limited to the occupancies allowed on the *story* immediately below the roof where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Sections 907.5.2.1 and 907.5.2.3 is provided in the area of the occupied roof. *Emergency voice/alarm communication* system notification per Section 907.5.2.2 shall also be provided in the area of the occupied roof where such system is required elsewhere in the building.
2. Assembly occupancies shall be permitted on roofs of open parking spaces of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

503.1.4.1 Enclosures over occupied roof areas. Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

Exception: *Penthouses* constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.

Add new text as follows:

503.1.4.2 Guards.
Occupied roofs shall have guards in accordance with Section 1015.2.

Reason: This code change is needed to protect children. There are many cases where the design of an occupied roof includes only a portion of the entire roof area. The occupied portions of the roof are typically elevated 18" or less above the adjacent unoccupied areas of the roof, therefor no guard is currently required per Section 1015.2. This issue is regularly debated on building official chat lines and other forums due to the lack of regulatory authority to require the guard in this design scenario. Even the idea of a small child falling to their death because they bolted from a parent or guardian to look over the edge of a roof is unthinkable. Occupied roofs are relatively new in the IBC and we're discovering issues related to their design on a regular basis. This code change will eliminate or drastically reduce the potential for kids, or even adults who may be inebriated, from falling over the edge of a roof which even if the occupied portion of the roof is some distance away from the roof edge.
Adding a new Section 503.1.4.2 Guards, will insure that the reader will go to Section 1015.2 to see that guards are required. Examples of this can be found in Sections 406.4.1, 505.3.3 and 1029.17.

Cost Impact: The code change proposal will increase the cost of construction
The cost to construct some occupied roofs where the edge of the occupied portion of the occupied roof is inboard of the roof edge will go up due to the installation of guards.

G106-21 Part I

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The proposal does not allow for other options such as planters. Generally guards are unnecessary unless there is a drop. (Vote: 8-5)

Individual Consideration Agenda

Public Comment 1:

Proponents: Bill McHugh, representing National Fireproofing Contractors Association (bill@mc-hugh.us) requests As Submitted

Commenter's Reason: The trend of building owners and managers using rooftop areas or the whole roof - as an occupiable area - is growing and happening. People with little or no experience on a rooftop are now allowed to experience the roof for various activities. The issue in this proposal addresses keeping the general public from wandering past the occupiable area and safe. The construction industry is a hazardous occupation. Roofing workers account for about 1/3 or fall deaths, according to an OSHA report over a 10 year period.

Falls are the leading cause of death in the construction industry, accounting for over 3,500 fatalities between 2003 and 2013. Falls from roofs accounted for nearly 1,200, or 34%, of the fall deaths during that period. Roofers encounter many hazards on the job, including hazards associated with working at heights and from ladders, power tools, electricity, noise, hazardous substances, and extreme temperatures. Unless these hazards are controlled by the employer, roofers risk serious injury, illness and death.1

The roofing industry - and others who work on roofs - get safety training from their employers about the risks, and safety equipment needed to work on rooftops. People on occupiable rooftops do not have safety training. Yet, they can be on roofs. Without specified guards, they can wander around on the roof without protection, presenting a safety risk to themselves and others. This proposal points to Chapter 10 and brings attention that a guard is needed to protect people on occupiable roofs.

Bibliography: Protecting Roofing Workers U.S. Department of Labor Occupational Safety and Health Administration OSHA 3755-05 2015

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
The cost to construct some occupied roofs where the edge of the occupied portion of the occupied roof is inboard of the roof edge will go up due to the installation of guards.

Public Comment# 2869

G106-21 Part II

Proposed Change as Submitted

Proponents: Lee Kranz, City of Bellevue, WA, representing Myself (lkranz@bellevuewa.gov)

2021 International Building Code

Revise as follows:

1015.2 Where required. *Guards* shall be located along open-sided walking surfaces, including *mezzanines*, equipment platforms, *aisles*, *stairs*, *ramps* and landings that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. <u>*Guards* shall be provided at the perimeter of the occupied portions of an occupied roof.</u> *Guards* shall be adequate in strength and attachment in accordance with Section 1607.9.

Exceptions: *Guards* are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of *stages* and raised *platforms*, including *stairs* leading up to the *stage* and raised *platforms*.
3. On raised *stage* and *platform* floor areas, such as runways, *ramps* and side *stages* used for entertainment or presentations.
4. At vertical openings in the performance area of *stages* and *platforms*.
5. At elevated walking surfaces appurtenant to *stages* and *platforms* for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating areas at cross *aisles* in accordance with Section 1030.17.2.
8. On the loading side of station platforms on fixed guideway transit or passenger rail systems.

Reason: This code change is needed to protect children. There are many cases where the design of an occupied roof includes only a portion of the entire roof area. The occupied portions of the roof are typically elevated 18" or less above the adjacent unoccupied areas of the roof, therefor no guard is currently required per Section 1015.2. This issue is regularly debated on building official chat lines and other forums due to the lack of regulatory authority to require the guard in this design scenario. Even the idea of a small child falling to their death because they bolted from a parent or guardian to look over the edge of a roof is unthinkable. Occupied roofs are relatively new in the IBC and we're discovering issues related to their design on a regular basis. This code change will eliminate or drastically reduce the potential for kids, or even adults who may be inebriated, from falling over the edge of a roof which even if the occupied portion of the roof is some distance away from the roof edge.
Adding a new Section 503.1.4.2 Guards, will insure that the reader will go to Section 1015.2 to see that guards are required. Examples of this can be found in Sections 406.4.1, 505.3.3 and 1029.17.

Cost Impact: The code change proposal will increase the cost of construction
The cost to construct some occupied roofs where the edge of the occupied portion of the occupied roof is inboard of the roof edge will go up due to the installation of guards.

G106-21 Part II

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved for several reasons. There are issues with structural attachment if the guard is not on the edge of the roof. There are a lot of barriers that would work to stop people from moving out of the areas intended to be occupied. There are no fall issues, so a guard is not needed. This is an issue to prevent access, not a fall issue. This requirement is an over reach. (Vote: 11-3)

G106-21 Part II

Individual Consideration Agenda

Public Comment 1:

IBC: 1015.2

Proponents: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

1015.2 Where required . *Guards* shall be located along open-sided walking surfaces, including *mezzanines*, equipment platforms, *aisles*, *stairs*, *ramps* and landings that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side<u>,</u> ~~*Guards* shall be provided~~ <u>and</u> at the perimeter of ~~the occupied portions of an~~ occupied <u>roofs.</u> ~~roof.~~ *Guards* shall be adequate in strength and attachment in accordance with Section 1607.9.

Exceptions: *Guards* are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of *stages* and raised *platforms*, including *stairs* leading up to the *stage* and raised *platforms*.
3. On raised *stage* and *platform* floor areas, such as runways, *ramps* and side *stages* used for entertainment or presentations.
4. At vertical openings in the performance area of *stages* and *platforms*.
5. At elevated walking surfaces appurtenant to *stages* and *platforms* for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating areas at cross *aisles* in accordance with Section 1030.17.2.
8. On the loading side of station platforms on fixed guideway transit or passenger rail systems.
9. <u>Portions of an occupied roof located less than 30 inches measured vertically to adjacent unoccupied roof areas where approved guards are present at the perimeter of the roof.</u>
10. <u>At portions of an occupied roof where an *approved* barrier is provided.</u>

Commenter's Reason: Clarification is needed in the code to inform design professionals and building officials when a *guard* or barrier is required for occupied roofs where the occupied roof deck is less than 30" above the adjoining unoccupied roof areas. There are many cases where the design of an occupied roof includes only a portion of the entire roof area. Occupied portions of the roof are typically elevated 18" or less above the adjacent unoccupied areas of the roof, therefor, no *guard* is currently required for these areas per Section 1015.2 which means that a child or an adult could wander over to the edge of the roof and fall off. This issue is regularly debated on building official chat lines and other forums due to the lack of regulatory authority to require the *guard* in this design scenario.
To address the constructive comments made at the Committee Action Hearings we have made the following changes:

- Instead of having a separate sentence to add the need for guards at the perimeter of the occupied roofs, the scoping has been added to the end of the laundry list for where guards are required. This creates continuity for the scoping and provides better clarity for the reader. Because the new scoping comes after the 30 inch change in elevation language in Section 1015.2, guards will typically be required at the perimeter of occupied roofs.

Exceptions 9 and 10 have been added in this Public Comment to address concerns expressed at the Committee Action Hearings.

- Exception 9 exempts the need for *guards* between the occupied and unoccupied roof areas if the entire roof perimeter is provided with a *guard*. In this scenario, safety is ensured even if occupants wander over to the edge roof.
- Exception 10 allows the building official to approve the use of a barrier when the need for a full Chapter 16 compliant *guard* is not warranted. In these cases, an approved barrier may be provided instead of a *guard*.

Occupied roofs are relatively new in the IBC and we're discovering new issues such as this related to their design. This code change will eliminate or drastically reduce the potential for kids, or even adults who may be inebriated, from falling over the edge of a roof, even if the occupied portion of the roof is some distance away from the roof edge.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
This code change will add cost because there will be a need for more guardrail installations on occupied roofs. There are most likely many occupied roofs that, under the current code, would not require a guard; this code change will change that to require a guard or barrier for most partial roof area occupied roofs at the perimeter of the occupied roof.

Public Comment# 2379

G109-21

Proposed Change as Submitted

Proponents: Jeffrey Grove, representing Jensen Hughes (jgrove@jensenhughes.com)

2021 International Building Code

Revise as follows:

TABLE 504.4 ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE[a, b]

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION												
	See Footnotes	Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
B	NS	UL	11	5	3	5	3	5	5	5	5	3	2
	S	UL	12	6	~~4~~ 5	6	4	18	12	9	6	4	3

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
d. The NS value is only for use in evaluation of existing *building height* in accordance with the *International Existing Building Code*.
e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the International Fire Code.
g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Reason: In general, the allowable height measured in stories for business occupancies is equal to or higher than the allowable height for group R residential occupancies. This is in recognition that occupants in business occupancies are generally awake and alert, while occupants of group R residential buildings may be sleeping, and thus take longer to evacuate.
However, for buildings of type IIB constriction that are sprinklered in accordance with NFPA 13, table 504.4 allows R residential buildings to be five stories in height, but it only allows group B buildings to be four stories in height. Table 504.3 allows both group B and group R buildings of type IIB construction that are sprinklered in accordance with NFPA 13 to be 75 feet in height.

Cost Impact: The code change proposal will decrease the cost of construction
Construction cost would decrease as an additional story could be constructed of Type IIB construction for a Group B occupancy building.

G109-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The proposal provided insufficient justification for the proposed change. (Vote: 9-5)

G109-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Shamim Rashid-Sumar, representing National Ready Mixed Concrete Association (ssumar@nrmca.org); Jeffrey Grove, representing Jensen Hughes (jgrove@jensenhughes.com) requests As Submitted

Commenter's Reason: G109-21 is recommended for Approval As Submitted based on documentation of additional technical justification to support

the proposed code change.
Previously in the support statement for G109-21, it was identified that in general, in accordance with Table 504.4 the allowable height measured in stories for Business Occupancy is equal to or higher than the allowable height for Residential Occupancy for Type IIB construction. This is shown in Figure 1, which provides a side by side comparison for allowable height in stories for Group B and Group R occupancies in Table 504.4. However, for buildings of Type IIB construction that are sprinklered in accordance with NFPA 13, Table 504.4 allows R Residential buildings to be five stories in height, while Group B buildings are permitted only to be four stories in height.

It should be noted that NFPA 5000 [2021 edition] Table 7.4.1 permits Business occupancy group buildings constructed of Type II unprotected construction to be built 5 stories in height, consistent with Residential occupancies.

TABLE 504.4
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE[a, b]

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	5	3	2	3	2	3	3	3	3	2	1
	S	UL	6	4	3	4	3	9	6	4	4	3	2
A-2	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-3	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-4	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	1	1	1	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	UL	11	5	3	5	3	5	5	5	5	3	2
	S	UL	12	6	4	6	4	18	12	9	6	4	3

TABLE 504.4—continued
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE[a, b]

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
R-1[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	3	2
	S13R	4	4									4	3
	S	UL	12	5	5	5	5	18	12	8	5	4	3
R-2[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	3	2
	S13R	4	4	4								4	3
	S	UL	12	5	5	5	5	18	12	8	5	4	3
R-3[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	3	3
	S13D	4	4									3	3
	S13R	4	4									4	4
	S	UL	12	5	5	5	5	18	12	5	5	4	4
R-4[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	3	2
	S13D	4	4									3	2
	S13R	4	4									4	3
	S	UL	12	5	5	5	5	18	12	5	5	4	3

Figure 1. Comparison of allowable height in stories for Group B and Group R occupancies in accordance with Table 504.4.

An additional comparison is provided in Table 1 below for the allowable number of stories for selected occupancy types in buildings protected by automatic sprinklers in accordance with Table 504.4.

Occupancy Group	Allowable Number of Stories Permitted for Type II-B Buildings Protected by Automatic Sprinklers
Business (B)	4
Residential (R-1, R-2, R-3, R-4)	5
Factory Industrial, Moderate Hazard (F-1)	3
Factory Industrial, Low Hazard (F-2)	4
Storage, Moderate Hazard (S-1)	4
Storage, Low Hazard (S-2)	4

Table 1. Allowable Number of Stories for Selected Occupancy Types in Type II-B Buildings Protected by Automatic Sprinklers in accordance with Table 504.4.

Based on this comparison, Storage occupancies of low and moderate hazard as well as low hazard Factory/Industrial occupancies are permitted to be constructed to the same number of stories as Business occupancies, even though Business occupancies present a lesser hazard than Group F and Group S occupancies.

The low level of fire threat that is presented by Business occupancies as compared to Residential occupancies is most clearly apparent in the statistics of civilian fire deaths in Residential occupancies. According to NFPA Research on “Number of Fires Reported to Local Fire Departments in the United States by Property Use”, annual averages for 2014-2018 included 15 civilian deaths reported in structural fires in Business and Mercantile properties. However, 2,746 deaths were reported in Residential properties for the same period. This is a staggering differential.

In summary, Business occupancies present a low level of fire threat as compared with Residential occupancies and should be allowed the additional story height proposed in G109-21 consistent with Residential occupancies and other nationally recognized construction codes.

Recommend APPROVAL AS SUBMITTED for G109-21.

Bibliography: National Fire Protection Association. (n.d.). *Fires By Occupancy or Property Type*. Retrieved July 2, 2021, from https://www.nfpa.org/News-and-Research/Data-research-and-tools/US-Fire-Problem/Fires-by-occupancy-or-property-type
NFPA 5000: Building Construction and Safety Code, 2021 Edition. In NFPA National Fire Codes Online (Free Access). Retrieved from https://www.nfpa.org/5000

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
Construction cost would decrease as an additional story could be constructed of Type IIB construction for a Group B occupancy building.

Public Comment# 2857

G112-21 Part I

Proposed Change as Submitted

Proponents: Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov); Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee (jonsiuconsulting@gmail.com)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE MEANS OF EGRESS CODE COMMITTEE. PART III WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Add new definition as follows:

EGRESS ROOF ACCESS WINDOW. A skylight or roof window designed and installed to satisfy the emergency escape and rescue opening requirements of Section 1031.

SLEEPING LOFT. A sleeping space on a floor level located more than 30 inches (762 mm) above the main floor and open to the main floor on one or more sides with a ceiling height of less than 6 feet 8 inches (2032 mm).

LANDING PLATFORM. A landing provided as the top step of a stairway accessing a sleeping loft.

Add new text as follows:

SECTION 506
SLEEPING LOFT

506.1 General.
Sleeping lofts shall comply with Sections 506.1 through 506.5.

506.2 Sleeping loft area and dimensions.
Sleeping lofts shall meet the minimum area and dimension requirements of Sections 506.2.1 through 506.2.3. A s*leeping loft* or *sleeping lofts* in compliance with Section 506.2 shall be considered a portion of the story below. Such *sleeping lofts* shall not contribute to either the building area or number of stories as regulated by Section 503.1. The area of the *sleeping loft* shall be included in determining the *fire area*.

506.2.1 Area.
Sleeping lofts shall have a floor area of not less than 35 square feet (3.25 m^2) and less than 70 square feet (6.5 m^2).

506.2.2 Minimum horizontal dimensions.
Sleeping lofts shall be not less than 5 feet (1524 mm) in any horizontal dimension.

506.2.3 Height effect on sleeping loft area.
Portions of a *sleeping loft* with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft but shall contribute to the maximum allowable area.

> **Exception:**
> Under gable roofs with a minimum slope of 6 units vertical in 12 units horizontal (50-percent slope), portions of a sleeping loft with a sloped ceiling measuring less than 16 inches (406 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the sleeping loft but shall contribute to the maximum allowable area.

506.3 Sleeping loft access and egress.
The access to and primary egress from sleeping lofts shall be of any type described in Sections 506.3.1 through 506.3.5 and shall meet the sleeping loft where the sleeping loft's ceiling height is not less than 3 feet (914 mm) along the entire width of the access and egress component.

506.3.1 Stairways.
Stairways accessing sleeping lofts shall comply with Sections 506.3.1.1 through 506.3.1.7.

506.3.1.1 Headroom.
The headroom above the sleeping loft access and egress shall be not less than 6 feet 2 inches (1880 mm), as measured vertically, from a sloped line connecting the tread, landing, or landing platform nosing's in the center of their width, and vertically from the landing or landing platform along the center of its width.

506.3.1.2 Width.
Stairways accessing a sleeping loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The width below the handrail shall be not less than 20 inches (508 mm).

506.3.1.3 Treads and risers.
Risers for stairs accessing a sleeping loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:

1. The tread depth shall be 20 inches (508 mm) minus four-thirds of the riser height.
2. The riser height shall be 15 inches (381 mm) minus three-fourths of the tread depth.

506.3.1.4 Landings.
Intermediate landings and landings at the bottom of stairways shall comply with Section 1011.6, except that the depth in the direction of travel shall be not less than 24 inches (508 mm).

506.3.1.5 Landing platforms.
The top tread and riser of *stairways* accessing *sleeping lofts* shall be constructed as a *landing platform* where the loft ceiling height is less than 6 feet 2 inches (1880 mm) where the stairway meets the *sleeping loft*. The *landing platform* shall be not less than 18 inches (508 mm) in width and in depth measured horizontally from and perpendicular to the nosing of the *landing platform*. The *landing platform* riser height to the edge of the *sleeping loft* floor, shall not be greater than 18 inches (508 mm) in height.

506.3.1.6 Handrails.
Handrails shall comply with Section 1011.11.

506.3.1.7 Stairway guards.
Guards at open sides of *stairways*, *landings*, and *landing platforms* shall comply with Section 1115.

506.3.2 Ladders.
Ladders accessing sleeping lofts shall comply with Sections 506.3.2.1 and 506.3.2.2.

506.3.2.1 Size and capacity.
Ladders accessing sleeping lofts shall have a rung width of not less than 12 inches (305 mm), and 10-inch (254 mm) to 14-inch (356 mm) spacing between rungs. Ladders shall be capable of supporting a 300-pound (136 kg) load on any rung. Rung spacing shall be uniform within 3/8 inch (9.5 mm).

506.3.2.2 Incline.
Ladders shall be installed at 70 to 80 degrees from horizontal.

506.3.3 Alternating tread devices.
Alternating tread devices accessing *sleeping lofts* shall comply with Section 1011.14. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

506.3.4 Ships ladders.
Ships ladders accessing sleeping lofts shall comply with Sections 1011.15. The clear width at and below handrails shall be not less than 20 inches (508 mm).

506.4 Sleeping Loft Guards.
Guards shall be located along open sides of sleeping lofts that are located more than 30 inches (762 mm) measured vertically to the floor below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Sleeping loft guards shall be constructed in accordance with Section 1015.

506.5 Emergency escape and rescue openings.
An emergency escape and rescue opening shall be located in each *sleeping loft.*

Exception:
Sleeping lofts where an egress roof access window is provided complying with Section 1031.3.

Reason: This proposal takes an important part of the Residential Code Appendix Q outlining the design criteria for a loft, modifies some of the requirements, and then incorporates it into the main sections of the IBC with definitions and a new section. This proposal provides allowances and limitations on designed spaces specifically identified as a sleeping loft, while clearly differentiating these small spaces from mezzanines and other habitable space.
The proposal requires these small spaces to include smoke detection and an emergency escape and rescue opening. A sleeping loft in an IBC dwelling unit would provide the equivalent safety standards as a loft located in a small dwelling unit as currently allowed in IRC Appendix Q. Expanding the availability of sleeping lofts will promote more broad uses of space, while possibly allowing for an increase in housing density and affordability.

Most of the technical provisions are taken from IRC Appendix Q. However, the list below explains the differences between this proposal and Appendix Q, and our rationale.

- "sleeping loft" vs "loft" – we want to trigger smoke alarm, emergency escape/rescue opening.
- 506.2.1: Imposes max. 70 sf area. Intent is to keep these small, without being able to circumvent minimum habitable space requirements for larger rooms. Thus, beyond 70 sf, space should meet full interior dimension requirements for habitable space (IBC 1208) and mezzanines (IBC 505)
- 506.3: Requires 3' ceiling height at access/egress component. Stair requires 6'2" headroom, but ladders, alternating tread devices, and ships ladders have no similar requirement. Ceiling heights of less than 3' are allowed, and nothing states that the ladders, etc. can't be placed in those lower-ceiling areas. Some minimum height above the device is necessary to allow people in the sleeping loft to egress in an emergency.
- 506.3.1.5: Allows 18" landing platforms, vs "18 to 22 inches" in direction of travel in Appendix Q. Picked lower limit, since Appendix Q doesn't say when to use anything larger. Allows 18" rise from landing platform to loft floor, where Appendix Q allows 16 to 18 inches. In this case, picked 18" as the maximum, again, because there is no other guidance in Appendix Q why something smaller might be required.
- 506.3.2.1: Requires ladders be capable of supporting 300 pound load on any rung, vs 200 in Appendix Q. 300 is consistent with load requirements in IBC Chapter 16.

The change to 1011.14 is for coordination with the new Section 506.3.3. In order to add to the list of allowed uses, there was a need to clarify whether alternating tread devices are allowed to provide access to unoccupied roofs to other than I-3 occupancies. Numbering the list is for clarity, taking the place of a long sentence with clauses separated by semicolons, and also clearly allows these for unoccupied roof access in other occupancies besides I-3s, consistent with the IBC Commentary. The change to 1015.2 and the new Exception 4 in 1015.3 integrate the sleeping loft guard provisions from IRC Appendix Q Section AQ104.2.5 into the guard provisions of the IBC, instead of having them reside in the sleeping loft section."

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal will not increase or decrease the cost of construction because the new sections to the code add an option and not a requirement. When and applicant decides to utilize these new sections, the code provides guidance on minimum standards for that space.

G112-21 Part I

Public Hearing Results

This proposal includes the following errata

Section 506.2. - replace "floor area of not less than 35" with "floor area greater than or equal to 35"

Section 506.3.1.7 - replace "Section 1115" with "Section "1015"

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The committee had several concerns, including appropriate location in the code. Confusion between mezzanine and/or sleeping loft. There is no defined height. The proposal had no scoping. The committee expressed concerns about guards. (Vote: 12-1)

G112-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: 202 (New), 420.12 (New), 420.12.1 (New), 420.12.2 (New), 420.12.3 (New), 420.12.4 (New), 420.12.4.1 (New), 420.12.4.2 (New), 420.12.4.2.1 (New), 420.12.4.2.2 (New), 420.12.4.2.3 (New), 420.12.4.3 (New), 420.12.4.4 (New), 420.12.4.5 (New), 420.12.4.5.1 (New), 420.12.4.5.2 (New), 420.12.5 (New), SECTION 505, 505.1

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

SLEEPING LOFT . A space on an intermediate level or levels between the floor and ceiling of a Group R occupancy dwelling or sleeping unit, open on one or more sides to the room in which the sleeping loft is located, and in accordance with Section 420.12.

420.12 Sleeping lofts . Where provided in Group R occupancies, sleeping lofts shall comply with this code as modified by Sections 420.12.1 through 420.12.5. Sleeping lofts constructed in compliance with this section shall be considered a portion of the story below. Such sleeping lofts shall not contribute to either the building area or number of stories as regulated by Section 503.1. The sleeping loft floor area shall be included in determining the fire area.

Exception: Sleeping lofts need not comply with Section 420.12 where they meet any of the following conditions:

1. The sleeping loft has a maximum depth of less than 3 feet (914 mm).
2. The sleeping loft has a floor area of less than 35 square feet (3.3 m^2).
3. The sleeping loft is not provided with a permanent means of egress.

420.12.1 Sleeping loft limitations . Sleeping lofts shall comply with the following conditions:

1. The sleeping loft floor area shall be less than 70 square feet (6.5 m^2).
2. The sleeping loft ceiling height shall not exceed 7 feet (2134 mm) for more than one-half of the sleeping loft floor area.

The provisions of Sections 420.12.2 through 420.12.5 shall not apply to to sleeping lofts that do not comply with Items 1 and 2.

420.12.2 Sleeping loft ceiling height . The clear height below the sleeping loft floor construction shall not be less than 7 feet (2134 mm). The ceiling height above the finished floor of the sleeping loft shall not be less than 3 feet (914 mm). Spaces adjacent to the sleeping loft with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not contribute to the sleeping loft floor area.

420.12.3 Sleeping loft area . The aggregate area of all sleeping lofts and mezzanines within a room shall comply with Section 505.2.1.

Exception: The area of a single sleeping loft shall not be greater than two-thirds of the area of the room in which it is located, provided that no other sleeping lofts or mezzanines are open to the room in which the sleeping loft is located.

420.12.4 Permanent egress for sleeping lofts . Where a permanent means of egress is provided for sleeping lofts, the means of egress shall comply with Chapter 10 as modified by Sections 420.12.4.1 through 420.12.4.5.

420.12.4.1 Ceiling height at sleeping loft means of egress . A minimum ceiling height of 3 feet (914 mm) shall be provided for the entire width of the means of egress from the sleeping loft.

420.12.4.2 Stairways . Stairways providing egress from sleeping lofts shall be permitted to comply with Sections 420.12.4.2.1 through 420.12.4.2.3.

420.12.4.2.1 Width . Stairways providing egress from a sleeping loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The width below the handrail shall be not less than 20 inches (508 mm).

420.12.4.2.2 Treads and risers . Risers for stairs providing egress from a sleeping loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:

1. The tread depth shall be 20 inches (508 mm) minus four-thirds of the riser height.
2. The riser height shall be 15 inches (381 mm) minus three-fourths of the tread depth.

420.12.4.2.3 Landings . Landings at stairways providing egress from sleeping lofts shall comply with Section 1011.6, except that the depth of landings in the direction of travel shall be not less than 24 inches (508 mm).

420.12.4.3 Alternating tread devices . Alternating tread devices shall be permitted as a means of egress from sleeping lofts where the sleeping loft floor is no more than 10 feet (3048 mm) above the floor of the room in which it is located. Handrails and treads of such alternating tread devices shall comply with Section 1011.14.

420.12.4.4 Ship's ladders . Ship's ladders shall be permitted as a means of egress from sleeping lofts where the sleeping loft floor is no more than 10 feet (3048 mm) above the floor of the room in which it is located. Handrails and treads of such ship's ladders shall comply with Section 1011.15.

420.12.4.5 Ladders . Ladders shall be permitted as a means of egress from sleeping lofts where the sleeping loft floor is no more than 10 feet (3048 mm) above the floor of the room in which it is located. Such ladders shall comply with Sections 420.12.4.5.1 and 420.12.4.5.2.

420.12.4.5.1 Size and capacity . Ladders providing egress from sleeping lofts shall have a rung width of not less than 12 inches (305 mm), and 10-inch (254 mm) to 14-inch (356 mm) spacing between rungs. Ladders shall be capable of supporting a 300-pound (136 kg) load on any rung. Rung spacing shall be uniform within 3/8 inch (9.5 mm).

420.12.4.5.2 Incline . Ladders shall be inclined at 70 to 80 degrees from horizontal.

420.12.5 Smoke alarms . Single- or multiple-station smoke alarms shall be installed in all sleeping lofts in accordance with Section 907.2.11.1 or 907.2.11.2.

SECTION 505
MEZZANINES AND EQUIPMENT PLATFORMS

505.1 General . *Mezzanines* shall comply with Section 505.2. *Equipment platforms* shall comply with Section 505.3.

> **Exception:** Sleeping lofts in Group R occupancy dwelling units and sleeping units shall be permitted to comply with Section 420.12, subject to the limitations in Section 420.12.1.

Commenter's Reason: This public comment fully replaces the originally-proposed sleeping loft provisions. We have made changes in response to comments we received from the Committees and opposing testimony at the Committee Action Hearings, and in collaboration with some of the opponents. The revisions we have made are attempting to balance flexibility in design with maintaining a minimum level of safety.
Housing affordability has also become increasingly important in recent years due to the impacts of recessions and COVID. This proposal allows for densification of multi-family residential housing, allowing for additional sleeping space within the same building footprint. The proposed provisions are especially important for increasing usable space in very small units, which have been increasingly popular with the importance of sustainability and living more simply. Not only would this allow more living space within a new multifamily building, but would also encourage alteration of existing dwelling and sleeping units rather than demolition and new construction.

We received conflicting comments whether sleeping loft provisions belong in Chapter 4 or Chapter 5 (specifically, in Section 505 re mezzanines), or in an appendix. We believe the issue of how to reasonably regulate sleeping lofts is prevalent and important enough to warrant placement in the body of the code. While the proposed text scopes sleeping lofts to Group R occupancies, this public comment places the provisions in Section 420 – GROUPS I-1, R-1, R-2, R-3 AND R-4, in order to clarify and reinforce that scope. Other changes and responses are described below.

Sleeping loft scoping and general provisions:

In response to opposing testimony, we have clarified that sleeping lofts are an option in Section 420.12 ("Where provided….") It will be up to the designer to decide whether or not to designate these areas as sleeping lofts.

- In response to Committee comments, sleeping lofts are limited to dwelling units or sleeping units in R occupancies (420.12 and Definition). I-2 sleeping units are not included.
- We have clarified that sleeping lofts are required to comply with the base code, except where the provisions of the new section modify them (420.12). This allowed us to clean up the text by removing pointers to other sections of the code for various provisions.
- In response to opposing testimony at the CAH, small spaces that might technically meet the definition of a sleeping loft, or sleeping loft-like spaces that don't have a permanent means of egress are exempt from the requirements of this section (420.12, Exception, Items 1, 2, and 3).
- In response to comments from a Committee member, the proposal now specifies a sleeping loft must be smaller than 70 square feet, and any ceiling height above the sleeping loft cannot exceed 7 feet for more than half of its area. The intent is to keep sleeping lofts as small spaces. Once the space is provided with dimensions that are equivalent to habitable residential living spaces, this section no longer applies (420.12.1).
- The requirement for 7 feet below the sleeping loft (420.12.2) was added in response to a comment received from a Committee member. The text is drawn from IBC 505.2 regarding clear height below mezzanines. We actually don't see an issue with having shorter, usable spaces below sleeping lofts (what about a storage closet?) but the 7-foot dimension is consistent with the required height of spaces below mezzanines, and also reflects what we have seen in real-world project proposals, where these are generally placed on top of bathrooms in microhousing. (See Figure 1 below.)

Sleeping loft vs mezzanine:

During testimony, the question was raised as to how sleeping lofts are the same as or different from mezzanines. We also received conflicting comments as to whether these provisions belonged in the mezzanine provisions or in its own section. We believe it is more understandable to keep sleeping loft provisions separate from mezzanine provisions. However, we have added a pointer back to 420.12 in the new exception to Section 505.1, with a condition that sleeping lofts are limited in size.

In response to Committee and opposing comments, we have clarified that the aggregate area of sleeping lofts plus any mezzanines must meet the area limitations of mezzanines (420.12.3). However, the exception in 420.12.3 allows a very small dwelling or sleeping unit, to have a single sleeping loft (up to 69.9 square feet), as long as it is the only sleeping loft or mezzanine in the room and its area does not exceed two thirds of the area of the main room (420.12.3, Exception). The two-thirds figure is based on the allowance for mezzanines and equipment platforms in IBC Section 505.2.1.1. This allows microhousing units, which in today's code can have as little as 70 square feet of habitable space, to utilize the space on top of the bathroom for a sleeping loft.

Sleeping loft egress:

In general, means of egress (including individual components) must comply with the base code, but the specific provisions in 420.12.4.1 through 420.12.4.5 modify Chapter 10 (420.12.4).

Changes from the original proposal include specifically allowing the use of alternating tread devices, ship's ladders, and ladders as a means of egress, but limiting their height (420.12.4.3, 420.12.4.4, and 420.12.4.5). We received a comment after the CAH expressing concern about having small children only having a ladder for a means of egress from an unlimited height. The 10-foot limitation is consistent with the 7-foot clear height requirement in 420.12.2, and would allow for floor framing plus the flexibility to provide a full-height space below the sleeping loft.

In response to a comment received after the CAH, the base requirement in Section 420.12.4 to comply with Chapter 10 would allow the use of a spiral stair to provide egress from a sleeping loft. Because we are not modifying any of the requirements for spiral stairs, there is no section devoted to spiral stairs in 420.12.4

Examples of sleeping lofts:

Figures 1 and 2 below show real-life examples of sleeping lofts taken from the article, "What you need to know about NYC apartments with sleeping lofts" posted on www.brickunderground.com. The loft in Figure 1 appears to have been located on top of the unit's bathroom. It is unclear what is below the loft in Figure 2, or if the ceiling height below the loft would comply with the 7-foot requirement in this public comment. Note the non-compliant guard in Figure 1, and the total lack of a guard in Figure 2. The object of providing these examples is not to question what is allowed in New York, but to show that sleeping lofts are not a "niche" as was suggested in testimony at the CAH. As the chair of the Means of Egress Committee indicated, sleeping lofts are prevalent across the country, particularly in college towns. These spaces are being created whether or not the code addresses them, so code provisions are needed for consistency in regulating them.

FIGURE 1

FIGURE 2

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
As stated in the original proposal, sleeping lofts are an option and not a requirement. When an applicant chooses to install a sleeping loft, the code will provide guidance on the minimum standards for the space.

Public Comment# 2401

Public Comment 2:

IBC: APPENDIX P (New), SECTION P101 (New), P101.1 (New), P101.2 (New), P101.3 (New), P101.4 (New), SECTION P102 (New), P102.1 (New), SECTION P103 (New), P103.1 (New), P103.2 (New), P103.3 (New), P103.3.1 (New), P103.3.2 (New), P103.3.3 (New), P103.4 (New), P103.5 (New), P103.6 (New), P103.6.1 (New), P103.6.2 (New), SECTION P104 (New), P104.1 (New), SECTION P105 (New), P105.1 (New)

Proponents: Sue Coffman, representing City of Tacoma (sue.coffman@cityoftacoma.org); Ardel Jala, representing Seattle Dept of Construction & Inspections (ardel.jala@seattle.gov); Hoyt Jeter, representing City of Tacoma (hjeter@cityoftacoma.org); Quyen Thai, representing City of Tacoma (qthai76@gmail.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

APPENDIX P
SLEEPING LOFTS

SECTION P101
GENERAL

P101.1 General . Where provided in Group R occupancies,sleeping lofts shall comply with the provisions of this code, except as modified by this appendix. Sleeping lofts constructed in compliance with this appendix shall be considered a portion of the story below. Such sleeping lofts shall not contribute to either the building area or number of stories as regulated by Section 503.1. The sleeping loft floor area shall be included in determining the fire area.
The following sleeping lofts are exempt from compliance with this appendix:

1. Sleeping lofts with a maximum depth of less than 3 feet (914 mm).
2. Sleeping lofts with a floor area of less than 35 square feet (3.3 m^2).

3. Sleeping lofts not provided with a permanent means of egress.

P101.2 Sleeping loft limitations . Sleeping lofts shall comply with the following:

1. The sleeping loft floor area shall be less than 70 square feet (6.5 m^2).
2. The sleeping loft ceiling height shall not exceed 7 feet (2134 mm) for more than one half of the sleeping loft floor area.

The provisions of this appendix shall not apply to sleeping lofts that do not comply with Items 1 and 2.

P101.3 Sleeping loft ceiling height . The clear height below the sleeping loft floor construction shall not be less than 7 feet (2134 mm). The ceiling height above the finished floor of the sleeping loft shall not be less than 3 feet (914 mm). Portions of the sleeping loft with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not contribute to the sleeping loft floor area.

P101.4 Sleeping loft area . The aggregate area of all sleeping lofts and mezzanines within a room shall comply with Section 505.2.1.

Exception: The area of a single sleeping loft shall not be greater than two-thirds of the area of the room in which it is located, provided that no other sleeping lofts or mezzanines are open to the room in which the sleeping loft is located.

SECTION P102
DEFINITIONS

P102.1 General . The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.
SLEEPING LOFT. A space on an intermediate level or levels between the floor and ceiling of a Group R occupancy dwelling or sleeping unit, open on one or more sides to the room in which the sleeping loft is located.

SECTION P103
MEANS OF EGRESS

P103.1 General . Where a permanent means of egress is provided for sleeping lofts, the means of egress shall comply with Chapter 10 of this code, as modified by Sections P103.2 through P103.6.

P103.2 Ceiling height at sleeping loft means of egress . A minimum ceiling height of 3 feet (914 mm) shall be provided for the entire width of the means of egress from the sleeping loft.

P103.3 Stairways . Stairways providing egress from sleeping lofts shall be permitted to comply with Sections P103.3.1 through P103.3.3.

P103.3.1 Width . Stairways providing egress from a sleeping loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The width below the handrail shall be not less than 20 inches (508 mm).

P103.3.2 Treads and risers . Risers for stairs providing egress from a sleeping loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:

1. The tread depth shall be 20 inches (508 mm) minus four-thirds of the riser height.
2. The riser height shall be 15 inches (381 mm) minus three-fourths of the tread depth.

P103.3.3 Landings . Landings at stairways providing egress from sleeping lofts shall comply with Section 1011.6, except that the depth of landings in the direction of travel shall be not less than 24 inches (508 mm).

P103.4 Alternating tread devices . Alternating tread devices shall be permitted as a means of egress from sleeping lofts, where the sleeping loft floor is no more than 10 feet (3048 mm) above the floor of the room to which it is open. Handrails and treads of such alternating tread devices shall comply with Section 1011.14.

P103.5 Ship's ladders . Ship’s ladders shall be permitted as a means of egress from sleeping lofts where the sleeping loft floor is no more than 10 feet (3048 mm) above the floor of the room to which it is open. Handrails and treads of such ship’s ladders shall comply with Section 1011.15.

P103.6 Ladders . Ladders shall be permitted as a means of egress from sleeping lofts where the sleeping loft floor is no more than 10 feet (3048 mm) above the floor of the room to which it is open. Such ladders shall comply with Sections P103.6.1 and P103.6.2.

P103.6.1 Size and capacity . Ladders providing egress from sleeping lofts shall have a rung width of not less than 12 inches (305 mm), and 10-inch (254 mm) to 14-inch (356 mm) spacing between rungs. Ladders shall be capable of supporting a 300-pound (136 kg) load on any rung. Rung spacing shall be uniform within 3/8 inch (9.5 mm).

P103.6.2 Incline . Ladders shall be inclined at 70 to 80 degrees from horizontal.

SECTION P104
GUARDS

P104.1 **General .** Guards complying with Section 1015 of this code shall be provided at the open sides of sleeping lofts.

> **Exception:** The guard height at sleeping lofts shall be permitted to be 36 inches (914 mm) where the ceiling height of the sleeping loft is 42 inches (1067 mm) or less.

SECTION P105
SMOKE ALARMS

P105.1 **General .** Listed single- or multiple-station smoke alarms complying with UL 217 shall be installed in all sleeping lofts.

Commenter's Reason: This public comment fully replaces G112-21 Parts I, II, and III, and places the proposed sleeping loft provisions from G112-21 Parts I, II, and III into a new appendix, where a jurisdiction has the option to adopt them. While sleeping lofts are a prevalent and important enough issue to warrant placement in the body of the code, this appendix is being offered in response to comments from some Committee members and some opponents.
The provisions of the appendix were modified from the original proposal in response to comments we received from the Committees and opposing testimony, and in collaboration with some of the opponents. A general description of the changes made to the original provisions follows.

Sleeping loft scoping and general provisions:

Even if the appendix is adopted by a jurisdiction, application of the appendix is an option (“Where provided…,” P101.1). It will be up to the designer to decide whether or not to designate these areas as sleeping lofts.

- Sleeping lofts are limited to dwelling units or sleeping units in R occupancies (P101.1, P102.1).
- Sleeping lofts are required to comply with the base code, except where the provisions of the appendix modify them (P101.1).
- Small spaces that might technically meet the definition of a sleeping loft or sleeping loft-like spaces that don’t have a permanent means of egress are exempt from the requirements of the appendix (P101.1).
- Once a sleeping loft is provided with dimensions that are equivalent to “normal” residential living spaces, it must comply with the full provisions for egress, habitable space, etc. (P101.2).
- The requirement for 7 feet below the sleeping loft was added in response to a comment received from a Committee member (P101.3). The text is drawn from IBC 505.2 regarding clear height below mezzanines. We actually don’t see an issue with having smaller, usable spaces below sleeping lofts (what about a storage closet?) but the 7-foot requirement also reflects what we have seen in real-world project proposals, where these are generally placed on top of bathrooms in microhousing. See Figure 1 below, which is an example of a real-life (constructed) sleeping loft, taken from the article, "What you need to know about NYC apartments with sleeping lofts" posted on www.brickunderground.com.

Figure 1: Example of constructed sleeping loft

Sleeping loft vs mezzanine:

During testimony, the question was raised as to how sleeping lofts are the same as or different from mezzanines. We also received conflicting comments as to whether these provisions belonged in the mezzanine provisions or in its own section. We believe it is more understandable to keep sleeping lofts separate. We have clarified that the aggregate area of all sleeping lofts plus any mezzanines must meet the area limitations of mezzanines (P101.4). However, the exception in P101.4 allows a very small dwelling or sleeping unit, which can be as small as 70 square feet of habitable space (think microhousing), to have a single sleeping loft that can be up to two-thirds of the area of the main room. This is based on the allowance for mezzanines and equipment platforms in IBC 505.2.1.1.

Sleeping loft egress and guards:

In general, means of egress (including individual components) and guards must comply with the base code, but the specific provisions in P103 and the exception in P104.1 modify Chapter 10 (P103.1, P104.1). Changes from the original proposal include:

- Allowing the use of alternating tread devices, ship's ladders, and ladders as a means of egress, but limiting their height (P103.4, P103.5, P103.6). We received a comment after the CAH expressing concern about having small children only having a ladder for a means of egress from an unlimited height. The 10-foot limitation is consistent with the 7-foot clear height requirement in P101.3, and would also allow for floor framing and a full-height space below the sleeping loft.
- Guards at sleeping lofts must fully comply with Section 1015 (P104.1), but the exception allows a shorter guard in sleeping lofts with lower ceiling heights. Based on comments we received after the CAH, a 36-inch guard is only allowed where a 42-inch guard would not fit.

Housing affordability has become increasingly important in recent years due to the impacts of recessions and COVID. This proposal allows for densification of multi-family residential housing by providing an option for additional sleeping space within the same building footprint. The proposed provisions are especially important for increasing usable space in very small units, which have been increasingly popular with the importance of sustainability and living more simply. Not only would this allow more living space within a new multifamily building, but it also encourages the alteration of existing dwelling and sleeping units rather than demolition and new construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal will not increase or decrease the cost of construction because the appendix adds an option and not a requirement. When a jurisdiction adopts the appendix and an applicant decides to utilize these new provisions, the code will provide guidance on minimum standards for that space.

Public Comment# 2422

G112-21 Part II

Proposed Change as Submitted

Proponents: Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov); Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee (jonsiuconsulting@gmail.com)

2021 International Building Code

Revise as follows:

1011.14 Alternating tread devices. *Alternating tread devices* are limited to an element of a *means of egress* in any of the following locations:

1. ~~buildings of~~ Groups F, H and S from a mezzanine not more than 250 square feet (23 m^2) in area and that serves not more than five occupants~~;~~ .
2. ~~in buildings of~~ Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m^2) in area ~~and~~ .
3. For ~~for~~ access to unoccupied roofs
4. Group R from sleeping lofts.

Alternating tread devices used as a *means of egress* shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

1015.2 Where required. *Guards* shall be located along open-sided walking surfaces, including *mezzanines*, equipment platforms, *aisles*, *stairs*, *ramps* and landings that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Guards shall be located along sleeping lofts in accordance with Section 506.4. *Guards* shall be adequate in strength and attachment in accordance with Section 1607.9.

Exceptions: *Guards* are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of *stages* and raised *platforms*, including *stairs* leading up to the *stage* and raised *platforms*.
3. On raised *stage* and *platform* floor areas, such as runways, *ramps* and side *stages* used for entertainment or presentations.
4. At vertical openings in the performance area of *stages* and *platforms*.
5. At elevated walking surfaces appurtenant to *stages* and *platforms* for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating areas at cross *aisles* in accordance with Section 1030.17.2.
8. On the loading side of station platforms on fixed guideway transit or passenger rail systems.

1015.3 Height. Required *guards* shall be not less than 42 inches (1067 mm) high, measured vertically as follows:

1. From the adjacent walking surfaces.
2. On *stairways* and stepped *aisles*, from the line connecting the leading edges of the tread *nosings*.
3. On *ramps* and ramped *aisles*, from the *ramp* surface at the guard.

Exceptions:

1. For occupancies in Group R-3 not more than three stories above grade in height and within individual *dwelling units* in occupancies in Group R-2 not more than three stories above grade in height with separate *means of egress*, required *guards* shall be not less than 36 inches (914 mm) in height measured vertically above the adjacent walking surfaces.
2. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, *guards* on the open sides of *stairs* shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
3. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, where the top of the *guard* serves as a *handrail* on the open sides of *stairs*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.
4. *Sleeping loft guards* shall be not less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less.

~~4.~~ 5. The *guard* height in assembly seating areas shall comply with Section 1030.17 as applicable.

~~5.~~ 6. Along *alternating tread devices* and ships ladders, *guards* where the top rail serves as a *handrail* shall have height not less than 30 inches (762 mm) and not more than 34 inches (864 mm), measured vertically from the leading edge of the device tread *nosing*.

~~6.~~ 7. In Group F occupancies where *exit access stairways* serve fewer than three stories and such *stairways* are not open to the public, and where the top of the *guard* also serves as a *handrail*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

Reason: This proposal takes an important part of the Residential Code Appendix Q outlining the design criteria for a loft, modifies some of the requirements, and then incorporates it into the main sections of the IBC with definitions and a new section. This proposal provides allowances and limitations on designed spaces specifically identified as a sleeping loft, while clearly differentiating these small spaces from mezzanines and other habitable space.
The proposal requires these small spaces to include smoke detection and an emergency escape and rescue opening. A sleeping loft in an IBC dwelling unit would provide the equivalent safety standards as a loft located in a small dwelling unit as currently allowed in IRC Appendix Q. Expanding the availability of sleeping lofts will promote more broad uses of space, while possibly allowing for an increase in housing density and affordability.

Most of the technical provisions are taken from IRC Appendix Q. However, the list below explains the differences between this proposal and Appendix Q, and our rationale.

- "sleeping loft" vs "loft" – we want to trigger smoke alarm, emergency escape/rescue opening.
- 506.2.1: Imposes max. 70 sf area. Intent is to keep these small, without being able to circumvent minimum habitable space requirements for larger rooms. Thus, beyond 70 sf, space should meet full interior dimension requirements for habitable space (IBC 1208) and mezzanines (IBC 505)
- 506.3: Requires 3' ceiling height at access/egress component. Stair requires 6'2" headroom, but ladders, alternating tread devices, and ships ladders have no similar requirement. Ceiling heights of less than 3' are allowed, and nothing states that the ladders, etc. can't be placed in those lower-ceiling areas. Some minimum height above the device is necessary to allow people in the sleeping loft to egress in an emergency.
- 506.3.1.5: Allows 18" landing platforms, vs "18 to 22 inches" in direction of travel in Appendix Q. Picked lower limit, since Appendix Q doesn't say when to use anything larger. Allows 18" rise from landing platform to loft floor, where Appendix Q allows 16 to 18 inches. In this case, picked 18" as the maximum, again, because there is no other guidance in Appendix Q why something smaller might be required.
- 506.3.2.1: Requires ladders be capable of supporting 300 pound load on any rung, vs 200 in Appendix Q. 300 is consistent with load requirements in IBC Chapter 16.

The change to 1011.14 is for coordination with the new Section 506.3.3. In order to add to the list of allowed uses, there was a need to clarify whether alternating tread devices are allowed to provide access to unoccupied roofs to other than I-3 occupancies. Numbering the list is for clarity, taking the place of a long sentence with clauses separated by semicolons, and also clearly allows these for unoccupied roof access in other occupancies besides I-3s, consistent with the IBC Commentary. The change to 1015.2 and the new Exception 4 in 1015.3 integrate the sleeping loft guard provisions from IRC Appendix Q Section AQ104.2.5 into the guard provisions of the IBC, instead of having them reside in the sleeping loft section."

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal will not increase or decrease the cost of construction because the new sections to the code add an option and not a requirement. When and applicant decides to utilize these new sections, the code provides guidance on minimum standards for that space.

G112-21 Part II

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the committee felt this was a very niche market that would be more appropriate in an appendix, similar to the IRC. It could be read to prohibit something as simple as a built in bunk bed. The requirements for guards have safety concerns. G112-21 Part 1 did not pass, and this needs to be a package. (Vote: 13-0)

G112-21 Part II

Individual Consideration Agenda

Public Comment 1:

IBC: 1011.14, 1011.15, 1011.16, 1015.2, 1015.3

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

1011.14 Alternating tread devices . *Alternating tread devices* are limited to an element of a *means of egress* in any of the following locations:

1. ~~buildings of~~ Groups F, H and S from a *mezzanine* not more than 250 square feet (23 m^2) in area and that serves not more than five occupants~~;~~.
2. ~~in buildings of~~ Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m^2) in area. ~~and~~
3. For ~~for~~ access to unoccupied roofs.
4. Group R dwelling units and sleeping units from sleeping lofts in accordance with Section 420.12.

Alternating tread devices used as a *means of egress* shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

1011.15 Ship's ladders . Ship's ladders are permitted to be used in Group I-3 as a component of a *means of egress* to and from control rooms or elevated facility observation stations not more than 250 square feet (23 m^2) with not more than three occupants and in sleeping lofts in accordance with Section 420.12, and for access to unoccupied roofs. The minimum clear width at and below the *handrails* shall be 20 inches (508 mm). Ship's ladders shall be designed for the live loads indicated in Section 1607.17.

1011.16 Ladders . Permanent ladders shall not serve as a part of the *means of egress* from occupied spaces within a building. Permanent ladders shall be constructed in accordance with Section 306.5 of the International Mechanical Code and designed for the live loads indicated in Section 1607.17. Permanent ladders shall be permitted to provide access to the following areas:

1. Spaces frequented only by personnel for maintenance, repair or monitoring of equipment.
2. Nonoccupiable spaces accessed only by catwalks, crawl spaces, freight elevators or very narrow passageways.
3. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands.
4. Elevated levels in Group U not open to the general public.
5. Nonoccupied roofs that are not required to have *stairway* access in accordance with Section 1011.12.1.
6. Where permitted to access equipment and appliances in accordance with Section 306.5 of the International Mechanical Code.

Exception: Permanent ladders shall be permitted to serve as a means of egress from sleeping lofts in accordance with Section 420.12.

1015.2 Where required . *Guards* shall be located along open-sided walking surfaces, including *mezzanines*, equipment platforms, sleeping lofts in accordance with Section 420.12, *aisles*, *stairs*, *ramps* and landings that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. *Guards* shall be adequate in strength and attachment in accordance with Section 1607.9.

Exceptions: *Guards* are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of *stages* and raised *platforms*, including *stairs* leading up to the *stage* and raised *platforms*.
3. On raised *stage* and *platform* floor areas, such as runways, *ramps* and side *stages* used for entertainment or presentations.
4. At vertical openings in the performance area of *stages* and *platforms*.
5. At elevated walking surfaces appurtenant to *stages* and *platforms* for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating areas at cross *aisles* in accordance with Section 1030.17.2.
8. On the loading side of station platforms on fixed guideway transit or passenger rail systems.

1015.3 Height . Required *guards* shall be not less than 42 inches (1067 mm) high, measured vertically as follows:

1. From the adjacent walking surfaces.
2. On *stairways* and stepped *aisles*, from the line connecting the leading edges of the tread *nosings*.
3. On *ramps* and ramped *aisles*, from the *ramp* surface at the guard.

Exceptions:

1. For occupancies in Group R-3 not more than three stories above grade in height and within individual *dwelling units* in occupancies in Group R-2 not more than three stories above grade in height with separate *means of egress*, required *guards* shall be not less than 36 inches (914 mm) in height measured vertically above the adjacent walking surfaces.
2. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, *guards* on the open sides of *stairs* shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
3. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, where the top of the *guard* serves as a *handrail* on the open sides of *stairs*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.
4. The guard height at sleeping lofts constructed in accordance with Section 420.12 shall be permitted to be 36 inches (914 mm) where the ceiling height of the sleeping loft is 42 inches (1067 mm) or less.

~~4~~ 5. The *guard* height in assembly seating areas shall comply with Section 1030.17 as applicable.

~~5~~ 6. Along *alternating tread devices* and ships ladders, *guards* where the top rail serves as a *handrail* shall have height not less than 30 inches (762 mm) and not more than 34 inches (864 mm), measured vertically from the leading edge of the device tread *nosing*.

~~6~~ 7. In Group F occupancies where *exit access stairways* serve fewer than three stories and such *stairways* are not open to the public, and where the top of the *guard* also serves as a *handrail*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

Commenter's Reason: This public comment fully replaces the original Part II. Most of the revisions clarify that the proposed changes in Chapter 10 are scoped to sleeping lofts that comply with the new Section 420.12 in Part I (added "…in accordance with Section 420.12" in each of the sections being modified). We made the following substantive changes to the proposed language in response to comments specifically related to Part II we received during and after the CAH:

- We added specific allowances for ship's ladders and ladders to serve as a means of egress from sleeping lofts, since Section 420.12.4 in Part I allows them. We received a comment after the CAH that while the original proposal had an allowance for alternating tread devices (1011.14), the public comment should include corresponding allowances for ship's ladders and permanent ladders in Sections 1011.15 and 1011.16.
- We moved the trigger for guards in sleeping lofts from its own sentence in 1015.2 to the laundry list in the first sentence. This change was made in response to a comment we received after the CAH, indicating that as a result of the multi-year ICC Code Technology Committee's negotiations on guards, every trigger for guards must be included in the laundry list in the first sentence or significant opposition will be triggered because of liability.
- Guards at sleeping lofts must fully comply with Section 1015, but Exception 4 to 1015.3 allows a shorter guard in sleeping lofts with lower ceiling heights. Based on comments we received from a Committee member and comments we received after the CAH, the revised Exception 4 only allows a 36" high guard where a 42" guard would not fit.

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Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
As stated in the original proposal, sleeping lofts are an option and not a requirement. When an applicant chooses to install a sleeping loft, the code will provide guidance on the minimum standards for the space.

Public Comment# 2305

Public Comment 2:

IBC: 1015.3

Proponents: Sue Coffman, representing City of Tacoma (sue.coffman@cityoftacoma.org); Ardel Jala, representing Seattle Dept of Construction & Inspections (ardel.jala@seattle.gov); Hoyt Jeter, representing City of Tacoma (hjeter@cityoftacoma.org); Quyen Thai, representing City of Tacoma (qthai76@gmail.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

1015.3 Height . Required *guards* shall be not less than 42 inches (1067 mm) high, measured vertically as follows:

1. From the adjacent walking surfaces.
2. On *stairways* and stepped *aisles*, from the line connecting the leading edges of the tread *nosings*.
3. On *ramps* and ramped *aisles*, from the *ramp* surface at the guard.

Exceptions:

1. For occupancies in Group R-3 not more than three stories above grade in height and within individual *dwelling units* in occupancies in Group R-2 not more than three stories above grade in height with separate *means of egress*, required *guards* shall be not less than 36 inches (914 mm) in height measured vertically above the adjacent walking surfaces.
2. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, *guards* on the open sides of *stairs* shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
3. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, where the top of the *guard* serves as a *handrail* on the open sides of *stairs*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.
4. ~~*Sleeping loft guards*~~ In areas of sleeping lofts with ceiling heights of 7 feet (2134 mm) or less, guards shall be not less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less.
5. The *guard* height in assembly seating areas shall comply with Section 1030.17 as applicable.
6. Along *alternating tread devices* and ships ladders, *guards* where the top rail serves as a *handrail* shall have height not less than 30 inches (762 mm) and not more than 34 inches (864 mm), measured vertically from the leading edge of the device tread *nosing*.
7. In Group F occupancies where *exit access stairways* serve fewer than three stories and such *stairways* are not open to the public, and where the top of the *guard* also serves as a *handrail*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

Commenter's Reason: This public comment is only intended to address the height of guards for sleeping lofts.
This public comment will require a 42-inch guard where ceiling heights are 7 feet or more. For a ceiling height between 7 feet and 6 feet, the guard height will be 36 inches. For ceiling heights less than 6 feet, the guard will linearly decrease in height until an 18-inch guard is provided for the lowest allowable ceiling height (3 feet).

We believe the half-height guard is reasonable because:

- Providing a guard that is at least half the height of the sleeping loft space will allow the occupant(s) to hoist a mattress over the guard, even at the minimum 3-foot ceiling height.
- As noted above, the standard 42-inch guard will be required where ceiling heights are 7 feet or greater.
- 36-inch guards are permitted by Exception 1 to Section 1015.3 for R-3 and R-2 dwelling units, regardless of ceiling height. In this public comment, the ceiling height must be 6 feet before you have a 36-inch guard. While the code limits the 36-inch allowance to buildings of 3 stories or less, this does not make sense for interior guards--whether the unit is on the ground floor or on the fourth floor, the hazard on the interior is the same.
- Bunk beds have railings as low as 14 inches, and are apparently deemed to be safe enough by other regulatory agencies (Consumer Product Safety Commission) to prevent falls out of bunk beds, since that is the height of the railings on a bunk bed purchased by a contributor to this public comment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Because sleeping lofts are being introduced as an option, this public comment in conjunction with the main proposal will not affect the cost of construction.

Public Comment# 2481

G112-21 Part III

Proposed Change as Submitted

Proponents: Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov); Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee (jonsiuconsulting@gmail.com)

2021 International Fire Code

Revise as follows:

907.2.11.1 Group R-1. Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas and in each sleeping loft.
2. In every room in the path of the means of egress from the sleeping area to the door leading from the sleeping unit.
3. In each story within the sleeping unit, including basements. For sleeping units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

907.2.11.2 Groups R-2, R-3, R-4 and I-1. Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room sleeping loft and used for sleeping purposes.
3. In each story within a *dwelling unit*, including *basements* but not including crawl spaces and uninhabitable attics. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

Reason: This proposal takes an important part of the Residential Code Appendix Q outlining the design criteria for a loft, modifies some of the requirements, and then incorporates it into the main sections of the IBC with definitions and a new section. This proposal provides allowances and limitations on designed spaces specifically identified as a sleeping loft, while clearly differentiating these small spaces from mezzanines and other habitable space.
The proposal requires these small spaces to include smoke detection and an emergency escape and rescue opening. A sleeping loft in an IBC dwelling unit would provide the equivalent safety standards as a loft located in a small dwelling unit as currently allowed in IRC Appendix Q. Expanding the availability of sleeping lofts will promote more broad uses of space, while possibly allowing for an increase in housing density and affordability.

Most of the technical provisions are taken from IRC Appendix Q. However, the list below explains the differences between this proposal and Appendix Q, and our rationale.

- "sleeping loft" vs "loft" – we want to trigger smoke alarm, emergency escape/rescue opening.
- 506.2.1: Imposes max. 70 sf area. Intent is to keep these small, without being able to circumvent minimum habitable space requirements for larger rooms. Thus, beyond 70 sf, space should meet full interior dimension requirements for habitable space (IBC 1208) and mezzanines (IBC 505)
- 506.3: Requires 3' ceiling height at access/egress component. Stair requires 6'2" headroom, but ladders, alternating tread devices, and ships ladders have no similar requirement. Ceiling heights of less than 3' are allowed, and nothing states that the ladders, etc. can't be placed in those lower-ceiling areas. Some minimum height above the device is necessary to allow people in the sleeping loft to egress in an emergency.
- 506.3.1.5: Allows 18" landing platforms, vs "18 to 22 inches" in direction of travel in Appendix Q. Picked lower limit, since Appendix Q doesn't say when to use anything larger. Allows 18" rise from landing platform to loft floor, where Appendix Q allows 16 to 18 inches. In this case, picked 18" as the maximum, again, because there is no other guidance in Appendix Q why something smaller might be required.
- 506.3.2.1: Requires ladders be capable of supporting 300 pound load on any rung, vs 200 in Appendix Q. 300 is consistent with load requirements in IBC Chapter 16.

The change to 1011.14 is for coordination with the new Section 506.3.3. In order to add to the list of allowed uses, there was a need to clarify whether alternating tread devices are allowed to provide access to unoccupied roofs to other than I-3 occupancies. Numbering the list is for clarity, taking the place of a long sentence with clauses separated by semicolons, and also clearly allows these for unoccupied roof access in other occupancies besides I-3s, consistent with the IBC Commentary. The change to 1015.2 and the new Exception 4 in 1015.3 integrate the sleeping loft guard provisions from IRC Appendix Q Section AQ104.2.5 into the guard provisions of the IBC, instead of having them reside in the sleeping loft section."

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal will not increase or decrease the cost of construction because the new sections to the code add an option and not a requirement. When and applicant decides to utilize these new sections, the code provides guidance on minimum standards for that space.

G112-21 Part III

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee stated that the reasons for disapproval were that sleeping lofts may not be considered just for sleeping, a separate definition is needed, and the proponent requested it based on the other committees actions taken on Parts I and II. (Vote: 14-0)

G112-21 Part III

Individual Consideration Agenda

Public Comment 1:

IFC: 907.2.11.1, 907.2.11.2

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Replace as follows:

2021 International Fire Code

907.2.11.1 Group R-1 . Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In each sleeping loft constructed in accordance with Section 420.12 of the International Building Code.
3. ~~2~~ 3. In every room in the path of the *means of egress* from the sleeping area to the door leading from the *sleeping unit*.
4. ~~3~~ 4. In each story within the *sleeping unit*, including *basements*. For *sleeping units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

907.2.11.2 Groups R-2, R-3, R-4 and I-1 . Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.
3. In each sleeping loft constructed in accordance with Section 420.12 of the International Building Code.
4. ~~3~~ 4. In each story within a *dwelling unit*, including *basements* but not including crawl spaces and uninhabitable attics. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

Commenter's Reason: While this public comment is a complete replacement of the original Part III submittal for clarity, we are making only minimal editorial modifications to the original proposal. No technical changes are being made. The feedback we received from the Committee was that the technical content of the original Part III was fine, and did not need to be modified. However, despite the fact that Section 201.3 in both the IBC and IFC states that definitions in other I-codes are applicable in the code under consideration, there was some testimony that suggested definitions for “sleeping loft” were necessary in the IFC. In order to address the concern without duplicating the definitions, we have created a new, separate trigger for smoke alarms in sleeping lofts in each of the lists in Sections 907.2.11.2 and 907.2.11.2. The new items point back to the new

IBC Section 420.12 created in Part I, which not only scopes the provision, but will also get code users to the definition in the IBC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
As stated in the original proposal, sleeping lofts are an option and not a requirement. When an applicant chooses to install a sleeping loft, the code will provide guidance on the minimum standards for the space.

Public Comment# 2646

G116-21

Proposed Change as Submitted

Proponents: Stephen Thomas, Colorado Code Consulting, a Shums Coda Assoc Company, representing Colorado Chapter ICC (sthomas@coloradocode.net); Timothy Pate, representing Colorado Chapter Code Change Committee (tpate@broomfield.org)

2021 International Building Code

506.3 Frontage increase. Every building shall adjoin or have access to a *public way* to receive an area factor increase based on frontage. Area factor increase shall be determined in accordance with Sections 506.3.1 through 506.3.3.

506.3.1 Minimum percentage of perimeter. To qualify for an area factor increase based on frontage, a building shall have not less than 25 percent of its perimeter on a *public way* or open space. Such open space shall be either on the same lot or dedicated for public use and shall be accessed from a street or approved *fire lane*.

Revise as follows:

506.3.2 Minimum frontage distance. To qualify for an area factor increase based on frontage, the *public way* or open space adjacent to the building perimeter shall have a minimum distance *(W)* of 20 feet (6096 mm) measured at right angles from the building face to any of the following:

1. The closest interior lot line.
2. The entire width of a street, alley or *public way.*
3. The exterior face of an adjacent building on the same property.

The frontage increase shall be based on the smallest *public way* or open space that is 20 feet (6096 mm) or greater, and the percentage of building perimeter having a minimum 20 feet (6096 mm) *public way* or open space. <u>Not all public ways or open spaces that are 20 feet (6096 mm) or greater are required to be used to determine the frontage increase.</u>

506.3.3 Amount of increase. The area factor increase based on frontage shall be determined in accordance with Table 506.3.3.

Revise as follows:

TABLE 506.3.3 FRONTAGE INCREASE FACTOR[a]

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)			
	~~0 to less than 20~~	20 to less than 25	25 to less than 30	30 or greater
0 to less than 25	~~0~~	0	0	0
25 to less than 50	~~0~~	0.17	0.21	0.25
50 to less than 75	~~0~~	0.33	0.42	0.50
75 to 100	~~0~~	0.50	0.63	0.75

a. Interpolation is permitted.

506.3.3.1 Section 507 buildings. Where a building meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) *public way* or *yard* requirement, the area factor increase based on frontage shall be determined in accordance with Table 506.3.3.1. The frontage increase shall be based on the smallest public way or open space that is 30 feet (9144 mm) or greater, and the percentage of building perimeter having a minimum 30 feet (9144 mm) public way or open space. Not all public ways or open spaces that are 20 feet (6096 mm) or greater are required to be used to determine the frontage increase.

TABLE 506.3.3.1 SECTION 507 BUILDINGS[a]

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)					
	30 to less than 35	**35 to less than 40**	**40 to less than 45**	**45 to less than 50**	**50 to less than 55**	**55 ~~to less than 60~~ or greater**
0 to less than 25	0	0	0	0	0	0
25 to less than 50	0.29	0.33	0.38	0.42	0.46	0.50
50 to less than 75	0.58	0.67	0.75	0.83	0.92	1.00
75 to 100	0.88	1.00	1.13	1.25	1.38	1.50

a. Interpolation is permitted.

Reason: This proposal provides some minor revisions to the new process of determining the frontage increase. We felt that additional clarification was needed for application. The proposed language does not change any technical provisions of the section.
The additional language is needed because there are situations where you can get a larger increase by not using all of the open space around the building.

For a couple examples:

1) A building with four sides open at 30', 35', 24' and 60'. The percentage of building perimeter open (>20') is 100%, with the smallest open space at 25 feet, my increase would be 0.50.

2) A building with three sides open at 30' 35' and 60', plus a short side that is not open. Assume the percentage of perimeter at least 20' open at 90%. With the smallest open space that is 20' or more being 30', my increase would be 0.75.

So I get a bigger increase with no yard than I do with a 24' yard.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal is designed to clarify the requirement.

G116-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as it is not needed as it is understood that one does not have to use the frontage increase. Additionally, when calculating the frontage increase, one does not need to consider all the open spaces around the building. (Vote: 8-7)

G116-21

Individual Consideration Agenda

Public Comment 1:

IBC: 506.3.2, 506.3.3.1

Proponents: Stephen Thomas, representing Colorado Chapter ICC (sthomas@coloradocode.net) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

506.3.2 Minimum frontage distance . To qualify for an area factor increase based on frontage, the *public way* or open space adjacent to the building perimeter shall have a minimum distance *(W)* of 20 feet (6096 mm) measured at right angles from the building face to any of the following:

1. The closest interior lot line.
2. The entire width of a street, alley or *public way.*
3. The exterior face of an adjacent building on the same property.

The frontage increase shall be based on the smallest *public way* or open space that is 20 feet (6096 mm) or greater, and the percentage of building perimeter having a minimum 20 feet (6096 mm) *public way* or open space. ~~Not all public ways or open spaces that are 20 feet (6096 mm) or greater are required to be used to determine the frontage increase.~~

506.3.3.1 Section 507 buildings . Where a building meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) *public way* or *yard* requirement, the area factor increase based on frontage shall be determined in accordance with Table 506.3.3.1. The frontage increase shall be based on the smallest public way or open space that is 30 feet (9144 mm) or greater, and the percentage of building perimeter having a minimum 30 feet (9144 mm) public way or open space. ~~Not all public ways or open spaces that are 20 feet (6096 mm) or greater are required to be used to determine the frontage increase.~~

Commenter's Reason: The committee agreed with the major portion of this proposal. However, they did not like the last sentence in Sections 506.3.2 and 506.3.3.1. They felt that the language was more commentary and already permitted by the current language. They did not think it was necessary. Therefore, we have deleted the two sentences to address their concerns. The original reason statement supports the public comment as well. This proposed language is intended to clean up the language based on users of the code contacting us with their questions and concerns. The new language is intended to be a clarification and does not create a technical change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal is a clarification of the current language.

Public Comment# 2359

G118-21

Proposed Change as Submitted

Proponents: Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com)

2021 International Building Code

Revise as follows:

507.11 Group E buildings. The area of a Group E building not more than one *story above grade plane*, of Type II, III ~~IIIA~~ or IV construction, shall not be limited provided that the following criteria are met:

1. Each classroom shall have not less than two *means of egress*, with one of the *means of egress* being a direct exit to the outside of the building complying with Section 1022.
2. The building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
3. The building is surrounded and adjoined by *public ways* or *yards* not less than 60 feet (18 288 mm) in width.

Reason: In Table 601, the hourly fire-resistance rating for bearing walls, both exterior and interior, in Type IIB construction is 0 hours. In Type IIIB construction, the hourly fire-resistance rating for exterior bearing walls is 2 hours and 0 hours for interior bearing walls. In Table 602, for Group E (Educational) occupancies, the most restrictive categories for exterior nonbearing walls and partitions have a 1-hour rating, based on fire separation distance. Yet, Type IIB allows for a 0-hour rating when the fire-separation distance is at least 10 feet but less than 30 feet.In other words, the hourly fire-resistance rating requirements for Type IIIB construction is just as, and in some cases, more restrictive when compared to Type IIB construction (i.e., 2 hours for exterior bearing walls in Type IIIB vs. 0 hours for Type IIB). However, Type IIB is allowed in this code provision, and Type IIIB is not. Finally, note that for Group A-3 buildings, Types II (507.6) and III (507.7) construction have essentially the same requirements with nearly identical language except that Type III has an additional requirement for ramps (507.7#3).Removing the “A” in this proposal will allow Type IIIB construction with its stronger hourly fire-resistance requirements, thus improving building and life safety for educational buildings and their occupants.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal does not change the current standard for Type II and Type IV construction. Those costs are constant for any who wish to continue building those types. The change from Type IIIA to Type III opens another option for designers.

G118-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as not appropriate due to the differences in Type IIIB and IIIA construction. (Vote: 14-0)

G118-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Mike Eckhoff, representing Hoover Treated Wood Products, Inc. (meckhoff@frtw.com); Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com) requests As Submitted

Commenter's Reason: Adding Type IIIB to the list of types of construction suitable for Group E occupancies is appropriate for this exception. Type IIIB has the same hourly ratings in Table 601 that Type IIB has, with one exception: exterior bearing walls in Type IIIB construction must have a minimum 2-hour rating; exterior bearing walls in Type IIB construction, which is already allowed in this exception, have no minimum hourly rating requirement. Type IIIB therefore requires the same, if not higher, minimum hourly rating requirement as Type IIB.

Regarding fire flow and fire loading concerns raised during the hearing: For understanding how the code addresses fire flow, one would look to the fire flow requirements of Table B105.1(2) of the International Fire Code, Appendix B. The table does not differentiate between either Types IIA and

IIIA or between Types IIB and IIIB. Despite one construction type being noncombustible and the other combustible, they share the same fire flow (water GPM) requirements. In other words, the IFC does not consider building material composition (fire loading) influential for fire-flow water demand. Therefore, this is a moot issue.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal does not change the current standard for Type II and Type IV construction. Those costs are constant for any who wish to continue building those types. The change from Type IIIA to Type III opens another option for designers.

Public Comment# 2889

G119-21

Proposed Change as Submitted

Proponents: Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com)

2021 International Building Code

Revise as follows:

507.12 Motion picture theaters. In buildings of Type II or Type III construction, the area of a motion picture theater located on the first *story above grade plane* shall not be limited where the building is provided with an *automatic sprinkler system* throughout in accordance with Section 903.3.1.1 and is surrounded and adjoined by *public ways* or *yards* not less than 60 feet (18 288 mm) in width.

Reason: In Table 601, the most restrictive rating for bearing walls in Type II construction is 1 hour (Type IIA, exterior and interior). In Type III construction, the most restrictive rating for exterior bearing walls is 2 hours (in both Types IIIA and IIIB). In Table 602, for Group A (Assembly) occupancies, the most restrictive categories for exterior nonbearing walls and partitions have a 1-hour rating, based on fire separation distance.
In other words, the hourly fire-resistance rating requirements for Type III construction are just as, and in some cases, more restrictive compared to Type II construction (i.e., 2 hours for Type III vs. 1 hour for Type II).

Finally, note that for Group A-3 buildings, Types II (507.6) and III (507.7) construction have essentially the same requirements with nearly identical language except for Type III has an additional requirement for ramps (507.7#3).

Adding “Type III” to this exception will allow for exterior walls with higher hourly requirements, thus improving building and life safety for motion picture theaters and their occupants.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change does not change that which is currently allowed. It gives another option, which is Type III

G119-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved based on the proposal to add Type III construction to Section 507.12 is not appropriate for motion picture theaters. (Vote: 14-0)

G119-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Mike Eckhoff, representing Hoover Treated Wood Products, Inc. (meckhoff@frtw.com); Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com) requests As Submitted

Commenter's Reason: Adding Type III to the list of types of construction allowed for motion picture theaters is appropriate for this exception.
Type IIIB has the same hourly ratings in Table 601 that Type IIB has, with one exception: exterior bearing walls in Type IIIB construction must have a minimum 2-hour rating; exterior bearing walls in Type IIB construction, which is already allowed in this exception, have no minimum hourly rating requirement.

Interior bearing wall requirements are identical for Type IIA and Type IIIA and for Type IIB and Type IIIB.

The inclusion of Type III also provides designers with additional options that in some cases could also increase a project’s ability to sequester carbon.

Regarding fire flow and fire loading concerns raised during the hearing: For understanding how the code addresses fire flow, one would look to the fire flow requirements of Table B105.1(2) of the International Fire Code, Appendix B. The table does not differentiate between either Types IIA and IIIA or between Types IIB and IIIB. Despite one construction type being noncombustible and the other combustible, they share the same fire flow (water GPM) requirements. In other words, the IFC does not consider building material composition (fire loading) influential for fire-flow water demand. Therefore, this is a moot issue.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The code change does not change that which is currently allowed. It gives another option, which is Type III.

Public Comment# 2890

G121-21

Proposed Change as Submitted

Proponents: Shane Nilles, City of Cheney, WA, representing Self (snilles@cityofcheney.org)

2021 International Building Code

Revise as follows:

302.1 Occupancy classification. Occupancy classification is the formal designation of the primary purpose of the building, structure or portion thereof. Structures shall be classified into one or more of the occupancy groups specified in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure. An area, room or space that is intended to be occupied at different times for different purposes shall comply with all applicable requirements associated with such potential multipurpose. ~~Structures containing multiple occupancy groups shall comply with Section 508 .~~ Where a structure is proposed for a purpose that is not specified in this section, such structure shall be classified in the occupancy it most nearly resembles based on the fire safety and relative hazard. Occupied roofs shall be classified in the group that the occupancy most nearly resembles, according to the fire safety and relative hazard, and shall comply with Section 503.1.4 .

1. Assembly (see Section 303): Groups A-1, A-2, A-3, A-4 and A-5.
2. Business (see Section 304): Group B.
3. Educational (see Section 305): Group E.
4. Factory and Industrial (see Section 306): Groups F-1 and F-2.
5. High Hazard (see Section 307): Groups H-1, H-2, H-3, H-4 and H-5.
6. Institutional (see Section 308): Groups I-1, I-2, I-3 and I-4.
7. Mercantile (see Section 309): Group M.
8. Residential (see Section 310): Groups R-1, R-2, R-3 and R-4.
9. Storage (see Section 311): Groups S-1 and S-2.
10. Utility and Miscellaneous (see Section 312): Group U.

SECTION 403
HIGH-RISE BUILDINGS

Revise as follows:

403.1 <u>General</u> ~~Applicability~~. *High-rise buildings* shall comply with Sections 403.2 through 403.6. <u>Where high-rise buildings contain mixed use and occupancies, the most restrictive provisions of this section shall apply throughout the fire area of the high-rise building or portion thereof.</u>

Exceptions: The provisions of Sections 403.2 through 403.6 shall not apply to the following buildings and structures:

1. Airport traffic control towers in accordance with Section 412.2.
2. *Open parking garages* in accordance with Section 406.5.
3. The portion of a building containing a Group A-5 occupancy in accordance with Section 303.6.
4. Special industrial occupancies in accordance with Section 503.1.1.
5. Buildings containing any one of the following:

   5.1. A Group H-1 occupancy.

   5.2. A Group H-2 occupancy in accordance with Section 415.8, 415.9.2, 415.9.3 or 426.1.

   5.3. A Group H-3 occupancy in accordance with Section 415.8.

SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

Revise as follows:

406.2.8 Mixed occupancies and uses. Mixed uses shall be allowed in the same building <u>provided that they are separated from</u> ~~as~~ public parking garages and *repair garages* by 2-hour rated fire barriers or horizontal assemblies.~~in accordance with Section 508.1.~~ Mixed uses in the same building as an *open parking garage* are subject to Sections 402.4.2.3, 406.5.11,~~ 508.1,~~ 510.3, 510.4 and 510.7.

Exception: The separation from public parking garages and repair garages shall be permitted to be reduced to 1-hour provided that the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1

406.3.2 Separation. For other than *private garages* adjacent to dwelling units, the separation of *private garages* from other occupancies shall comply with Section 406.2.8~~508~~. Separation of *private garages* from *dwelling units* shall comply with Sections 406.3.2.1 and 406.3.2.2.

406.5.3 Mixed occupancies and uses. Mixed uses shall be allowed in the same building as an *open parking garage* subject to the provisions of Sections 402.4.2.3, 406.5.11, 504.2, 506.2.2,~~ 508.1,~~ 510.3, 510.4 and 510.7.

406.5.4 Area and height. Area and height of *open parking garages* shall be limited as set forth in Chapter 5 for Group S-2 occupancies~~ and as further provided for in Section 508.1~~.

SECTION 407
GROUP I-2

Revise as follows:

407.1.1 Group I-2, Condition 2 occupancies. The most restrictive requirements of Section 407, 509, and 712 shall apply throughout the entire fire area containing the Group I-2 occupancy. The most restrictive requirements of Chapter 10 shall apply to the path of egress from the Group I-2, Condition 2 occupancy up to and including the exit discharge.

SECTION 415
GROUPS H-1, H-2, H-3, H-4 AND H-5

415.6.4 Mixed-occupancies. Where located in the same building H-2, H-3, H-4, and H-5 occupancies shall each be individually separated from the rest of the building by fire barriers constructed in accordance with Section 707, horizontal assemblies constructed in accordance with Section 711, or combination thereof having a fire-resistance rating of no less than required by Table 415.6.4. H-1 shall not be located in buildings containing any other occupancies or uses.

Add new text as follows:

TABLE 415.6.4 SEPARATION OF GROUP H OCCUPANCIES (HOURS)

OCCUPANCY	H-2	H-3, H-4	H-5
A, E, I, R, F-2, S-2	3	2	2
B, F-1, M, S-1	2	1	1
H-2	N	1	1
H-3, H-4	1	1[a]	1
H-5	1	1	N

N = No separation requirement

a. Separation is not required between occupancies of the same classification.

Revise as follows:

[F] 415.9.1.1 Mixed occupancies. Where the storage tank area is located in a building of two or more occupancies and the quantity of liquid exceeds the maximum allowable quantity for one *control area*, the use shall be completely separated from adjacent occupancies in accordance with the requirements of Section 415.6.4~~508.4~~.

SECTION 428
HIGHER EDUCATION LABORATORIES

Revise as follows:

[F] 428.3.1 Separation from other nonlaboratory areas. *Laboratory suites* shall be separated from other portions of the building with fire barriers or horizontal assemblies as required in Table 428.3. Fire barriers shall be constructed in accordance with Section 707 and horizontal assemblies constructed in accordance with Section 711.~~in accordance with the most restrictive of the following~~:

Exception: Where an individual laboratory suite occupies more than one story, the fire-resistance rating of intermediate floors contained within the laboratory suite shall comply with the requirements of this code.

~~1. *Fire barriers* and *horizontal assemblies* as required in Table 428.3. *Fire barriers* shall be constructed in accordance with Section 707 and *horizontal assemblies*constructed in accordance with Section 711.~~

~~**Exception:** Where an individual*laboratory suite*occupies more than one *story*, the *fire-resistance rating* of intermediate floors contained within the *laboratory suite*shall comply with the requirements of this code.~~

~~2. Separations as required by Section 508.~~

SECTION 504
BUILDING HEIGHT AND NUMBER OF STORIES

Revise as follows:

504.2 Mixed occupancy. In a building containing mixed occupancies~~ in accordance with Section 508~~, no individual occupancy shall exceed the height and number of *story* limits specified in this section for the applicable occupancies.

Exception: Accessory occupancies with an aggregate area that does not exceed 10% of the floor area of the story in which they are located, and does not exceed the tabular values for nonsprinklered buildings in Table 506.2 for such occupancy, the allowable height and number of stories of the accessory occupancy is permitted to be evaluated as part of one of the other occupancies on that story.

SECTION 506
BUILDING AREA

Revise as follows:

506.2.2 Mixed-occupancy buildings. The allowable area of each *story* of a mixed-occupancy building shall be determined in accordance with Section 506.2.2.1~~ the applicable provisions of , Section 508.3.2 for nonseparated occupancies and Section 508.4.2 for separated occupancies~~. For buildings with more than three *stories above grade plane,* the total *building area* shall be such that the aggregate sum of the ratios of the actual area of each *story* divided by the allowable area of such stories, determined in accordance with Equation 5-3 based on the ~~applicable~~ provisions of Section 506.2.2.1~~508.1~~, shall not exceed three.

$$A_a = [A_t + (NS \times I_f)]$$ **(Equation 5-3)**

A_a

= Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.
NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building, regardless of whether the building is sprinklered.
I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

> **Exception:** For buildings ~~designed as separated occupancies under Section 508.4 and~~ equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.2, the total *building area* shall be such that the aggregate sum of the ratios of the actual area of each *story* divided by the allowable area of such *stories* determined in accordance with Equation 5-3 based on the ~~applicable~~ provisions of Section 506.2.2.1~~508.1~~, shall not exceed four.

Add new text as follows:

506.2.2.1 Mixed-occupancy, stories.
Where a building story contains more than one occupancy group, each portion of the building story shall be individually classified in accordance with Section 302.1. In each story, the building area shall be such that the sum of the rations of the actual building area of each occupancy divided by the allowable building area of each occupancy shall not exceed 1.

> **Exception:** Accessory occupancies with an aggregate area that does not exceed 10% of the floor area of the story in which they are located, and does not exceed the tabular values for nonsprinklered buildings in Table 506.2 for such occupancy, the area of the accessory occupancy is permitted to be included as part of the area for one of the other occupancies on that story.

Revise as follows:

~~506.2.2.1~~ 506.2.2.1.1
Group H-2 or H-3 mixed occupancies. For a building containing Group H-2 or H-3 occupancies, the allowable area shall be determined in accordance with Section506.2.2.1~~508.4.2~~, with the sprinkler system increase applicable only to the portions of the building not classified as Group H-2 or H-3.

SECTION 507
UNLIMITED AREA BUILDINGS

Revise as follows:

507.1.1 Accessory occupancies. Accessory occupancies shall be permitted in unlimited area buildings in accordance with the provisions of Section 504.2 and 506.2.2~~508.2~~, otherwise the requirements of Sections 507.3 through 507.13 shall be applied, where applicable.

507.4.1 Mixed occupancy buildings with Groups A-1 and A-2. Group A-1 and A-2 occupancies of other than Type V construction shall be permitted within mixed occupancy buildings of unlimited area complying with Section 507.4, provided that the following criteria are met:

1. Group A-1 and A-2 occupancies are separated from B, F, M, or S occupancies with 2-hour rated fire barriers or horizontal assemblies. Fire barriers shall be constructed in accordance with Section 707 and horizontal assemblies shall be constructed in accordance with Section 711 ~~as required for separated occupancies in Section 508.4.4 with no reduction allowed in the *fire-resistance rating* of the separation based upon the installation of an *automatic sprinkler system*~~.
2. Each area of the portions of the building used for Group A-1 or A-2 occupancies shall not exceed the maximum allowable area permitted for such occupancies in Section 503.1.
3. *Exit* doors from Group A-1 and A-2 occupancies shall discharge directly to the exterior of the building.

Delete without substitution:

~~SECTION 508~~
~~MIXED USE AND OCCUPANCY~~

~~508.1 General~~.
~~Each portion of a building shall be individually classified in accordance with Section 302.1. Where a building contains more than one occupancy group, the building or portion thereof shall comply with the applicable provisions of Section 508.2, 508.3, 508.4 or 508.5, or a combination of these sections.~~

> **~~Exceptions:~~**
>
> 1. ~~Occupancies separated in accordance with Section 510.~~
> 2. ~~Where required by Table 415.6.5, areas of Group H-1, H-2 and H-3 occupancies shall be located in a *detached building* or structure.~~

~~508.2 Accessory occupancies.~~ ~~Accessory occupancies are those occupancies that are ancillary to the main occupancy of the building or portion thereof. Accessory occupancies shall comply with the provisions of Sections 508.2.1 through 508.2.4.~~

~~508.2.1 Occupancy classification.~~ ~~Accessory occupancies shall be individually classified in accordance with Section 302.1. The requirements of this code shall apply to each portion of the building based on the occupancy classification of that space.~~

~~508.2.2 Allowable building height.~~ ~~The allowable height and number of *stories* of the building containing accessory occupancies shall be in accordance with Section 504 for the main occupancy of the building.~~

~~508.2.3 Allowable building area.~~ ~~The allowable area of the building shall be based on the applicable provisions of Section 506 for the main occupancy of the building. Aggregate accessory occupancies shall not occupy more than 10 percent of the floor area of the *story* in which they are located and shall not exceed the tabular values for nonsprinklered buildings in Table 506.2 for each such accessory occupancy.~~

~~508.2.4 Separation of occupancies.~~
~~No separation is required between accessory occupancies and the main occupancy.~~

~~Exceptions:~~

1. ~~Group H-2, H-3, H-4 and H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.4.~~
2. ~~Group I-1, R-1, R-2 and R-3 *dwelling units* and *sleeping units* shall be separated from other *dwelling* or *sleeping units* and from accessory occupancies contiguous to them in accordance with the requirements of Section 420.~~

~~508.3 Nonseparated occupancies.~~ ~~Buildings or portions of buildings that comply with the provisions of this section shall be considered as nonseparated occupancies.~~

~~508.3.1 Occupancy classification.~~ ~~Nonseparated occupancies shall be individually classified in accordance with Section 302.1. The requirements of this code shall apply to each portion of the building based on the occupancy classification of that space. In addition, the most restrictive provisions of Chapter 9 that apply to the nonseparated occupancies shall apply to the total nonseparated occupancy area.~~

~~508.3.1.1 High-rise buildings.~~ ~~Where nonseparated occupancies occur in a *high-rise building,* the most restrictive requirements of Section 403 that apply to the nonseparated occupancies shall apply throughout the *high-rise building.*~~

~~508.3.1.2 Group I-2, Condition 2 occupancies.~~ ~~Where one of the nonseparated occupancies is Group I-2, Condition 2, the most restrictive requirements of Sections 407, 509 and 712 shall apply throughout the *fire area* containing the Group I-2 occupancy. The most restrictive requirements of Chapter 10 shall apply to the path of egress from the Group I-2, Condition 2 occupancy up to and including the *exit discharge.*~~

~~508.3.2 Allowable building area, height and number of stories.~~ ~~The allowable *building area, height* and number of *stories* of the building or portion thereof shall be based on the most restrictive allowances for the occupancy groups under consideration for the type of construction of the building in accordance with Section 503.1.~~

~~508.3.3 Separation.~~
~~No separation is required between nonseparated occupancies.~~

~~Exceptions:~~

1. ~~Group H-2, H-3, H-4 and H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.4.~~
2. ~~Group I-1, R-1, R-2 and R-3 *dwelling units* and *sleeping units* shall be separated from other *dwelling* or *sleeping units* and from other occupancies contiguous to them in accordance with the requirements of Section 420.~~

~~508.4 Separated occupancies.~~ ~~Buildings or portions of buildings that comply with the provisions of this section shall be considered as separated occupancies.~~

~~TABLE 508.4 REQUIRED SEPARATION OF OCCUPANCIES (HOURS)[f]~~

~~OCCUPANCY~~	~~A, E~~		~~I-1[a], I-3, I-4~~		~~I-2~~		~~R[a]~~		~~F-2, S-2[b], U~~		~~B[e], F-1, M,S-1~~		~~H-1~~		~~H-2~~		~~H-3, H-4~~		~~H-5~~	
	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~	~~S~~	~~NS~~
~~A, E~~	~~N~~	~~N~~	~~1~~	~~2~~	~~2~~	~~NP~~	~~1~~	~~2~~	~~N~~	~~1~~	~~1~~	~~2~~	~~NP~~	~~NP~~	~~3~~	~~4~~	~~2~~	~~3~~	~~2~~	~~NP~~
~~I-1[a], I-3, I-4~~	~~1~~	~~2~~	~~N~~	~~N~~	~~2~~	~~NP~~	~~1~~	~~NP~~	~~1~~	~~2~~	~~1~~	~~2~~	~~NP~~	~~NP~~	~~3~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~
~~I-2~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~N~~	~~N~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~NP~~	~~NP~~	~~3~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~
~~R[a]~~	~~1~~	~~2~~	~~1~~	~~NP~~	~~2~~	~~NP~~	~~N~~	~~N~~	~~1[c]~~	~~2[c]~~	~~1~~	~~2~~	~~NP~~	~~NP~~	~~3~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~
~~F-2, S-2[b], U~~	~~N~~	~~1~~	~~1~~	~~2~~	~~2~~	~~NP~~	~~1[c]~~	~~2[c]~~	~~N~~	~~N~~	~~1~~	~~2~~	~~NP~~	~~NP~~	~~3~~	~~4~~	~~2~~	~~3~~	~~2~~	~~NP~~
~~B[e], F-1, M, S-1~~	~~1~~	~~2~~	~~1~~	~~2~~	~~2~~	~~NP~~	~~1~~	~~2~~	~~1~~	~~2~~	~~N~~	~~N~~	~~NP~~	~~NP~~	~~2~~	~~3~~	~~1~~	~~2~~	~~1~~	~~NP~~
~~H-1~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~N~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~	~~NP~~
~~H-2~~	~~3~~	~~4~~	~~3~~	~~NP~~	~~3~~	~~NP~~	~~3~~	~~NP~~	~~3~~	~~4~~	~~2~~	~~3~~	~~NP~~	~~NP~~	~~N~~	~~NP~~	~~1~~	~~NP~~	~~1~~	~~NP~~
~~H-3, H-4~~	~~2~~	~~3~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~3~~	~~1~~	~~2~~	~~NP~~	~~NP~~	~~1~~	~~NP~~	~~1[d]~~	~~NP~~	~~1~~	~~NP~~
~~H-5~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~2~~	~~NP~~	~~1~~	~~NP~~	~~NP~~	~~NP~~	~~1~~	~~NP~~	~~1~~	~~NP~~	~~N~~	~~NP~~

~~S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.~~

~~NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.~~

~~N = No separation requirement.~~

~~NP = Not Permitted.~~

- ~~a. See Section 420.~~
- ~~b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.~~
- ~~c. See Sections 406.3.2 and 406.6.4.~~
- ~~d. Separation is not required between occupancies of the same classification.~~
- ~~e. See Section 422.2 for *ambulatory care facilities*.~~
- ~~f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.~~

~~**508.4.1 Occupancy classification.** Separated occupancies shall be individually classified in accordance with Section 302.1. Each separated space shall comply with this code based on the occupancy classification of that portion of the building. The most restrictive provisions of Chapter 9 that apply to the separate occupancies shall apply to the total nonfire-barrier-separated occupancy areas. Occupancy separations that serve to define *fire area* limits established in Chapter 9 for requiring a *fire protection system* shall also comply with Section 901.7.~~

~~**508.4.2 Allowable building area.** In each *story*, the *building area* shall be such that the sum of the ratios of the actual *building area* of each separated occupancy divided by the allowable *building* area of each separated occupancy shall not exceed 1.~~

~~**508.4.3 Allowable building height and number of stories.**~~
~~Each separated occupancy shall comply with the *building height limitations* and *story* limitations based on the type of construction of the building in accordance with Section 503.1.~~

> ~~**Exception:** Special provisions of Section 510 shall permit occupancies at *building heights* and number of *stories* other than provided in Section 503.1.~~

~~**508.4.4 Separation.** Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.4.~~

~~**508.4.4.1 Construction.** Required separations shall be *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. *Mass timber* elements serving as *fire barriers* or *horizontal assemblies* to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with an *approved* thermal barrier consisting of *gypsum board* that is not less than $^1/_2$ inch (12.7 mm) in thickness or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.~~

SECTION 510
SPECIAL PROVISIONS

Revise as follows:

510.4 Parking beneath Group R. Where a maximum one *story above grade plane* Group S-2 parking garage, enclosed or open, or combination thereof, of Type I construction or open of Type IV construction, with grade entrance, is provided under a building of Group R, the number of *stories* to be used in determining the minimum type of construction shall be measured from the floor above such a parking area. The floor assembly between the parking garage and the Group R above shall comply with the type of construction required for the parking garage and shall also provide a *fire-resistance rating* not less than 2 hours~~the mixed occupancy separation required in Section 508.4~~.

Exception: Where permitted by the type of construction, the floor assembly shall be permitted to be reduced to 1-hour provided that the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

510.7.1 Fire separation. The parking occupancy shall be separated from the upper occupancy by 2-hour rated fire barriers or horizontal assemblies. *Fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711 ~~between the parking occupancy and the upper occupancy shall correspond to the required *fire-resistance rating* prescribed in Table 508.4 for the uses involved~~. The type of construction shall apply to each occupancy individually, except that structural members, including main bracing within the open parking structure, which is necessary to support the upper occupancy, shall be protected with the more restrictive fire-resistance-rated assemblies of the groups involved as shown in Table 601. *Means of egress* for the upper occupancy shall conform to Chapter 10 and shall be separated from the parking occupancy by *fire barriers* having not less than a 2-hour *fire-resistance rating* as required by Section 707 with *self-closing* doors complying with Section 716 or *horizontal assemblies* having not less than a 2-hour *fire-resistance rating* as required by Section 711, with *self-closing* doors complying with Section 716. *Means of egress* from the *open parking garage* shall comply with Section 406.5.

Exception: Where permitted by the type of construction, the separation between the parking occupancy and the upper occupancy shall be permitted to be reduced to 1-hour provided that the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

SECTION 707
FIRE BARRIERS

Revise as follows:

~~**707.3.9 Separated occupancies.** Where the provisions of Section 508.4 are applicable, the *fire barrier* separating mixed occupancies shall have a *fire-resistance rating* of not less than that indicated in Table 508.4 based on the occupancies being separated.~~

SECTION 711
FLOOR AND ROOF ASSEMBLIES

Revise as follows:

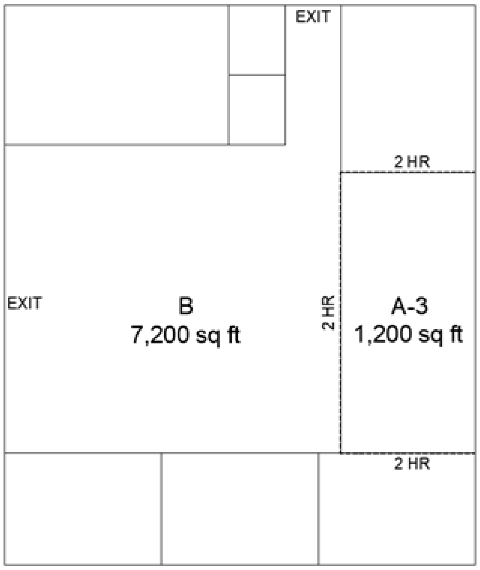
~~**711.2.4.1 Separating mixed occupancies.** Where the *horizontal assembly* separates mixed occupancies, the assembly shall have a *fire-resistance rating* of not less than that required by Section 508.4 based on the occupancies being separated.~~

~~SECTION C103~~
~~MIXED OCCUPANCIES~~

~~**C103.1 Mixed occupancies.** Mixed occupancies shall be protected in accordance with Section 508.~~

Reason: The way mixed-occupancy buildings are currently addressed for allowable area is confusing, misleading, commonly misapplied, and arbitrary. Designers are forced to analyze the building multiple ways and do multiple presentations on the cost of construction for each option and limitations in future building expansions. In unfortunate scenarios, designers, builders, and officials may even be misled to believe that the “separated” option is the only option, leading to a network of fire-rated separations, including all associated opening protectives, to be put into place where the “non-separated” option would work without even coming close to the maximum allowable area, which is a substantial penalty that is not necessary. Even more alarming is scenarios where a code user misapplies 508 to extend beyond its purpose, which is allowable height and area only, and uses it to justify not providing proper separations for “fire areas” or otherwise uses it to avoid sprinklers or fire alarms where they actually would be needed. More importantly, having two options, separated and nonseparated, is unnecessary as a single option can provide a logical allowable area without requiring separations that serve no actual life/safety function. As an example, a building that contains B/A-3 occupancies, non-sprinkled, Type VB construction, in order to be larger than the 6,000 square feet restriction where the non-separated option is used, the separated option requires a 2hr fire barrier between the B and A-3. Looking at the illustration below the question is, what does the fire barrier achieve? Are we protecting the occupants in the A-3 that are going to exit out through the B? Are we concerned about the storage of combustibles that wouldn’t actually occur in the A-3? How is the expense of the fire barrier in terms of materials, extra construction and design time to address all details therefore, and the cost to install and maintain all opening protectives justified in order to allow the allowable area to be ratio based, which logically should apply without any arbitrary separation? It makes sense to not penalize the building and code user.

B/A-3, Type VB
No Sprinkler System
Separated to allow >6,000 sq ft



This proposal simplifies and corrects these issues by taking height/area provisions from 508 and redistributing to 504.2 (new exception) and a new Section 506.2.2.1 which will govern limitations to all mixed occupancy buildings' height and area by allowing ratio method for allowable area, without the unnecessary separations, and providing for "accessory occupancies" as a permissible exception as appropriate. Additionally, there are many provisions that are currently in 508 that are unrelated to height and area, or are better located elsewhere in the code. This proposal relocates those provisions so that the information is in the place where the user is initially looking, and therefore prevents further misinterpretation:

-302.1 (Occupancy classification), edited to remove no longer needed reference to 508.

- 508.2.4 exception #1 (requirement for H-2, H-3, H-4 and H-5 to always be separated from other occupancies) relocated as charging language in new section 415.6.4 and new table 415.6.4 (415 is H occupancy provisions)

- 508.3.1.1 (high-rise building provisions), provisions are moved to section 403.1 (403 is high-rise building provisions)

- 508.3.1.2 (Group I-2, Condition 2 occupancy provisions), provisions are moved to new section 407.1.1 (407 is Group I-2 provisions)

- 406.2.8 (mixed occupancies with garages), edited to specify 2 hour separation as is currently otherwise required by its pointing to 508 with exception for 1 hour if NFPA 13 system throughout.

- 406.3.2 (Non-private garage provisions), edited to remove no longer needed reference to 508.

- 406.5.3 (Mixed use building with open parking garages), edited to change the pointer from 508 to the new provision location of 504.2 and 506.2.

- 406.5.4 (Area and height of open parking garages), edited to remove no longer needed reference to 508.

- 428.3.1 (Separation from other nonlaboratory areas), edited to removed no longer needed reference to 508.

- 507.1.1 (Accessory occupancies in unlimited are buildings), edited to change the pointer from 508 to the new provision location of 504.2 and 506.2.

-507.4.1 (Unlimited size mixed occupancy buildings with Groups A-1 and A-2), edited to specify 2 hour separation as is currently otherwise required by its pointing to 508.

- 510.4 (Special Height/Area provisions with parking beneath Group R), edited to specify 2 hour separation as is currently otherwise required by its pointing to 508 with exception for 1 hour if NFPA 13 system throughout.

- 510.7.1 (Special Height/Area provisions with open parking below provisions), edited to specify 2 hour separation as is currently otherwise required by its pointing to 508 with exception for 1 hour if NFPA 13 system throughout.

- 707.3.9 (Fire barriers separating mixed occupancies pointer), deleted entirely as it is only a reference to 508.

- 711.2.4.1 (Horizontal assemblies separating mixed occupancies pointer), deleted entirely as it is only a reference to 508.

- C103 and C103.1 (Mixed occupancies in agricultural buildings), deleted entirely as it is only a reference to 508.

Any situation where the code is not correctly applied leads to frustration, lack of proper life/safety features, and unnecessary costs; this proposal will lead to more consistent application of the codes which will prevent those issues.

There is a correlative change to move Section 508.5 back to Section 419 where it was in 2018 IBC.

Cost Impact: The code change proposal will decrease the cost of construction
There is a reduction in cost of construction for mixed use buildings in cases where rated separations will no longer be required to use the ratio-calculation for allowable area.

G121-21

Public Hearing Results

This proposal includes published errata
This proposal was part of the listed errata at https://cdn-web.iccsafe.org/wp-content/uploads/2021-GROUP-A-CONSOLIDATED-MONOGRAPH-UPDATES-Updated-4-02-2021-complete.pdf. Section 406.2.8 was missing from the posted proposal and some sections were out of order.

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as not necessary. The committee was concerned about the effect on mixed use buildings. (Vote 14-0)

G121-21

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 406, 406.2.8

Proponents: Shane Nilles, representing Self (snilles@cityofcheney.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

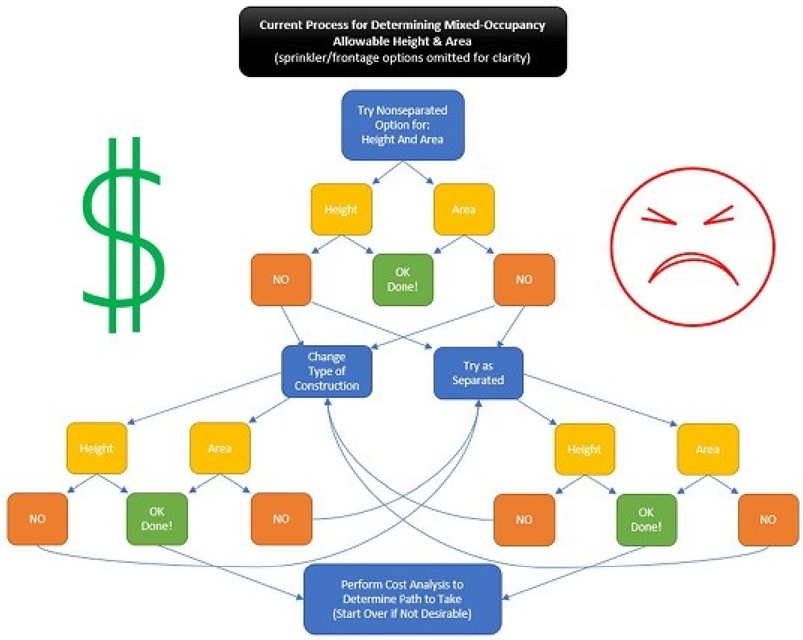
SECTION 406
MOTOR-VEHICLE-RELATED OCCUPANCIES

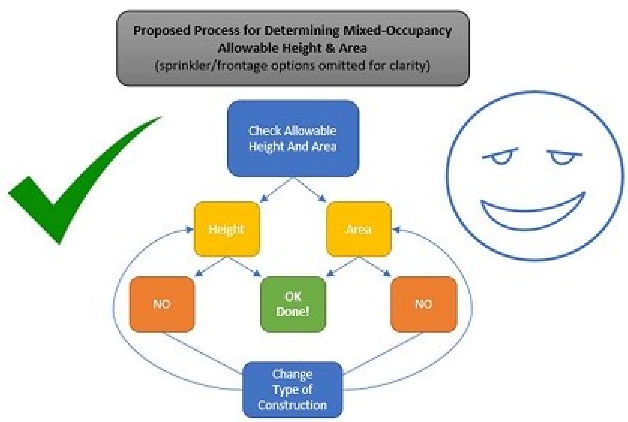
406.2.8 Mixed occupancies and uses . Mixed uses shall be allowed in the same building provided that they are separated from public parking garages and *repair garages* by ~~2-hour 2~~ 1 -hour rated fire barriers or horizontal assemblies. Mixed uses in the same building as an *open parking garage* are subject to Sections 402.4.2.3, 406.5.11, 510.3, 510.4 and 510.7.

> **Exception:** ~~-~~ In other than buildings with I-2 occupancies, The separation from public parking garages and repair garages ~~shall be permitted to be reduced to 1-hour~~ is not required provided that the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1

Commenter's Reason: The committee was mislead by the opposition to believe that the proposal deleted all mixed-uses from the code. This is not

the case as the proposal only changes the methodology to calculate the allowable height and area of a mixed-use building. Some of the opposition further confused the committee by suggesting that the proposal would be more restrictive in the allowed number of stories for buildings but in reality the proposal maintains the same allowances while removing the need for horizontal separations that otherwise the code currently penalizes non-separated mixed use buildings, regardless as to which story of the building each type of use is located. The public comment addresses an inaccuracy for the separation for public garages and repair garages to be more consistent with the current code provisions.
The approval of this proposal will greatly reduce costs, level of confusion, and time of all code users while increasing the level of safety for buildings by facilitating consistent enforcement and application of the life safety provisions that are commonly overlooked due to the current provisions or the code's common confusion.





Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
Costs of construction will decrease as unnecessary separations will no longer be required and planning and design time will be greatly reduced. It will also reduce time for enforcement agencies.

Public Comment# 2549

G122-21 Part I

Proposed Change as Submitted

Proponents: Dennis Richardson, representing self (dennisrichardsonpe@yahoo.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE SAFETY CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Revise as follows:

508.4.4.1 Construction. Required separations shall be *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. ~~*Mass timber* elements serving as *fire barriers* or *horizontal assemblies* to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with an *approved* thermal barrier consisting of *gypsum board* that is not less than $^1/_2$ inch (12.7 mm) in thickness or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.~~

Delete without substitution:

~~**509.4.1.1 Type IV-B and IV-C construction.** Where Table 509.1 specifies a fire-resistance-rated separation, *mass timber* elements serving as *fire barriers* or *horizontal assemblies* in Type IV-B or IV-C construction shall be separated from the interior of the incidental use with an *approved* thermal barrier consisting of *gypsum board* that is not less than $^1/_2$ inch (12.7 mm) in thickness or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.~~

Reason: This code proposal attempts to fix something that slipped through the cracks and is now broken and confusing in Sections 508 and 509. It also updates section 2603.4 to be consistent with the definition of mass timber now found in Section 202 and clarifies the reference to heavy timber in 602.4 is now found in Section 2304.11.
The ad hoc committee on tall wood buildings did an outstanding job developing and submitting code changes to create three new types of construction: Types IV-A, IV-B and IV-C.

One of their proposals, G89-18, was developed at he last minute and flawed, but was still ultimately approved as modified. The modification somewhat fixed the change but did so in a way that just seems to create confusion and complicate the applicable portions of Sections 508 and 509 with no real benefit.

G89-18 as submitted required a thermal barrier such as 1/2" gypsum board or a "noncombustible equivalent" to cover up exposed wood in Type IV B or C construction when the mass timber is used as a fire barrier or horizontal assembly for separated uses or when serving as a fire barrier or horizontal assembly on the interior of incidental uses. The whole purpose of having exposed mass timber is to have exposed mass timber. The only place in Type IV B construction that exposed mass timber is allowed is where it is limited in area, and physically separated a distance away from other exposed mass timber far enough so that the exposed mass timber will burn out when the content burns out. Covering the exposed mass timber with 1/2" gypsum or a noncombustible equivalent kind of defeats the purpose of having exposed mass timber.

The reason statement for G89-18 stated the concern from the tall wood ad hoc committee: "The concern is that without any modifications to these provisions regulating separated occupancies and incidental uses, a fire barrier or horizontal assembly could be designed using mass timber that could comply with the fire resistance rating, but which would allow any exposed mass timber to contribute to the fuel load. This can occur in Types IV-B and IV-C construction." The reason statement for G89-18 went on to explain the intent to have the thermal barrier delay or prevent the ignition of the mass timber (that is definition of noncombustible protection not thermal barriers) and the reason statement also said the thermal barrier only needs to cover the exposed mass timber (which would make it no longer exposed???). It begs the question why provisions were developed allowing exposed mass timber.

G89-18 was approved as modified to become the current 2021 IBC language by incorporating a standard used for thermal barriers elsewhere in the code instead of as was originally proposed by the tall wood ad hoc committee. The code committee reason stated the modification "makes the proposal consistent with the current code". The language contained in the modification requires an alternate to 1/2" gypsum board specified for the thermal barrier to be a "material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275" .

When one searches the current code to see where this requirement for the stated NFPA 275 criteria for a thermal barrier is located, one need go no farther than section 2603.4 where thermal barriers are required to cover foam plastic insulation. In that section 1/2" gypsum **or heavy timber** is allowed to serve as a thermal barrier covering foam plastic insulation. In 2603.4.1.6, even 1/4" wood structural panel is deemed to comply to cover foam plastic in attics in lieu of a thermal barrier.

In Types IV-A, B and C construction foam plastic is not even allowed on the inside or the outside of the building as noncombustible protection is required. Mass timber is heavy timber by definition in Section 202.

Why do we need to protect something with a thermal barrier that is deemed to serve equivalently in other sections of the code as a thermal barrier? And this being required when the thing we typically protect from (foam plastic) is not even allowed in the Type IV-A, IV-B or IV-C construction in 602.4. Since heavy timber is allowed to serve equivalently as a thermal barrier why can't exposed mass timber protect itself? Why were these changes in G89-18 as submitted or as modified even needed?

The original code proposal reason said the tall wood building committee was worried about contribution of the mass timber to the fuel load.

Full scale tests were conducted for Type IV B construction at the ATF lab where the exposed wood area was limited and separated to show when limited it does not adversely contribute to the fuel. Numberous E-119 tests have been performed of exposed mass timber to show conformity with fire resistance rating as well as other methods allowed in the code to determine the fire resistance rating. The ATF lab testing also had a light frame noncombustible wall in the assembly clearly showing a single layer of 1/2" gypsum placed on nonbearing walls disappeared rapidly when the content fire burns without sprinkler protection. The testing also showed how the portions of unexposed wood protected with at least 2 layers of 5/8" type x gypsum or equivalent (noncombustible protection) was adequate to prevent or limit contribution of the mass timber to the fire load. In order to establish a base line as part of the ATF tests the contents were first covered 100% with 2 layers of 5/8" gypsum and the contents burned out. Then the test was run later with limited areas exposed again allowing the contents and exposed wood to burn out. The limited exposed areas in Type IV-B did not substantially increase the fire output and the combustion burned out even when first generation mass timber was used (the second generation mass timber adhesive now required performs better).

In Type IVC construction the mass timber is required to be of 2 hour construction but is allowed to be exposed throughout all areas except stair enclosures, shafts and concealed spaces as long as flame spread is met. Type IV-C was justified by the two hour fire resistance rating and by limited the height to that of Type IV HT.

Covering limited exposed mass timber in IV-B or some or all exposed mass timber in IV-C with 1/2" gypsum accomplishes nothing. There is no foam plastic to thermally protect and contribution of the mass timber was already addressed.

When exposed mass timber requires a fire resistance rating in Type IV-B and IV-C construction as a fire barrier or a horizontal assembly by definition in Section 202 in Sections 508 and 509 fire barriers and horizontal assemblies are serving to restrict the spread of fire as found in the definition and applicable sections. Change in temperature on the non fire side and lack of ignition of cotton waste acceptance criteria in E-119 or other applicable methods in Section 703.3 must be met to restrict the spread of fire in addition to the structural fire resistance requirement.

We are all grateful for the work the ad hoc committee did to develop tall wood provisions.

Again, this code proposal attempts to fix something that slipped through the cracks and is now broken and confusing in Sections 508 and 509. It also updates section 2603.4 to be consistent with the definition of mass timber now found in Section 202 and clarifies the reference to heavy timber in 602.4 is now found in Section 2304.11.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal eliminates code language that is confusing.

G122-21 Part I

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved based on the proposal would be a large reduction. The current wording is appropriate. (Vote: 9-5)

G122-21 Part I

Individual Consideration Agenda

Public Comment 1:

Proponents: Dennis Richardson, representing self (dennisrichardsonpe@yahoo.com) requests As Submitted

Commenter's Reason: G 122-21, Part I, was disapproved by a 9 to 5 vote of the General Committee with the committee reason stating it “would be a large reduction”.
First of all please note the term “noncombustible protection” which is akin but not exactly the same as the Canadian term “encapsulation” is far more robust than the “thermal barrier” requirement in IBC 508.4.4.1 and 509.4.4.1 which is proposed to be eliminated. “Noncombustible protection” has to do with the fire behavior remains unchanged by this proposal and public comment despite incorrect testimony to the contrary by Doug Evans and Marcelo Hirschler at the General Committee Hearing.

Apparently the large reduction the Committee reason authors referred to is the fire resistance rating but one can’t be sure what the reason is referring to as that statement is factually incorrect. Mass timber and Type IV A, B and C construction are new and many respected consultants do not fully understand the code provisions. There are separate requirements in Table 601 for overall fire resistance rating and also specific requirements for the use of noncombustible protection in 602.4.1.2, 602.4.2.2 and 602.4.3.5 and 602.4.3.6 to affect the fire behavior <u>which remain unchanged by this proposal and public comment</u>.

Also fire resistance rating of building elements remains unchanged in Table 602.1. It is unclear how removal a 15 minute thermal barrier “would be a larger reduction” of an overall minimum 2 hour or greater fire resistance rating and testing at the ATF lab confirmed the amount of exposed wood approved was acceptable from a fire behavior standpoint.

A member of the General Committee who was on the Ad Hoc for Tall Wood Construction also stated in error that the “thermal barrier” requirement was a progression with the IV C not requiring a “thermal barrier”, IV B requiring a “thermal barrier” for portions and IV A requiring a “thermal barrier” everywhere. If you read at 508.4.4.1 and 509.4.4.1 that is not correct. This would be true if the committee member had talked about “noncombustible protection” which is unaffected by this proposal and still is required to be 80 minutes for IV B and still required to be 40 minutes (where required) in type IV C (at shafts and concealed spaces in IV C).

Separately a member of the Ad Hoc on Tall Wood told me the reason they agreed to the G89-19 language (which was proposed by competing interests at the last day of the last Ad Hoc meeting before the code submittal deadline and after at least one member had left to catch his plane flight) added the language in IBC Sections 508.4.4.1 and 509.4.4.1 was because CLT and other mass timber was not already approved in the code as a fire barrier. That could not be farther from the truth and represents another great misunderstanding. IBC Sections 707.2 and 711.2.1 specifically allow Fire Barriers and Floor and Roof Assemblies to be “of materials permitted by the building type of construction”. Mass timber has passed numerous E-119 fire resistance tests as a fire barrier and as a horizontal assembly. Additionally full scale non E-119 fire behavior testing at the ATF lab helped determine how much mass timber can be exposed and still burn out and not create problems for the fire service. That amount was further increased this cycle by the General Committee approving G147-21 for Type IV B construction after great performance of exposed second-generation adhesive mass timber in fire tests conducted since the initial ATF lab tests.

Some of the 5 General Committee members that voted for G122-21 Part I with the elimination of this conflicting language do get it and pointed out “noncombustible protection” is the term developed by the Ad Hoc Committee as the noncombustible material that delays combustion and increases fire resistance rating of mass timber and approved in the code and is regulated by other sections of the code (602.4.2.2 in type IV B and 602.4.3.5 and 602.4.3.6 in type IV C).

“Noncombustible protection” is <u>NOT</u> being reduced by this proposal and public comment.

“Noncombustible protection” is <u>NOT</u> a “thermal barrier” designed to protect foam plastic.

Fortunately the Fire Safety Committee got it correct and voted 13-0 to approve G 122-21 Part II to include mass timber as a thermal barrier in Section 2603.4.

Tests at the ATF specifically checked whether exposed wood in limited quantities negatively affected the occupant or fire fighter safety. The burning of contents has a much greater effect than the contribution of the mass timber yet some competing interests continue to misrepresent this with incorrect facts and distortions. Mass timber was specifically tested and approved in the code to have a portion exposed wood in Type IV B and IV C.

The material (exposed mass timber) that is suggested to be in need of protection by a “thermal barrier”, itself meets the criteria to protect foam plastic as a “thermal barrier” and was determined by the Fire Safety Committee 13-0 in G 122-21 Part II (like heavy timber) to be a “thermal barrier”. The provisions in 508.4.4.1 and 509.4.4.1 are in conflict with the concept of “noncombustible protection” and do nothing but create confusion.

The provisions suggested to be eliminated in 508.4.4.1 and 509.4.4.1 have nothing to do with flame spread as was also erroneously suggested.

Please review the original reason statement in for G 122-21 which can be found after G 122-21 Part II and vote to overturn the General Committee 9 to 5 vote on G 122-21 Part 1. This proposal and public comment in no way changes the amount or locations of the minimum 80 minute noncombustible protection and 40 minute noncombustible protection where it is stipulated for Type IV B and IV C in 602.4.2.2 (type IV B) and 602.4.3.5 and 602.4.3.6 (type IV C).

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
This change eliminates a requirement which is confusing and not needed.

NOTE: G122-21 PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G122-21 Part II

Proposed Change as Submitted

Proponents: Dennis Richardson, representing self (dennisrichardsonpe@yahoo.com)

2021 International Building Code

Revise as follows:

2603.4 Thermal barrier. Except as provided for in Sections 2603.4.1 and 2603.9, foam plastic shall be separated from the interior of a building by an approved thermal barrier of $^{1}/_{2}$-inch (12.7 mm) *gypsum wallboard*, *mass timber* or heavy timber in accordance with Section 2304.11 ~~602.4~~ or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275. Combustible concealed spaces shall comply with Section 718.

Reason: See Part 1.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
See Part 1.

G122-21 Part II

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The committee thought including mass timber in section 2603.4, Thermal barrier, is a proper action. The proposal updates section 2603.4 to be consistent with the definition of mass timber now found in Section 202 and clarifies the reference to heavy timber in 602.4 is now found in Section 2304.11. (Vote: 13-0)

G122-21 Part II

G124-21

Proposed Change as Submitted

Proponents: Shane Nilles, City of Cheney, WA, representing Self (snilles@cityofcheney.org)

2021 International Building Code

Add new text as follows:

SECTION 419
LIVE/WORK UNITS

Revise as follows:

419.1 ~~508.5~~ General~~Live/work units~~. A *live/work unit* shall comply with Sections 419.1 ~~508.5~~ through 419.9 ~~508.5.11~~.

> **Exception:** *Dwelling or sleeping units* that include an office that is less than 10 percent of the area of the dwelling or sleeping unit ~~are permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2~~.

419.1.1 ~~508.5.1~~ Limitations. The following shall apply to live/work areas:

1. The *live/work unit* is permitted to be not greater than 3,000 square feet (279 m^2) in area.
2. The nonresidential area is permitted to be not more than 50 percent of the area of each *live/work unit*.
3. The nonresidential area function shall be limited to the first or main floor only of the *live/work unit*.
4. Not more than five nonresidential workers or employees are allowed to occupy the nonresidential area at any one time.

419.2 ~~508.5.2~~ Occupancies. *Live/work units* shall be classified as a Group R-2 occupancy. Separation requirements found in Section~~s~~ 420 ~~and 508~~ shall not apply within the *live/work unit* where the *live/work unit* is in compliance with Section 419 ~~508.5~~. Nonresidential uses that would otherwise be classified as either a Group H or S occupancy shall not be permitted in a *live/work unit*.

> **Exception:** Storage shall be permitted in the *live/work unit* provided that the aggregate area of storage in the nonresidential portion of the *live/work unit* shall be limited to 10 percent of the space dedicated to nonresidential activities.

419.3 ~~508.5.3~~ Means of egress. Except as modified by this section, the*means of egress* components for a *live/work unit* shall be designed in accordance with Chapter 10 for the function served.

419.4 ~~508.5.4~~ Egress capacity. The egress capacity for each element of the*live/work unit* shall be based on the *occupant load* for the function served in accordance with Table 1004.5.

419.5 ~~508.5.5~~ Spiral stairways. *Spiral stairways*
that conform to the requirements of Section 1011.10 shall be permitted.

419.6 ~~508.5.6~~ Vertical openings. Floor openings between floor levels of a*live/work unit* are permitted without enclosure.

[F] 419.7 ~~508.5.7~~ Fire protection. The*live/work unit* shall be provided with a monitored *fire alarm* system where required by Section 907.2.9 and an *automatic sprinkler system* in accordance with Section 903.2.8.

419.8 ~~508.5.8~~ Structural. Floors within a*live/work unit* shall be designed for the *live loads* in Table 1607.1, based on the function within the space.

419.9 ~~508.5.9~~ Accessibility. *Accessibility*
shall be designed in accordance with Chapter 11 for the function served.

419.10 ~~508.5.10~~ Ventilation. The applicable*ventilation* requirements of the *International Mechanical Code* shall apply to each area within the *live/work unit* for the function within that space.

419.11 ~~508.5.11~~ Plumbing facilities. The nonresidential area of the*live/work unit* shall be provided with minimum plumbing facilities as specified by Chapter 29, based on the function of the nonresidential area. Where the nonresidential area of the *live/work unit* is required to be accessible by Section 1108.6.2.1, the plumbing fixtures specified by Chapter 29 shall be accessible.

SECTION ~~419~~ 429
ARTIFICIAL DECORATIVE VEGETATION

[F] ~~419.1~~ 429.1 Artificial decorative vegetation. Artificial decorative vegetation exceeding 6 feet (1830 mm) in height and permanently installed outdoors within 5 feet (1524 mm) of a building, or on the roof of a building, shall comply with Section 321.1 of the *International Fire Code.*

Exception: Artificial decorative vegetation located more than 30 feet (9144 mm) from the *exterior wall* of a building.

Reason: Live/work units was relocated last cycle from Section 419 to 508.5. This was part of an attempt to eliminate Chapter 4. Live/work units are Group R-2 without a separation between a person's living and work space. They should not be under Section 508, Mixed Use Buildings. They should be relocated back to Section 419.
The new section for Artificial Vegetation that was inserted in place of Section 419 is being relocated to the end of Chapter 4.
There is a correlative change to delete/relocate the rest of Section 508. This proposal would coordinate, or it could stand on it's own.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is just a relocation, not a change in requirements.

G124-21

Public Hearing Results

This proposal includes the following errata
The information note at the beginning of the code change is deleted.

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the current wording needs to say 'as is'. The committee suggested this topic be reviewed by BCAC. (Vote: 8-6)

G124-21

Individual Consideration Agenda

Public Comment 1:

IBC: 310.4.3 (New), 419.1 , 508.1

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

310.4.3 Live/work units .
Live/work units shall comply with Section 419.

419.1 General . A *live/work unit* shall comply with Sections 419.1 through 419.9 .

Exception: *Dwelling ~~or sleeping~~ units* that include an office that is less than 10 percent of the area of the dwelling ~~or sleeping unit~~ units are permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

508.1 General . Each portion of a building shall be individually classified in accordance with Section 302.1. Where a building contains more than one occupancy group, the building or portion thereof shall comply with the applicable provisions of Section 508.2, 508.3~~,~~ or 508.4 ~~or 508.5~~, or a combination of these sections.

Exceptions:

1. Occupancies separated in accordance with Section 510.
2. Where required by Table 415.6.5, areas of Group H-1, H-2 and H-3 occupancies shall be located in a *detached building* or structure.
3. Uses within live/work units, complying with Section 419, are not considered separate occupancies.

Commenter's Reason: The committee was split on if this section should have stayed in Chapter 4. Current Section 508.5.2 specifically says that live/work units are not a mixed use occupancy, so this should not be in a mixed occupancy section. G90-18 moved this Section from 419 to 508.5.

The modifications put back some of the clarifications that were removed by G90-18 and picks up a pointer to Live/work in Chapter 4. That would be consistent with Chapter 3 references to other sections in Chapter 4.
One committee member spoke against this change as consistent with the committee action on G121-21. Moving this section back to Chapter 4 is not related to that change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is just a relocation, not a change in requirements.

Public Comment# 2683

G125-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

Revise as follows:

508.5 Live/work units. A *live/work unit* shall comply with Sections ~~508.5~~ 508.5.1 through 508.5.11. Live/work units complying with the requirements of Section 508.5.1 through 508.5.11 for the non-residential portion of the unit and that are within the scope of the *International Residential Code*, shall be permitted to be constructed in accordance with this code or the *International Residential Code*.

Exception: *Dwelling or sleeping units* that include an office that is less than 10 percent of the area of the *dwelling unit* ~~are~~ shall be permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

508.5.1 Limitations. The following shall apply to live/work areas:

1. The *live/work unit* is permitted to be not greater than 3,000 square feet (279 m^2) in area.
2. The nonresidential area is permitted to be not more than 50 percent of the area of each *live/work unit*.
3. The nonresidential area function shall be limited to the first or main floor only of the *live/work unit*.
4. Not more than five nonresidential workers or employees are allowed to occupy the nonresidential area at any one time.

508.5.2 Occupancies. *Live/work units* shall be classified as a Group R-2 occupancy. Separation requirements found in Sections 420 and 508 shall not apply within the *live/work unit* where the *live/work unit* is in compliance with Section 508.5. Nonresidential uses that would otherwise be classified as either a Group H or S occupancy shall not be permitted in a *live/work unit*.

Exception: Storage shall be permitted in the *live/work unit* provided that the aggregate area of storage in the nonresidential portion of the *live/work unit* shall be limited to 10 percent of the space dedicated to nonresidential activities.

508.5.3 Means of egress. Except as modified by this section, the *means of egress* components for a *live/work unit* shall be designed in accordance with Chapter 10 for the function served.

508.5.4 Egress capacity. The egress capacity for each element of the *live/work unit* shall be based on the *occupant load* for the function served in accordance with Table 1004.5.

508.5.5 Spiral stairways. *Spiral stairways* that conform to the requirements of Section 1011.10 shall be permitted.

Revise as follows:

508.5.6 Vertical openings. Floor openings between floor levels of a *live/work unit* ~~are~~ shall be permitted without enclosure.

[F] 508.5.7 Fire protection. The *live/work unit* shall be provided with a monitored *fire alarm* system where required by Section 907.2.9 and an *automatic sprinkler system* in accordance with Section 903.2.8.

508.5.8 Structural. Floors within a *live/work unit* shall be designed for the *live loads* in Table 1607.1, based on the function within the space.

508.5.9 Accessibility. *Accessibility* shall be designed in accordance with Chapter 11 for the function served.

508.5.10 Ventilation. The applicable *ventilation* requirements of the *International Mechanical Code* shall apply to each area within the *live/work unit* for the function within that space.

508.5.11 Plumbing facilities. The nonresidential area of the *live/work unit* shall be provided with minimum plumbing facilities as specified by Chapter 29, based on the function of the nonresidential area. Where the nonresidential area of the *live/work unit* is required to be accessible by Section 1108.6.2.1, the plumbing fixtures specified by Chapter 29 shall be accessible.

Reason: The intent of the proposal is to coordinate the IRC and IBC scoping. IRC Section 101.2 Exception 1 allows for live/work units to be constructed under the IRC. However, the IBC does not state this option in IBC Section 101.2 or this section.

During the discussions, there were concerns that the current requirements for complying with the IRC and the IBC could be a conflict for several of the items listed, such as means of egress, fire protection, structural and accessibility. The addition of 'for the non-residential portion of the unit' should help clarify that the means of egress, fire protection, structural loading and plumbing facilities for the business/mercantile portion of the unit needs to look at the IBC for requirements.

This is one of a group of proposals intended to coordinate the scoping items in IBC Section 101.2 and IRC 101.2. While the proposals work

together, then also work separately. The proposal for coordination will be in Group B.
This proposal is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a coordination of scoping requirements and references in the IBC and IRC, not a change to construction requirements.

Staff Note: G125-21 and G126-21addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G125-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as it still needs work since the wording is unclear. (Vote: 14-0)

Staff Analysis: G125-21 and G126-21addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G125-21

Individual Consideration Agenda

Public Comment 1:

IBC: 508.5

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

508.5 Live/work units . A *live/work unit* shall comply with Sections 508.5.1 through 508.5.11. Live/work units complying with the requirements of Section 508.5.1 through 508.5.11 for the non-residential portion of the unit and that are <u>townhouses</u> within the scope of the *International Residential Code*, shall be permitted to ~~be~~ <u>have the residential portion be</u> constructed in accordance with this code or the *International Residential Code* <u>and Section 508.5.7</u> .

> **Exception:** *Dwelling ~~or sleeping~~ units* that include an office that is less than 10 percent of the area of the *dwelling unit* shall be permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

Commenter's Reason: The primary intent of this proposal is to match the scoping allowances in the IRC. This public comment proposal addresses concerns raised during the testimony. Adding ‘townhouses’ and ‘residential portion’ in addition to ‘within the scope of the IRC’ emphasized the limitations for what can be constructed under the IRC and clarifies that this is not permitted for apartment buildings. (G126 Part 2 AM expanded on the fire protection requirements for live/work units in Section 508.5.7 and added the sprinkler requirements specific to live/work units constructed under the IRC.) The non-residential portion staying with the scope of the IBC will address the concerns raised for structural loads. The modification to the exception is strictly correlation – the main text is about dwelling units, so the exception should not include sleeping units.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is a coordination of scoping requirements and references in the IBC and IRC, not a change to construction requirements.

Public Comment# 2684

Public Comment 2:

IBC: 508.5

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

508.5 Live/work units . ~~A~~ L*ive/work unit* s shall comply with one of the following;

1. For a live/work unit located in a building constructed in accordance with this code, both the residential and non-residential portions of the live/work unit shall comply with Sections 508.5 through 508.5.11.
2. For a live/work unit located in a building constructed in accordance with the International Residential Code, the non-residential portion of the live/work unit shall comply with Sections 508.5.1 through 508.5.11, and the residential portion of the live/work unit shall be constructed in accordance with the International Residential Code and Section 508.5.7.

Exception: *Dwelling or sleeping units* that include an office that is less than 10 percent of the area of the *dwelling unit* are permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

Commenter's Reason: This public comment represents an effort to coordinate and collaborate proposals G125 and G126, Part 1. I withdrew proposal G126, Part 1 in an effort to consolidate discussion of these items, but the online hearing format and the pressure to speed discussion prevented thorough consideration of this topic, including consideration of a floor modification that included this text. G126, Part 2 was approved, and it is important that the companion effort to clean up the remainder of the live/work provisions be completed.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Intent of this public comment is to clarify existing code requirements.

Public Comment# 2981

G126-21 Part II

Proposed Change as Submitted

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

2021 International Building Code

Revise as follows:

[F] 508.5.7 Fire protection. ~~The~~
~~live~~ *Live*/*work* ~~*unit*~~ *units* constructed in accordance with this code shall ~~comply with be provided with a monitored *fire alarm* system where required by Section 907.2.9 and~~ be provided with all of the following:

1. An *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 ~~903.2.8~~.
2. *Smoke alarms* in accordance with Section 907.2.11.
3. Where required by Section 907.2.9.1, a manual *fire alarm system*.

Live/work units constructed in accordance with the *International Residential Code* shall be provided with an *automatic sprinkler system* and *smoke alarms*. The *automatic sprinkler system* shall comply with *International Residential Code* Section P2904, and *smoke alarms* shall comply with *International Residential Code* Section 314.

Reason: Currently, some live/work units are permitted to be constructed under the IRC, per the IRC scope, but the IRC scope references back to IBC Section 508.5 for additional specific requirements. So presumably, IRC live/work units are constructed to the IRC, except as modified by IBC Section 508.5. On the other hand, IBC live/work units are constructed to the IBC, including Section 508.5. This proposal more clearly states that approach.
In addition, the fire protection requirements have been edited to clarify the allowance to use fire protection requirements in the IRC for IRC live/work units. It does not appear that the intent of membership in establishing live/work provisions was requiring IRC live/work units to comply with IBC Group R2 fire protection requirements. Plus, the IBC fire protection requirements have been clarified/improved by directly referencing the two applicable sprinkler standards for Group R2 vs. sending the user to another code section to receive the references, and the requirement for smoke alarms has been added for completeness.

Regarding fire alarms for live/work units under the IBC, there are not and never have been any special live/work requirements. Instead, the requirements are based on the general Group R2 occupancy triggers and exceptions found in Section 907.2.9.1, which often won't require a fire alarm system for live/work units based on the exceptions. The reference to "monitored" systems has been dropped, as monitoring requirements will be determined by Section 907.

Cost Impact: The code change proposal will decrease the cost of construction
By clearly conveying that IRC live/work units do not have to meet IBC fire protection requirements, the cost of construction for live/work units may be reduced.

Staff Note: G125-21 and G126-21addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G126-21 Part II

Public Hearing Results

Committee Action: **As Modified**

Committee Modification:

[F] 508.5.7 Fire protection. *Live/work units* in buildings constructed in accordance with this code shall be provided with all of the following:

1. An *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 .
2. *Smoke alarms* in accordance with Section 907.2.11.
3. Where required by Section 907.2.9.1, a manual *fire alarm system*.

Live/work units in buildings constructed in accordance with the *International Residential Code* shall be provided with an *automatic sprinkler* *system* and *smoke alarms*. The *automatic sprinkler system* shall comply with *International Residential Code* Section P2904, and *smoke alarms* shall comply with *International Residential Code* Section 314.

Committee Reason: The committee stated that the reason for the approval of the modification was that it clarifies the requirement by specifying that the live work units are in buildings. The reason for the approval of the proposal is that it improves the intent of the requirements and gives the correct code citations for the various items in the list. (Vote: 14-0)

Staff Analysis: G125-21 and G126-21addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G126-21 Part II

Individual Consideration Agenda

Public Comment 1:

IBC: [F] 508.5.7

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

[F] 508.5.7 Fire protection . *Live/work units* ~~in buildings~~ constructed in accordance with this code shall be provided with all of the following:

1. An *automatic sprinkler system* in accordance with Section 903.3.1.1 , ~~or~~ 903.3.1.2 or 903.3.1.3.
2. *Smoke alarms* in accordance with Section 907.2.11.
3. Where required by Section 907.2.9.1, a manual *fire alarm system*.

Live/work units ~~in buildings~~ constructed in accordance with the *International Residential Code* shall be provided with an *automatic sprinkler system* and *smoke alarms*. The *automatic sprinkler system* shall comply with *International Residential Code* Section P2904, and *smoke alarms* shall comply with *International Residential Code* Section 314.

Commenter's Reason: The modification to add 'in buildings' is not consistent with the remainder of the requirements for Live/work units. This brings up unnecessary questions about fire wall and separation requirements that do not affect this requirement. Townhouse are within the scope of an NFPA13D system, so this should not have been removed as an option simply because these townhouses are classified as Group R-2. Live/work units that are constructed with the IRC can use the system comparable to NFPA 13D. To have a higher level for IBC is not consistent application and would force many more live work units to the IRC.
This public comment is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 and 2021 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
By clearly conveying that IRC live/work units do not have to meet IBC fire protection requirements, the cost of construction for live/work units may be reduced.

Public Comment# 2685

NOTE: G126-21 PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G126-21 Part I

Proposed Change as Submitted

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

Revise as follows:

508.5 Live/work units. In addition to other requirements of this code ~~A~~ *live/work* ~~unit~~ *units* shall comply with Sections 508.5 through 508.5.11.

~~**Exception**~~ **Exceptions:**

1. Dwelling or sleeping units that include an office that is less than 10 percent of the area of the dwelling unit are permitted to be classified as dwelling units with accessory occupancies in accordance with Section 508.2.
2. Live/work units complying with the *International Residential Code* shall not be required to comply with requirements of this code, other than requirements in Section 508.5.

Reason: Currently, some live/work units are permitted to be constructed under the IRC, per the IRC scope, but the IRC scope references back to IBC Section 508.5 for additional specific requirements. So presumably, IRC live/work units are constructed to the IRC, except as modified by IBC Section 508.5. On the other hand, IBC live/work units are constructed to the IBC, including Section 508.5. This proposal more clearly states that approach.
In addition, the fire protection requirements have been edited to clarify the allowance to use fire protection requirements in the IRC for IRC live/work units. It does not appear that the intent of membership in establishing live/work provisions was requiring IRC live/work units to comply with IBC Group R2 fire protection requirements. Plus, the IBC fire protection requirements have been clarified/improved by directly referencing the two applicable sprinkler standards for Group R2 vs. sending the user to another code section to receive the references, and the requirement for smoke alarms has been added for completeness.

Regarding fire alarms for live/work units under the IBC, there are not and never have been any special live/work requirements. Instead, the requirements are based on the general Group R2 occupancy triggers and exceptions found in Section 907.2.9.1, which often won't require a fire alarm system for live/work units based on the exceptions. The reference to "monitored" systems has been dropped, as monitoring requirements will be determined by Section 907.

Cost Impact: The code change proposal will decrease the cost of construction
By clearly conveying that IRC live/work units do not have to meet IBC fire protection requirements, the cost of construction for live/work units may be reduced.

Staff Note: G125-21 and G126-21addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G126-21 Part I

Public Hearing Results

Committee Action: **Withdrawn**

Staff Analysis: G125-21 and G126-21addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G126-21 Part I

G135-21

Proposed Change as Submitted

Proponents: Bill McHugh, The McHugh Company, representing National Fireproofing Contractors Association (bill@mc-hugh.us)

2021 International Building Code

Revise as follows:

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[~~f~~ g] (see Section 202)	3[a, ~~b~~ c]	2[a, ~~b,~~ c, d]	1[~~b,~~ c, d]	0[~~c~~ d]	1[~~b,~~ c, d]	0	3[a]	2[a]	2[a]	HT	1[~~b,~~ c, d]	0
Bearing walls												
Exterior[~~e,~~ f, g]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[~~g~~ h]	1	0
Nonbearing walls and partitionsExterior	See Table 705.5											
Nonbearing walls and partitionsInterior[~~d~~ e]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	$1^1/_2$[b, c]	1[b,c, d]	1[b,c, d]	0[~~c~~ d]	1[b,c,d]	0	$1^1/_2$[b]	1[b]	1[b]	HT	1[b,c,d]	0

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Where a roof is an occupiable space, the fire-resistance rating of the roof assembly shall be equal to or greater than the floor below.

~~b.~~ c. Except in Group F-1, H, M and S-1 occupancies and where the roof is an occupiable space, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.

~~c.~~ d. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less *fire-resistance rating is required.*

~~d.~~ e. Not less than the fire-resistance rating required by other sections of this code.

~~e.~~ f. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

~~f.~~ g. Not less than the fire-resistance rating as referenced in Section 704.10.

~~g.~~ h. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a *fire resistance* rating of not less than 1 hour.

Reason: The purpose of this code proposal is to bring clear guidance to code users that the complete roof assembly is to be fire-resistance rated and not just the area under the occupiable space. This code proposal recognizes that the size of the occupied area can change after certificate of occupancy is granted. Providing the same degree of fire-resistance for the complete roof assembly gives occupants the same protection as if they were on the floor below. We know that the number of people located on a floor or roof can vary including things like events, amusement, meetings, or other reasons. This protects those on the rooftop just as if they were standing on a floor below.

Cost Impact: The code change proposal will increase the cost of construction
This code proposal will increase the cost of construction for the roof assembly by about $1.00 / SF of roof area.

G135-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the proposed new footnote was confusing and the committee recommended the proponent work with all involved to improve the proposal. (Vote: 14-0)

Individual Consideration Agenda

Public Comment 1:

IBC: TABLE 601

Proponents: Bill McHugh, representing National Fireproofing Contractors Association (bill@mc-hugh.us) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[g] (see Section 202)	3[a, c]	2[a, c, d]	1[c, d]	0[d]	1[c, d]	0	3[a]	2[a]	2[a]	HT	1[c, d]	0
Bearing walls												
Exterior[f, g]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[h]	1	0
Nonbearing walls and partitionsExterior	See Table 705.5											
Nonbearing walls and partitionsInterior[e]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 1/2[b, c]	1[b,c, d]	1[b,c, d]	0[d]	1[b,c,d]	0	1 1/2[b]	1[b]	1[b]	HT	1[b,c,d]	0

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Where a roof is an occupiable space, the fire-resistance rating of the ~~roof~~ roof construction ~~assembly~~ shall be equal to or greater than the required rating of the floor below.

c. ~~Except in Group F-1, H, M and S-1 occupancies and where the roof is an occupiable space,~~ Where every part of the roof construction is 20 ft or more above the floor immediately below, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and ~~decking~~ decking ~~where every part of the roof construction is 20 feet or more above any floor immediately below.~~ except where any of the following conditions apply:

1. In Group F-1, H, M and S-1 occupancies.
2. Where the roof is occupiable.

Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.

d. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less *fire-resistance rating is required.*

e. Not less than the fire-resistance rating required by other sections of this code.

f. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

g. Not less than the fire-resistance rating as referenced in Section 704.10.

h. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a *fire resistance* rating of not less than 1 hour.

Commenter's Reason: During the Committee Action Hearings, the General Committee supported the concept behind this proposal. However, there was confusion with the word "Except" in conjunction with the word "and" separating the reference to the occupancies and occupiable space in the revised Footnote c. In order to avoid confusion, this public comment changes the format of Footnote c for a clearer section. Where any of the conditions stated in 1 and 2 apply, the allowance to leave the structural members in the roof construction unprotected when 20 ft or more above the floor below - does not apply. There is also a general clean up of b as well.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
This code proposal will increase the cost of construction for the roof assembly by about $1.00 / SF of roof area.

Public Comment# 2887

G142-21

Proposed Change as Submitted

Proponents: Paul Coats, representing American Wood Council (pcoats@awc.org)

2021 International Building Code

Revise as follows:

602.3 Type III. Type III construction is that type of construction in which the *exterior walls* are of noncombustible materials and the interior *building elements* are of any material permitted by this code. ~~*Fire-retardant-treated wood* framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies of a 2-hour rating or less.~~ Exterior walls complying with Section 602.3.1 or 602.3.2 shall be permitted.

Add new text as follows:

602.3.1 Fire-retardant-treated wood in exterior walls.
Fire-retardant-treated wood framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies of a 2-hour fire-resistance rating or less.

602.3.2 Cross-laminated timber in exterior walls.
Cross-laminated timber (CLT) not less than 4 inches (102 mm) in thickness complying with Section 2303.1.4 and appurtenant heavy timber structural members shall be permitted within exterior wall assemblies with a 2-hour fire-resistance rating or less. The exterior side of the exterior walls shall be protected with noncombustible protection with a minimum assigned time of 40 minutes and shall comply with Section 722.7. Components of the exterior wall covering shall be of noncombustible material except water-resistive barriers complying with Section 1402.5.

Reason: Low-rise and mid-rise buildings are beginning to utilize cross-laminated timber (CLT) and other mass timber products. CLT walls are layers of solid-sawn or structural composite lumber bonded with structural adhesive to form a solid wood wall panel without concealed spaces, typically between 4 and 10.5 inches thick. CLT walls have exceptional fire resistance as demonstrated by the research and testing completed by the ICC Ad Hoc Committee on Tall Wood Buildings when the new mass timber construction types in the 2021 IBC were being considered.
Currently exterior load-bearing walls of Type III construction are required to be of 2-hour fire-resistance rated noncombustible construction, such as light gauge steel framing, or 2-hour fire-resistance rated fire-retardant-treated wood framing and sheathing. This proposal would permit load-bearing two-hour fire-resistance rated and protected mass timber in lieu of fire-retardant-treated wood framing for exterior walls in Type III construction if they are protected with noncombustible materials and comply with other requirements for exterior walls of Type IV-C construction (or the more restrictive requirements for Types IV-B and IV-A construction). For comparison, Type IV-C construction is permitted greater allowable areas than Type III and more stories above grade for many occupancies, including Groups R, S-1, M, B, A-3, and A-2.

Load-bearing exterior mass timber walls of Type IV-C construction are required to be two-hour fire-resistance rated with at least 40 minutes of noncombustible protection on the exterior side. In addition, except for a water-resistive barrier complying with the heat release, flame spread, and smoke-developed index limits of Section 602.4.3.1, combustible exterior wall coverings are prohibited. The combined requirements of a two-hour rating, a minimum noncombustible protection of 40 minutes on the exterior, and the prohibition of combustible materials on the exterior side will provide exterior wall performance that exceeds the existing alternatives for Type III construction.

The form of the proposal mirrors the current requirements in Section 602.4.4.2 for CLT in exterior walls of Type IV-HT construction. However, whereas Type IV-HT exterior walls require the mass timber to be protected on the exterior with 15/32-inch fire-retardant-treated wood, 1/2-inch gypsum board, or simply a noncombustible material of any thickness, under this proposal the two-hour exterior walls in Type III will be required to have at least 40 minutes of noncombustible protection on the exterior, and combustible exterior wall coverings are not permitted.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is an additional alternative for exterior walls in Type III construction and therefore there is no mandate that will increase the cost of construction.

G142-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved due to concerns for special inspection requirements. (Vote: 14-0)

G142-21

Individual Consideration Agenda

Public Comment 1:

Proponents: David Tyree, representing AWC (dtyree@awc.org) requests As Submitted

Commenter's Reason: The Committee Reason was not helpful and actually not germane to the code change proposal. The Committee Reason referred to concerns over special inspection, which was not even a requirement being proposed in the modification. There is no justification to trigger special inspection of exterior wall construction in Type III construction. The other concern voiced by a committee member at the Committee Action Hearings tied the modification to a "blurring the lines" of Type III construction. The proposal would not exempt CLT exterior walls from meeting the fire-resistance rating requirements of Type III construction, and would also require noncombustible protection on the exterior surface. The performance of CLT in this application is equal to or better than that of the FRTW-framed or light-gage steel-framed exterior walls that are already permitted in Type III construction. Furthermore, this is analogous to the current allowance for use of CLT in exterior walls of Type IV-HT construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is an additional alternative for exterior walls in Type III construction and therefore there is no mandate that will increase the cost of construction.

Public Comment# 2301

G143-21

Proposed Change as Submitted

Proponents: Christopher Athari, Hoover Treated Wood Products, representing Hoover Treated Wood Products (cathari@frtw.com)

2021 International Building Code

Revise as follows:

602.4 Type IV. Type IV construction is that type of construction in which the *building elements* are *mass timber* or noncombustible materials and have *fire-resistance ratings* in accordance with Table 601. *Mass timber* elements shall meet the *fire-resistance-rating* requirements of this section based on either the *fire-resistance rating* of the *noncombustible protection*, the *mass timber*, or a combination of both and shall be determined in accordance with Section 703.2. The minimum dimensions and permitted materials for *building elements* shall comply with the provisions of this section and Section 2304.11. *Mass timber* elements of Types IV-A, IV-B and IV-C construction shall be protected with *noncombustible protection* applied directly to the *mass timber* in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the *noncombustible protection* shall be determined in accordance with Section 703.6 and comply with Section 722.7.
Cross-laminated timber shall be labeled as conforming to ANSI/APA PRG 320 as referenced in Section 2303.1.4.

Exterior *load-bearing walls* and *nonload-bearing walls* shall be *mass timber*construction, or shall be of noncombustible construction.

Exception: Exterior *load-bearing walls* and *nonload-bearing walls* of Type IV-HT Construction in accordance with Section 602.4.4.

The interior *building elements*, including *nonload-bearing walls* and partitions, shall be of *mass timber*construction or of noncombustible construction.

~~**Exception**~~ **<u>Exceptions</u>:**

1. Interior building elements and nonload-bearing walls and partitions of Type IV-HT construction in accordance with Section 602.4.4.
2. <u>Fire-retardant-treated wood complying with Section 2303.2 shall be permitted for use as interior nonload-bearing walls and partitions for Types IV-A, IV-B and IV-C construction.</u>

Combustible concealed spaces are not permitted except as otherwise indicated in Sections 602.4.1 through 602.4.4. Combustible stud spaces within light frame walls of Type IV-HT construction shall not be considered concealed spaces, but shall comply with Section 718.

In buildings of Type IV-A, IV-B, and IV-C construction with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department access, up to and including 12 *stories* or 180 feet (54 864 mm) above *grade plane*, *mass timber* interior exit and elevator hoistway enclosures shall be protected in accordance with Section 602.4.1.2. In buildings greater than 12 *stories* or 180 feet (54 864 mm) above *grade plane*, interior exit and elevator hoistway enclosures shall be constructed of noncombustible materials.

Reason:
In Table 601, the hourly fire-resistance ratings for interior nonbearing walls and partitions in Types IV-A, IV-B, and IV-C are the same for the other construction types where fire-retardant-treated wood (FRTW) is permitted (ex. Type IIIA is also 0.)

The difference between FRTW and other materials used in a 0-hour-rated assembly is that through its chemical impregnation, smaller-diameter FRTW behaves like the larger-diameter heavy timber members when exposed to real-world fire conditions. This behavior helps explain why FRTW is already allowed in exterior wall assemblies in Type IV-HT construction and also can be used in lieu of noncombustible materials in certain applications in the code for Types I and II construction.

By allowing this exception, there will be no decrease in the minimum hourly fire-resistance rating by including FRTW for Types IV-A, IV-B, and IV-C construction as interior nonbearing walls and partitions, nor will there be any adverse impact to building or life safety**.**

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code as it is written is unchanged and no extra requirements have been added. This just allows for another safe option that may be constructed.

G143-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as this not part of the TWB ad hoc committee recommendations. (Vote: 13-1)

G143-21

Individual Consideration Agenda

Public Comment 1:

Proponents: Mike Eckhoff, representing Hoover Treated Wood Products, Inc. (meckhoff@frtw.com); Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com) requests As Submitted

Commenter's Reason: Interior nonbearing walls and partitions for Types IV-A, IV-B, and IV-C have a 0-hour rating requirement in Table 601. This rating requirement is identical for other types of construction where fire-retardant-treated wood (FRTW) is already allowed for use in interior nonbearing walls and partitions e.g., Types I and II. Given that FRTW is allowed to be used in interior nonbearing walls and partitions in these more restrictive construction types, an allowance for using FRTW in interior nonbearing walls and partitions in Types IV-A, IV-B, and IV-C makes sense. Finally, the inclusion of FRTW also provides designers with an additional option that could also increase a project's ability to sequester additional carbon.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The code as it is written is unchanged and no extra requirements have been added. This change would just allow for another safe option that may be used in construction.

Public Comment# 2891

G147-21

Proposed Change as Submitted

Proponents: Susan Jones, atelierjones, llc, representing atelierjones, llc (susan@atelierjones.com); Stephen DiGiovanni, representing Self (sdigiovanni@clarkcountynv.gov); Carl Baldassarra, Wiss Janney Elstner Associates, representing Self (cbaldassarra@wje.com)

2021 International Building Code

602.4.2.2 Interior protection. Interior faces of all *mass timber* elements, including the inside face of exterior *mass timber* walls and *mass timber* roofs, shall be protected, as required by this section, with materials complying with Section 703.3.

602.4.2.2.1 Protection time. *Noncombustible protection* shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions specified in Table 722.7.1(2) shall be permitted to be used for compliance with Section 722.7.1.

Revise as follows:

602.4.2.2.2 Protected area. Interior faces of *mass timber* elements, including the inside face of exterior *mass timber walls* and *mass timber roofs*, shall be protected in accordance with Section 602.4.2.2.1.

Exceptions: Unprotected portions of *mass timber*ceilings and walls complying with Section 602.4.2.2.4 and the following:

1. Unprotected portions of mass timber ceilings and walls complying with one of the following:
   1.1. Unprotected portions of *mass timber* ceilings, including attached beams, shall be permitted and shall be limited to an area less than or equal to ~~20~~ 100 percent of the floor area in any *dwelling unit* or *fire area.*
   1.2. Unprotected portions of *mass timber* walls, including attached columns, shall be permitted and shall be limited to an area less than or equal to 40 percent of the floor area in any *dwelling unit* or *fire area*.
   1.3. Unprotected portions of both walls and ceilings of *mass timber*, including attached columns and beams, in any *dwelling unit* or *fire area* shall be permitted in accordance with Section 602.4.2.2.3.
2. *Mass timber* columns and beams that are not an integral portion of walls or ceilings, respectively, shall be permitted to be unprotected without restriction of either aggregate area or separation from one another.

602.4.2.2.3 Mixed unprotected areas. In each *dwelling unit* or *fire area* , where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1.

$$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \le 1$$ **Equation 6-1**

where:
U_{tc} = Total unprotected *mass timber* ceiling areas.
U_{ac} = Allowable unprotected *mass timber* ceiling area conforming to Exception 1.1 of Section 602.4.2.2.2.
U_{tw} = Total unprotected *mass timber* wall areas.
U_{aw} = Allowable unprotected *mass timber* wall area conforming to Exception 1.2 of Section 602.4.2.2.2.

Revise as follows:

602.4.2.2.4 Separation distance between unprotected mass timber elements. In each *dwelling unit* or *fire area*, unprotected portions of *mass timber* walls ~~and ceilings~~ shall be not less than 15 feet (4572 mm) from unprotected portions of other walls ~~and ceilings, measured horizontally along the ceiling and from other unprotected portions of walls~~ measured horizontally along the floor.

Reason: The Ad-Hoc Committee on Tall Wood Buildings (TWB) was created by the Board of Directors of the International Code Council (ICC) to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB created several code change proposals with respect to the concept of tall buildings of mass timber in the last code cycle. All of the TWB proposals were approved.
The TWB decided, as it worked its way through data and research, that it would only incorporate criteria into the code that had bases in tests. When the fire test program at ATF was being developed, a determination was made regarding how much ceiling area and how much wall area and in which combinations could be left exposed in those tests. Limitations in the physical equipment (exhaust hood and exhaust duct connector) limited the amount of exposed MT material and led to a conservative calculation estimate which, for ceilings, became 20% of the floor area. Thus, the number that was incorporated into the text of the 2021 IBC reflected those limitations.

The proposed revisions above are based upon recently completed research conducted at the Research Institute of Sweden (RISE). These fire tests demonstrated that the proposed amounts of unprotected areas on the ceiling and walls, as a function of floor area, can be safely implemented while still achieving the performance objectives specified by the ICC Tall Wood Building Ad-Hoc Committee in the development of the tall building mass timber provisions in the 2021 I-codes. Specifically, Test 1 of the test series conducted at RISE involved a ceiling in which 100% of the area was unprotected mass timber. Tests 2 and 5 had unprotected mass timber on 100% of the ceiling area, in addition to unprotected areas on the two opposing side walls, equivalent to 78% of the floor area. These tests exhibited satisfactory performance in that no significant fire re-growth was observed and temperatures within the compartment decreased continuously from the time of the fully-developed phase until the end of the four-hour test.

The proposed increase of allowable unprotected area on the ceiling from 20% to 100% is consistent with the configurations tested in all of the RISE tests. Although the RISE data also justifies a higher percentage of unprotected area of the wall, this proposal leaves the limit at 40% of the floor area for the sake of conservatism. Videos of the tests performed at RISE may be viewed at the following link: https://www.ri.se/en/what-we-do/expertises/fire-safety-timber-buildings

Furthermore, all of the code proposals included in the work of the TWB were based on CLT products using an earlier edition of material standard PRG 320. During that code development process, being responsive to the concerns of the TWB, the industry demonstrated that the latest PRG-320 standard required a higher grade of adhesive to limit delamination during fire exposure. These RISE fire tests used the subsequent improvements in the code-referenced product standard for CLT (ANSI/APA PRG-320), resulting in enhancements to fire safety.

Cost Impact: The code change proposal will decrease the cost of construction
The prosed changes will decrease the cost of construction, by reducing the required amount of noncombustible protection on walls and ceilings in Type IV-B Construction.

G147-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as submitted since the provided preliminary RISE test report indicated that the test met or exceeded the requirements. (Vote: 9-5)

G147-21

Individual Consideration Agenda

Public Comment 1:

IBC: 602.4.2.2, 602.4.2.2.1, 602.4.2.2.2, 602.4.2.2.3, 602.4.2.2.4

Proponents: Shamim Rashid-Sumar, representing National Ready Mixed Concrete Association (ssumar@nrmca.org); Tim Earl, representing The Gypsum Association (tearl@gbhint.com); Larry Williams, representing Steel Framing Industry Association (williams@steelframingassociation.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

602.4.2.2 Interior protection . Interior faces of all *mass timber* elements, including the inside face of exterior *mass timber* walls and *mass timber* roofs, shall be protected, as required by this section, with materials complying with Section 703.3.

602.4.2.2.1 Protection time . *Noncombustible protection* shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions specified in Table 722.7.1(2) shall be permitted to be used for compliance with Section 722.7.1.

602.4.2.2.2 Protected area . Interior faces of *mass timber* elements, including the inside face of exterior *mass timber walls* and *mass timber roofs*, shall be protected in accordance with Section 602.4.2.2.1.

Exceptions: Unprotected portions of *mass timber*ceilings and walls complying with Section 602.4.2.2.4 and the following:

1. Unprotected portions of mass timber ceilings and walls complying with one of the following:

    1.1. Unprotected portions of *mass timber* ceilings, including attached beams, shall be permitted and shall be limited to an area less than or equal to ~~100 percent of~~ 20 percent of the floor area in any *dwelling unit* or *fire area.*

1.2. Unprotected portions of *mass timber* walls, including attached columns, shall be permitted and shall be limited to an area less than or equal to 40 percent of the floor area in any *dwelling unit* or *fire area.*

1.3. Unprotected portions of both walls and ceilings of *mass timber*, including attached columns and beams, in any *dwelling unit* or *fire area* shall be permitted in accordance with Section 602.4.2.2.3.

2. *Mass timber* columns and beams that are not an integral portion of walls or ceilings, respectively, shall be permitted to be unprotected without restriction of either aggregate area or separation from one another.

602.4.2.2.3 Mixed unprotected areas . In each *dwelling unit* or *fire area* , where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1.

$$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \le 1 \qquad \textbf{Equation 6-1}$$

where:
U_{tc} = Total unprotected *mass timber* ceiling areas.
U_{ac} = Allowable unprotected *mass timber* ceiling area conforming to Exception 1.1 of Section 602.4.2.2.2.
U_{tw} = Total unprotected *mass timber* wall areas.
U_{aw} = Allowable unprotected *mass timber* wall area conforming to Exception 1.2 of Section 602.4.2.2.2.

602.4.2.2.4 Separation distance between unprotected mass timber elements . In each *dwelling unit* or *fire area*, unprotected portions of *mass timber* walls and ceilings shall be not less than 15 feet (4572 mm) from unprotected portions of other walls and ceilings, measured horizontally along the ceiling and from other unprotected portions of walls measured horizontally along the floor.

Commenter's Reason: Proposal G-147 includes editorial revisions to provide clarity to Section 602.4.2.2 on interior protection for Type IV-B construction. Additionally, the proposal seeks to decrease the limitations of exposed ceiling area for Type IV-B construction that were originally developed by the ICC Ad Hoc Committee on Tall Wood Buildings. The proposal increases allowable unprotected areas on the ceiling from 20% to 100% based on preliminary results from ongoing research at the Research Institute of Sweden (RISE).
G-147 is recommended for Approval as Modified by Public Comment based on the following technical points:

1. As of the submission date for public comment, the RISE study on "Fire Safe Implementation of Visible Mass Timber in Tall Buildings" is not yet completed. As stated in the interim report, the full overview of all results has not yet been provided and will be documented at a later date. Many aspects of CLT design and firefighter operations are still under evaluation. These include, but are not limited to, the following:
   - Comparisons of the fire exposure measured on the front façade above ventilation openings of compartments. The interim report indicates that the exposure of these tests is expected to be statistically severe but has not yet been completed.
   - Mapping of the influence of increasing the surface area of exposed mass timber on the façade exposure. Results of this influence have not been shared or documented.
   - Description of locations where smoldering continued after the fires.
   - Assessing techniques for firefighters to locate and extinguish smoldering that is left after fire incidents.
   - Case studies on repairing of fire damaged CLT structural elements after fire incidents.
2. Preliminary results from the RISE tests demonstrate that compartments with certain quantities of exposed wood can exhibit continuous decay due to hotspots and embers after flashover. As per the interim report, the presence of two exposed wall surfaces in one corner should be avoided to ensure this. The 15-foot separation distance between unprotected portions of mass timber walls and ceilings currently required by the code is critical to this point.
3. There are noticeable differences in the test plans developed for the ATF lab tests versus the RISE tests. One such difference was that CLT walls in RISE tests 2,3, and 5 were encapsulated in three (3) layers of gypsum wallboard, while walls in the ATF lab tests were encapsulated in two (2) layers of gypsum wallboard. While the extra layer of gypsum provides additional protection, it exaggerates the results of the RISE tests considering Table 722.7.1(2) only requires 2 layers of 5/8-inch gypsum board to achieve the 80 minutes protection required for Type IV-B construction by Section 602.4.2.2.1.
4. The research project used for justification of the increase in unprotected ceiling area is owned by the American Wood Council and contracted to the research Institutes of Sweden. While the ATF lab tests were overseen by the Tall Wood Ad Hoc Committee with broad representation outside of the timber industry, the Steering Committee for the RISE project does not have comparable industry representation. To this point, an independent peer review of the test methodology and preliminary results has not been conducted.

In summary, a number of unanswered technical questions exist regarding the outcomes of the RISE study on "Fire Safe Implementation of Visible Mass Timber in Tall Buildings." While the editorial revisions to G-147 are justifiable, the increase of allowable exposed ceiling area for Type IV-B construction is based on a study that is not yet complete and is inconsistent with the test parameters originally established by the Ad Hoc Committee on Tall Wood Buildings. Additionally, the expansion of exposed ceiling area from 20 percent to 100 percent of total ceiling area is premature based on the relatively recent addition of the tall wood building provisions to the code and the lack of building history for CLT structures in jurisdictions where the IBC has been adopted.

Recommend **APPROVAL AS MODIFIED BY PUBLIC COMMENT** for G147-21.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The public comment will result in editorial changes to the code and will not increase the cost of construction.

Public Comment# 2697

Public Comment 2:

Proponents: Jason Smart, representing AWC (jsmart@awc.org); David Tyree, representing AWC (dtyree@awc.org) requests As Submitted

Commenter's Reason: We request approval as submitted, as recommended by the code development committee. The committee was correct that tests performed at the Research Institutes of Sweden (RISE) met or exceeded the fire safety performance objectives specified by the ICC Tall Wood Building Ad Hoc Committee. Most of the committee members studied the RISE test report and agreed that it justified approval of the proposal. To address the comment that reporting was not yet complete and the membership should wait until it is completed, please note the results and conclusions have been made available since before the CAH, and the final report is now available at the following link:

https://www.ri.se/en/what-we-do/expertises/fire-safety-of-timber-buildings

In response to a committee member that had reservations due to the limited history of buildings that have been constructed to date and concerns over how to repair fire damage the following is offered: 1) there are plenty of examples of exposed heavy timber construction in North America – certainly more than enough to provide 'proof of concept,' 2) part of the research conducted at RISE deals with the topic of how to repair a mass timber structure that has experienced a fire. The results of this study are also published in the final RISE report, available at the link above.

To help increase the comfort level in acceptance of the committee action and to address any remaining concerns, AWC has presented a webinar with Daniel Brandon, RISE, to discuss the test results, findings and conclusions of the research performed at RISE. This webinar may be viewed at the following link:

https://www.awc.org/education/main/lists/des-design-considerations/des612---expanding-mass-timber-opportunities-through-testing-and-code-development

We also felt the votes by the few committee members who voted against the motion to approve G147 may have been swayed by the opposition testimony provided at the Committee Action Hearings, so we are offering rebuttal to each of their concerns and comments as follows.

Opposition comment: It is too soon for this change. The Type IV-A, B and C mass timber provisions were just added to the 2021 IBC in the last cycle, and now we're starting to pick these provisions apart with changes like G147, after all the work that the TWB Committee did with their evaluations. **Rebuttal:** Rather than 'picking apart' the provisions developed by the TWB Committee, this proposal is intended to complement it by addressing a factor that could not be addressed at the time of the ATF tests due to the fact that PRG 320-18-compliant CLT was not available at that time. Because PRG 320-18-compliant CLT was not available at the time of the tests performed at ATF, the exposed mass timber areas tested in that series had to be kept to a lower percentage than would have been otherwise justified had PRG 320-18-compliant CLT been used. So, in the absence of test data showing that the full ceiling area could be safely exposed where PRG 320-18-compliant CLT is used, the TWB Committee set the original ceiling area limits equivalent to what was tested in ATF Test 2. Now that we have the data that the TWB did not have at their disposal, based on testing performed on PRG 320-18-compliant CLT, which the 2021 IBC requires anyway, this proposal is perfectly logical, timely, prudent and justifiable.

Opposition comment: The TWB worked for over a year-and-a-half to develop their proposals, but this proposal is based on just one set of tests from Sweden. **Rebuttal:** The justification for the proposal in G147 is the result of two years' worth of research by a team of world-renowned experts in fire science at the Research Institute of Sweden (RISE). It would be a misrepresentation to imply that this research was simply cobbled together in a haphazard manner.

Opposition comment: The RISE tests used a different fuel load basis than the ATF tests. **Rebuttal:** This is incorrect. Both the ATF tests and the RISE tests used approximately the same fuel load. The ATF tests used a fuel load of 550 MJ/m^2. The RISE tests used a fuel load of 560 MJ/m^2.

Opposition comment: The RISE tests were less severe than the E119 test that the other building materials must test to for fire resistance. **Rebuttal:** The tests performed at RISE were not "less severe", they were *different* than a standard ASTM E119 exposure because they followed natural growth and decay curves. Moreover, in certain respects (such as during the fully developed phase), they actually resulted in a more severe exposure for temperature and heat flux exposure than would result from a standard ASTM E119 curve.

Opposition comment: Standardized test protocols should have been used, instead of the non-standard tests performed at RISE. **Rebuttal:** A multitude of tests have been performed on CLT, including standardized tests (such as horizontal and vertical ASTM E119 fire-resistance tests). The results from many of these tests are readily available on AWC's website. As for why non-standard tests such as those performed at ATF and RISE were performed *in addition* to the standardized tests, the TWB Committee developed a set of six fire performance objectives at the outset of their work. They recognized early-on that it would not be possible to assess these fire performance objectives by simply performing standardized tests alone. This is why they developed the ATF test series: to determine whether the new mass timber construction types could meet their fire performance objectives. The TWB Fire Work Group determined that this assessment needed to be performed on a full scale structure which resulted in the two story structure of the test series. The configurations tested in the research at RISE were similar to the ATF tests in many respects (including fuel load density), with the primary differences being that 1) PRG 320-18-compliant CLT was used, and 2) commensurately larger areas of mass timber were exposed.

Opposition comment: It would be unsafe to allow an exposed mass timber area on a wall to intersect an exposed mass timber area on the ceiling. **Rebuttal:** All five of the RISE tests involved configurations in which exposed mass timber areas on the walls intersected exposed mass timber areas on the ceiling. These were not shown to be problem areas, and did not result in fire re-growth.

Opposition comment: This proposal would allow for 100% of the mass timber to be exposed on the ceiling, with the top 40% of the intersecting wall also exposed simultaneously. **Rebuttal:** This is incorrect. The options under Exception 1 to IBC Section 602.4.2.2.2 are mutually exclusive – only one of them can be applied for any particular fire area or dwelling unit. Because of this, it would not be permissible to have 100% of the ceiling exposed and simultaneously have exposed mass timber on the walls.

Opposition comment: The concern of delamination has not been completely resolved. **Rebuttal:** The Tall Wood Building (TWB) Committee's original concern over delamination has to do with fire re-growth, which could lead to a second flashover. While delamination led to this unacceptable fire performance in some of the tests performed using the previous generation of CLT, this concern is now addressed through qualification requirements in the CLT product standard (PRG 320-18). Now the CLT adhesive is required to be qualified under PRG 320-18, proving that it does not exhibit delamination which can cause fire re-growth leading to a second flashover. Compartment fire tests performed with this newer generation of CLT have also verified this superior fire performance. Not only has this concern been resolved, but the outcome of this resolution (i.e., the newer generation of CLT products) is what made it possible to meet the fire safety performance objectives in the more rigorous test configurations of the RISE test series.

Opposition comment: The RISE tests were conducted in open air, so how was the performance of the interior protection evaluated?" **Rebuttal:** Although the test structures were situated outside, in open air, the interior protection was <u>inside</u> the test structure in each test. Every building is ultimately located "outside" so this is a legitimate *full scale* test of a building, not just a system. This scenario is representative of a building fire in which the glazing has broken out in the openings. Except in the case of tempered glass, the glazing would typically break and fall out (either partially or completely) during a fully developed fire. By testing a configuration without any glazing in the openings, more oxygen is supplied to the fire during the growth phase, thereby allowing the fire to reach the fully developed phase sooner. This also eliminates a significant source of test variability related to the timing and degree to which the glazing would break out of the openings.

Bibliography: The final RISE report is now available at the following link:
https://www.ri.se/en/what-we-do/expertises/fire-safety-of-timber-buildings

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
The prosed changes will decrease the cost of construction, by reducing the required amount of noncombustible protection on walls and ceilings in Type IV-B Construction.

Public Comment# 2292

Public Comment 3:

Proponents: Stephen Skalko, representing Precast Concrete Institute (svskalko@svskalko-pe.com) requests Disapprove

Commenter's Reason: The technical change for G147-21 was based on fire tests performed in Sweden as outlined in the Summary RISE Report 2020.94 - Fire Safe Implementation of Visible Mass Timber in Tall Buildings - Compartment Fire Testing, prepared by the Research Institute of Sweden. Of importance however is the parameters for compartment size and openings were based on a probabilistic study of compartments using only residential buildings in the U.K. These compartment sizes and percent of openings vary from those utilized by the ICC Ad-Hoc Committee on Tall Wood Buildings when their fire testing was performed at the ATF labs. To consider making changes to the requirements established in the IBC, compartment fire test should be performed on compartments of similar size and with opening parameters that are consistent with the original test parameters used as the basis for the present code requirements established by the ICC Ad-Hoc Committee on Tall Wood Buildings. Recommend Disapproval of G147-21.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No change to code thus no impact to cost.

Public Comment# 2909

G154-21

Proposed Change as Submitted

Proponents: Christopher Athari, representing Hoover Treated Wood Products (cathari@frtw.com)

2021 International Building Code

Revise as follows:

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:

    1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less except in *shaft enclosures* within Group I-2 occupancies and *ambulatory care facilities.*

    1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.

    1.3. Roof construction, including girders, trusses, framing and decking.

    Exceptions:

    1. In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
    2. Group I-2, roof construction containing *fire-retardant-treated wood* shall be covered by not less than a Class A*roof covering* or roof assembly, and the roof assembly shall have a *fire-resistance rating* where required by the construction type.

    1.4. Balconies, porches, decks and exterior *stairways* not used as required exits on buildings three *stories* or less above grade plane.

    <u>1.5. Floors, including trusses, framing and decking, of Type IIB construction where fire-resistance-rated construction is not required.</u>

2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

    Exceptions:

    1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
    2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.

3. Foam plastics in accordance with Chapter 26.
4. *Roof coverings* that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated* wood, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. *Stages* and *platforms* constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.

14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic *veneer* installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.4.4 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.1.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.15 and 1705.16, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect *joints* in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m^2), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
27. Wood nailers for parapet flashing and roof cants.

Reason: In Table 601, Type IIB floors have a “0” fire resistance rating. Fire-retardant-treated wood is allowed in Section 603 in several areas. The height limitations for many sprinklered occupancy groups for Type IIB are the same as IIIB, where untreated wood floors are allowed. Many floor decks are designed for diaphragm action, and fire-retardant-treated plywood is often used in this application but requires approval as an alternate by the AHJ. This code provision will provide design professionals with an additional option. Fire-retardant-treated wood floor trusses or framing should also be allowed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code proposal allows for another method to construct within Type II. All current methods are unchanged.

G154-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the proposal adds confusion on what is considered Type IIB construction. (Vote: 14-0)

G154-21

Individual Consideration Agenda

Public Comment 1:

Proponents: James Gogolski, representing Hoover Treated Wood Products, Inc. (jgogolski@frtw.com); Mike Eckhoff, representing Hoover Treated Wood Products, Inc. (meckhoff@frtw.com) requests As Submitted

Commenter's Reason: In Table 601, Type IIB floors have a "0" fire resistance rating. Fire-retardant-treated wood is allowed in Section 603 in several areas. The height limitations for many sprinklered occupancy groups for Type IIB are the same as IIIB, where untreated wood floors are allowed. In Type IIB construction, the roof system, framing and decking, can be fire-retardant-treated wood. Fires typically burn in an upward direction. So, the ceiling of a roof is similar to the ceiling of a floor. Moreover, in Section 603, untreated wood finish flooring may be used in Type I and II construction.
The Committee commented that since fire-retardant-treated wood is not a noncombustible product, it would add fuel load to the fire. For understanding how the code addresses fire flow, one would look to the fire flow requirements of Table B105.1(2) of the International Fire Code, Appendix B. The table does not differentiate between either Types IIA and IIIA or between Types IIB and IIIB. Despite one construction type being noncombustible and the other combustible, they share the same fire flow (water GPM) requirements. In other words, the IFC does not consider building material composition (fire loading) influential for fire-flow water demand. Therefore, this is a moot issue.

Many floor decks are designed for diaphragm action, and fire-retardant-treated plywood is often used in this application but requires approval as an alternative by the AHJ. This code provision will provide design professionals with an additional option.

Finally, as carbon sequestration is now a factor in design, and will be emphasized more into the future, wood and other carbon sequestered material will be demanded at an increasing rate.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
It provides another method to construct within Type II.

Public Comment# 2673

G155-21

Proposed Change as Submitted

Proponents: Christopher Athari, Hoover Treated Wood Products, representing Hoover Treated Wood Products (cathari@frtw.com); James Gogolski, representing Hoover Treated Wood Products (jgogolski@frtw.com)

2021 International Building Code

Revise as follows:

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:

   1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less except in *shaft enclosures* within Group I-2 occupancies and *ambulatory care facilities.*

   1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.

   1.3. Roof construction, including girders, trusses, framing and decking.

   Exceptions:

   1. In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
   2. Group I-2, roof construction containing *fire-retardant-treated wood* shall be covered by not less than a Class A *roof covering* or roof assembly, and the roof assembly shall have a *fire-resistance rating* where required by the construction type.

   1.4. Balconies, porches, decks and exterior *stairways* not used as required exits on buildings three *stories* or less above grade plane.

   <u>1.5. Mezzanine floor construction and associated secondary members where the fire-resistance-rated floor assembly has the fire resistance of that required by the type of construction and is solidly filled with insulation or is constructed with fireblocking of fire-retardant-treated wood.</u>

2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

   Exceptions:

   1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
   2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.

3. Foam plastics in accordance with Chapter 26.
4. *Roof coverings* that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated* wood, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. *Stages* and *platforms* constructed in accordance with Sections 410.2 and 410.3, respectively.

13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic *veneer* installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.4.4 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.1.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.15 and 1705.16, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect *joints* in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m^2), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
27. Wood nailers for parapet flashing and roof cants.

Reason: Many mezzanine floors are designed to carry heavy loads and as diaphragms to resist lateral forces. Plywood is ideally suited for these applications, and designers frequently want to use plywood in their mezzanine floor designs. Currently, in Types I and II construction, design professionals must seek approval from the AHJ through Section 104.11 and the alternative materials process.
Mezzanine floors do not contribute to either the building area or number of stories as regulated by Section 503.1. This is also the case for kiosks. Kiosks are allowed to be constructed of fire-retardant-treated wood in malls of any type of construction (see Section 402.6.2). By logical extension, mezzanine floors should be allowed to be constructed of fire-retardant-treated wood in Types I and II construction.

This code proposal does not alter any of the requirements in Section 505.2 for Mezzanines or the fire-resistance requirements for floor construction per Table 601. For example, in addition to being constructed of fire-retardant-treated wood elements (lumber framing, plywood sheathing, and fireblocking), a mezzanine floor in a Type IIA building would be required to have a 1-hour fire-resistance rating**.**

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal just adds another option to design professionals and clarifies for code officials. All current options in the code are unchanged.

G155-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved consistent with the committee action on G154 on the same code section. (Vote: 14-0)

G155-21

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 603, 603.1

Proponents: James Gogolski, representing Hoover Treated Wood Products, Inc. (jgogolski@frtw.com); Mike Eckhoff, representing Hoover Treated Wood Products, Inc. (meckhoff@frtw.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

SECTION 603
COMBUSTIBLE MATERIAL IN TYPES I AND II CONSTRUCTION

603.1 Allowable materials . Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:

    1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less except in *shaft enclosures* within Group I-2 occupancies and *ambulatory care facilities.*

    1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.

    1.3. Roof construction, including girders, trusses, framing and decking.

    Exceptions:

    1. In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
    2. Group I-2, roof construction containing *fire-retardant-treated wood* shall be covered by not less than a Class A*roof covering* or roof assembly, and the roof assembly shall have a *fire-resistance rating* where required by the construction type.

    1.4. Balconies, porches, decks and exterior *stairways* not used as required exits on buildings three *stories* or less above grade plane.

    <u>1.5 Mezzanine construction and associated secondary members where the assembly is solidly filled with insulation or is constructed with *fireblocking* of *fire-retardant-treated wood.*</u>

2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

    Exceptions:

    1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
    2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.

3. Foam plastics in accordance with Chapter 26.
4. *Roof coverings* that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated* wood, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. *Stages* and *platforms* constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.

14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic *veneer* installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.4.4 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.1.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.15 and 1705.16, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect *joints* in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m^2), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
27. Wood nailers for parapet flashing and roof cants.

Commenter's Reason: Adds allowance for FRTW in mezzanine floor construction. Section 603 Combustible Material in Types I and II Construction.
Revise as follows:

603.1 Allowable materials.

1. Fire-retardant-treated wood shall be permitted in:

<u>1.5. Mezzanine construction and associated secondary members where the assembly is solidly filled with insulation or is constructed with *fireblocking* of *fire-retardant-treated wood.*</u>

Commenters reason:

Subsequent to the hearing, it was pointed out that the code does not require mezzanines to be constructed of fire resistance rated construction. This public comment removes this requirement and the term “floor” that is not included in the definition of mezzanine.

Many mezzanines are designed to carry heavy loads and act as diaphragms to resist lateral forces. Plywood is ideally suited for these applications and designers frequently use plywood in their mezzanine designs. All too frequently, design professionals are required to seek approval from some AHJs through Section 104.11, the alternative materials process.

This is not supported or otherwise required by the code. A mezzanine is defined as a level, not a floor. The code does not stipulate in Section 505, what materials are used to construct a mezzanine. Therefore, mezzanines can be constructed of fire-retardant-treated wood.

This code proposal does not alter any of the requirements in Section 505.2 for mezzanines. It provides clarity of what is permitted in construction types employing noncombustible materials.

Last April, the main concern of the Committee was that FRTW is not a noncombustible product and will add fuel to a fire. Regarding fire flow and fire loading concerns raised during the hearing: For understanding how the code addresses fire flow, one would look to the fire flow requirements of Table B105.1(2) of the International Fire Code, Appendix B. The table does not differentiate between either Types IIA and IIIA or between Types IIB and IIIB. Despite one construction type being noncombustible and the other combustible, they share the same fire flow (water GPM) requirements. In other words, the IFC does not consider building material composition (fire loading) influential for fire-flow water demand. Therefore, this is a moot issue.

Finally, as carbon sequestration is now a factor in design, and will be emphasized more into the future, wood and other carbon sequestered material will be demanded at an increasing rate.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal just adds another option to design professionals and provides clarity for code officials.

G162-21

Proposed Change as Submitted

Proponents: Thomas Bowles, EPA, representing EPA (bowles.thomas@epa.gov); Jane Malone, American Association of Radon Scientists and Technologists, representing American Association of Radon Scientists and Technologists (janemalonedc@gmail.com); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com); Ruth Mcburney, representing CRCPD (rmcburney@crcpd.org); Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, American Lung Association, representing American Lung Association (Kevin.Stewart@Lung.org); Tobie Bernstein, representing Environmental Law Institute (bernstein@eli.org)

2021 International Building Code

Add new text as follows:

1202.7 Soil Gas Control: Educational Buildings.
Soil gas control systems shall be provided for in Group E educational buildings. Systems shall comply with ANSI-AARST CC1000.

Add new standard(s) as follows:

AARST

American Association of Radon Scientists and Technologists
527 N Justice Street
Hendersonville, NC 28739
USA

AARST ANSI-AARST CC-1000-2018:
Soil Gas Control Systems in New Construction of Buildings

Reason: · *The purpose of this proposed requirement is to protect students, faculty, and other staff from exposure to radon gas in school buildings which are not covered by the International Residential Code and are beyond the scope of the IRC's Appendix F.*
· *Several states (Maine, Nebraska, New Jersey, Oregon, Rhode Island) require soil gas control in schools.*

· *A nationwide survey of radon levels in schools estimates that nearly one in five has at least one schoolroom with a short-term radon level above the EPA action level of 4 pCi/L (picocuries per liter) - the level at which EPA recommends that schools take action to reduce the level.* Radon is present in indoor air everywhere, regardless of building type or radon zone. Radon-induced lung cancer takes 21,000 lives in the US each year. Chemical vapor is an increasingly documented hazard that also enters buildings from the soil and is increasingly a liability issue.

· It is more efficient and cost-effective to establish soil gas control from the ground up during construction than to retrofit a structure later to seal up the interface between structure and soil and position suction points, ventilation piping and other components.

· The standard included in this proposal has been vetted and approved by EPA and multiple regulatory states. In 2020, an addendum to ASHRAE 189.1 - 2017 was approved to incorporate a requirement for ANSI-AARST CC-1000 to replace the standard's existing soil gas requirement.

· More Background on Radon:

· Epidemiological studies confirm that radon increases the risk of lung cancer in the general population. Radon is the second leading cause of lung cancer – second only to smoking – and more significant than secondhand smoke. In the US alone, 21,000 lung cancer deaths each year are caused by radon exposure. 3 The World Health Organization estimates that between 3% and 14% of all lung cancer cases worldwide are caused by radon exposure. 4 The Surgeon General of the United States issued a Health Advisory in 2005 warning Americans about the health risk from exposure to radon in indoor air. Dr. Richard Carmona, the Nation's Chief Physician, urged Americans find out how much radon they might be breathing. Dr. Carmona also stressed the need to remedy the problem as soon as possible when the radon level is 4 pCi/L or more.Radon is a colorless and odorless gas that is a decay product of uranium and occurs naturally in soil and rock. The main source of high-level radon pollution in buildings is surrounding uranium-containing soil such as granite, shale, phosphate and pitchblende. Radon enters a building through cracks in walls, basement floors, foundations and other openings. There is no known threshold concentration below which radon exposure presents no risk. Even low concentrations of radon can result in a small increase in the risk of lung cancer.

The CC-1000 standard is posted for public access at **https://standards.aarst.org/CC-1000-2018/index.html**

Bibliography:

- The CC-1000 standard is posted for public access at **https://standards.aarst.org/CC-1000-2018/index.html**

Cost Impact: The code change proposal will increase the cost of construction
This proposal does not add a requirement to install a radon control system. The proposal will add incremental cost to construction where radon control systems are installed if the builder is not already following the standard practice.

According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260. The cost of a system for a nonresidential commercial building will range from $2500 to higher depending on the footprint, volume and type of HVAC system.

Staff Analysis: A review of the standard proposed for inclusion in the code, AARST CC1000-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G162-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The AARST standard has suggestive language, not enforceable language. There is no specific directions for testing and it is not clear for how to comply. As written this would be required a radon system in all schools while maps show high risk only on specific areas and in these areas the testifiers said that radon was found in only 15% of the schools tested. (Vote 14-0)

G162-21

Individual Consideration Agenda

Public Comment 1:

IBC: 1202.7 (New)

Proponents: Jane Malone, representing American Assocation of Radon Scientists and Technologists; Kevin Stewart, representing American Lung Association (kevin.stewart@lung.org); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com); Thomas Bowles, representing Indoor Environments Division (bowles.thomas@epa.gov); Warren Friedman, representing Office of Lead Hazard Control and Healthy Homes (warren.friedman@hud.gov); Ruth McBurney, representing CRCPD (rmcburney@crcpd.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

<u>**1202.7 Soil gas control in Educational buildings .** Occupiable spaces in Group E occupancies shall have indoor radon levels below 4 picocuries per liter (pCi/L). Radon levels shall be determined by an approved testing method. Radon levels equal to or exceeding 4 pCi/L shall be reduced by an approved mitigation method. A radon test report indicating satisfactory test results shall be provided to the code official.</u>

Commenter's Reason: This comment responds to two of the Committee's reasons by omitting the applicable ANSI standard and adding general direction to use approved methods for testing and mitigation. The requirement to deliver a compliant test report to the code official is consistent with IRC Appendix F. Because radon has been found in buildings in all areas and thus exposes students and educators in all areas to risk of lung cancer, the proposed language does not limit the requirement to only some areas.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
The cost of a system for a nonresidential commercial building will range from $2500 to higher depending on the footprint, volume and type of HVAC system.

Public Comment# 2822

G163-21

Proposed Change as Submitted

Proponents: Jane Malone, American Association of Radon Scientists and Technologists, representing American Association of Radon Scientists and Technologists; Thomas Bowles, representing EPA (bowles.thomas@epa.gov); Ruth Mcburney, representing CRCPD (rmcburney@crcpd.org); Jonathan Wilson, National Center for Healthy Housing, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, American Lung Association, representing American Lung Association (Kevin.Stewart@Lung.org); Tobie Bernstein, representing Environmental Law Institute (bernstein@eli.org); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com)

2021 International Building Code

Add new text as follows:

1202.7 Soil gas control systems.
Soil gas control systems shall be provided for in Group R-2 apartment buildings. Systems shall comply with ANSI-AARST CC-1000.

Add new standard(s) as follows:

AARST

American Association of Radon Scientists and Technologists
527 N Justice Street
Hendersonville, NC 28739
USA

AARST ANSI-AARST CC-1000-2018:
Soil Gas Control Systems in New Construction of Buildings

Reason: The purpose of this proposed requirement is to protect families from exposure to radon gas in apartments in multifamily buildings, which are not covered by the International Residential Code and are beyond the scope of the IRC's Appendix F.
Radon is present in indoor air everywhere, regardless of building type or radon zone. Radon-induced lung cancer takes 21,000 lives in the US each year. Chemical vapor is an increasingly documented hazard that also enters buildings from the soil. A requirement for soil gas control in multifamily housing will protect future occupants who will have no authority, capacity, or other means to address excessive radon levels in their homes. It is more efficient and cost-effective to establish soil gas control from the ground up during construction than to retrofit a structure later to seal up the interface between structure and soil and position suction points, ventilation piping and other components.

The awareness of the need to address radon in multifamily buildings is increasing. HUD's multifamily loan program (which finances construction of both market-rate and subsidized properties) requires soil gas control in all new multifamily construction according to ANSI-AARST CC-1000.[1] Several states (Illinois, Minnesota, New Jersey, Oregon, Washington) require soil gas control in the construction of multifamily buildings. Since 2017, the International Green Construction Code, in conjunction with the related standard ASHRAE 189.1, has required soil gas control in new green buildings.

The standard included in this proposal has been vetted and approved by EPA, multiple regulatory states and by HUD (as mentioned above). It can be reviewed at https://standards.aarst.org/CC-1000-2018/index.html. In 2020, an addendum to ASHRAE 189.1 - 2017 was approved to incorporate a requirement for ANSI-AARST CC-1000 to replace the standard's existing soil gas requirement.

More Background on Radon:

Epidemiological studies confirm that radon increases the risk of lung cancer in the general population. Radon is the second leading cause of lung cancer – second only to smoking – and more significant than secondhand smoke. In the US alone, 21,000 lung cancer deaths each year are caused by radon exposure. 3 The World Health Organization estimates that between 3% and 14% of all lung cancer cases worldwide are caused by radon exposure. 4 The Surgeon General of the United States issued a Health Advisory in 2005 warning Americans about the health risk from exposure to radon in indoor air. Dr. Richard Carmona, the Nation's Chief Physician, urged Americans find out how much radon they might be breathing. Dr. Carmona also stressed the need to remedy the problem as soon as possible when the radon level is 4 pCi/L or more.

Radon is a colorless and odorless gas that is a decay product of uranium and occurs naturally in soil and rock. The main source of high-level radon pollution in buildings is surrounding uranium-containing soil such as granite, shale, phosphate and pitchblende. Radon enters a building through cracks in walls, basement floors, foundations and other openings. There is no known threshold concentration below which radon exposure presents no risk. Even low concentrations of radon can result in a small increase in the risk of lung cancer.

[1] US Department of Housing and Urban Development, *Multifamily Accelerated Processing (MAP) Guide*, December 2020, page 9-36. Accessed at https://www.hud.gov/program_offices/housing/mfh/map/maphome

Cost Impact: The code change proposal will increase the cost of construction
According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260.

Staff Analysis: A review of the standard proposed for inclusion in the code, AARST CC1000-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G163-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved for consistency with the committee action on G162-21. The AARST standard has suggestive language, not enforceable language. There is no specific directions for testing and is not clear for how to comply. As written this would be required in all Group R-2 to have a radon system while maps show high risk only on specific areas. This is in the International Green Code. If jurisdictions want to require testing, this would be better in an appendix for how to comply. (Vote 14-0)

G163-21

Individual Consideration Agenda

Public Comment 1:

IBC: 1202.7 (New)

Proponents: Jane Malone, representing American Assocation of Radon Scientists and Technologists; Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, representing American Lung Association (kevin.stewart@lung.org); David Kapturowski, representing Spruce Environmental Technologies, Inc.; Thomas Bowles, representing Indoor Environments Division (bowles.thomas@epa.gov); Warren Friedman, representing Office of Lead Hazard Control and Healthy Homes (warren.friedman@hud.gov); Ruth McBurney, representing CRCPD (rmcburney@crcpd.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

<u>**1202.7 Soil gas control in Group R-2 apartment buildings .** Occupiable spaces in Group R-2 apartment buildings shall have indoor radon levels below 4 picocuries per liter (pCi/L). Radon levels shall be determined by an approved testing method. Radon levels equal to or exceeding 4 pCi/L shall be reduced by an approved mitigation method. A radon test report indicating satisfactory test results shall be provided to the code official.</u>

Commenter's Reason: This comment responds to two of the Committee's reasons by omitting the applicable ANSI standard and adding general direction to use approved methods for testing and mitigation. The requirement to deliver a compliant test report to the code official is consistent with IRC Appendix F.
Because radon has been found in buildings in all areas and thus exposes occupants in all areas to risk of lung cancer, the proposed language does not limit the requirement to only some areas.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260.

Public Comment# 2824

G164-21

Proposed Change as Submitted

Proponents: Jane Malone, American Association of Radon Scientists and Technologists, representing American Association of Radon Scientists and Technologists; Thomas Bowles, representing EPA (bowles.thomas@epa.gov); Ruth Mcburney, representing CRCPD (rmcburney@crcpd.org); Jonathan Wilson, National Center for Healthy Housing, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, American Lung Association, representing American Lung Association (Kevin.Stewart@Lung.org); Tobie Bernstein, representing Environmental Law Institute (bernstein@eli.org); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com)

2021 International Building Code

Add new text as follows:

1202.7 Soil gas control systems.
Soil gas control systems shall comply with ANSI-AARST CC1000.

Exception:
Radon control systems in one- and two-family dwellings and townhouses shall comply with Appendix F of the International Residential Code or ANSI-AARST RRNC.

Add new standard(s) as follows:

AARST

American Association of Radon Scientists and Technologists
527 N Justice Street
Hendersonville, NC 28739
USA

AARST ANSI-AARST CC1000-2018:
Soil Gas Control Systems in New Construction of Buildings

AARST ANSI-AARST RRNC 2020:
Rough-In of Radon Control Components In New Construction Of 1 & 2 Family Dwellings And Townhouses

Reason: · Several states (Illinois, Maine, Minnesota, Nebraska, New Jersey, Oregon, Rhode Island, Washington) require soil gas control in new buildings that cannot possibly be addressed through Appendix F of the International Residential Code, such as schools, child day care facilities, and multifamily housing. Even where there are no requirements, builders are including some form of soil gas control in buildings. The IBC lacks any meaningful provision to oversee soil gas control systems in larger buildings.

While an appendix has been used for this radioactive building hazard in the IRC, lack of appendix adoption in a jurisdiction has meant no enforcement on voluntary systems and no need to comply with standard practices. Placing the specification for how to build soil gas control in the body of the code does not establish a mandate for a soil gas control system; instead, it helps to ensure that those who choose, or are required by state or local policy, to include a soil gas control system adhere to the current professional standard and industry practice. The proposed new subsection 1202.7.1 will make the current standard for soil gas control in large buildings, ANSI-AARST CC-1000-2018 Soil Gas Control Systems in New Construction of Buildings, available as an enforcement tool for code officials and provide consistency among builders, architects, and developers and across jurisdictions.

Radon is present in indoor air everywhere, regardless of building type or radon zone. Radon-induced lung cancer takes 21,000 lives in the US each year. Chemical vapor is an increasingly documented hazard that also enters buildings from the soil.

It is more efficient and cost-effective to establish soil gas control from the ground up during construction than to retrofit a structure later to seal up the interface between structure and soil and position suction points, ventilation piping and other components.

The exception allows the use of Appendix F of the IRC, or the applicable current consensus standard ANSI-AARST RRNC 2020, for one- and two-family homes.
'he standards included in this proposal have been vetted and approved by EPA, multiple regulatory states, and HUD. In 2020, an addendum to ASHRAE 189.1 - 2017 was approved to incorporate a requirement for ANSI-AARST CC-1000 to replace the standard's existing soil gas requirement. The CC-1000 standard is posted for public access at **https://standards.aarst.org/CC-1000-2018/index.html.**

This proposal is one of six proposals that have been submitted to increase protection from radon this year. The following is noted to clarify how these proposals are inter-related.

Each proposal stands on its own, and It is the proponents' intent that:

(1) If all three proposed additions to Chapter 12 of the IBC (covering Method of soil gas control, educational building requirements, and apartment house requirements) are approved, they would be renumbered in a single new section that would read:

1202.7 Soil gas control systems. Soil gas control systems **s**hall comply with ANSI-AARST CC-1000.

Exception: Radon control systems in one- and two-family buildings shall comply with Appendix F of the International Residential Code or ANSI-AARST RRNC**.**

1202.7.1. Apartment houses. Soil gas control systems shall be provided for in Group R-2 apartment buildings.

1202.7.2. Educational buildings. Soil gas control systems shall be provided for in Group E educational buildings.

(2) If the IBC Chapter 12 proposals for apartment buildings and educational buildings are approved but not the Method one, these would be renumbered in a single new section that would read:

1202.7 Soil gas control systems. Soil gas control systems as required below shall comply with ANSI-AARST CC-1000.

1202.7.1. Apartment houses. Soil gas control systems shall be provided for in Group R-2 apartment buildings.

1202.7.2. Educational buildings. Soil gas control systems shall be provided for in Group E educational buildings.

(3) If the IBC Method proposal (new section 1202.7) is approved, the proposed Appendix to the IBC would be redundant.

(4) The proposed revision to IMC Section 512 is not redundant with the Method proposal (IBC proposed new section 1202.7) but instead ensures that the IMC and IBC are consistent and correlated about soil gas control.

Cost Impact: The code change proposal will increase the cost of construction
This proposal does not add a requirement to install a radon control system. The proposal will add incremental cost to construction where radon control systems are installed if the builder is not already following the standard practice.
According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260. The cost of a system for a nonresidential commercial building will range from $2500 to higher depending on the footprint, volume and type of HVAC system.

Staff Analysis: A review of the standard proposed for inclusion in the code, AARST RRNC-2020 and AARST CC1000-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G164-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved based on the committee action on G162 and G163. The AARST standard has suggestive language, not enforceable language. There is no specific directions for testing and is not clear for how to comply. (Vote 14-0)

G164-21

Individual Consideration Agenda

Public Comment 1:

IBC: 1202.7 (New)

Proponents: Jane Malone, representing American Assocation of Radon Scientists and Technologists; Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, representing American Lung Association (kevin.stewart@lung.org); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com); Thomas Bowles, representing Indoor Environments Division (bowles.thomas@epa.gov); Warren Friedman, representing Office of Lead Hazard Control and Healthy Homes (warren.friedman@hud.gov); Ruth McBurney, representing CRCPD (rmcburney@crcpd.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

1202.7 Soil Gas Control . Where a soil gas control system is provided, occupiable spaces shall have indoor radon levels below 4 picocuries per liter (pCi/L). Radon levels shall be determined by an approved testing method. Radon levels equal to or exceeding 4 pCi/L shall be reduced by an approved mitigation method. A radon test report indicating satisfactory test results shall be provided to the code official.

Commenter's Reason: This section would only apply where a soil gas control system is specified. This comment responds to Committee reasons by omitting the applicable ANSI standard and adding general direction to use approved methods for testing and mitigation. The requirement to deliver a compliant test report to the code official is consistent with IRC Appendix F.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal does not add a requirement to install a radon control system.
The proposal will add incremental cost to construction where radon control systems are installed if the builder is not already following approved methods.
According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260. The cost of a system for a nonresidential commercial building will range from $2500 to higher depending on the footprint, volume and type of HVAC system.

Public Comment# 2825

G165-21

Proposed Change as Submitted

Proponents: Tom Zaremba, representing Glazing Industry Code Committee (tzaremba@ralaw.com); Nicholas Resetar, Roetzel & Andress, representing National Glass Association (nresetar@ralaw.com)

2021 International Building Code

1204.1 General. Every space intended for human occupancy shall be provided with natural light by means of exterior glazed openings in accordance with Section 1204.2 or shall be provided with artificial light in accordance with Section 1204.3. Exterior glazed openings shall open directly onto a *public way* or onto a *yard* or *court* in accordance with Section 1205.

Add new text as follows:

1204.1.1 Classrooms.
In Group E occupancies, not less than 50 percent of all classrooms shall be provided with natural light in accordance with Section 1204.2. Artificial light in accordance with Section 1204.3 shall be permitted but shall not substitute for natural light.

Reason: The lighting requirements of Section 1204.1 are acceptable for most occupancies. However, classrooms in Group E-Occupancies are different from any other Occupancy type. Classrooms in E-Occupancies are used primarily for teaching children. During the long hours they spend in classrooms, children are not only learning, but their brains and psychological makeups are developing. To maximize their learning and growth potentials, children **need** natural daylight in classrooms where they are growing and being taught. For example, one study conducted over a one-year period found that both testing and behavioral outcomes are markedly improved when classrooms use natural light. It found that children in classrooms with natural daylighting progressed 20% faster on math testing and 26% faster on reading testing. The research also found that classrooms that provided students with greater amounts of natural light correlated to a 15% to 23% overall improvement in academic outcomes. Research clearly shows that children in classrooms need natural daylight for optimal development and performance. The adoption of this proposal will ensure that children attending class in our schools will have the best possible opportunity to grow and develop in classrooms lit by the natural light of the sun.

In the 2019 Group A development cycle, a similar proposal was brought forward. While the Committee was supportive of the concept, the proposal was, ultimately, unsuccessful. This proposal is different from the unsuccessful 2019 proposal. First and foremost, since it is unlikely that all classrooms can be located on exterior walls where natural daylight is easily accessed, this proposal limits its natural daylighting mandate to 50% of classrooms. Second, this proposal does **not** include I-4 Occupancies. Finally, this proposal is only intended to apply to new construction, not to any existing E-Occupancies.

Bibliography: Green Building Consultants - (The Benefits of Daylighting in Your Building) https://sigearth.com/the-benefits-of-daylighting-in-your-building/.
National Renewable Energy Laboratory - "Daylighting in Schools: Improving Student Performance and Health at a Price Schools Can Afford" - https://digital.library.unt.edu/ark:/67531/metade712249/

Journal of Educational and Instructional Studies in the World - "Impact of Daylighting on Student and Teacher Performance" - https://www.researchgate.net/publication/301284909_The_impact_of_daylighting_in_classrooms_on_students'_performance

International Conference on "Health, Biological and Life Science" - "Natural Light and Productivity: Analyze the Impacts of Daylighting on Students' and Workers' Health and Alertness" - http://scholar.google.com/scholar_url?
=https://www.researchgate.net/profile/Nastaran_Shishegar/publication/303484362_Natural_Light_and-Productivity_Analyzing_the_impacts_of_daylighting_on_students%27_and_Workers%27_Health_and_Alertness/links/5744aa1608ae9f741b407f8f.pdf&
Ny9YPt6-10Ac&scisig=AAGBfm3QfVcmePDtLnHQ4m1DJyCGZ9b2tA&noss1=1&oi=sch10Ac&scisig=AAGBfm3QfVcmePDtLnHQ4m1DJyCGZ9v2tA&noss1=1&

National Renewable Energy Laboratory - "A Literature of the Effects of Natural Light on Building Occupants" - http://scholar.google.com/scholar_url?url=https://www.osti.gov/servlets/purl/15000841&h1=en&sa=X&ei=3y3eX9aOK4fPmAGK94aACg&scisig=AAGBfm25rM8uusi4kS6H9KOyrtAUVr7FrQ&

Miassar Mohammed Bakri - University of Nottingham - "Daylighting Strategies in Educational Spaces" - https://www.researchgate.net/publication/288181980_DAYLIGHTING_STRATEGIES_IN_EDUCATIONAL_SPACES

Angela Read - Rochester Institute of Technology - "Integration of Daylighting into Educational (School) Building Design for Energy Efficiency, Health Benefit, and Mercury Emissions Reduction Using Heliodon for Physical Modeling" - http://scholarworks.rit.edu/cgi/viewcontent.cgi?article=10826&context=theses

Cost Impact: The code change proposal will increase the cost of construction
This proposal could increase the cost of construction if additional windows must be added to the building's exterior in order to comply with the proposal.

Staff Note: G165-21 and G166-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G165-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. Use of windows for light versus artificial light is a designers choice and not a minimum requirement that deals with health, safety or welfare. Natural light also varies based on time of the day, day of the year and weather. The improvements in test scores indicated in the reasons is suspect - if this is true why were there no school representative testifying? Requiring windows could conflict with the energy code requirements. G128-18 asked for 100% of classrooms - this is not better. The language could be read to also include all day care classrooms or school classrooms such as music rooms (acoustics concerns), shops and gyms. There is also the question if this would be applied to a change of occupancy, even in current school buildings being reconfigured. (Vote: 14-0)

Staff Analysis: G165-21 and G166-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G165-21

Individual Consideration Agenda

Public Comment 1:

IBC: 1204.1.1, 1204.3

Proponents: Thomas Culp, representing representing self and the Aluminum Extruders Council (culp@birchpointconsulting.com); Nicholas Resetar, representing Glazing Industry Code Committee (nresetar@ralaw.com); Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org); Tom Bratten, representing Stow-Munroe Falls, OH City School District (st_tbratten@smfcsd.org) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

1204.1 General . Every space intended for human occupancy shall be provided with natural light by means of exterior glazed openings in accordance with Section 1204.2 or shall be provided with artificial light in accordance with Section 1204.3. Exterior glazed openings shall open directly onto a *public way* or onto a *yard* or *court* in accordance with Section 1205.

1204.1.1 Classrooms . In Group E occupancies, not less than 50 percent of all classrooms shall be provided with both natural light in accordance with Section 1204.2~~.~~ and artificial ~~Artificial~~ light in accordance with Section 1204.3~~ shall be permitted but shall not substitute for natural lightlight.~~

Exception:

1. Day care facilities within a different primary occupancy are not required to comply with this section.
2. Existing buildings undergoing alterations or a change of occupancy are not required to comply with this section.

1204.3 Artificial light . Artificial light shall be provided that is adequate to provide an average illumination of not less than 10 footcandles (107 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

Commenter's Reason: This public comment addresses issues raised by committee members and testifying opponents at the Committee Action Hearing by clarifying that the revised language only applies to newly constructed educational buildings and does not seek and/or intend to displace the use of artificial light. In addition, this public comment directly satisfies the Committee’s concern that, despite numerous peer reviewed scholarly articles, no educators supported this proposal or confirmed the positive benefits to students related to the exposure to natural light and views. After voting to disapprove this proposal, the Committee commented that the utilization of natural or artificial light in schools should be left to a designer because this choice does not affect health, safety, or welfare. With all due respect to the Committee, exposing students to natural light and views empirically and quantifiably increase students' reading and math test scores, significantly improves academic outcomes, and promotes their behavioral and psychological wellbeing. These effects clearly relate to students' health, safety, and welfare. This phenomenon is even more pronounced as the COVID-19 pandemic exposed the pitfalls of subjecting students to less than optimal learning environments.

The Committee expressed concern that if these positive benefits were indeed real and substantial, educators should weigh in to confirm. In that regard, Superintendent Tom Bratten of Stow-Munroe Falls, Ohio City School District, a Northeast Ohio school district of over 5,100 students, agrees that additional daylighting and views is very beneficial not only to students, but educators alike. Anecdotally, Mr. Bratten confirms the findings of the various studies and academic literature as he has experienced the benefits of natural daylight and views firsthand. Mr. Bratten explains that, in an area with long winters and frequently dreary conditions, it is imperative that students and educators are exposed to natural light as often as possible. In fact, Mr. Bratten has advised that he fields requests for and is routinely looking for additional educational space that provides natural light and views. Mr. Bratten also believes, as an educator, that natural daylight in newly constructed schools should not be left to the decision of a single designer, but rather mandatory for benefit of all.

This public comment also addresses concerns raised by two prior opponents (who are now in support) that the original proposal could be misinterpreted to reduce or limit the use of artificial light, even though that was not the intent. This public comment clarifies the language in 1204.1.1 and 1204.3 to ensure that both artificial lighting and natural lighting will be provided.

Finally, the modified code language clarifies that it does not apply to daycare facilities within other building types such an office building, and that it would not apply to existing buildings or reconfigured spaces. As shown in the table below, the intended application is for new stand-alone educational buildings. Furthermore, only requiring compliance for 50% of classrooms provides the necessary flexibility for cases identified by the committee such as music rooms, shops, and gyms.

Example	Covered?
New stand-alone school building	**Yes**
New stand-alone daycare building	**Yes**
Existing buildings and reconfigurations	No
Training center / tutoring center in an office building or strip mall (classified as Group B)	No
Classroom in church (classified as Group A-3)	No
Daycare in church (classified as Group A-3)	No
Daycare in office building (primary occupancy is Group B)	No
Daycare in home or apartment complex (primary occupancy is Group R)	No

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
The code change proposal will increase the cost of construction in the event glazing and/or glass construction materials are more costly than the alternative.

Public Comment# 2751

G170-21

Proposed Change as Submitted

Proponents: Cesar Lujan, National Association of Home Builders, representing National Association of Home Builders (clujan@nahb.org)

2021 International Building Code

1206.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent *dwelling units* and *sleeping units* or between *dwelling units* and *sleeping units* and adjacent public areas.

1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50 where tested in accordance with ASTM E90, or have a Normalized Noise Isolation Class (NNIC) rating of not less than 45 if field tested, in accordance with ASTM E336 for airborne noise. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

1206.2.1 Masonry. The sound transmission class of concrete masonry and clay masonry assemblies shall be calculated in accordance with TMS 302 or determined through testing in accordance with ASTM E90.

Revise as follows:

1206.3 Impact Sound Transmission. Floor-ceiling assemblies between*dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50 where tested in accordance with ASTM E492, or have a Normalized Impact Sound Rating (NISR) of not less than 45 if field tested in accordance with ASTM E1007. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.

> <u>**Exception:** Floor/ceiling assemblies between a dwelling unit or sleeping unit and a public or service area shall not be required to have an impact insulation rating, or have a normalized impact sound rating (NISR), where the ambient noise within any public or service space will be unaffected by impact noise from the dwelling unit or sleeping unit above.</u>

Reason: Normalized Impact Sound Ratings (NISR) and impact insulation class (IIC) rate the structure-borne impact sound transmission between floor/ceiling assemblies, such as the sound of an object dropping on a floor. Impact sounds between dwelling units is mitigated by the requirements of the current code language to protect inhabitants from unwanted impact noise, as is airborne sound from adjacent spaces. Theoretically, an impact sound from a *dwelling unit* or *sleeping unit* would minimally affect a public or service area below since those spaces are either occupied and have various levels of noise from occupants/users (public area) or are not occupied spaces (service area). Examples include, but are not limited to arcades, bowling alleys, and other commercial and business uses.
This code change would only affect the requirements for impact sound and not the airborne sound requirements The airborne sound requirements in Section 1206.2 for floor/ceiling assemblies shall still apply to protect *dwelling units* and *sleeping units* located above a public or service area from sound transmission created by airborne sounds (i.e. sound from appliances, tv's, talking, etc).

Cost Impact: The code change proposal will decrease the cost of construction

The structure-borne sound requirements for floor/ceiling assemblies between *dwelling units* or *sleeping units* with public or service areas below, cost an average between $8,000 to $15,000 per dwelling unit if an IIC rating or NISR rating is required. The added exception is proposed language that would only affect the floor/ceiling assemblies where a dwelling unit or sleeping unit is located above a public or service area.

G170-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the exception as written would be difficult to uniformly enforce and is too broad and ambiguous . Who would determine the allowance? How would the code official determine this if there is no planned tenant at the time of construction, or the tenant changes over time? (Vote: 12-1)

Individual Consideration Agenda

Public Comment 1:

IBC: 1206.3

Proponents: Cesar Lujan, representing National Association of Home Builders (clujan@nahb.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

1206.3 Impact Sound Transmission . Floor-ceiling assemblies between*dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50 where tested in accordance with ASTM E492, or have a Normalized Impact Sound Rating (NISR) of not less than 45 if field tested in accordance with ASTM E1007. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.

> **Exception:** Floor/ceiling assemblies between a dwelling unit or sleeping unit and a public or service area shall not be required to have an impact insulation rating~~, or have a normalized impact sound rating (NISR), where the ambient noise within any public or service space will be unaffected by impact noise from the dwelling unit or sleeping unit above.~~

Commenter's Reason:
The intent of the original proposal was to address the impact sound requirements of the floor/ceiling assembly between a dwelling or sleeping unit and a public or service area in order to reduce the cost of the required IIC rating, which ranges between $8,000 to $15,000 per dwelling unit. An exception was added that would not require an IIC rating for the floor/ceiling assembly when a dwelling unit is located above a public/service space below. The exception would only apply to the IIC rating for impact noise and not the sound transmission requirements for airborne sound.

The Code Action Committee expressed concern that part of the proposed exception was ambiguous and unenforceable since it would require a code official to judge which public/service tenants would occupy a commercial space at any given time, how they may be affected by impact noise from the dwelling unit above, and when the exception would apply.

This public comment modifies the proposed exception to remove the ambiguous language since it would be difficult to enforce, and to state that floor/ceiling assemblies between a dwelling unit or sleeping unit and a public or service area shall not be required to have an impact insulation rating. This would put the responsibility on the public/service tenant to provide and install noise control and sound isolating products in the ceiling assembly when needed and prior to occupancy.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
The proposed change in this public comment would reduce the cost of the required IIC rating, which ranges between $8,000 to $15,000 per dwelling unit.

Public Comment# 2698

G172-21

Proposed Change as Submitted

Proponents: Jake Pauls, representing Myself (bldguse@aol.com)

2021 International Building Code

Add new definition as follows:

STANCHION. An often vertical, tubular structure serving as a hand-grasped, point of control that is fixed between separate supporting structures such as surfaces or other railings, as opposed to being mounted, in cantilever fashion, on walls as occurs with conventional grab bars.

Add new text as follows:

1210.3 Grab bars and stanchions at bathtubs and showers in Groups R-1, R-2, R-3 and R-4.
Bathtubs in Groups R-1, R-2, R-3 and R-4 occupancies shall be provided with grab bars or stanchions complying with Section 1210.3.1, 12010.3.2 and 12010.3.4. Showers in Groups R-1, R-2, R-3 and R-4 shall be provided with a grab bar or stanchion complying with Section 1210.3.3 and 1210.3.4.

Exception:
Accessible units complying with ICC A117.1 Section 1102.11 are not required to comply with this section.

1210.3.1 Grab bar or stanchion at the access side to bathtubs and shower/bathtub combinations.
A grab bar or stanchion shall be provided at the access side to each bathtub and shower/bathtub combination in accordance with Section 1210.3.1.1 or 1210.3.1.2. Location dimensions, except as provided for spacing in Section 1210.3.4.2, are to the centerline of the grab bar or stanchion at the fixed end of its graspable tubing component complying with Section 1210.3.4.1.

1012.3.1.1 End wall grab bar.
A vertical grab bar on one end wall of the bathtub shall be provided between 9 inches (230 mm) and 12 inches (305 mm) horizontally, inward from the access side of the bathtub. The grab bar shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum above the finished floor.

1012.3.1.2 Bathtub access side, grab bar or stanchion.
A vertical grab bar or a vertical stanchion shall be provided within 2 inches (51 mm) maximum inward, and within 6 inches (152 mm) maximum outward, from the access side of the bathtub. The grab bar or stanchion shall be located 2 inches (51 mm) minimum, horizontally, from the centerline of any shower curtain rod installation. The grab bar or stanchion shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum above the finished floor.

1210.3.2 Grab bar and stanchion at the back wall, or non-access side, of bathtubs and shower/bathtub combinations.
A grab bar or stanchion shall be provided on the back wall, or non-access side of each bathtub and shower/bathtub combination in accordance with Section 1210.3.2.1 or 1210.3.2.2. Location dimensions, except as provided for spacing in Section1210.3.4.2, are to the centerline of the grab bar or stanchion at the fixed end of its graspable tubing component complying with Section 1210.3.4.1.

Exception:
For relatively deep bathtubs, where the required centerline height for the overall or lower end height exceeds 24 inches (610 mm) above the adjacent finished floor elevation, the centerline height shall be permitted to be 3 inches (76 mm) maximum above the bathtub rim height.

1210.3.2.1 Horizontal grab bar or stanchion.
A grab bar 36 inches (910 mm) minimum in length, centered, plus or minus two inches (51 mm), along the length of the bathtub, or a full-length stanchion installed between end walls. Its height above the bathtub rim shall be 8 inches (203 mm) minimum and 10 inches (255 mm) maximum.

1210.3.2.2 Diagonal grab bar.
A grab bar shall be installed in a diagonal position with its angle, to horizontal, 30 degrees minimum and 60 degrees maximum. The diagonal grab bar shall have the higher end located 12 inches (305 mm) maximum from the control end wall, measured horizontally. The lower end shall be 8 inches (203 mm) minimum and 10 inches (255 mm) maximum above the bathtub rim.

1210.3.3 Grab bar or stanchion at the access to showers.
A grab bar or stanchion shall be provided for the shower in accordance with Section 1210.3.3.1 or 1210.3.3.2. or 1210.3.3.3. Location dimensions, except as provided for spacing in Section 1210.3.4.2, are to the centerline of the grab bar or stanchion at the fixed end of its graspable tubing component complying with Section1210.3.4.1.

1210.3.3.1 At shower exterior.
A vertical grab bar or stanchion shall be provided outside of the shower compartment, adjacent to the access opening. The grab bar or stanchion shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum, measured vertically above the finished floor.

1210.3.3.2 For smaller shower interior.
For showers with interior plan dimensions, including diagonally between corners, 51 inches (1295 mm) maximum, a vertical grab bar shall be provided, interior to the shower compartment, 30 inches (762 mm) maximum, measured horizontally from the control wall on the side closest to the access opening. The grab bar shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum, measured vertically above the finished floor outside the shower.

1210.3.3.3 For larger shower interior.
For showers with any interior plan dimensions exceeding 51 inches (1295 mm), including diagonally between corners, a grab bar or stanchion located interior to the shower compartment shall be 30 inches (762 mm) maximum, measured horizontally to the access to the shower. If oriented vertically, the grab bar or stanchion shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum, measured vertically above the finished floor outside the shower. If oriented horizontally, the grab bar or stanchion shall have a length 36 inches (915 mm) minimum at a height, measured vertically above the finished floor outside the shower, of 48 inches (1220 mm) minimum and 60 inches (1524 mm) maximum.

1210.3.4 Grab bar and stanchion requirements.
Grab bars and stanchions, shall comply with Section 1210.3.4.1 through 1210.3.4.5.

1210.3.4.1 Cross section.
Grab bars and stanchions shall have a cross section complying with one of the following:

1. A circular cross section with an outside diameter of 1-1/4 inch (32 mm) minimum and 2 inches (51 mm) maximum.
2. A noncircular cross section complying with ICC A117.1.

1210.3.4.2 Spacing.
The space between a grab bar or stanchion and any adjacent surface, including the closest surfaces of fixed, sliding or swinging panel enclosure system provided to prevent water migration on the access side of a bathtub or shower, shall be 1-1/2 inches (38 mm) minimum.

1210.3.4.3 Surface Hazards.
Grab bars or stanchions and adjacent surfaces shall be free of sharp or abrasive elements. Edges shall be rounded.

1210.3.4.4 Structural characteristics.
Grab bars and stanchions shall be designed and constructed for the structural loading conditions set forth in Section 1607.9.2.

1210.3.4.5 Moisture.
Grab bars and stanchions, including mountings, shall be installed and sealed, or provided with permanent drainage such as weep holes for components subject to water intrusion, to protect structural elements from moisture.

Reason: SECTION 202. DEFINITIONS: Stanchion.
An often vertical, tubular structure serving as a hand-grasped, point of control that is fixed between separate supporting structures, surfaces or other railings as opposed to being mounted, in cantilever fashion, on walls as occurs with conventional grab bars.

Brief Introduction to, and Demonstrating Use of, Stanchions and Points of Control. Stanchions have a long history beginning—especially in a facility safety engineering sense—with transportation vehicles such as buses and many intensive-occupancy trains.

See examples below of early stanchions dating back about 100 to 200 years, as photographed in 2018 at the London Transport Museum in London. The first example is of one of the earliest stanchions, likely a wrought iron, vertically-oriented rod, on a horse-drawn, omnibus carrying up to 22 passengers. Next to it are examples of stanchions dating back about 100 years and, at the right side, about one year ago, in a Canadian light rail train car.



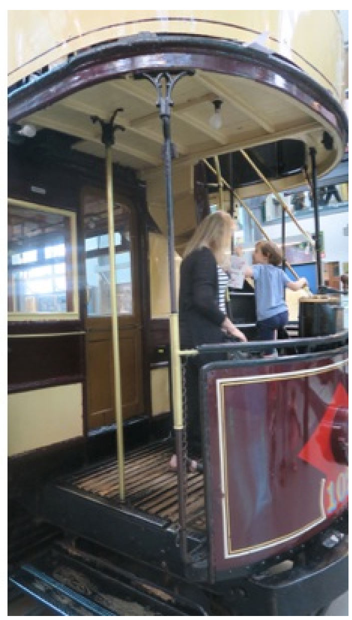
Not very long after the first example, such vehicles started carrying passengers on the roof level reached by a ladder in relatively rare examples and soon a helical stair became quite standard with relatively good railings on each side.

The central handrail for such helical stairs was often a nearly straight, vertical stanchion. Stair steps had more than a 50-degree pitch at the center of the stair width with risers sometimes well over a foot in height.

They were well equipped with handholds which were used by ascending and descending passengers often with three Points of Control, e.g., both hands on railings to either side and at least one foot planted on the small treads.

The sequence of photos below demonstrate not just the range of numbers of Points of Control achieved by adults and children on one of the historic trams (about a hundred years old) in the London Transport Museum. When examined carefully, the photos bring new realizations of what typical users of facilities provided with stanchions do with them and what that means for the technical details we will see in this proposal for grab bars and stanchions in the IBC.





The woman at the right is traversing a step height of 16 inches, as is the young boy. This is comparable to what is needed to step up and over a bathtub wall.

Stanchions predate the relatively recent conventional, wall-mounted grab bars (for which an early example is installed on the tram's end wall adjacent to the woman's left arm. Note that the woman has chosen to grasp a point on the stanchion, with her right hand, at a height that would be at the top of the very short-length grab bar and thus only marginally useful with her left hand.

The people in the sequence of photographs (above) taken at the London Museum, include a very young boy and his mother, traversing two steps each in excess of one foot rise—indeed, the second step is has a full 16 inch (406 mm) rise. Note the young boy's most-effective handholds are at the elevation of his head; both children and adults instinctively know how high the more effective points of control are. (Now if adults drafting and applying point of control would only apply the same lessons learned early in life at about age 12 months.) Moreover the boy maintains a minimum of three points of control in both ascent and descent—*to the full extent the available railings—mostly vertical stanchions—allow.* I was able to capture images of children, as well as some adults using the railings with the precarious underfoot challenges (comparable in a way to what bathers need to do). Note these photos were not staged in any way; the are completely spontaneous with absolutely no communication between camera operator and subjects photographed who were unaware of the photography.

The boy, shown in his ascent of the both stairs leading to the upper level seating, would have had difficulty if he had attempted to use the short grab bar instead of the full-length stanchion. He would only have been able to reach the grab bar from a position on the first tread, not from the ground level. Both of his hands are grasping a stanchion in the first photo; his left hand is at about the elevation of his head (and thus hidden from the camera's view). You can see this is the situation shown in the last of the three photos; his left hand is reaching for a head-height grasp on a stanchion to his left while his right hand is at about his shoulder height.

An important lesson, from the photo sequence above, is that stanchions provide more options for placement and more options for users to choose the points of control they perceive as important to their task and safety. In other words ordinary people, even of young age, are displaying skill in ergonomics (the science and technology of how people utilize things, systems, etc. available to them to perform tasks efficiently and safely).

Now, for purposes of this IBC proposal, along with grab bars, it should be clear that stanchions are reliable, indeed superior, time-tested means of providing for "points of control" and they provide options for location and length that greatly exceed what conventional grab bars can provide.

Comparing Points of Control Quantitatively.

Grab bars, handrails and stanchions are important building components (and some mobility aids such as walkers) providing—in combination with our hands and our feet—what are called (in ergonomics) "points of control" to maintain balance and aid in ambulation and other movement activities that are crucial to utilizing means of egress, for example, for safety generally (in both normal and emergency conditions) and which pose dangers of injurious falls, the leading source of injuries in most countries, including the USA.

Regarding ergonomics as a basis for regulating movement task safety, today, three points of control are the minimum acceptable standard for occupational settings in the USA for ladders, etc., including the minimal footholds and handholds that truck drivers (accessing and leaving their high-off-the-ground truck cabs) have learned to climb up and down safety by exercising, continuously, provision of three points of control; i.e., with only one extremity (or four) in motion at any one time. The table below describes the full range of points of control provided in several contexts.

Number of Points of Control Via Hands or Feet	≤1	1	2	3	3-4
Standard walker for older adult with altered gait.					✔
Occupational settings with risk of worker falls from heights. Also, stairs where users can use two handrails simultaneously, one on each side.				✔	
Stairs where users have only a single handrail. ***Grab bar(s) usable for bathtub/shower entry/egress.***			✔ ★		
Bathtubs/showers with slip resistant underfoot surfaces when wet.		✔			
Bathtubs/showers without slip resistant underfoot surfaces when wet, the common condition currently.	✔				

Having introduced some key terminology related to Points of Control, we move to the proposal for a new Section of requirements for the International Building Code in which, currently, the requirements for points of control for bathing and showering facilities exist in the lower left corner of the Table shown above. The proposal of several new requirements follows next, along with supplementary text expanding on what is being required, how the requirements can be implemented, and what are the benefits and costs of doing so (as NFPA 101 plus NFPA 5000) have been doing since 2018 and the *National Building Code of Canada* has parallel new requirements proposed (and formally, publicly reviewed) for its 2020 edition (which is slated for publication later in 2021, a delay brought on by the COVID-19 pandemic).

IBC SECTION

1210

TOILET AND BATHROOM REQUIREMENTS

. . . .

1210.3 Grab bars and stanchions at bathtubs and showers in Groups R-1, R-2 R-3 and R-4. Bathtubs in Groups R-1, R-2, R-3 and R-4 occupancies shall be provided with grab bars and/or stanchions complying with Section 1210.3.1, 12010.3.2 and 12010.3.4. Showers in Groups R-1, R-2, R-3 and R-4 shall be provided with a grab bar or stanchion complying with Section 1210.3.3 and 1210.3.4.

Exception: Accessible units complying with ICC A117.1 Section 1102.11 are not required to comply with this section.

A separate proposal for the IBC is being submitted as a "fall back" in the event ICC members are unhappy with these new requirements for grab bars and stanchions. It references the current requirements, for grab bars and stanchions, in NFPA 101 (and 5000), 2021 edition, after being first published in their 2018 editions. The NFPA requirements include broader scoping that extends what is proposed here for residential and includes all the residential settings listed here for the IBC as well as for the IRC which will be addressed in ICC's Group B proposal review in 2022 (also for the 2024 edition for which this scoping is proposed for the IBC).

The largest number of approximately one million-plus professionally treated injuries annually in the USA, arising from fall events in bathing and showering facilities occur in residential settings.

See the extract from the best recent published paper on injury epidemiology involving consumer products, including the top two—stairs and bathtubs/showers—that are (or should be) regulated with improved building code requirements. The table below is extracted from Table 2 in the publication: Lawrence B, Spicer R, Miller T. A fresh look at the costs of non-fatal consumer product injuries. *Injury Prevention* 2015; **21**:23-29. It shows products that are covered by building codes; this accounts for the omission, in this extract, of products ranked between 13 and 27.

Note that the "bathtubs/showers" category does not include "Toilets" which has its own data; neither does the "bathtubs/showers" category include scald-related injuries for which CPSC/NEISS has a separate coding.

Table 2 Leading products involved in injury, ranked by non-fatal injury cost, 2009–2010 (2009 dollars)

Rank	Product	Annual total cost ($)	Percentage	Annual incidence	Mean cost ($)
1	Stairs	92 294 000 000	10.1	1 231 619	74 937
2	Floors	81 233 000 000	8.9	941 296	86 299
3	Beds	44 192 000 000	4.9	612 658	72 131
4	Bicycles	38 898 000 000	4.3	536 360	72 521
5	Football	27 127 000 000	3.0	467 575	58 016
6	Basketball	25 677 000 000	2.8	508 167	50 529
7	Chairs	22 377 000 000	2.5	335 180	66 761
8	Bathtubs/showers	19 723 000 000	2.2	262 849	75 037
9	Ladders	18 662 000 000	2.1	179 195	104 144
10	Exercise (w/o equipment)	16 135 000 000	1.8	211 682	76 224
11	Doors	15 914 000 000	1.7	334 868	47 522
12	Ceilings and walls	15 545 000 000	1.7	288 755	53 833
28	Toilets	6 691 000 000	0.7	77 675	86 145

The available data from US CPSC NEISS (National Electronic Injury Surveillance System) are not fine grained enough to assign injuries to the subgroups of R1, R2, R3, and R4 occupancies (along with the likely biggest culprit, one and two-family dwellings). Injury treatment professionals (who provide the basic data collection for NEISS) are already too busy and not trained in the arcane topic of occupancy classification to provide the fine-grained location data some might like to have. (The current COVID pandemic means this shortcoming is even more pronounced.)

Thus, more-basic criteria based on etiology, epidemiology, ergonomics and economics must be used. To make a long complex story short, the public health approach has to be founded on basic equity we deserve, with this daily or otherwise frequent exposure to dangers of baths and showers.

The most dangerous aspect of “exposure to dangers of baths and showers” occurs in only a relatively few seconds—the transfers into and out of bathtubs and showers, unlike exposure to stairs which accounts for many seconds per day per person. Thus exposure to injury per use, e.g., only as much as an average one bathtub or shower use per day per residential occupant must be recognized.

With such correction for exposure, the injury risk for bathtubs/showers is in the same league as stairs. This is the most important factor to be kept in mind when considering the scoping for the new grab bar and stanchion requirements, the sole focus of IBC section 1210.3. Moreover, as is clear in the epidemiological data provided with a breakdown by age of injured people.

Like all good public health practice, this includes a focus on two topics: epidemiology (incidence of injuries, for example, in the population) and etiology (causes of, and contributing factors to, injuries—our focus here). Etiology is substantially linked to the ergonomics involved in bathing, showering and the injury incidents associated with each due to two major factors, points of control and underfoot conditions.

This latter topic, *underfoot conditions*, is beyond the scope of the this proposal and, moreover, is currently most effectively addressed with non-IBC interventions, partly because the plumbing industry is even less well equipped, technologically, to address underfoot conditions, including slipping within, and in the vicinity of, bathtubs and showers.

Beyond the scope of this IBC change proposal are non-code solutions for solving the slipping problem at extremely modest cost and bather effort; this involves having a wet terry cloth towel between a bather’s feet and the bathtub or shower’s underfoot surface. This works more reliably than does almost any attempt to have an inherent slip-resistant surface manufactured into the underfoot bathtub or shower surface for which, the proponents extensive worldwide travels are very, very rarely found, for example, in hotel guest room bathrooms. If hotel operators, who are relatively risk conscious, cannot reliably provide slip-resistant bathing surfaces, what can we expect of ordinary residential occupants or building officials, very few of whom are sufficiently expert on slip resistance.

See the fourth framed figure, a table with fine-grained analysis, of CPSC/NEISS data for a 4-year period, by the Pacific Institute for Research and Evaluation, PIRE, reproduced below—as part of a set of 13 selected slides from the proponent’s presentation at a world congress on ergonomics in 2018. This is very relevant to the issue of scoping of these proposed IBC requirements.

In relation to the 2018 presentation, solutions to the ergonomics challenges of bathing and showering safety were addressed by the proponent in a 2018 publication as well as the related presentation delivered at the (latest) 20th Triennial Congress of the International Ergonomics Association which are provided, to the extent possible this proposal. The citation to the formally published paper is:

Pauls, J. and Johnson, D.A. (2018). **Applying Ergonomics to Bathing Safety: Including adoption of unorthodox practices for slip-resistant underfoot surfaces of bathtubs plus showers and provision of effective points of control.** *Proceedings of the 20th Congress of the International Ergonomics Association (IEA2018),* Vol II, Springer, pp. 486-500.

To provide an overview of this scientific paper and full presentation on the ergonomics and epidemiology of the problem this proposal addresses, here follow 13 of the proposal-relevant slides from the 26 PowerPoint slides used in the formal presentation by the lead author (the proponent of this proposal) in Florence, Italy, in 2018. The full presentation can be delivered, at no cost, to any ICC Chapter in a one-hour Webinar by contacting Jake Pauls at bldguse@aol.com. Here follows a selection of the slides from 2018 to introduce the very large background for the full proposal. Presenting them here provides better readability for this proposal.

Applying Ergonomics to Bathing Safety:

Including adoption of unorthodox practices for slip-resistant underfoot surfaces of bathtubs plus showers and provision of effective points of control

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1. Introduction to Epidemiology, Etiology and Economics of the Problem

. . . . Falls are a typical mechanism leading to injuries, many of which occurred with bather movement before, during and after bathing when combinations of four key dangers are present:

- Geometry of the impediments over which one must transfer (e.g., bathtub walls and high sills for dedicated showers)
- Hard, unforgiving surfaces
- Insufficient, effective points of control
- Slippery underfoot surfaces.

Showers & Tubs More Dangerous than Stairs per Unit of Exposure

. . . . A single step into or out of a bathtub imposes a higher risk of a misstep and fall than occurs in a person's typical single step on stair flight—which entails moving ones foot the height of two risers. Each entails traversing about 400 mm vertically. . . .

Growth of bathing-related falls versus those associated with stairs.

Bath and shower-related injuries in the US grew in the two decades between 1991 and 2010 by a factor of two for those resulting in an ED visit and by a factor of three for those resulting in hospital admission after first going to the ED.

For 2010, in the USA, there were about 263,000 ED-treated injuries associated with bathtubs and showers and about one million treated by medical personnel in all settings. . . . Toilet use involves some similar transfer issues to bathing with comparable mitigation measures, namely improving points of control. . . . Vulnerability of older adults [with their non-voluntary exposure] leads to larger proportions of older person injuries from toilet use [relative to use of bathtubs or stairs].

PIRE-calculated annual injuries in USA (2010-14) by treatment type and age

Bathtubs and Showers

			Hospital-admitted			
Age	Doc/Outp	ED	via ED	Direct	Total	%
00-09	37,421.8	43,503.5	1,167.9	620.3	82,713.5	
10-19	35,732.0	23,165.9	449.5	164.8	59,512.1	14
20-29	70,160.9	36,019.2	1,196.7	438.5	107,815.2	
30-39	111,471.0	36,842.1	1,355.1	394.4	150,062.6	59
40-49	128,771.0	37,902.7	2,180.3	666.2	169,520.2	
50-59	123,201.0	38,110.5	3,513.7	1,235.5	166,060.7	
60-69	70,778.2	24,719.1	4,742.3	1,571.3	101,811.0	
70-79	50,653.0	18,959.1	5,648.5	1,762.5	77,023.1	28
>=80	50,961.4	23,964.3	9,880.1	2,699.0	87,504.8	
Total	679,150.0	283,187.0	30,134.0	9,552.5	1,002,023.5	
%	68	28	3	1		

PIRE-calculated annual injuries in USA (2010-14) by treatment type and age

Toilets

			Hospital-admitted			
Age	Doc/Outp	ED	via ED	Direct	Total	%
00-09	8,189.7	7,788.1	200.2	79.0	16,257.0	
10-19	3,013.0	2,532.5	84.2	24.4	5,654.0	7
20-29	7,713.5	5,373.5	250.0	125.0	13,461.9	
30-39	15,319.0	5,987.9	459.1	125.2	21,891.2	
40-49	19,713.9	6,995.6	1,055.7	391.1	28,156.3	34
50-59	26,914.0	9,408.3	2,112.3	673.5	39,108.2	
60-69	30,101.1	10,529.7	3,840.1	1,318.7	45,789.6	
70-79	28,111.9	10,741.6	5,512.9	1,751.8	46,118.2	58
>=80	44,531.3	21,436.1	12,449.2	3,353.6	81,770.2	
Total	183,607.0	80,793.3	25,963.8	7,842.2	298,206.3	
%	62	27	9	3		

2 Practice Innovations Addressing 3 of the 4 Types of Dangers

2.1 Points of Control to Mitigate Transfers over Impediments

Points of control, usable simultaneously by one or both bather's hands, augment the limited and bare feet which are vulnerable to various missteps entering/using/exiting the bathtub or shower.

The costs of installing the two points of control (horizontal or diagonal and vertical) are comparable to the average USD280 societal cost of bathing and toileting-related injuries—expressed on an average, per-household basis—over a one-year period.

The economic bottom line: there is a close match in the annual societal cost-per household, of bathing and toileting-related fall injuries in the US and the cost of installing points of control, such as conventional grab bars and, as a cost-effective, more versatile innovation—*stanchions* (which are very common in buses, street cars and train cars).

See Figure 1 for both options shown simultaneously.

2.2 Hard, Unforgiving Surfaces, Including Those of Impediments

. . . . Dangers are geometry of the impediments one must traverse by stepping over (e.g., bathtub walls and high sills for shower enclosures) and hard, unforgiving surfaces (e.g., enamel surfaces of rigid tub walls, ceramic tiles on walls and floors, and metal water controls plus spouts).

Showers require careful attention to underfoot slip resistance that is often inherent in wet conditions, even with certain tiles and surface roughness treatments underfoot. . . . Unfortunately, for conventional bathtubs with their smooth surfaces, another approach to slip resistance is needed and this is the largest focus of this paper, especially as the recommended intervention is somewhat unorthodox, even heretical to some objecting to a virtually no-cost, simple solution to a complex problem.

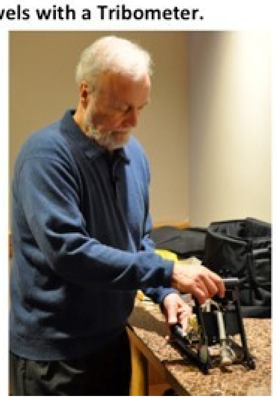
3. Provision of Effective Underfoot Slip Resistance

3.1 Recent and Current Safety Standard Situation

Efforts to deal with slippery underfoot surfaces of bathtubs with manufactured surface treatments have not been successful. . . .

Testing Slip Resistance of Terry Cloth Towels with a Tribometer.

The second author of this paper, who is certified in the use of a tribometer (the *Variable Incident Tribometer, VIT*) has, independently been testing comparable terry cloth towel samples with a smooth granite surface as well as a calibrated test tile of known slip resistance (SR) comparable to what a glazed enamel tub provides under dry, damp and sopping wet conditions.



4. Conclusions

Generally, the practice of using ordinary terry cloth towels to solve one of the main problems with bathing safety, along with installation of effective points of control—for example, using stanchions that integrate well with bathroom décor at low cost—should make bathing a less dangerous activity, at modest cost and low installation complexity in both new bathrooms and existing ones.

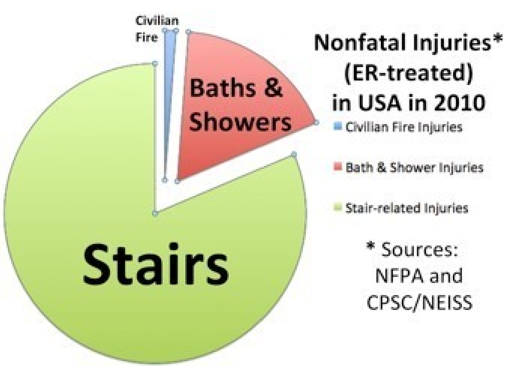
One bottom line is somewhat unorthodox, even heretical. Whereas in much of the work on slip resistance, water is considered an "enemy," it turns out that for slip resistance of smooth, wet surfaces typically found underfoot in a bathtub or shower, the combination of ordinary terry cloth towels and water is your "friend."

Solutions to the slipping and other problems for bathing—especially showering—can be elegant, counterintuitive, inexpensive and immediately at hand (or should we say also "at foot") in every bathroom. Such solutions are addressed in freely accessible videos and, increasingly, those solutions requiring structurally adequate installation of points of control are being enshrined in North American safety standards and building codes. Thus improved bathing safety could be a success story in applying ergonomics to heretofore inadequately addressed public health problems.

References (20 provided)

See www.bldguse.com for related videos on bathing safety and the IEA2018 Proceedings, Vol 2, for the full, 15-page paper.

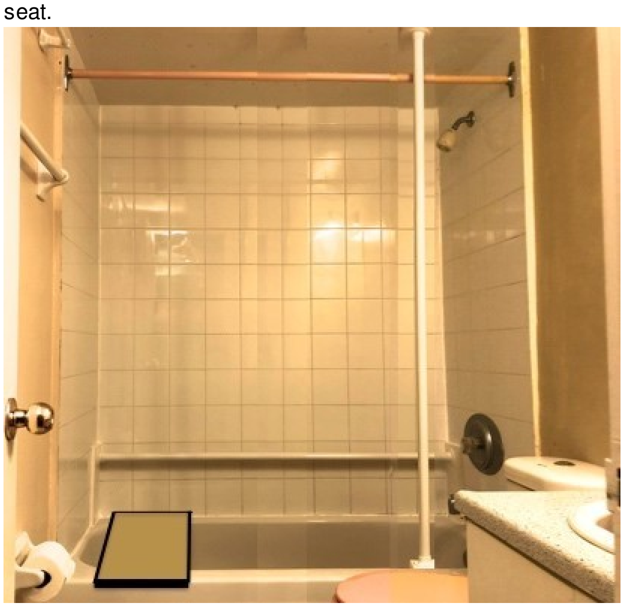
This overdue attention to this huge public health and safety problem is, significantly, the longstanding, official public policy position of the American Public Health Association (which the proponent has represented on ICC's Industry Advisory Committee since the late 1990s) and the Canadian Public Health Association. As well as being a longtime member of both Associations, the proponent is also a recipient of both Associations' public service awards for his work on model codes and safety standards committee for decades—now totaling over 280 Committee-years of experience, dating back to the 1970s, he has as a voting member on over a dozen national committees in the US alone. Before moving on scoping to technical requirements, there is one last exhibit, a pie chart showing the relative number of nonfatal injuries associated with bathtubs and showers relative to nonfatal stair-related injuries and nonfatal fire-related injuries.



The vast majority of issues that make up the agendas of ICC code development hearings are not associated with the number of injuries that relate to bathing and showering. This is a major reason for the scoping being broad; the problem is broad and involve over one million injured Americans annually who seek professional medical attention for their bathing and showering-related injuries.

Proposed IBC Technical Requirements for Bathtubs withPoints of Control Utilizing Grab Bars and Stanchions Front or Access Side of the Bathtub. Included within proposed section 1210.3.1, for the access (front) side of bathtubs, are five options, all premised on the assumption that the bathtub will be used for both immersion bathing and showering. The later involves some kind of water spray control barrier between the bathtub and the remainder of the bathroom which (at last in North American bathrooms) is designed to stay relatively dry. This can be as simple as an installed shower curtain rod or track over the tub's access side tub rim and manual sealing of the curtain (hung from the rod or track) before each shower at both the control end wall and the head end wall. Thus, at the end walls, an area several inches wide, horizontally, has to be kept free of wall mounted, conventional grab bars that interfere with such routine, yet critical sealing to capture all the shower spray water in the tub, not on the floor outside the tub. This is addressed in 1012.3.1.1 covering options for vertical grab bar, horizontally located ***inside*** the shower curtain rod or track and enclosure wall end framing area of each end wall. The graphic below shows all eight of the options from which a minimum of two are required by the proposed requirements for bathtubs. The eight options include two (grab bar) locations for each of two end walls plus one stanchion option for the entire length of the access side of the bathtub. The graphic shows such a stanchion option about midway along the bathtub length because that works best for the adjacent toilet for which the stanchion is an aid in stand-to-sit and sit-to-stand transfers. These front of tub access side options are discussed below the graphic.

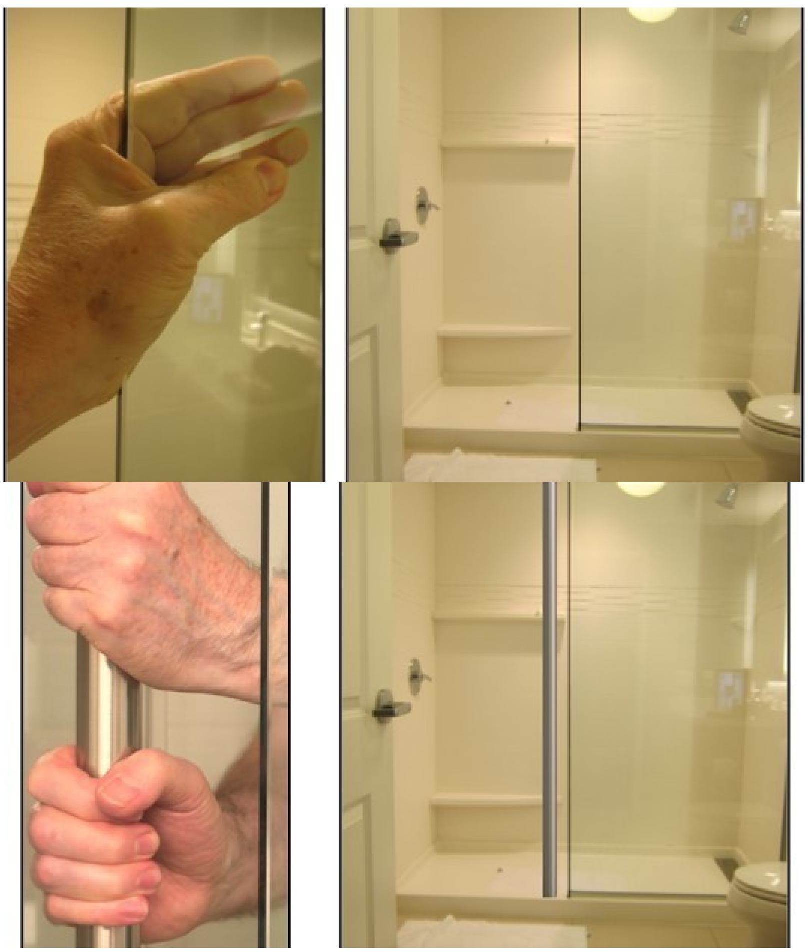
Note that the figure shows the (50-year old enamel steel) bathtub rim-mounted stanchion is outside of the shower curtain rod by 2 to 3 inches, so that the stanchion interferes in no way with the (not shown) shower curtain. Although the curtain is not a matter for IBC scoping, the installed shower curtain rod or track should be as the location is critical to performance of the bathtub or shower both in terms of water control—which is addressed already in IBC Section 1210—as well as in user safety from falls that IBC Section 1210 must now incorporate. Section 1012.3.1.2, covers the access-side option which is outside the shower curtain rod/track either approximately over the outer edge of the bathtub or within 6 inches (150 mm), horizontally, outside the bathtub footprint. Either a wall-mounted conventional grab bar or a stanchion can be located within this area, up to 6 inches (150 mm) away from the access side tub wall as well as the first two inches over the outer edge of the tub rim. Thus there are five options for a single required grab bar as well as multiple additional options for a vertical stanchion anywhere along the length of the access side tub wall. This provides maximum flexibility with bathroom layouts including double-duty service provided by a floor (or tub rim for steel bathtubs) lower mount-to-ceiling vertical stanchion if there is a toilet adjacent to the bathtub. For some users this stanchion will be the most used of all (eight) options included in the proposal package. Also, demonstrating the flexibility of placement with the access side, vertical stanchion is the figure below which has the rim-mounted stanchion (which could also be floor mounted for the same utility) shifted away from the center of the tub wall to allow a person using a head end, tub seat which means more bathtub rim length needs to be clear so ones legs can be easily lifted over the tub rim and into (or out of) the tub. There is also a wall-mounted grab bar located just outside the head end wall to assist with stand-to-sit and sit-to-stand transfers to/from the tub seat.



Although it would drastically affect the tub seat just described, there is also an option of installing rigid glazed panels, fixed, sliding or, more rarely, hinged to form an access side enclosure for the bathtub and manage the shower water capture. The installation and use of such an enclosure, also involves keeping end wall-mounted grab bars and the end-wall framing for the enclosure separated. This is specified in 1210.3.4.2 Spacing, which is addressed later near the end of the proposed technical requirements, the first group of which follow directly below. **1210.3.1 Grab bar or stanchion at the access side to bathtubs and shower/bathtub combinations.** A grab bar or stanchion shall be provided at the access side to each bathtub and shower/bathtub combination in accordance with Section 1210.3.1.1 or 1210.3.1.2. Location dimensions, except as provided for spacing in 1210.3.4.2, are to the centerline of the grab bar or stanchion at the fixed end of its graspable tubing component complying with 1210.3.4.1. **1012.3.1.1 End wall grab bar.** A vertical grab bar on one end wall of the bathtub shall be provided between 9 inches (230 mm) and 12 inches (305 mm) horizontally, inward from the access side of the bathtub. The grab bar shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum above the finished floor. **1012.3.1.2 Bathtub access side, grab bar or stanchion.** A vertical grab bar or a vertical stanchion shall be provided within 2 inches (51 mm) maximum inward, and within 6 inches (152 mm) maximum outward, from the access side of the bathtub. The grab bar or stanchion shall be located 2 inches (51 mm) minimum, horizontally, from the centerline of any shower curtain rod installation. The grab bar or stanchion shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum above the finished floor. **Back Wall or Non-access Side of the Bathtub.** Shifting attention now to the back wall or non-access side, there are three options there with a few the diagonal grab bar having multiple options with the slope angle permitted to be between 30 and 60 degrees to horizontal which could serve differing statures of users. The back wall options are shown in the graphics below.

1210.3.2 Grab bar and stanchion at the back wall, or non-access side, of bathtubs and shower/bathtub combinations. A grab bar or stanchion shall be provided on the back wall, or non-access side of each bathtub and shower/bathtub combination in accordance with Section 1210.3.2.1 or 1210.3.2.2. Location dimensions, except as provided for spacing in 1210.3.4.2, are to the centerline of the grab bar or stanchion at the fixed end of its graspable tubing component complying with 1210.3.4.1. **Exception:** For relatively deep bathtubs, where the required centerline height for the overall or lower end height exceeds 24 inches (610 mm) above the adjacent finished floor elevation, the centerline height shall be permitted to be 3 inches (76 mm) maximum above the bathtub rim height. **1210.3.2.1 Horizontal grab bar or stanchion.** A grab bar 36 inches (910 mm) minimum in length, centered, plus or minus two inches (51 mm), along the length of the bathtub, or a full-length stanchion installed between end walls. Its height above the bathtub rim shall be 8 inches (203 mm) minimum and 10 inches (255 mm) maximum. **1210.3.2.2 Diagonal grab bar.** A grab bar shall be installed in a diagonal position with its angle, to horizontal, 30 degrees minimum and 60 degrees maximum. The diagonal grab bar shall have the higher end located 12 inches (305 mm) maximum from the control end wall, measured horizontally. The lower end shall be 8 inches (203 mm) minimum and 10 inches (255 mm) maximum above the bathtub rim. It should be clear that the back wall (or non-access side) points of control are mostly intended for use in stand-to-sit and the more difficult to perform (with lower limb weakness and issues with postural hypotension), sit-to-stand transfers. The points of control are less used—with the exception of missteps that lead one to fall during tub entry or egress that might be mitigated with a (desperate) grab for something on the non-access side—for the challenge of stepping over the access side of the tub wall. One increasing situation is larger tubs that can be completely or relatively free-standing with no Immediately adjacent walls on any side of the tub. **Summing Up Bathtub Requirements.** To underline how minimal or flexible this code change proposal is, it only requires two points of control —*out of several options*—for bathtub users to enter and exit a bathtub which can have tub walls to surmount that exceed one foot in height (305 mm) with possibly slippery conditions under the weight-bearing foot. Currently that single point of control, under a person's weight-bearing foot, is all that is provided for bathtubs. This merits repetition: *the IBC currently permits one dubious point of control underfoot with no possibility of a hand providing a point of control because there are no grab bars or stanchions at hand*. **Lessons about "Reinforcement" ("Backing") Instead of Actual Installation of Points of Control.** There are many lessons in this proposal's use of many photos (which are but a tiny part of the proponent's image collection); one that has special relevance to the argument about providing only reinforcement for future grab bar installation and thus rely, into the future, on code rules which have begun to provide for this. However, the dimensions for installing such backing, based on (unlikely to be timely) future grab bar installations, were premised on a different paradigm or set of assumptions, namely to provide for future grab bars that, while perhaps working for non-ambulatory users who were relying upon seated-position-to-seated-position transfers into and out of bathtubs and transfer-type showers. Grab bars installed within the limits of such backing would all ambulatory users. Furthermore, they are often based on horizontal grab bar installations that are not as useful as vertical ones for *ambulatory* transfers over tub rims. Thus, instead of having the option of using conventional wall-mounted (into reinforcement or backing) grab bars for *ambulatory* users, especially taller adults, there will possibly be greater reliance on stanchion solutions which do not rely on cantilevered structures attached to walls (which might or might not have appropriate reinforcement) and needing to sustain loads of up to a few hundred pounds, possibly on screwed in attachments that will have substandard performance, for grab bars, if affected by water issues that are addressed at the end of this Reason statement.

Proposed IBC Technical Requirements for Showers withA Single Point of Control Utilizing a Grab Bar or Stanchion Although stand-alone showers are simpler than are combination bathtubs and showers, they are changing from the conventional small plan area showers to larger plan areas, including retrofit showers where there were formerly bathtubs. Those plan areas were often about 30 by 60 inches (762 by 1524 mm), a retrofit that is increasingly seeing in hotel guest rooms. An example follows of such a conversion before and after the retrofit of a floor-to-ceiling stanchion located at the side of the opening near the edge of the (safety) glass half panel on the access side of the shower. The upper photographs show, on the left side, the poor graspability of the edge of the glass panel, the only thing available as a point of control, albeit a relatively poor one. The lower photographs show the stainless steel stanchion (33 mm diameter) and both hands of a person preparing to exit the shower enclosure



Note that the shower has the controls for the shower water convenient to the entry to the shower enclosure, one of the considerations for such larger showers, especially where the shower head is far away from the entry opening to limit water discharge onto the bathroom floor. The stanchion is located within 36 inches (762 mm), measured horizontally, from both the shower head (which was chosen—in this first proposal—as a reference point for locating the stanchion; another choice—triggered by an amendment to this proposal could reference this to the control or at least one of both). With the lengthened facility, it became clear that a horizontal bar might be more effective than a vertical one, for example to serve bathers needing to take a few steps to get from one end to the other, especially in showers with the (roughly) half-length (safety) glass barrier to help prevent water spray from ending up on the bathroom floor (as illustrated above). There is also (as the ICC ANSI A117 Committee, Accessible Bathing Task Group has started discussing) the problem of where controls for the shower water flow and temperature should be placed, i.e., near the entry end (the situation in the photos above) or at the shower head(s) end. Another consideration, beyond the scope of this code proposal is that, if a point of control for the toilet also becomes important, such a stanchion is also within reach of a person using the toilet.

Thus the stanchion, installed primarily for the shower, also serves stand-to-sit and sit-to-stand transfers associated with the toilet. This option was confirmed by the hotel guest at the time these photographs were taken (as documented in the photograph above). There are also many instances where, depending on the layout of a bathtub (including its controls) and an adjacent shower, a single grab bar or, more likely, a stanchion can serve both bathing/showering facilities. Below is one example (selected from many other bathroom settings in the proponent's photo library of new dwelling unit and hotel guest room bathrooms during the last decade. In this case, this is a hotel guest room which, contrary to the hotel chain's policy, had no grab was provided for either facility. This led to a meeting with the Manager on Duty to complain and point out how easy it would be to retrofit a grab bar or, easier still, a stanchion (similar to the one depicted here which was "installed" digitally). Such a grab bar would comply with both 1210.3.3.1 (for the shower) and 1210.3.1.2 (for the bathtub).

Generally, there is a need for some of the current developments with showers to have the benefit of focused discussions by other experts in both the field of ergonomics as well as the accessibility field. Discussions have already begun with interested members of the previously mentioned A117 Accessible Bathing Task Group who recognize the benefits of what is proposed here for ambulatory users has a benefit for ongoing considerations of bathing and showering facilities for those not capable of ambulation. Some of this rethinking of ICC A117.1 requirements will continue to occur as this proposal goes to the CAH part of the ICC process and as amendments are possible subsequently. With that background to showers, here are the currently proposed requirements for showers as addressed in the IBC. **1210.3.3 Grab bar or stanchion at the access to showers.** A grab bar or stanchion shall be provided for the shower in accordance with Section 1210.3.3.1 or 1210.3.3.2. or 1210.3.3.3. Location dimensions, except as provided for spacing in 1210.3.4.2, are to the centerline of the grab bar or stanchion at the fixed end of its graspable tubing component complying with 1210.3.4.1. **1210.3.3.1 At Shower Exterior.** A vertical grab bar or stanchion shall be provided outside of the shower compartment, adjacent to the access opening. The grab bar or stanchion shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum, measured vertically above the finished floor. **1210.3.3.2 For Smaller Shower Interior.** For showers with interior plan dimensions, including diagonally between corners, 51 inches (1295 mm) maximum, a vertical grab bar shall be provided, interior to the shower compartment, 36 inches (910mm) maximum, measured horizontally from the control wall on the side closest to the access opening. The grab bar shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum, measured vertically above the finished floor outside the shower. **1210.3.3.3 For Larger shower Interior.** For showers with any interior plan dimensions exceeding 51 inches (1295 mm), including diagonally between corners, a grab bar or stanchion located interior to the shower compartment shall be 36 inches (915 mm) maximum, measured horizontally to the access to the shower. If oriented vertically, the grab bar or stanchion shall extend from 24 inches (610 mm) maximum to 60 inches (1524 mm) minimum, measured vertically above the finished floor outside the shower. If oriented horizontally, the grab bar or stanchion shall have a length 36 inches (915 mm) minimum at a height, measured vertically above the finished floor outside the shower, of 48 inches (1220 mm) minimum and 60 inches (1524 mm) maximum. The final section, 12.3.4. deals with mostly well-established details based on the current ICC A117.1 or IBC Section 1210. **1210.3.4 Grab bar and stanchion requirements.** Grab bars and stanchions, shall comply with Section 1210.3.4.1 through 1210.3.4.5. With following requirements almost entirely consistent with the parallel A117.1 requirements, the only reason statement needed is for two matters, both tiny but important details. First, unlike A117.1, the clearance between walls and grab bars is 1.5 inches (38 mm) minimum, not 1.5 inches absolute. The latter is an error in A117.1 that will be corrected, I hope, in the next (2024) edition. The majority of users' hands will slip through a 1.5-inch opening and the danger, when bearing down onto a grab bar, of ones hand slipping into the space and breaking bones in ones forearm is not reduced by the absolute criterion rather than a minimum. See the photos below illustrating how even the hand of a large male, admittedly of advanced age (with some shrinkage of muscle mass),c an slip through a 1.5-inch (38 mm) space. While this results in minor bruising of a very small area of the back of ones hand, there is a benefit to the hand not being jammed in the space as the area of the hand and wrist just above the hand is not an area one wants to injure, as with fracture(s). Having the hand go through the space and then having the arm caught nearer the elbow provides some protection from fracture due to the muscle mass in the upper forearm and the larger bones there.




Bottom line, one does not want to injure ones hand or wrist when “bearing down” on a (horizontal) grab bar with a grab bar that only nominally meets the 1.5-inch (38 mm), absolute spacing rule that must now be reconsidered in A117.1. Hence this draft for mainstreamed grab bars refers to the 1.5 inches as a “minimum” for good reason. **1210.3.4.1 Cross section.** Grab bars and stanchions shall have a cross section complying with one of the following:1. A circular cross section with an outside diameter of 1-1/4 inch (32 mm) minimum and 2 inches (51 mm) maximum.2. A noncircular cross section complying with ICC A117.1. **1210.3.4.2 Spacing.** The space between a grab bar or stanchion and any adjacent wall surface, shall be 1-1/2 inches (38 mm) minimum. **1210.3.4.3 Surface Hazards.** Grab bars or stanchions and adjacent surfaces shall be free of sharp or abrasive elements. Edges shall be rounded. **1210.3.4.4 Structural Characteristics.** Grab bars and stanchions shall be designed and constructed for the structural loading conditions set forth in Section 1607.8.2. **1210.3.4.5 Moisture.** G rab bars and stanchions, including mountings, shall be installed and sealed, or provided with permanent drainage (such as weep holes) for components subject to water intrusion, to protect structural elements from moisture. Aside from the clearance space issue in 1210.3.4, the other new detail is in the existing requirements in IBC 1210 with the addition of the “drainage” detail (in 1210.3.4.5 Moisture) which deals with a common problem with many conventional grab bars which trap water in the bottom third or so of the snap on caps over the fixing plates for screws into the wall. Water flowing along the grab bar can readily enter the void behind the caps and be trapped there indefinitely causing corrosion of the screws and deterioration of the wall materials resulting failure of the screws, especially to pull out forces on the grab bar. Sealing does not solve this problem. Drainage through weep holes or even prying the bottom of the cap away from the wall can mitigate this water entry/accumulation issue. (The latter solution is one the proponent practices in many of the hotels in which he is a guest and an investigator of water deterioration of conventional grab bar fixing systems. This is after describing the problem, among others, to the highest management leaders of the very large hotel chain for which he is a “Titanium” member.) A simple procedure for some minor “surgery” on the offending grab bar caps is illustrated below. Simple cut out a small triangle of the cap edge so water can escape after it (invariably) gets inside the cap by flowing through the typically oversized hole in the cap where the tubing passes through. The full justification (to be provided separately as it is largely consistent with what was submitted in the prior cycle.) will show what can collect and grow behind such caps. Below is shown the readily available tool for creating a permanent drainage hole in the relatively thin metal sheet material formed into the cap shape. The last photo depicts the “V” notch which should be on the bottom edge of the cap when it is installed.


Bibliography: Bibliography

Approximately 50 internationally-produced scientific and technical references, on bathing/showering safety, were compiled by the proponent, in

2016, for an American Public Health Association (APHA) draft policy highlighting, especially two Canadian research studies that also are addressed in video presentations by Principal Investigators (Dr. Nancy Edwards, Dr. Alison Novak) for the research and posted, for free streaming viewing at, https://vimeo.com/164239941 Accessed January 8, 2018. Additional videos covering technical aspects of bathing and showering safety (including cost impact and benefit issues*) are found at the following links (all of which are available, with descriptions, at www.bldguse.com, the proponent's Professional Practice Website, Accessed January 8, 2018.).

https://vimeo.com/237294479

https://vimeo.com/239276202 *

https://vimeo.com/197742277

https://vimeo.com/193507768

https://vimeo.com/173883358

https://vimeo.com/175101448 *

https://vimeo.com/117572176

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Vena D, Novak AC, King EC, Dutta T, & Fernie GR. The Evaluation of Vertical Pole Configuration and Location on Assisting the Sit-to-Stand Movement in Older Adults with Mobility Limitations. *Assistive Technology* 27, 4, 2015, Available at http://www.tandfonline.com/doi/full/10.1080/10400435.2015.1030514. Accessed January 8, 2018. (In referring to sit-to-stand transfers, as from a toilet, this article uses the term, "transfer poles," to describe the configuration and location of "poles" referred to in the code change proposal.)

Kennedy MJ, Arcelus A, Guitard P, Goubran, RA, Sveistrup H (2015). Toilet Grab-Bar Preference and Center of Pressure Deviation During Toilet Transfers in Healthy Seniors, Seniors With Hip Replacements, and Seniors Having Suffered a Stroke. *Assistive Technology: The Official Journal of RESNA*, 27:2, 78-87. Available at http://dx.doi.org/10.1080/10400435.2014.976799 Accessed December 31, 2020.

Cost Impact: The code change proposal will increase the cost of construction
This proposal, if adopted, will increase the cost of construction but the payback period is only a few years.

The order of magnitude of such increase, covering two full, three-piece bathrooms with one bathing facility in each, is on the order of a hundred dollars, more specifically in the low hundreds, e.g., 300 to 400 per one-family dwelling and half as much for apartments, hotel rooms, etc. Against these additional costs, which should be amortized over approximately a 15-year period (if not longer), the societal injury costs averted annually are approximately $150, per family, with a break-even point reached in a few years.

On a societal scale, in the USA, the estimated annual number of injuries nearly a decade ago led to over one million professional medical visits (second only to stairs at over four million such visits annually in the USA). About 90 percent of the injuries occur in residential settings, but the breakdown of injury occurrences, for ICC occupancy groupings of R1, R2, R3 and R4, is not available. (More-detailed information can be seen in a more authoritative form in the video of world injury economics expert, Dr. Ted Miller, from Maryland, presenting at the World Public Health Congress in Melbourne, in 2017. This is available on a video streaming freely at https://vimeo.com/channels/866600/239276202).

The injury reduction benefits assumed in this analysis do not cover the much larger daily benefits of enhanced usability and ability to have, for example, a daily shower, which increases in value with the user's age. For example, at 78, proponent Jake Pauls values the daily "hedonistic" benefit (a standard term used in cost-benefit analysis) of each morning shower—facilitated with a single stanchion—at about a dollar per day or $365 per year. The stanchion parts cost only about $40 and DIY installation took about an hour. My total benefit per year, not even assuming any injury averted, exceeds my costs.

The COVID epidemic has likely increased the injury toll, perhaps also the need for therapeutic baths and showers, as it has also greatly increased home usage by all family members. It has also complicated, immensely, the availability of consultations with medical professionals with resulting increase in fall consequences, e.g., leading to physical disabilities. Reduced mobility also increases balance issues and falls generally in the entire population. It will be years before we have authoritative studies and impact analyses on what has happened in 2020 due to the pandemic which is expected to continue well into 2021.

G172-21

Public Hearing Results

This proposal includes the following errata

1210.3.4.4 Structural characteristics. Grab bars and stanchions shall be designed and constructed for the structural loading conditions set forth in Section ~~1607.8.2~~ 1607.9.2.

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the committee had several concerns. Have there been any dwelling or sleeping units constructed with the proposed grab bar configurations so that the increase in safety can be verified? Have their been any studies or empirical evidence that indicate that this will significantly improve safety? Requiring the installation in all bathrooms in all Group R units is going too far - perhaps blocking so that residents can add grab bars based on need. The choices for grab bar installation should be based on individual residents needs and choices, which may not be this configuration. The locations specified can be an issue with the different types of tubs and showers on the market for design and structural strength. There is a concern about the grab bar location conflicting with the shower curtains so that water would end up on the room floor, thus creating a slip and fall hazard. (Vote: 14-0)

G172-21

Individual Consideration Agenda

Public Comment 1:

IBC: SECTION 202, 1210.3, 1210.3.4.4

Proponents: Stan Harbuck, representing American Public Health Association (he@xmission.com) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

STANCHION . An often vertical, tubular structure serving as a hand-grasped, point of control that is fixed between separate supporting structures such as surfaces or other railings, as opposed to being mounted, in cantilever fashion, on walls as occurs with conventional grab bars.

1210.3 Grab bars and stanchions at bathtubs and showers in Groups R-1, R-2, R-3 and R-4 . Where grab bars or stanchions are provided for bathtubs and showers in Groups R-1, R-2, R-3 and R-4 occupancies, such grab bars and stanchions shall comply with NFPA 101, Chapter 24.

Exception: Grab bars and stanchions in Accessible units shall complying with ICC A117.1 1102.11 are not required to comply with this section.

1210.3.1 Structural characteristics of grab bars and stanchions . Grab bars and stanchions shall be designed, constructed and installed for the structural loading conditions set forth in Section 1607.9.2.

Commenter's Reason: For this Public Comment REASON statement, refer first to the background as provided with the very detailed, full REASON statement for proposal G172-21. This Comment will not repeat the earlier-provided information although there are some edited extracts used here from the Proposal IBC G172-21 REASON statement. This comment does borrow extensively from the public comment submitted by Proponent, Jake Pauls, that seeks Public Comment Hearing (PCH) action of "As submitted" rather than the simpler option of utilizing the established requirements of NFPA 101 for grab bars and stanchions for bathtubs and showers as sought in this public comment (submitted by a home inspector —a*nd teacher of home inspection*—serving on the NFPA Residential Occupancies Technical Committee and Chair of NFPA's Manufactured Housing Technical Committee).
There are two public comments being offered – As Modified and As Submitted. The basic REASON, behind overturning Committee action, is that—compared with the record for the Committee Action Hearing—there is far more multifaceted, justification provided with Proposal G172-21 as replaced with the established, detailed requirements in NFPA 101 or, as provided with a separate detailed comment, with "*Approval as Submitted*" as an equally appropriate—and perhaps more acceptable to ICC members—inclusion of the detailed technical requirements in the IBC. Both comments respond with detailed, forensic quality information to the criticisms expressed during the Committee Action Hearing. The information extends the detail in the REASON provided with Proposal G172-21, including a very extensive Bibliography and very supportive Impact statement of large benefits versus very low cost impact—with a payback period on the order of a few years. These extensive details are presented with each of the two public comments.

The following treatment might resemble a forensic examination. *This is intended and healthy for the ICC process and products.* The matter of bathing and showering safety—*and related model code requirements*—might, someday, be resolved in the courts. The consequences to public health and safety are simply too great not to be argued with all the checks and balances*, plus respect for evidence*, that are at the core of legal proceedings. The Proponent of the code change G172-21, Jake Pauls, has testified under oath about 170 times with a comparable number of court-acceptable reports prepared in 40 years where such work represents a minority of his professional duties during that period. (For example, among his many worldwide advisory roles, he served, for two Olympic Games, as the lead advisor on spectator safety.) Forensic quality and detailed evidence are thus at the core of his 54-year professional safety career that led, in 2017, to the University of Greenwich (the world leader in research on people movement in buildings) conferring his Honorary Doctor of Science Degree.

For this Comment there is an update with a recent (Spring 2021) analysis of voluntary measures that people have taken when coping with relatively dangerous bathtubs and showers, among a few comparable dangers (such as stairs and toilets). This helps to understand why we have a current toll of over a million professionally treated injuries, annually in the US, associated with bathtub/shower use and why the injury toll is not even higher. In large part—*with the exception of toilets*, people are limiting their exposure to these relatively dangerous facilities that are more dangerous—*on an exposure-corrected basis*—than are stairs (on which about 90 percent of the injurious, stair-related falls occur in homes) that injure over four million people annually in the US to the extent of leading to professional medical attention and imposing annual societal costs exceeding 100 billion dollars annually for stairs alone with over 20 billion dollars annual societal cost for bathtub and shower-related injuries (not including hot water scalds); toilets are associated with a somewhat lower injury cost of several billion dollars annually in the USA. These annual US cost estimates were for a period about a decade ago (Ref. Lawrence B, Spicer R, Miller T. A fresh look at the costs of non-fatal consumer product injuries. *Injury Prevention* 2015; 21:23-29).

The Comment then continues with a formal response, including some rebuttal to the *published* report of Committee statements at the Committee Action Hearing (CAH) as well as Committee members' *actual* comments as transcribed from the ICC Web site record. The comments, as transcribed from ICC recordings, were not completely, or even sufficiently, similar to the published report to satisfy the standard to which the Proponent of the code change, Jake Pauls, is accustomed and, very reasonably, should be expected of the ICC process. They are, in the professional opinion of the Proponent of the code change, worthy of pursuing in a separate formal objection, including within the Industry Advisory Committee (on which he has long represented the American Public Health Association), and via an Appeal to the ICC Board of Directors.

Voluntary Measures Now Being Taken by Adults To Limit or Avoid, If Possible, Uses of Relatively Dangerous Facilities

First it should be very clear that, based on US CPSC/NEISS data, these uses of dangerous facilities occur almost entirely in residential settings. Hence the proposed scoping—*R1, R2, R3, R4*— is valid. The most dangerous facilities, regulated by codes—*including the I-Codes and, more specifically, IBC Chapters 10 (on stairs) and 12 (in relation to Proposal G172-21)*—are:

· stairs (for traversing different floor levels);

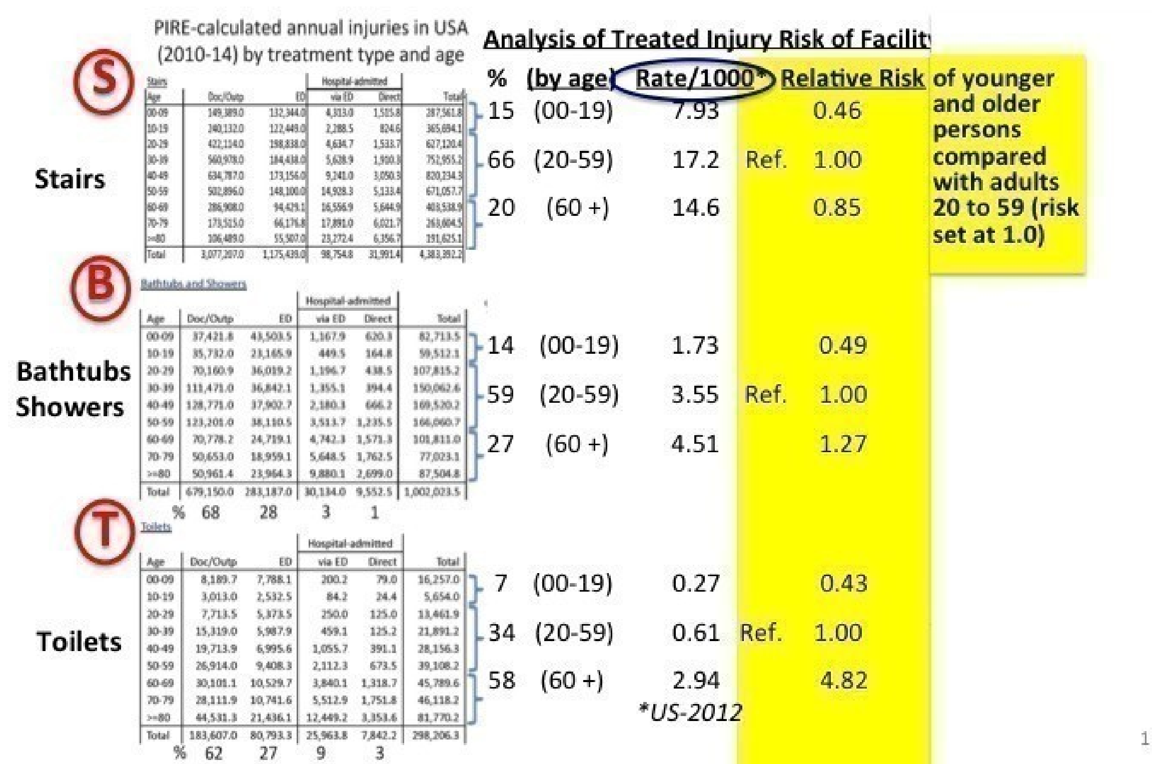
· showers and bathtubs (for external cleansing); and

· toilets (for elimination of bodily wastes).

The following is based on an analysis performed early in 2021 by Dr. Jake Pauls, Proponent of the code change G172-21, presented to a Canadian Commission on Building and Fire Codes (CCBFC) Standing Committee (responsible for grab bar and stanchion requirements in the *National Building Code of Canada*). *Voluntary avoidance of use* of the first two of the above list of three relatively dangerous facilities, found in most residential settings, helps to explain population and age-corrected injury data based on nonfatal injuries professionally treated in settings. The treatment contexts range from doctor' offices, medical centers, emergency departments, and admitted patient wards of hospitals. (In relation to the deliberations in Canada, note that the USA has bathtub, shower and toilet design and installation practices very comparable to those in Canada. The USA has a superior injury treatment documentation system with US CPSC/NEISS.)

Here follows a graphic (Figure 1) from the recent PowerPoint Presentation, of 194 slides, to Canadian safety and codes authorities) with, on the left side, tables of non-fatal injury treatment data for stairs, bathtubs/shower and toilets for the USA annually during 2010-14 using US-CPSC/NEISS data as analyzed by Dr. Bruce Lawrence at the Pacific Institute for Research and Evaluation (PIRE) in Maryland. He and his colleagues at PIRE were also the authors of the injury cost paper published in the highly regarded journal, *Injury Prevention,* 2015, cited above.

While the tables' data (in Figure 1) are in small font (with two of the three, in larger size, provided in the Proposal Reason statement), pay attention to the more-readable, middle and (yellow-highlighted) right side summations of the injury data expressed as relative risks for the three injury sites by three age groups, 0-19, 20-59, plus 60-and-older. The relative risks are normalized with the middle-age group set at a reference risk of 1.0 for each of the three facility groups: stairs, bathtub/showers and toilets. (For those interested in the totals for ***annual*** treatments averaged over the period 2010-2014—the bottom line on the leftmost column of each facility table—were: stairs - 4,390,022; bathtubs & showers - 1,002,023; toilets - 298,206. By comparison, US nonfatal fire-related injuries, in the last decade, are estimated to be in the 10,000 to 20,000 range or about 0.3 percent of the nonfatal injury toll due to stairs, bathtubs/showers and toilets (as illustrated in the pie chart provided in the Proposal Reason statement—about 2/3 into the text of the statement).
Figure 1.



Note that, for stairs and bathtubs/showers, the relative risk rates (per 1000 population) for the two older age groupings (20-59 and 60-plus) are relatively similar (within same order of magnitude). However for toilets, the only facility category for which use cannot be voluntarily avoided by older persons (i.e., 60-plus), their relative risk of injuries is much higher (by nearly a factor of five).

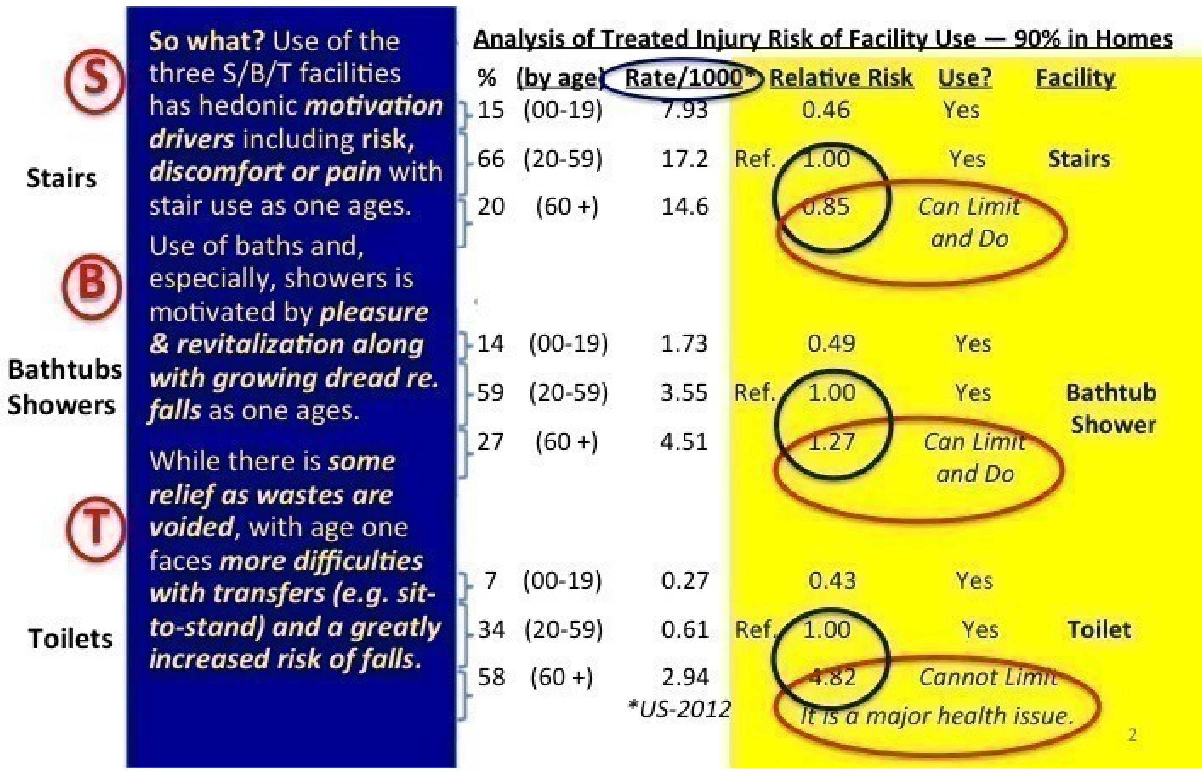
What this means is that people older than about 60 (and other adults not yet in the 60-plus age group) achieve improved safety with stairs and bathtubs/showers by limiting, avoiding or foregoing use (technically termed "exposure")—*something they cannot do with toilets*. Thus vulnerable bathtub and shower users and inadequate safety provisions—e.g., facilities lacking functional grab bars and stanchions—lead to substantial avoidance of use as we age. *Also, note that the age group accounting for the majority of professionally treated injuries involving stairs and bathtubs/showers is not people over 60, but the 20-59 age group!*

Note here that older people might be falling—*with injuries*—less often, but their injuries are more serious and require more intensive—*and expensive*—medical attention.

The takeaway message here is that we need to do a much better job of making bathing and showering facilities more-usable as well as safer for everybody if we want older persons to use the facilities to enjoy the health and other benefits they offer.

Waiting until home occupants get older is simply not a good strategy for installation of grab bars and other devices providing at least two points of control—three for in-tub, immersion bathing. We have to design *for all, at all stages of life*. The next graphic (Figure 2), also from Dr. Pauls' PowerPoint presentation to Canadian codes and safety experts early in 2021, provides a summary of the psychological aspects or implications of these use and safety data, plus analyses.The arguments made by opposing participants at the Committee Action Hearings (CAH)—as described below, as well as some of the committee members, whose remarks are reproduced in even more detail below, are clearly not helping to reduce the large injury toll. Moreover, they perpetuate avoidance of use as the main—*indeed virtually no-choice*—strategy for coping with clearly inadequate built environment facilities built to the minimum standards of the *I-Codes*.

Figure 2



FORMAL RESPONSE, INCLUDING REBUTTAL TO THE *PUBLISHED* REPORT

OF COMMITTEE STATEMENTS AT THE COMMITTEE ACTION HEARINGS (CAH)

AS WELL AS COMMITTEE MEMBERS' *ACTUAL* COMMENTS

How Did the IBC General Committee Hearing Deal with Proposal G172-21? A Detailed Account

Public Testimony Portion. Included in the following are the points brought up by the opposition and the rebuttal to those comments (the latter being extended beyond the very limited opportunities provided in, and unique to, ICC's CAH process (compared with other current model code development procedures used in the USA and Canada):

Time Analysis. The 14 voting members of the IBC General Committee heard 24 minutes of testimony on G172-21 of which about half a minute was direct testimony by the Proponent with the remainder of his time reserved for rebuttal, plus about two additional minutes (for balance) granted for rebuttal by the Moderator. This totaled about five minutes overall—almost all for the Proponent's rebuttal testimony—for the only testimony coming from the proponent side.

Opposing testimony by seven people occupied about 12.5 minutes after which two Committee members posed one question each for the Proponent, with very short, one-sentence, to-the-point answers by the Proponent. Then there were was an additional 4 minutes for rebuttal from four opponents. Summing up, of the total 24 minutes of testimony, less than a quarter of the time was permitted for Proponent testimony and rebuttal.

Here follow synoptic accounts of the testimony by the seven opponents followed by equally synoptic accounts of rebuttal testimony in opposition by four opponents (indicated as “Opposition comments”).

Post-hearing comments by the Proponent are shown immediately following, indicated as “Proponent Rebuttal.”

§ **Matt Sigler** (at the time of the CAH, with the Plumbing Manufacturers Institute)

Opposition comment: Many installations have prefab walls, which are not designed for grab bars

Proponent Rebuttal: In the rare cases that they incorporate something like a grab bar, they would not meet any standard nor are they ergonomically designed—i.e., to function adequately.

Opposition comment: Thus consumer choice is limited.

Proponent Rebuttal: A situation for which industry is largely to blame.

Opposition comment: CPSC/NEISS data lack detail re. “accidents”, e.g., alcohol or drug use while bathing and other medical issues

Proponent Rebuttal: All of these are quite acceptable—*if not also necessary in pandemic and normal times*—in residential settings, but the underlying assumption in industry attitudes is we do not need to cater to people—*as they are*—in their homes and we do not do anything to address the well-documented dangers (as well documented by research listed in the Bibliography) of industry’s products—neither of which are defensible positions in a court of law where it can be shown that the dangers to users—*and-countermeasures*—have been well identified in publicly available documents for nearly five decades in the USA (e.g., in the Abt Associates document published in 1975 and cited as number 11 in the Bibliography provided with proposal IBC G172-21).

Opposition comment: The proposal’s 1.5-inch minimum clearance between a grab bar and the adjacent surface does not comply with ANSI A117.1 which has maintained an absolute 1.5-inch requirement for grab bars

Proponent Rebuttal: Although the text shows it as an absolute dimension, a relevant A117.1 figure shows it *as a minimum* and despite making this a minimum for handrails years ago; a revision is expected for the next edition (per the Jake Pauls’ recent formal proposal to A117)—the one relevant to this edition of the IBC. See also the series of photos within the Proponent’s Reason for G172-21 which demonstrates that the absolute 1.5-inch criterion makes no sense in terms of safety for users.]

Opposition comment: No bathtub on the market is designed for fixing a stanchion “into the rim.”

Proponent Rebuttal: Yes, sometimes changes must made in manufacturing processes to better accommodate safety in the code. But if changes are the obstacle here, then why ever try to increase safety. The proposal is clear that fixing a stanchion to a bathtub rim is restricted to steel construction bathtubs which are still available (at very reasonable price, without special order) on the market and, furthermore, the Proponent of the code change, Jake Pauls, does not advocate attaching a stanchion “*into*” the tub rim of any type of construction. That is neither the only, nor best way of fixing a stanchion to a steel bathtub rim which, even if the industry’s switch to lesser-quality, plastic or fiberglass tubs persists. Industry cannot prevent users from sitting on the more-easily deformed plastic bathtub rim imposing a load much higher than that imposed by users securing an upper-body “point of control” which transmits a load to the tub rim. (Note that the IBC, Chapter 16, applies the 250-pound load requirement to seats—effectively the bathtub rim on which users can sit—the same load assigned for grab bars.)

Also, see the comment elsewhere also addressing testing stanchion fixing with modern RTV adhesive that easily withstands a load transmitted, in shear force (per sq. in.), to the rim surface that is more effective—by a multiple of about six—with an adhesive-attached (9 sq.in.) plate than is possible with all the screws (typically about 6 provided with conventional plumbing industry grab bars) into solid-framing backing in the surrounding walls. The latter is difficult to accomplish with some grab bars and conventional ‘2 by 4’ framing. The installation for rim *surface* mounting is more robust than what is currently achieved with conventional grab bars even before the latter suffer serious deterioration, from poor water protection, such has been widely documented by the Proponent of the code change in many of the grab bar-equipped guest rooms he encountered (pre-Pandemic) around the world. The bathtub industry needs to worry less about its warranties being violated—which sitting users can easily and completely innocently do—and more about the well-documented, real dangers of their inadequate designs and choices of materials. See the accompanying Bibliography including the many videos also listed there on bathing safety. These constitute “Actual Notice” as a legal concept established by the courts.

§ **Margo Thompson** (Multifamily Construction Council)

Opposition comment: Two or three grab bars are unreasonable.

Proponent Rebuttal: It is not unreasonable to have one bar for a shower and two—not three—bars for a tub at an installed cost of a few hundred dollars in an overall residential unit cost of a few hundred thousand dollars. This provides, on average per household, an annual injury prevention benefit of a comparable amount of a few thousand dollars. (See authoritative video at https://vimeo.com/channels/1362334 — as listed in the accompanying Bibliography).]

Opposition comment: Tenants do not want "accessibility" features and, if features thus recognized exist in their unit, they will expect to pay less.

Proponent Rebuttal: No proof is shown for this opposition comment. In addition leaving a decision on safety up to an aesthetic or attraction concern represents misplaced priorities. Also, poorer residents are clearly aware of their precarious financial position if unbudgeted medical costs are incurred and, even more important, such costs do not begin to include the much larger costs in reduced quality of life—*including loss of ability to work*—that a serious fall can precipitate.

Opposition comment: Members believe installation of such features should be only at the request of the tenant or owner-occupant.

Proponent Rebuttal: Making safety items optional defeats the purpose of having a code to promote safe surroundings. If you asked prospective buyers or tenants if they really wanted to have tempered glass in code required locations around stairways, etc. and told them that they could get a lower price or rental rate if they were willing to go without, would that be an acceptable option to propose to the public?

Opposition comment: Members are already putting blocking behind all tubs and showers.

Proponent Rebuttal: No evidence is provided for this and it certainly is not on every building because it is not required. Also, this can represent a waste if the design doesn't have to meet a standard that limits the need for specific locations for blocking. In addition, many grab bar manufacturers require the attachment screws to go into a stud. Another opponent pointed out that most bathtub installations and shower installations have plastic surrounds/enclosures that do not accommodate subsequent grab bar installation, even with blocking installed behind these relatively flimsy membranes that, if penetrated, could result in water entry to areas otherwise kept dry and less vulnerable to damage. Most important, all the requirements currently leading to all the blocking/backing/reinforcement for future grab bar installation is based not on safety but on accessibility, particularly for people approaching the bathtub in a wheeled device and transferring to/from a bathtub-supported seat. Grab bars intended for this function are wrong in orientation and height for ambulatory transfers; they are not designed to prevent falls to ambulatory users. (See also further details, below, in a rebuttal pertinent to transfers and role of retrofitting using "blocking.")

§ **Ceasar Luhan** (National Association of Home Builders)

Opposition comment: Why all R occupancies, both transient and permanent occupancy?

Proponent Rebuttal: Actually while it may seem more conspicuous that more transient residences would more logically require grab bars because many different individuals will be using a home. It is also true that the more permanent residence the more the need for grab bars since, as we get older, sooner or later, we need to have grab bars. Problems of bathtub and shower-related injuries are endemic in residential facilities of all types; thus the countermeasures should be equally broadly applied in model codes and safety standards. NFPA 5000 and NFPA 101 have, since 2018 editions, had grab bar requirements applying to all new residential plus board and care facilities, among others, for all showers and bathtubs.

Opposition comment: Only standard tub/shower designs taken into account with the proposed requirements.

Proponent Rebuttal: This is incorrect; many configurations and wall-and-no-wall boundary situations examined. The requirements have been carefully drafted for the current IBC proposal, as well as in revisions proposed for the 2024 editions of the NFPA documents PLUS that other ANSI-approved document, ICC A117.1 which has a package submitted for the current cycle of changes that is consistent with not only Proposal G-172-21, but with fine tuning submitted for NFPA documents PLUS the requirements that have been proposed for the National Building Code of Canada for all occupancies with bathtubs and showers (and which has had a Task Group including participation from top experts as well as builders) for about a decade. All of these—especially in the US—have tried to address nonconventional bathtub and shower designs, e.g., designs not bounded by walls—for which some of the many option (e.g., diagonally oriented, wall-mounted grab for the back wall) are not a good choice; for these there are other options including some that are a lot more aesthetically acceptable and achievable than some of the high-priced industry solutions to water delivery devices (illustrated in the 294-slide presentation the Proponent, Dr. Pauls, gave to a recent meeting of a key Canadian code committee; two slides from the Canadian presentation are reproduced, above, in this Reason statement).]

Opposition comment: There are problems posed with A117.1 current requirements.

Proponent Rebuttal: Proposals were submitted for the next edition of A117.1 recently under the new heading of "ambulatory accessible" facilities that take, as their precedent the long-established "ambulatory accessible toilet compartments" requirements..

Opposition comment: Grab bars are already readily available for purchase.

Proponent Rebuttal: Yes, and before tempered glass was required tempered glass was available for purchase but its installation rate was nowhere near what it became once required by code. Also, many of the available grab bars are not suitable for use in wet conditions. Moreover, they rely on difficult-to-achieve adequate and reliable fixing with the provided screw-based hardware which does not address moisture problems inherent with the currently provided cover plates.

Opposition comment: "Very much an overreach."

Proponent ~~*~~Rebuttal: Not anymore than other safety provisions in the code which are typically less risky to occupants than bathtubs, etc. are. (The overreach here is in the way a number of ICC residential codes have managed to usurp the benefits of using an ANSI consensus standard, including limiting one proposal per person under certain circumstances. Or a code standard that is considered a template for states to adopt for the residential codes, Failure to provide an ANSI consensus method is also much of the overreach by blocking a level playing field for the development of code standards.)

By way of background, the code change proponent's, Jake Pauls, highest degree is an HonDSc and he has over 300 committee-years of service on US standards and codes committees (about half of which have been as the lead voting representative of the American Public Health Association); thus his scoping decisions are based on evidence as much as possible—a key tenet of public health. Others have different insights on what is "reasonable" and what is "overreach." What is their "evidence" and how do they reconcile their "evidence" with the published injury toll of over one million, nonfatal, medically treated injuries annually in the US due to bathtubs and showers, with about 90 percent of these occurring in residential settings? (See the REASON statement for this evidence.) This toll exceeds nonfatal fire-related injuries by two orders of magnitude (e.g., a factor between 50 and 100 as illustrated in the pie chart provided in the REASON statement).

§ **Jim Kendzel** (ASA)

Opposition comment: A117 is an industry consensus standard and the issue was already covered.

Proponent Rebuttal. Note that the code change Proponent, Jake Pauls, has submitted proposals to A117 to add the relevant, *new* requirements for "ambulatory accessible" bathtubs and showers. Also other discussion herein addresses this issue.

§ **Steven M.** (American Institute of Building Design)

Opposition comment: Has seen this proposal develop over the years. He complained that the stanchion examples in the proposal were only on moving vehicles and the IBC covered R occupancies that were not in motion when occupants using them.

Proponent Rebuttal: Likewise, the photos only show the vehicles when not in motion. The occupants are the ones in motion and the grab bars are there to help them move safely in a well-established dangerous area.

Opposition comment: Grab bars can easily be added afterwards.

Proponent Rebuttal: Retrofitting grab bars is relatively difficult in comparison to stanchions which are much more versatile in terms of subsequent installation; none of the installations with which the code change Proponent, Jake Pauls, has worked, entailed holes in wall for screw attachment—as would be the case with conventional grab bars.

§ **Misty Guard** (Regulosity LLC)

Opposition comment: Structural load requirement was not being addressed.

Proponent Rebuttal: This was explicitly addressed with a mandatory reference to the IBC Chapter 16 requirement, re. 250-pounds, specific to grab bars and seats.

Opposition comment: For stanchions, load on surrounds exceeds structural capacity.

Proponent Rebuttal: Proponent has not encountered this and has the equipment needed to apply 250 pound loads to stanchions he has installed for both bathtubs and showers.

Opposition comment: The "Shelf", which is a horizontal surface filling the space between the top of a bathtub and the nearest room wall or a part of a podium in which the tub is placed, does not have load capacity.

Proponent Rebuttal: If it has not been designed for a 250-pound vertical load, how is the tub which it helps to support, with both horizontal and vertical load support, going to be able to withstand the weight of the water, plus occupant(s) in the tub, especially a large, multi-person tub (such as with some with multiple water jets). The load imposed through the grab bar or stanchion fixed to this tub surround is lower than these other loads; furthermore, these installations are often placed next to a wall or walls (as with a corner design which provides additional lateral support to the tub) and conventional grab bars can be readily attached to these walls adjacent to the open sides of the tub. Another option is a floor-to-ceiling stanchion. Some upper body "points of control" are going to be very important for users of such large tub installations which often have high tub walls relative to finished floor level. Such large tubs pose many challenges (which Jake Pauls has managed as a user of such installations in premium-price hotel rooms he has occupied as a paying guest in hotels worldwide. Provision of grab bars or stanchions is a minor cost and engineering consideration relative to other challenges associated with these large installations.

§ **Tom Zuzik,** Representing NOMMA (National Ornamental & Miscellaneous Metals Association)

Opposition comment: Stanchions are used, in the context of pedestrian barriers, as the vertical structural members—e.g., metal posts—supporting secondary, sloping, horizontal and secondary vertical members, typically of metal.

Proponent Rebuttal: None of these are grab bars or stanchions in the roles they play as single handheld members for grabbing by the hand(s) as part of transfers to/from/within bathing/showering facilities.

Rebuttal Testimony by Those Opposed to Proposal

§ **Tom Zuzik**, Representing NOMMA (National Ornamental & Miscellaneous Metals Association)

Opposition comment: Code is a minimum; items are not needed for all people. Safety versus accessibility briefly noted.

Proponent Rebuttal: This is not a matter of "safety" *versus/or* "accessibility." The scope is both safety in use *and* usability of bathing/showering facilities *for everyone*. Also, the evidence suggests that safety and usability interact strongly for many adults; see Figure 2 for quantitative evidence of this interaction in the USA. Moreover, the importance of such safety is shown by its existence in NFPA 101.

Matt Sigler, (at the time of the CAH) Plumbing Manufacturers Institute, PMI

Opposition comment: In Canada there was a recent rejection (in spring 2021), by Provincial and Territorial code authorities, of code changes, at National level, on grab bars and stanchions for bathtubs and showers.

Proponent Rebuttal: The meetings of "Provincial and Territorial code authorities"—unlike deliberations on *National Building Code of Canada* (NBCC) code change proposals, for its 2020 edition—were ***not*** conducted in an open, public fashion where all parties could observe and participate. Before these recent nonpublic meetings of P/T code authorities, there have been years of open, national meetings started after a proposal on grab bars for home bathtubs and showers was submitted—***in 2007*** by Dr. Nancy Edwards —and was addressed in many open, public meeting of the NBCC committee responsible for housing, along with its Grab Bar Task Groups.

Opposition comment: Blocking is sufficient as a solution to bathing safety.

Proponent Rebuttal: Note that some grab bar manufacturers are requiring grab bars to be connected to studs. Blocking is not sufficient. Indeed, no fall has ever been prevented or mitigated by blocking because the necessary grab bar is not installed and, if installed, it is likely in the wrong place for safety as opposed to accessibility (again in relation to transfers by non-ambulatory people from a wheeled device to/from a seat in a tub or shower). As noted above, such grab bars are neither intended for, nor sufficiently effective, for ambulatory users; see comments above on this.

Opposition comment: People do not want grab bars.

Proponent Rebuttal: No documentation of this has been provided. In addition, if you ask the average member of the public if they were willing to pay for tempered glass instead of regular glass and show them a photo of each one so that it was very difficult to see the difference, it's very likely that they would all say they'd rather pay less for a home or rental without tempered glass. Studies reported in scientific publications (listed in the Bibliography) report a nuanced response by members of the public. A lot depends on the quality and placement of such grab bars as well as the age of the users (which was noted in comments elsewhere in this Comment Reason statement), Avoidance of bathing, partly due to the perceived dangers involved, starts in younger adults, not just the elderly.

Evidence supports the contention that bathtubs and showers—as discussed elsewhere in this Public Comment—*are more dangerous on a use-exposure basis than are stairs (in residential settings)*. Such insights about bathtubs and showers date back to the first large US study in the mid 1970s, published in 1975 (and listed in the accompanying Bibliography for this Proposal and Comment: "11. A systematic program to reduce the incidence and severity of bathtub and shower area injuries."

§ **Misty Guard** Regulosity LLC

Opposition comment: Stanchions are not suitable for in-rim mounting on plastic plumbing products; they are not designed for the loads involved.

Proponent Rebuttal: The Proponent of stanchion mounting on—*not into*—bathtub rims, Jake Pauls, agrees that the relatively poor rigidity and strength of plastic tubs is not suited to such loads—possibly also the live loads from a heavy bather sitting on a tub rim (as discussed elsewhere in this comment). Thus, while the inability of one line of products to meet the 250-pound minimum load established by the IBC in Chapter 16, specifically for grab bars (and, now, stanchions which function as grab bars) should not have to be called out in a code requirement, especially a modern code that claims to use performance language. In any event, the proposals now being submitted for standards such as ICC A117.1, will specify that stanchion mounting on tub rims is only for steel tubs that should have no problem meeting IBC's 250-pound criterion.

§ **Margo Thompson** National Multihousing Council

Opposition comment: 'Me too' testimony.

Proponent Rebuttal: None

Input by IBC-General Committee Members During the Public Hearing Portion on G172-21

Here follows, in chronological order what IBC-G Committee Members asked by way of question, of the proponent, during the public testimony portion of the CAH., starting with Henry J. Kelly, CCPM, CCI, CCC, GRI, Representing the National Association of Home Builders:

"Mr. Pauls, your proposal is very detailed as to what will be required if approved. My question is how many units that have been built or retrofitted currently contain all the grab bars and stanchions as you propose in sections 1210.3 to 1210.3.4.5?" As the question was worded clearly in terms of "How many,"

Dr. Pauls' reply was, correctly, "I don't know," to which he could have added, realistically, that such expertise exists, if at all, within the housing industry and he would defer to such expertise on this particular question.

This was followed by a question by Lieutenant Michael Pokorny, Montgomery County Fire & Rescue, asked:

"Mr. Pauls, in Section 1210.3.4.4 you talk about structure—the stanchion being capable of structural loading set forth in Section 1607.8.2 and this section has to do with Fire Department vehicle loading. Is that what your intention is?

Dr. Pauls' reply, "The reference was provided by ICC staff so, if I am in error, I apologize for not checking it personally." (The reference used, 1607.8.2, was the correct one, in relation to grab bar loads, in the IBC, *2018 edition*, available to Dr. Pauls.)

Generally, on both questions, the first thing an expert on any subject should know is when to defer to the knowledge and expertise held by others.

Committee Action

Following the public testimony portion of the CAH, the Committee Action included a motion for Disapproval accompanied by the following comments by a small fraction of the Committee members. This occupied nearly the same length of time as allotted to the Proponent, Jake Pauls. Some of the Committee input appeared to be, effectively, in the form of testimony for which no rebuttal was possible (except in this public comment). The virtual hearing format also did not have any clearly apparent mechanism for a "point of order" to be made if new information was introduced in the Committee Action portion of the Hearing on G172-21. (This would have re-opened public testimony if the Moderator agreed that new information had been introduced.)

Three Committee members spoke, as follows.

(1) Henry J. Kelly, CCPM, CCI, CCC, GRI, Representing the National Association of Home Builders, (after making the motion for disapproval):

Committee member reason: "When I questioned the Proponent, he did not know if any of the units currently that have been built or have been retrofitted, that would require with all of the things that he proposes in 1210.3 through 1210.3.4.5, would solve the problem. If he does not know if they exist, then there's been no studies done and there's no empirical evidence that what he proposes will solve the problem and we shouldn't be adopting anything in the Code that there is no evidence this it will solve the problem."

Proponent Rebuttal: This was not the question asked during the public hearing portion when this committee member asked, specifically, "How many units that have been built or retrofitted currently contain all the grab bars and stanchions as you propose in sections 1210.3 to 1210.3.4.5?" Dr. Pauls' reply, correctly, was "I don't know."]

The exact *quantitative* question he originally asked was, "how many units. . . ," not "if any of the units. . . ." The correct answer to the first question—on narrowly specified quantity—was, correctly, "**I don't know**" and the correct answer to his rephrased, *yes* or *no* question was, "**Yes, those based on the criteria and background information set out in the proposal**." There was no mechanism (including a point of order) for reopening the public portion of the hearing. Moreover, there was specific, pertinent, published insights in some of the Canadian studies behind this answer, *to the latter question*, listed in the Bibliography provided with the initial proposal and highlighted again below with a listing of (numbered) titles only.

(2) Micah Chappell, MBA, CBO, Code Development Manager, Seattle Department of Construction and Inspections:

Committee member reason: "I just want to commend Mr. Pauls for bringing this proposal through on a regular basis for Code cycles. It just goes too far every time that's been mentioned several times. I do think he should come back with a portion. As one of the opponents talked about, there is a problem of not having backing when these things are necessary to install by choice. And maybe that's the proposal he needs to start with. This just goes too far."

(3) Eirene Knott, MCP, CBO, CFM, Director of Code Services, BRR Architecture:

Committee member reason: "One of the proponents provided the statement that this—the Code is a minimum standard and this requirement is going to raise that level of expectation of what a minimum standard is and I believe it goes beyond this. The second point I want to make is (that) my mother is somebody who is a fall risk and she made a choice to put her own grab bars within her own house, none of which were in the locations where Mr. Pauls is suggesting. So I don't believe this is ready for prime time."

Commenter Rebuttal: Many individuals sit on these code committees as experts. Expertise is the core of the development of good quality standards.

Proponent Rebuttal to All Three Committee Members Commenting: All of these Committee comments warrant responses which, given the current, highly limited testimony time in ICC hearings, can only be addressed—within the ICC process—in written public comments such as this one. For example, as there are two very different types of transfers—a *transfer from/to a wheeled mobility device* and *ambulatory transfers,* the bathing safety experts (as they are identified in the Bibliography for example) agree that the latter call for a minimum of two grab bars or stanchions. Within recent deliberations (over a decade or more) in multiple code development bodies, the frequent references to backing (blocking or reinforcement) have ***not*** been based on future provision of grab bars for *ambulatory transfers*; they are based on *transfers from/to wheeled mobility devices*. The two functions are very different.

Moreover, ambulatory transfers cover two dangerous aspects: (1) stepping over elevated—plus possibly slippery—surfaces and (2) stand-to-sit and sit-to-stand transfers also involving slippery surfaces. The originally submitted proposal, G172-21, address the two types of "points of control" appropriate for both the access side of a bathtub or shower—where vertical grab bars or stanchions are most useful—and, in the case of tubs, the non access side (with the latter being especially relevant for the stand-to-sit and sit-to-stand transfers where *bilateral*, upper body points of control are very relevant. Moreover, as ambulatory transfers can be facilitated entirely by stanchions, there may be no need for holes to be made in bathtub surrounds. Thus "backing" is not a necessary prerequisite for future installation. Proposal G172-21 illustrates two stanchion options (along with six, wall-mounted, grab bar options) that completely meet the minimum requirements proposed. (The relevant illustration is just below the pie chart graphic.)

There were a couple of comments on level of expectation leading to many avoidable injuries (as well as leading to reduced or avoided uses of bathtubs as addressed by the Proponent, Jake Pauls); it is clearly within the scope of the IBC to "raise expectations" to reduce the predictable and largely preventable million or so professionally treated injuries annually in the USA as well as to better facilitate the billions (with a "b") of uses of bathtubs and showers annually in the USA. Surely this is a "prime time" for ICC members and its code development process to respond positively.

Rebuttal Responses to the Committee Reasons in the Report of Hearing

Committee Reason (as reported by ICC). This statement is as follows except that, here (for clarity), sentences are separated, plus numbered, *and a comment has been added in italics about the accuracy, relevance, etc. of the summation.*

1. "This proposal was disapproved because the committee had several concerns."

Proponent Response: *Only items 2, 3, 4, and 5 were noted as reasons explicitly expressed by committee members; the other items came from opposition testimony which the Committee did not mention as reasons for disapproval.*

2. "Have there been any dwelling or sleeping units constructed with the proposed grab bar configurations so that the increase in safety can be verified?"

Proponent Response: This single, hugely-complex question posed by Committee member, NAHB representative, Henry Kelly (and underlining for emphasis): "<u>My question is how many units that have been built or retrofitted currently contain all the grab bars and stanchions as you propose in sections 1210.3 to 1210.3.4.5?</u>" The answer to Mr. Kelly's original question, was—correctly and appropriately, "I don't know." (The question, as originally asked reminds one of the historical practice in some parts of the US to have persons of color—seeking the right to vote in an election—

compelled to answer a question about how many jelly beans were inside a large jar.) As an expert who occasionally has to testify under oath, “I do not know” is a correct—and sufficient—answer to an impossible-to-answer question which was for “how many,” not the rephrasing of the question here as, “ Have there been any. . . ?”

If supportive evidence were needed, reference would be made to the Canadian studies referenced in the Bibliography which date back a couple of decades.

3. **“Have their been any studies or empirical evidence that indicate that this will significantly improve safety?”**

Proponent Response: Yes, see the excerpted titles, below, of a large number of studies that were included, numbered, in the Bibliography listing in this proposal (and earlier ones submitted to ICC for the 2018 editions of the IBC and IRC).

Moreover, see the recorded meetings of experts that go well beyond the published research studies in providing state-of-the-art presentations by Dr. Nancy Edwards and Dr. Alison Novak plus discussions with other injury prevention experts from Canada and the USA. For links to these freely streaming videos see section below, updating the Bibliography

See also—after the general comments below—several excerpts from Bibliography item 30, published a decade ago, that provides a good summary of what was learned about use and performance of grab bars as well as attitudes of tested adults about their intention to install grab bars such as the ones used in the tests.

4. “**Requiring the installation in all bathrooms in all Group R units is going too far — perhaps blocking so that residents can add grab bars based on need.”**

Proponent Response: As mentioned previously, stud placement is critical. Replacing studs in an existing building is not a practical retrofit for a grab bars and will represent multiples of the cost of installing the studs appropriately in the first place so the grab bars can be appropriately placed.

Generally, misconceptions about blocking need a powerful rebuttal, particularly the claim that “blocking” is the solution. First, the blocking still being specified for accessibility (by A117.1 and various codes), is not proposed for safety of ambulatory bathers who need points of control based on standing transfers. The blocking-facilitated grab bars are intended for transfers by wheel-using, seated persons needing to shift from a wheelchair seat to another seat in a bathtub or shower enclosure (and vice versa). The grab bars that make sense for such accessibility-related transfers are not high enough, suitably placed, and often vertically oriented to assist ambulatory users.

All of the currently installed blocking will only rarely be put into use, even for assistance to non-ambulatory bathers, let alone ambulatory users. Grab bars of incorrect position, orientation, height, etc. will be of limited use for the latter. Finally—for all situations—how easy will it be to find out if, and where, blocking has been installed and how is such blocking to be used in connection with all the recently and currently installed plastic surrounds for bathtubs and showers that the plumbing industry claims cannot have grab bars installed due to the flimsy nature—until reinforced—of the surrounds/enclosures. There is also the concern for water intrusion with the holes that must penetrate such membrane materials.

Both in Canada and the US, opponents have been outspoken about unsuitability, for grab bar installation, of industry’s products, whether plastic or fiberglass tubs and surrounds/enclosures. It turns out that the older ones bathtub is—likely with enamel-steel fabrication and with a structurally superior, tile (on solid backing) surround—the easier it might be to provide both the needed stanchions and/or, in some cases, conventional grab bars. The stanchions, for example, do not rely on blocking in either of the apartments where the Proponent, Dr. Pauls, has offices (in Toronto and in Maryland). Again, the IBC already requires provision for a 250-pound load for seats serving bathing and showering and that would include the bathtub rim in many cases.

5. **“The choices for grab bar installation should be based on individual residents needs and choices, which may not be this configuration.”**

Proponent Response: The proposed requirements, like those specified in established requirements in both the 2018 and 2021 editions of NFPA 101 and NFPA 5000, do not call for “this configuration.” Like what is proposed for ICC codes, there are multiple options that address various bathroom layouts and surroundings of the bathtub. Also, in treating stanchions and conventional grab bars as equally acceptable in the options, there is added choice about visual appearance which is especially discreet with stanchions which blend into the décor in a more-architectural fashion rather than looking institutional and an afterthought. Stanchions are also much more likely to serve other important usability and safety functions, notably for use of toilets located adjacent to bathtubs or showers. Conventional grab bars are not as versatile for such dual uses as are stanchions.

6. **“The locations specified can be an issue with the different types of tubs and showers on the market for design and structural strength.”**

Proponent Response: Wrong, the options include all manner of tub and shower shapes and sizes plus adjacent construction. Also, enamel steel bathtubs are still available and in stock at stores selling the more-expensive, less-durable plastic designs.

Furthermore, there is no need to install stanchions "into" bathtub rims. The same stores that sell steel bath tubs also sell the coated steel tubing and matching surface-mounted fixings needed—and structurally adequate—to mount the lower end of a stanchion "on" a bathtub rim, not "into" the rim using widely available, modern RTV adhesives (such as widely used in automobiles, even for water pumps) that have the strength to meet the 250-pound loading—in all directions—to satisfy the IBC structural requirement, even in very wet conditions. Dr. Pauls has such an installation in his Toronto apartment which has served well for years, on a 50-year old steel bathtub. It easily passed a structural load test exceeding 300 pounds, sustained for hours and directed laterally to serve as the toughest test of the adhesive-based mounting "onto" the bathtub rim.

7. **"There is a concern about the grab bar location conflicting with the shower curtains so that water would end up on the room floor, thus creating a slip and fall hazard."**

Proponent Response: This concern ~~-~~was both raised and solved by the G172 proposal with the very careful use of particular lateral locations of the vertical grab bar options for the control-end or head-end walls. The grab bars are thus clear of the standard shower curtain rod/track location over, or at, the inside wall of the bathtub at the approach side.

Getting into the details addressed: the issue had been thoroughly dealt with by the proposal in specifying vertical grab bar centerlines (in Section 1210.3.1): "between 9 inches (230 mm) and 12 inches (305 mm) horizontally, inward from the access side of the bathtub" or "within 2 inches (51 mm) maximum inward, and within 6 inches (152 mm) maximum outward, from the access side of the bathtub. The grab bar or stanchion shall be located 2 inches (51 mm) minimum, horizontally, from the centerline of any shower curtain rod/track installation." Thus a minimum of 7 inches (178 mm) of lateral area was reserved for the shower curtain rod/track or other enclosure system (e.g., sliding safety glass panels in a metal frame) that effectively address the danger of water ending up on the bathroom floor. Also, these protection measures are easy for bathing users to undertake.

PROPONENT'S GENERAL COMMENTS in Response to "Disapproval" Vote.

As noted previously, below are selected, excerpted portions of a large number of studies that were included, numbered, in the Bibliography listing in this proposal (and earlier ones submitted to ICC for the 2018 editions of the IBC and IRC), See also the links for several listed, streaming videos that go well beyond the published research studies in providing very accessible, state-of-the-art presentations by Dr. Nancy Edwards and Dr. Alison Novak (two world experts in safety of bathing and grab bar effectiveness studies) plus discussions with other injury prevention experts from Canada and the USA including five highly knowledgeable members of A117 and NFPA committees plus relevant ICC staff. (All 11 participants in the March 10, 2016 meeting are identified in the three-part video with the first part accessible at https://vimeo.com/channels/866600/167609881.)

From Bibliography item 30, come the following relevant quotations that address some of the criticisms made by Committee members quoted above. (the full citation for this item is: Guitard P, Sveistrup H, Edwards N, Lockett D. **Use of different bath grab bar configurations following a balance perturbation**. *Assistive Technology* 2011;23:205-15.

". . . . the vertical bar was by far the bar most often used by participants to regain their balance when entering/exiting the tub during platform perturbed transfers. . . . Overall, older adults used grab bars to regain their balance (alone or in combination with a surrounding structure) in 212 of the 425 instances where they were present (49.8%). Older adults found grab bars to be very helpful, felt comfortable using bars, and felt safer when grab bars were present. Most participants indicated they would eventually install the grab bars tested (84.3% for CSA, 70% for OCC), . . . Younger adults also reported an increased sense of security in the presence of grab bars. . . . Nine percent of younger adults and 8% of older adults felt there was no difference in their sense of security when entering/exiting the tub in the presence or absence of grab bars. . . . Interestingly, 23 participants (41.8%) recommended grab bars to family members, colleagues, and/or friends. . . ."

". . . . The vertical bar was most often used when entering and exiting the bathtub. . . . Our results support the need for two grab bars to ensure safety during all phases of bathing, as recommended in previous studies (Aminzadeh *et al*., 2000; Sveistrup *et al.,* 2006). **Building codes should be revised to require a minimum of two bath grab bars to ensure safety during bath transfers and prevent falls: one adjacent to the rim on the side wall to facilitate entry/exit and one on the back wall to help during sitting and standing in the tub. . . "**

Bold added here as this pertains to the heart of the issue in this proposal and related comments. It is also the most direct rebuttal to those speaking at the ICC CAH, who argue that Dr. Pauls' proposal goes too far. The evidence from research reported here and in the other sources, some of which are described next (in video and text formats) supports Dr. Pauls' position and it is up to those opposed to his position that, now, need to come up with evidence as opposed to mere opinion or conjecture.

For this reason—*and others*, Dr. Pauls, the Proponent of IBC G172-21 once again extends an offer of free technical presentations to, and related discussion within, ICC Chapters that wish to have a virtual presentation and discussion opportunity on the topic of how the I-codes can better address bathroom safety, in addition to stairway safety. This is especially important during 2021 as the ICC A117 Committee will also be processing a proposal to add new requirements to ICC-A117.1 dealing with ambulatory accessible bathing, showering and toileting facilities, a proposal submitted by Dr. Pauls, the longest serving Individual Member of the A117 Committee. Education of voting members of ICC is, ultimately, the best way to improve use of building codes as a key method of preserving, to a reasonable degree, the wellbeing and safety of the public—*including the families of ICC members.*

(From the slightly updated REASON statement): Approximately 50 internationally-produced scientific and technical references, on bathing/showering safety, were compiled by the Proponent, Jake Pauls, in 2016, for an American Public Health Association (APHA) draft policy highlighting, especially two Canadian research studies that also are addressed in three video presentations by Principal Investigators (Dr. Nancy Edwards, Dr. Alison Novak) for the research and posted, for free streaming viewing, starting at, https://vimeo.com/channels/866600/167609881, Accessed July 2, 2021. Beyond the three videos from the March 2016 meeting of experts, additional videos covering technical aspects of bathing and showering safety (including cost impact ~~and~~ benefit issues) are found at the following links (all of which are available, with descriptions, at http://www.bldguse.com/VideoPage.html, the Proponent's Professional Practice Website, This selection, from a subset of about a dozen videos, of about 30 at the site, was accessed July 2, 2021.):

https://vimeo.com/237294479

https://vimeo.com/197742277

https://vimeo.com/193507768

https://vimeo.com/173883358

https://vimeo.com/175101448

Selected publication titles, especially related to this Comment

(from Proposal Bibliography and other cited references with in the Proposal and Comment text)

1. Access to bathtub grab bars: evidence of a policy gap.

3. Nonfatal Bathroom Injuries Among Persons Aged ≥15 Years United States, 2008.

4. Development and evaluation of an instrument to measure seniors' attitudes toward the use of bathroom grab bars.

5. Utilization of bathroom safety devices, patterns of bathing and toileting, and bathroom falls in a sample of community living older adults.

11. A systematic program to reduce the incidence and severity of bathtub and shower area injuries.

14. Practice Guideline for Prevention of Falls in Older Persons.

15. Risk factors for falls among elderly persons living in the community.

17. A population-based study of environmental hazards in the homes of older persons.

18. Environmental hazards and the risk of nonsyncopal falls in the homes of community-living older persons.

19. Prevalence of selected risk and protective factors for falls in the home.

20. Unintentional injuries in the home in the United States.

21. Home environmental hazards and the risk of fall injury events among community-dwelling older persons.

23. Patterns of use of different toilet grab bar configurations by community-living older adults Research Highlight.

24. Evaluation of bath grab bar placement for older adults.

27. Biomechanical investigation of grab bar use and balance control during bathing transfers.

28. Predictors of bath grab-bar use among community living older adults.

29. Evaluation of bath grab bar placement for older adults.

30. Use of different bath grab bar configurations following a balance pertubation

34. Characteristics of gait in stepping over obstacles.

37. Injury Prevention: What works? A Summary of cost-outcome analysis for injury prevention programs.

38. Interventions for preventing falls in elderly people.

39. Modification of the home environment for the reduction of injuries

40. Home safety education and provision of safety equipment for injury prevention.

41. Formulating a programme of repairs to structural home injury hazards in New Zealand.

42. Home modifications to reduce injuries from falls in the Home Injury Prevention Intervention (HIPI) study: a cluster-randomized controlled trial.

45. Check for Safety: A home fall prevention checklist for older adults.

--. Effect of bathroom aids and age on balance control during bathing transfers.

--. The Evaluation of Vertical Pole Configuration and Location on Assisting the Sit-to-Stand Movement in Older Adults with Mobility Limitations.

--. Toilet Grab-Bar Preference and Center of Pressure Deviation During Toilet Transfers in Healthy Seniors, Seniors With Hip Replacements, and Seniors Having Suffered a Stroke

--. A fresh look at the costs of non-fatal consumer product injuries.

Bibliography: See the very extensive bibliography provided with proposal G172-21 (with key documents listed, by title only, above); there are only three additional references for that listing of references on the problems of, and solutions to, injuries and flawed performance (in terms of usability as well as progress with model building code development) of bathtubs and showers as addressed by this comment.

Lawrence, B., Spicer, R., Miller, T. (2015) **A fresh look at the costs of non-fatal consumer product injuries.** *Injury Prevention. 21*, 23-9
Pauls, J.L. and Johnson, D.A (2018). **Applying Ergonomics to Bathing Safety: Including adoption of unorthodox practices for slip-resistant underfoot surfaces of bathtubs plus showers and provision of effective points of control.** *Proceedings of the 20th Congress of the International Ergonomics Association (IEA2018),* Vol II, Springer, pp. 486-500.

Pauls, J.L. and Johnson, D.A (2021). **Why, How, and How Effectively Do USA and Canadian Building Codes Address Two Leading Fall Sites in Homes?** *Proceedings of the 21st Congress of the International Ergonomics Association (IEA2021),* Vol V, Springer, pp. 674-681.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
While the "net effect" includes a very modest increase in the cost of dwelling unit construction—on the order of 0.001 (one in a thousand) of the overall unit construction cost of a unit, the payback of this investment should be realized within a few years of occupancy in terms of reduced societal cost of injuries, to the occupants, from falls associated with bathing and showering in bathtubs and showers. Thus, for the vast majority of the time (say a few decades) the unit is occupied, there is only net payback on the investment.Beyond the significant reduction of injuries, there is a larger benefit to the well-being of the occupants in terms of reduced anxiety with some critical, relatively dangerous aspects of showering and bathing, namely the transfers in and out of the facility and, in the case of tubs especially, there are extraordinary challenges both underfoot conditions and with general need for postural control when people transfer between standing and sitting or, (with bathtubs) even lying down in the water-filled tub and, even more challenging, vice versa with transfers back to an upright posture with which one can step out of the facility.

For many occupants, especially in middle age, there will be increasing anxiety about, and even danger of, very serous injuries that, while averted for a time, have a growing probability of occurring. One common response is to reduce bathing and showering, especially with bathtubs. In other words, the cost of injuries—beyond direct pocketbook cost of comfort and safety—rises over time. Grab bars and stanchions—with their costs being almost entirely in the initial acquisition and installation—are an increasingly valuable investment for an individual and his/her co-occupants of the residential unit.

Thus over the life of a bathing/showering facility, the benefit-to-cost ratio is effectively reduced to the point where the initial acquisition and installation cost approaches nearly zero. Hence it could be argued that the best single response to the ICC's question for this little-to-no-cost impact section is "there is no cost impact" there is only benefit and that benefit grows over time as the value of well-being increases for each individual over time and the cost of recovering well-being—within the healthcare system, especially in the USA, increases faster than do construction costs.

Finally, it is important that, of two submitted Public Comments, the one referencing NFPA 101 for grab bar and stanchion installation, in a requested change to the IBC, calls for—*not a requirement that something be done*—but, rather, that if one decides to install a grab bar or stanchion, that it satisfies evidence-based selection and installation criteria published in the well-established, highly-respected ANSI standard for life safety in buildings and structures, i.e., NFPA 101, *Life Safety Code*. A related comment seeks Approval as Submitted.

Note that the author of this cost impact statement, and the Proponent of G172-21, Jake Pauls, is a member of the ICC Industry Advisory Committee

Task Group on Cost Impact and he has been involved with benefit-cost impact issues for decades in a professional capacity including being a member of the International Benefit-Cost Analysis Society based in the USA. He also serves on several NFPA 101 committees and is a longest serving member on at least two of its Technical committees including those most responsible for the grab bar and stanchion requirements in NFPA 101 and NFPA 5000. He is also the longest serving Individual Member of the ANSI-approved A117 Committee for which ICC is the current Secretariat. A117,1 also has proposals for "Ambulatory Accessible" bathtubs and showers that parallel those in the above-noted ANSI-approved standard, NFPA 101.

Public Comment# 2502

Public Comment 2:

Proponents: Jake Pauls, representing Myself (bldguse@aol.com) requests As Submitted

Commenter's Reason: For this Public Comment REASON statement, refer first to the background as provided with the very detailed, full REASON statement for proposal G172-21. This Comment will not repeat the earlier-provided information although there are some edited extracts used here from the Proposal IBC G172-21 REASON statement.
There are two public comments being offered – As Modified and As Submitted. The basic REASON, behind overturning Committee action, is that—compared with the record for the Committee Action Hearing—there is far more multifaceted, justification provided with Proposal G172-21 with "*Approval as Submitted*"—and perhaps more acceptable to ICC members—inclusion of the detailed technical requirements in the IBC, or as provided with a separate detailed comment, and as equally appropriate, as replaced with the established, detailed requirements in NFPA 101. Both comments respond with detailed, forensic quality information to the criticisms expressed during the Committee Action Hearing. The information extends the detail in the REASON provided with Proposal G172-21, including a very extensive Bibliography and very supportive Impact statement of large benefits versus very low cost impact—with a payback period on the order of a few years. These extensive details are presented with each of the two public comments.

The following treatment might resemble a forensic examination. *This is intended and healthy for the ICC process and products.* The matter of bathing and showering safety—*and related model code requirements*—might, someday, be resolved in the courts. The consequences to public health and safety are simply too great not to be argued with all the checks and balances*, plus respect for evidence*, that are at the core of legal proceedings. I have testified under oath about 170 times with a comparable number of court-acceptable reports prepared in 40 years where such work represents a minority of his professional duties during that period. (For example, among ~~his~~ my many worldwide advisory roles, I have served, for two Olympic Games, as the lead advisor on spectator safety.) Forensic quality and detailed evidence are thus at the core of my 54-year professional safety career that led, in 2017, to the University of Greenwich (the world leader in research on people movement in buildings) conferring an Honorary Doctor of Science Degree.

For this Comment there is an update with a recent (Spring 2021) analysis of voluntary measures that people have taken when coping with relatively dangerous bathtubs and showers, among a few comparable dangers (such as stairs and toilets). This helps to understand why we have a current toll of over a million professionally treated injuries, annually in the US, associated with bathtub/shower use and why the injury toll is not even higher. In large part—*with the exception of toilets*, people are limiting their exposure to these relatively dangerous facilities that are more dangerous—*on an exposure-corrected basis*—than are stairs (on which about 90 percent of the injurious, stair-related falls occur in homes) that injure over four million people annually in the US to the extent of leading to professional medical attention and imposing annual societal costs exceeding 100 billion dollars annually for stairs alone with over 20 billion dollars annual societal cost for bathtub and shower-related injuries (not including hot water scalds); toilets are associated with a somewhat lower injury cost of several billion dollars annually in the USA. These annual US cost estimates were for a period about a decade ago (Ref. Lawrence B, Spicer R, Miller T. A fresh look at the costs of non-fatal consumer product injuries. *Injury Prevention* 2015; 21:23-29).

The Comment then continues with a formal response, including some rebuttal to the *published* report of Committee statements at the Committee Action Hearing (CAH) as well as Committee members' *actual* comments as transcribed from the ICC Web site record. The comments, as transcribed from ICC recordings, were not completely, or even sufficiently, similar to the published report to satisfy the standard to which I am accustomed and, very reasonably, should be expected of the ICC process. They are, in my professional opinion, worthy of pursuing in a separate formal objection, including within the Industry Advisory Committee (on which I have long represented the American Public Health Association), and via an Appeal to the ICC Board of Directors.

Voluntary Measures Now Being Taken by Adults To Limit or Avoid, If Possible, Uses of Relatively Dangerous Facilities

First it should be very clear that, based on US CPSC/NEISS data, these uses of dangerous facilities occur almost entirely in residential settings. Hence the proposed scoping—*R1, R2, R3, R4*— is valid. The most dangerous facilities, regulated by codes—*including the I-Codes and, more specifically, IBC Chapters 10 (on stairs) and 12 (in relation to Proposal G172-21)*—are:

· stairs (for traversing different floor levels);

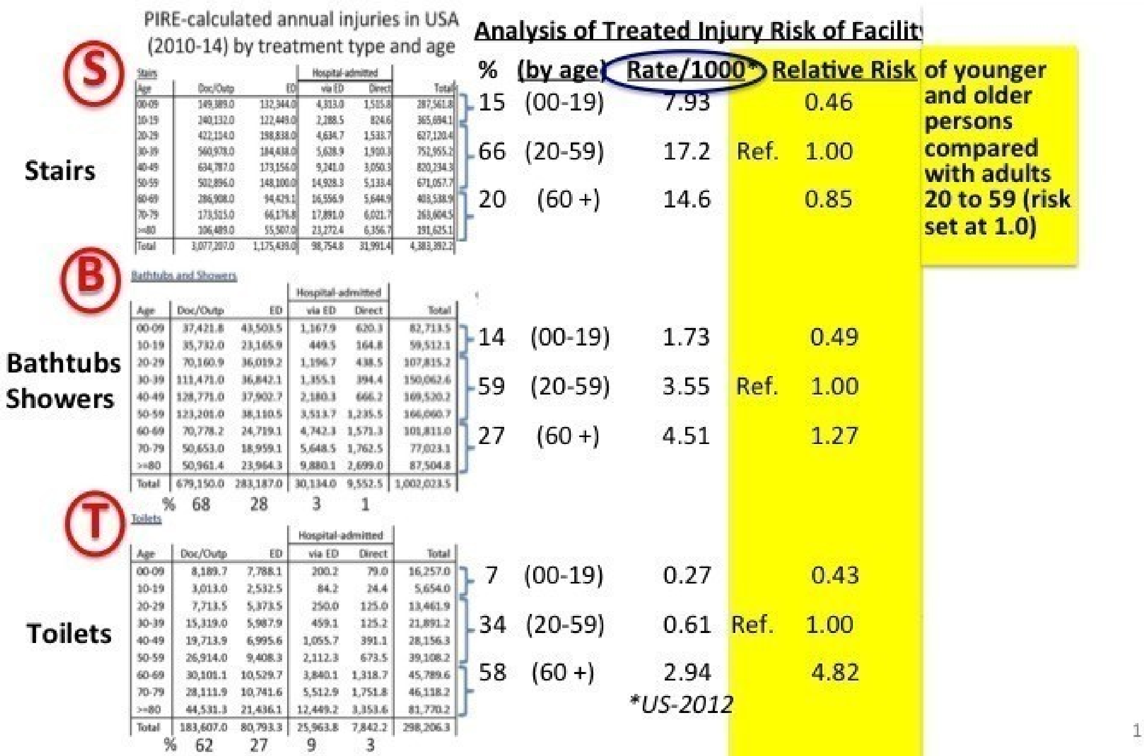
· showers and bathtubs (for external cleansing); and

· toilets (for elimination of bodily wastes).

The following is based on an analysis performed early in 2021 by myself-and-presented to a Canadian Commission on Building and Fire Codes (CCBFC) Standing Committee (responsible for grab bar and stanchion requirements in the *National Building Code of Canada*). *Voluntary avoidance of use* of the first two of the above list of three relatively dangerous facilities, found in most residential settings, helps to explain population and age-corrected injury data based on nonfatal injuries professionally treated in settings. The treatment contexts range from doctor' offices, medical centers, emergency departments, and admitted patient wards of hospitals. (In relation to the deliberations in Canada, note that the USA has bathtub, shower and toilet design and installation practices very comparable to those in Canada. The USA has a superior injury treatment documentation system with US CPSC/NEISS.)

Here follows a graphic (Figure 1) from the recent PowerPoint Presentation, of 194 slides, to Canadian safety and codes authorities) with, on the left side, tables of non-fatal injury treatment data for stairs, bathtubs/shower and toilets for the USA annually during 2010-14 using US-CPSC/NEISS data as analyzed by Dr. Bruce Lawrence at the Pacific Institute for Research and Evaluation (PIRE) in Maryland. He and his colleagues at PIRE were also the authors of the injury cost paper published in the highly regarded journal, *Injury Prevention,* 2015, cited above.

While the tables' data (in Figure 1) are in small font (with two of the three, in larger size, provided in the Proposal Reason statement), pay attention to the more-readable, middle and (yellow-highlighted) right side summations of the injury data expressed as relative risks for the three injury sites by three age groups, 0-19, 20-59, plus 60-and-older. The relative risks are normalized with the middle-age group set at a reference risk of 1.0 for each of the three facility groups: stairs, bathtub/showers and toilets. (For those interested in the totals for ***annual*** treatments averaged over the period 2010-2014—the bottom line on the leftmost column of each facility table—were: stairs - 4,390,022; bathtubs & showers - 1,002,023; toilets - 298,206. By comparison, US nonfatal fire-related injuries, in the last decade, are estimated to be in the 10,000 to 20,000 range or about 0.3 percent of the nonfatal injury toll due to stairs, bathtubs/showers and toilets (as illustrated in the pie chart provided in the Proposal Reason statement—about 2/3 into the text of the statement). **Figure 1.**



Stairs

Age	Doc/Outp	ED	Hospital-admitted via ED	Hospital-admitted Direct	Total
00-09	149,989.0	132,344.0	4,313.0	1,515.8	287,561.8
10-19	240,132.0	122,449.0	2,288.5	824.6	365,694.1
20-29	422,114.0	198,838.0	4,634.7	1,533.7	627,120.4
30-39	560,978.0	184,438.0	5,628.9	1,910.3	752,955.2
40-49	634,787.0	173,156.0	9,241.0	3,050.3	820,234.3
50-59	502,896.0	148,100.0	14,928.3	5,133.4	671,057.7
60-69	286,908.0	94,429.1	16,556.9	5,644.9	403,538.9
70-79	173,515.0	66,176.8	17,891.0	6,021.7	263,604.5
>=80	106,489.0	55,507.0	23,272.4	6,356.7	191,625.1
Total	3,077,207.0	1,175,439.0	98,754.8	31,991.4	4,383,392.2

Bathtubs and Showers

Age	Doc/Outp	ED	Hospital-admitted via ED	Hospital-admitted Direct	Total
00-09	37,421.8	43,503.5	1,167.9	620.3	82,713.5
10-19	35,732.0	23,165.9	449.5	164.8	59,512.1
20-29	70,160.9	36,019.2	1,196.7	438.5	107,815.2
30-39	111,471.0	36,842.1	1,355.1	394.4	150,062.6
40-49	128,771.0	37,902.7	2,180.3	666.2	169,520.2
50-59	123,201.0	38,110.5	3,513.7	1,235.5	166,060.7
60-69	70,778.2	24,719.1	4,742.3	1,571.3	101,811.0
70-79	50,653.0	18,959.1	5,648.5	1,762.5	77,023.1
>=80	50,961.4	23,964.3	9,880.1	2,699.0	87,504.8
Total	679,150.0	283,187.0	30,134.0	9,552.5	1,002,023.5
%	68	28	3	1	

Toilets

Age	Doc/Outp	ED	Hospital-admitted via ED	Hospital-admitted Direct	Total
00-09	8,189.7	7,788.1	200.2	79.0	16,257.0
10-19	3,013.0	2,532.5	84.2	24.4	5,654.0
20-29	7,713.5	5,373.5	250.0	125.0	13,461.9
30-39	15,319.0	5,987.9	459.1	125.2	21,891.2
40-49	19,713.9	6,995.6	1,055.7	391.1	28,156.3
50-59	26,914.0	9,408.3	2,112.3	673.5	39,108.2
60-69	30,101.1	10,529.7	3,840.1	1,318.7	45,789.6
70-79	28,111.9	10,741.6	5,512.9	1,751.8	46,118.2
>=80	44,531.3	21,436.1	12,449.2	3,353.6	81,770.2
Total	183,607.0	80,793.3	25,963.8	7,842.2	298,206.3
%	62	27	9	3	

Facility	%	(by age)	Rate/1000*		Relative Risk
Stairs	15	(00-19)	7.93		0.46
	66	(20-59)	17.2	Ref.	1.00
	20	(60 +)	14.6		0.85
Bathtubs Showers	14	(00-19)	1.73		0.49
	59	(20-59)	3.55	Ref.	1.00
	27	(60 +)	4.51		1.27
Toilets	7	(00-19)	0.27		0.43
	34	(20-59)	0.61	Ref.	1.00
	58	(60 +)	2.94		4.82

Note that, for stairs and bathtubs/showers, the relative risk rates (per 1000 population) for the two older age groupings (20-59 and 60-plus) are relatively similar (within same order of magnitude). However for toilets, the only facility category for which use cannot be voluntarily avoided by older persons (i.e., 60-plus), their relative risk of injuries is much higher (by nearly a factor of five).

What this means is that people older than about 60 (and other adults not yet in the 60-plus age group) achieve improved safety with stairs and bathtubs/showers by limiting, avoiding or foregoing use (technically termed "exposure")—*something they cannot do with toilets*. Thus vulnerable bathtub and shower users and inadequate safety provisions—e.g., facilities lacking functional grab bars and stanchions—lead to substantial avoidance of use as we age. *Also, note that the age group accounting for the majority of professionally treated injuries involving stairs and bathtubs/showers is not people over 60, but the 20-59 age group!*

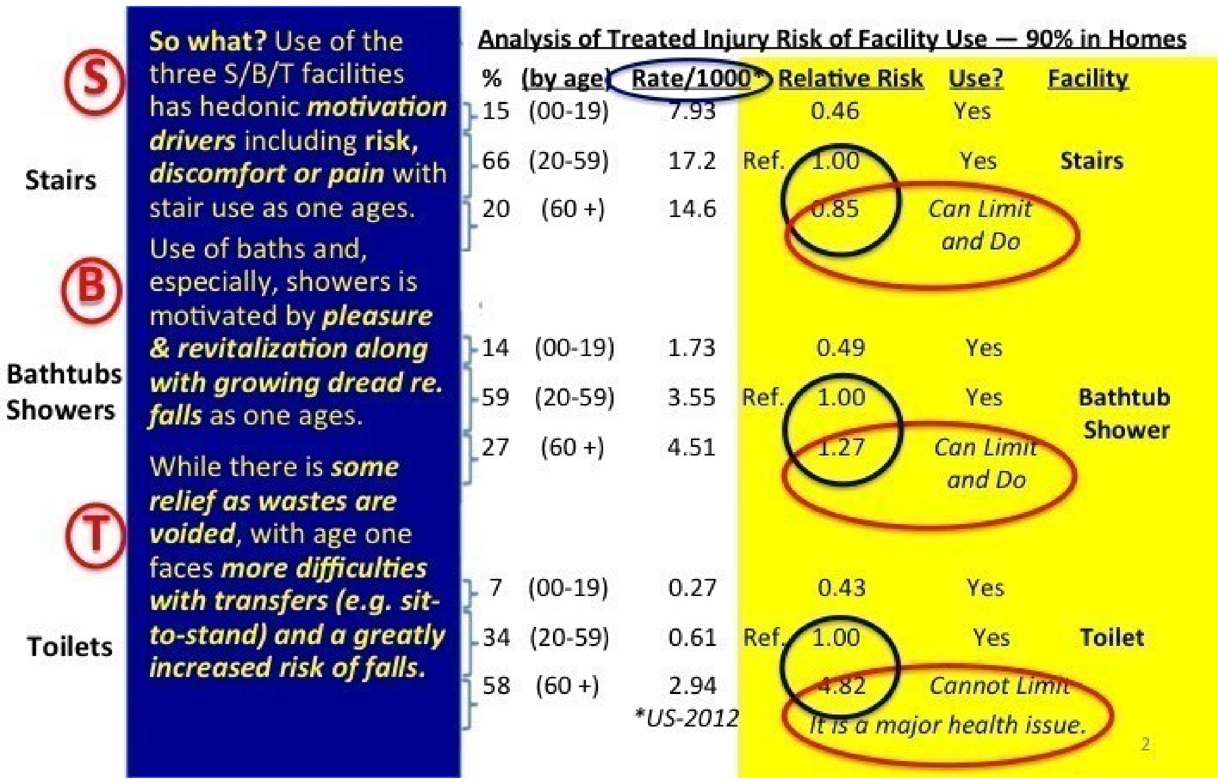
Note here that older people might be falling—*with injuries*—less often, but their injuries are more serious and require more intensive—*and* *expensive*—medical attention.

The takeaway message here is that we need to do a much better job of making bathing and showering facilities more-usable as well as safer for everybody if we want older persons to use the facilities to enjoy the health and other benefits they offer.

Waiting until home occupants get older is simply not a good strategy for installation of grab bars and other devices providing at least two points of control—three for in-tub, immersion bathing. We have to design *for all, at all stages of life*. The next graphic (Figure 2), also from my PowerPoint presentation to Canadian codes and safety experts early in 2021, provides a summary of the psychological aspects or implications of these use and safety data, plus analyses.

The arguments made by opposing participants at the Committee Action Hearings (CAH)—as described below, as well as some of the committee members, whose remarks are reproduced in even more detail below, are clearly not helping to reduce the large injury toll. Moreover, they perpetuate avoidance of use as the main—*indeed virtually no-choice*—strategy for coping with clearly inadequate built environment facilities built to the minimum standards of the *I-Codes.*

Figure 2



FORMAL RESPONSE, INCLUDING REBUTTAL TO THE *PUBLISHED* REPORT

OF COMMITTEE STATEMENTS AT THE COMMITTEE ACTION HEARINGS (CAH)

AS WELL AS COMMITTEE MEMBERS' *ACTUAL* COMMENTS

How Did the IBC General Committee Hearing Deal with Proposal G172-21? A Detailed Account

Public Testimony Portion. Included in the following are the points brought up by the opposition and the rebuttal to those comments (the latter being extended beyond the very limited opportunities provided in, and unique to, ICC's CAH process (compared with other current model code development procedures used in the USA and Canada):

Time Analysis. The 14 voting members of the IBC General Committee heard 24 minutes of testimony on G172-21 of which about half a minute was direct testimony by myself as Proponent, with the remainder of my time reserved for rebuttal, plus about two additional minutes (for balance) granted for rebuttal by the Moderator. This totaled about five minutes overall—almost all for my rebuttal testimony—for the only testimony coming from the proponent side.

Opposing testimony by seven people occupied about 12.5 minutes after which two Committee members posed one question each, with very short, one-sentence, to-the-point answers. Then there were was an additional 4 minutes for rebuttal from four opponents. Summing up, of the total 24 minutes of testimony, less than a quarter of the time was permitted for Proponent testimony and rebuttal.

Here follow synoptic accounts of the testimony by the seven opponents followed by equally synoptic accounts of rebuttal testimony in opposition by four opponents (indicated as "Opposition comments").

Post-hearing comments by the Proponent are shown immediately following, indicated as "Proponent Rebuttal."

§ **Matt Sigler** (at the time of the CAH, with the Plumbing Manufacturers Institute)

Opposition comment: Many installations have prefab walls, which are not designed for grab bars

Proponent Rebuttal: In the rare cases that they incorporate something like a grab bar, they would not meet any standard nor are they ergonomically designed—i.e., to function adequately.

Opposition comment: Thus consumer choice is limited.

Proponent Rebuttal: A situation for which industry is largely to blame.

Opposition comment: CPSC/NEISS data lack detail re. "accidents", e.g., alcohol or drug use while bathing and other medical issues

Proponent Rebuttal: All of these are quite acceptable—*if not also necessary in pandemic and normal times*—in residential settings, but the underlying assumption in industry attitudes is we do not need to cater to people—*as they are*—in their homes and we do not do anything to address the well-documented dangers (as well documented by research listed in the Bibliography) of industry's products—neither of which are defensible positions in a court of law where it can be shown that the dangers to users—*and-countermeasures*—have been well identified in publicly available documents for nearly five decades in the USA (e.g., in the Abt Associates document published in 1975 and cited as number 11 in the Bibliography provided with proposal IBC G172-21).

Opposition comment: The proposal's 1.5-inch minimum clearance between a grab bar and the adjacent surface does not comply with ANSI A117.1 which has maintained an absolute 1.5-inch requirement for grab bars

Proponent Rebuttal: Although the text shows it as an absolute dimension, a relevant A117.1 figure shows it *as a minimum* and despite making this a minimum for handrails years ago; a revision is expected for the next edition (per my recent formal proposal to A117)—the one relevant to this edition of the IBC. See also the series of photos within the Proponent's Reason for IBC G172-21 which demonstrates that the absolute 1.5-inch criterion makes no sense in terms of safety for users.]

Opposition comment: No bathtub on the market is designed for fixing a stanchion "into the rim."

Proponent Rebuttal: Yes, sometimes changes must made in manufacturing processes to better accommodate safety in the code. But if changes are the obstacle here, then why ever try to increase safety. The proposal is clear that fixing a stanchion to a bathtub rim is restricted to steel construction bathtubs which are still available (at very reasonable price, without special order) on the market and, furthermore, the proposal does not advocate attaching a stanchion "*into*" the tub rim of any type of construction. That is neither the only, nor best way of fixing a stanchion to a steel bathtub rim which, even if the industry's switch to lesser-quality, plastic or fiberglass tubs persists. Industry cannot prevent users from sitting on the more-easily deformed plastic bathtub rim imposing a load much higher than that imposed by users securing an upper-body "point of control" which transmits a load to the tub rim. (Note that the IBC, Chapter 16, applies the 250-pound load requirement to seats—effectively the bathtub rim on which users can sit—the same load assigned for grab bars.)

Also, see the comment elsewhere also addressing testing stanchion fixing with modern RTV adhesive that easily withstands a load transmitted, in shear force (per sq. in.), to the rim surface that is more effective—by a multiple of about six—with an adhesive-attached (9 sq.in.) plate than is possible with all the screws (typically about 6 provided with conventional plumbing industry grab bars) into solid-framing backing in the surrounding walls. The latter is difficult to accomplish with some grab bars and conventional '2 by 4' framing. The installation for rim *surface* mounting is more robust than what is currently achieved with conventional grab bars even before the latter suffer serious deterioration, from poor water protection, such has been widely documented by me in many of the grab bar-equipped guest rooms I have encountered (pre-Pandemic) around the world. The bathtub industry needs to worry less about its warranties being violated—which sitting users can easily and completely innocently do—and more about the well-documented, real dangers of their inadequate designs and choices of materials. See the accompanying Bibliography including the many videos also listed there on bathing safety. These constitute "Actual Notice" as a legal concept established by the courts.

§ **Margo Thompson** (Multifamily Construction Council)

Opposition comment: Two or three grab bars are unreasonable.

Proponent Rebuttal: It is not unreasonable to have one bar for a shower and two—not three—bars for a tub at an installed cost of a few hundred dollars in an overall residential unit cost of a few hundred thousand dollars. This provides, on average per household, an annual injury prevention benefit of a comparable amount of a few thousand dollars. (See authoritative video at https://vimeo.com/channels/1362334 — as listed in the accompanying Bibliography).]

Opposition comment: Tenants do not want "accessibility" features and, if features thus recognized exist in their unit, they will expect to pay less.

Proponent Rebuttal: No proof is shown for this opposition comment. In addition leaving a decision on safety up to an aesthetic or attraction concern represents misplaced priorities. Also, poorer residents are clearly aware of their precarious financial position if unbudgeted medical costs are incurred and, even more important, such costs do not begin to include the much larger costs in reduced quality of life—*including loss of ability to work*—that a serious fall can precipitate.

Opposition comment: Members-believe installation of such features should be only at the request of the tenant or owner-occupant.

Proponent Rebuttal: Making safety items optional defeats the purpose of having a code to promote safe surroundings. If you asked prospective buyers or tenants if they really wanted to have tempered glass in code required locations around stairways, etc. and told them that they could get a lower price or rental rate if they were willing to go without, would that be an acceptable option to propose to the public?

Opposition comment: Members are already putting blocking behind all tubs and showers.

Proponent Rebuttal: No evidence is provided for this and it certainly is not on every building because it is not required. Also, this can represent a waste if the design doesn't have to meet a standard that limits the need for specific locations for blocking. In addition, many grab bar manufacturers require the attachment screws to go into a stud. Another opponent pointed out that most bathtub installations and shower installations have plastic surrounds/enclosures that do not accommodate subsequent grab bar installation, even with blocking installed behind these relatively flimsy membranes that, if penetrated, could result in water entry to areas otherwise kept dry and less vulnerable to damage. Most important, all the requirements currently leading to all the blocking/backing/reinforcement for future grab bar installation is based not on safety but on accessibility, particularly for people approaching the bathtub in a wheeled device and transferring to/from a bathtub-supported seat. Grab bars intended for this function are wrong in orientation and height for ambulatory transfers; they are not designed to prevent falls to ambulatory users. (See also further details, below, in a rebuttal pertinent to transfers and role of retrofitting using "blocking.")

§ **Ceasar Luhan** (National Association of Home Builders)

Opposition comment: Why all R occupancies, both transient and permanent occupancy?

Proponent Rebuttal: Actually while it may seem more conspicuous that more transient residences would more logically require grab bars because many different individuals will be using a home. It is also true that the more permanent residence the more the need for grab bars since, as we get older, sooner or later, we need to have grab bars. Problems of bathtub and shower-related injuries are endemic in residential facilities of all types; thus the countermeasures should be equally broadly applied in model codes and safety standards. NFPA 5000 and NFPA 101 have, since 2018 editions, had grab bar requirements applying to all new residential plus board and care facilities, among others, for all showers and bathtubs.

Opposition comment: Only standard tub/shower designs taken into account with the proposed requirements.

Proponent Rebuttal: This is incorrect; many configurations and wall-and-no-wall boundary situations examined. The requirements have been carefully drafted for the current IBC proposal, as well as in revisions proposed for the 2024 editions of the NFPA documents PLUS that other ANSI-approved document, ICC A117.1 which has a package submitted for the current cycle of changes that is consistent with not only Proposal G-172-21, but with fine tuning submitted for NFPA documents PLUS the requirements that have been proposed for the National Building Code of Canada for all occupancies with bathtubs and showers (and which has had a Task Group including participation from top experts as well as builders) for about a decade. All of these—especially in the US—have tried to address nonconventional bathtub and shower designs, e.g., designs not bounded by walls—for which some of the many option (e.g., diagonally oriented, wall-mounted grab for the back wall) are not a good choice; for these there are other options including some that are a lot more aesthetically acceptable and achievable than some of the high-priced industry solutions to water delivery devices (illustrated in the 294-slide presentation I gave to a recent meeting of a key Canadian code committee; two slides from the Canadian presentation are reproduced, above, in this Reason statement).]

Opposition comment: There are problems posed with A117.1 current requirements.

Proponent Rebuttal: Proposals were submitted for the next edition of A117.1 recently under the new heading of "ambulatory accessible" facilities that take, as their precedent the long-established "ambulatory accessible toilet compartments" requirements..

Opposition comment: Grab bars are already readily available for purchase.

Proponent Rebuttal: Yes, and before tempered glass was required tempered glass was available for purchase but its installation rate was nowhere near what it became once required by code. Also, many of the available grab bars are not suitable for use in wet conditions. Moreover, they rely on difficult-to-achieve adequate and reliable fixing with the provided screw-based hardware which does not address moisture problems inherent with the currently provided cover plates.

Opposition comment: “Very much an overreach.”

Proponent Rebuttal: Not anymore than other safety provisions in the code which are typically less risky to occupants than bathtubs, etc. are.

By way of background, my highest degree is an HonDSc and I have over 300 committee-years of service on US standards and codes committees (about half of which have been as the lead voting representative of the American Public Health Association); thus my scoping decisions are based on evidence as much as possible—a key tenet of public health. Others have different insights on what is “reasonable” and what is “overreach.” What is their “evidence” and how do they reconcile their “evidence” with the published injury toll of over one million, nonfatal, medically treated injuries annually in the US due to bathtubs and showers, with about 90 percent of these occurring in residential settings? (See the REASON statement for this evidence.) This toll exceeds nonfatal fire-related injuries by two orders of magnitude (e.g., a factor between 50 and 100 as illustrated in the pie chart provided in the REASON statement).

§ **Jim Kendzel** (ASA)

Opposition comment: A117 is an industry consensus standard and the issue was already covered.

Proponent Rebuttal. Note that I have submitted proposals to A117 to add the relevant, *new* requirements for “ambulatory accessible” bathtubs and showers. Also other discussion herein addresses this issue.

§ **Steven M.** (American Institute of Building Design)

Opposition comment: Has seen this proposal develop over the years. He complained that the stanchion examples in the proposal were only on moving vehicles and the IBC covered R occupancies that were not in motion when occupants using them.

Proponent Rebuttal: Likewise, the photos only show the vehicles when not in motion. The occupants are the ones in motion and the grab bars are there to help them move safely in a well-established dangerous area.

Opposition comment: Grab bars can easily be added afterwards.

Proponent Rebuttal: Retrofitting grab bars is relatively difficult in comparison to stanchions which are much more versatile in terms of subsequent installation; none of the installations with which I have worked, entailed holes in wall for screw attachment—as would be the case with conventional grab bars.

§ **Misty Guard** (Regulosity LLC)

Opposition comment: Structural load requirement was not being addressed.

Proponent Rebuttal: This was explicitly addressed with a mandatory reference to the IBC Chapter 16 requirement, re. 250-pounds, specific to grab bars and seats.

Opposition comment: For stanchions, load on surrounds exceeds structural capacity.

Proponent Rebuttal: I have not encountered this and I have the equipment needed to apply 250 pound loads to stanchions <u>I have</u> installed for both bathtubs and showers.

Opposition comment: The “Shelf”, which is a horizontal surface filling the space between the top of a bathtub and the nearest room wall or a part of a podium in which the tub is placed, does not have load capacity.

Proponent Rebuttal: If it has not been designed for a 250-pound vertical load, how is the tub which it helps to support, with both horizontal and vertical load support, going to be able to withstand the weight of the water, plus occupant(s) in the tub, especially a large, multi-person tub (such as with some with multiple water jets). The load imposed through the grab bar or stanchion fixed to this tub surround is lower than these other loads; furthermore, these installations are often placed next to a wall or walls (as with a corner design which provides additional lateral support to the tub) and conventional grab bars can be readily attached to these walls adjacent to the open sides of the tub. Another option is a floor-to-ceiling stanchion. Some upper body “points of control” are going to be very important for users of such large tub installations which often have high tub walls relative to finished floor level. Such large tubs pose many challenges (which I have managed as a user of such installations in premium-price hotel rooms I have occupied as a paying guest in hotels worldwide). Provision of grab bars or stanchions is a minor cost and engineering consideration relative to other challenges associated with these large installations.

§ Tom Zuzik, Representing NOMMA (National Ornamental & Miscellaneous Metals Association)

Opposition comment: Stanchions are used, in the context of pedestrian barriers, as the vertical structural members—e.g., metal posts—

supporting secondary, sloping, horizontal and secondary vertical members, typically of metal.

Proponent Rebuttal: None of these are grab bars or stanchions in the roles they play as single handheld members for grabbing by the hand(s) as part of transfers to/from/within bathing/showering facilities.

Rebuttal Testimony by Those Opposed to Proposal

§ **Tom Zuzik**, Representing NOMMA (National Ornamental & Miscellaneous Metals Association)

Opposition comment: Code is a minimum; items are not needed for all people. Safety versus accessibility briefly noted.

Proponent Rebuttal: This is not a matter of "safety" *versus/or* "accessibility." The scope is both safety in use *and* usability of bathing/showering facilities *for everyone*. Also, the evidence suggests that safety and usability interact strongly for many adults; see Figure 2 for quantitative evidence of this interaction in the USA. Moreover, the importance of such safety is shown by its existence in NFPA 101.

Matt Sigler, (at the time of the CAH) Plumbing Manufacturers Institute, PMI

Opposition comment: In Canada there was a recent rejection (in spring 2021), by Provincial and Territorial code authorities, of code changes, at National level, on grab bars and stanchions for bathtubs and showers.

Proponent Rebuttal: The meetings of "Provincial and Territorial code authorities"—unlike deliberations on *National Building Code of Canada* (NBCC) code change proposals, for its 2020 edition—were ***not*** conducted in an open, public fashion where all parties could observe and participate. Before these recent nonpublic meetings of P/T code authorities, there have been years of open, national meetings started after a proposal on grab bars for home bathtubs and showers was submitted—***in 2007*** by Dr. Nancy Edwards —and was addressed in many open, public meeting of the NBCC committee responsible for housing, along with its Grab Bar Task Groups.

Opposition comment: Blocking is sufficient as a solution to bathing safety.

Proponent Rebuttal: Note that some grab bar manufacturers are requiring grab bars to be connected to studs. Blocking is not sufficient. Indeed, no fall has ever been prevented or mitigated by blocking because the necessary grab bar is not installed and, if installed, it is likely in the wrong place for safety as opposed to accessibility (again in relation to transfers by non-ambulatory people from a wheeled device to/from a seat in a tub or shower). As noted above, such grab bars are neither intended for, nor sufficiently effective, for ambulatory users; see comments above on this.

Opposition comment: People do not want grab bars.

Proponent Rebuttal: No documentation of this has been provided. In addition, if you ask the average member of the public if they were willing to pay for tempered glass instead of regular glass and show them a photo of each one so that it was very difficult to see the difference, it's very likely that they would all say they'd rather pay less for a home or rental without tempered glass. Studies reported in scientific publications (listed in the Bibliography) report a nuanced response by members of the public. A lot depends on the quality and placement of such grab bars as well as the age of the users (which was noted in comments elsewhere in this Comment Reason statement), Avoidance of bathing, partly due to the perceived dangers involved, starts in younger adults, not just the elderly.

Evidence supports the contention that bathtubs and showers—as discussed elsewhere in this Public Comment—*are more dangerous on a use-exposure basis than are stairs (in residential settings)*. Such insights about bathtubs and showers date back to the first large US study in the mid 1970s, published in 1975 (and listed in the accompanying Bibliography for this Proposal and Comment: "11. A systematic program to reduce the incidence and severity of bathtub and shower area injuries."

§ **Misty Guard** Regulosity LLC

Opposition comment: Stanchions are not suitable for in-rim mounting on plastic plumbing products; they are not designed for the loads involved.

Proponent Rebuttal: I support the stanchion mounting on—*not into*—bathtub rims. I agree that the relatively poor rigidity and strength of plastic tubs is not suited to such loads—possibly also the live loads from a heavy bather sitting on a tub rim (as discussed elsewhere in this comment). Thus, while the inability of one line of products to meet the 250-pound minimum load established by the IBC in Chapter 16, specifically for grab bars (and, now, stanchions which function as grab bars) should not have to be called out in a code requirement, especially a modern code that claims to use performance language. In any event, the proposals now being submitted for standards such as ICC A117.1, will specify that stanchion mounting on tub rims is only for steel tubs that should have no problem meeting IBC's 250-pound criterion.

§ **Margo Thompson** National Multihousing Council

Opposition comment: 'Me too' testimony.

Proponent Rebuttal: None

Input by IBC-General Committee Members During the Public Hearing Portion on G172-21

Here follows, in chronological order what IBC-G Committee Members asked by way of question, of the proponent, during the public testimony portion of the CAH., starting with Henry J. Kelly, CCPM, CCI, CCC, GRI, Representing the National Association of Home Builders:

"Mr. Pauls, your proposal is very detailed as to what will be required if approved. My question is how many units that have been built or retrofitted currently contain all the grab bars and stanchions as you propose in sections 1210.3 to 1210.3.4.5?" As the question was worded clearly in terms of "How many," my reply was, correctly, "I don't know," to which he could have added, realistically, that such expertise exists, if at all, within the housing industry and he would defer to such expertise on this particular question.

This was followed by a question by Lieutenant Michael Pokorny, Montgomery County Fire & Rescue, asked:

"Mr. Pauls, in Section 1210.3.4.4 you talk about structure—the stanchion being capable of structural loading set forth in Section 1607.8.2 and this section has to do with Fire Department vehicle loading. Is that what your intention is? My reply, "The reference was provided by ICC staff so, if I am in error, I apologize for not checking it personally." (The reference used, 1607.8.2, was the correct one, in relation to grab bar loads, in the IBC, *2018 edition*, available to me.)

Generally, on both questions, the first thing an expert on any subject should know is when to defer to the knowledge and expertise held by others.

Committee Action

Following the public testimony portion of the CAH, the Committee Action included a motion for Disapproval accompanied by the following comments by a small fraction of the Committee members. This occupied nearly the same length of time as allotted to me as the Proponent. Some of the Committee input appeared to be, effectively, in the form of testimony for which no rebuttal was possible (except in this public comment). The virtual hearing format also did not have any clearly apparent mechanism for a "point of order" to be made if new information was introduced in the Committee Action portion of the Hearing on G172-21. (This would have re-opened public testimony if the Moderator agreed that new information had been introduced.)

Three Committee members spoke, as follows.

(1) Henry J. Kelly, CCPM, CCI, CCC, GRI, Representing the National Association of Home Builders, (after making the motion for disapproval):

Committee member reason: "When I questioned the Proponent, he did not know if any of the units currently that have been built or have been retrofitted, that would require with all of the things that he proposes in 1210.3 through 1210.3.4.5, would solve the problem. If he does not know if they exist, then there's been no studies done and there's no empirical evidence that what he proposes will solve the problem and we shouldn't be adopting anything in the Code that there is no evidence this it will solve the problem."

Proponent Rebuttal: This was not the question asked during the public hearing portion when this committee member asked, specifically, "How many units that have been built or retrofitted currently contain all the grab bars and stanchions as you propose in sections 1210.3 to 1210.3.4.5?" My reply, correctly, was "I don't know."]

The exact *quantitative* question he originally asked was, "how many units. . . ," not "if any of the units. . . ." The correct answer to the first question—on narrowly specified quantity—was, correctly, "**I don't know**" and the correct answer to his rephrased, *yes* or *no* question was, "**Yes, those based on the criteria and background information set out in the proposal**." There was no mechanism (including a point of order) for reopening the public portion of the hearing. Moreover, there was specific, pertinent, published insights in some of the Canadian studies behind this answer, *to the latter question*, listed in the Bibliography provided with the initial proposal and highlighted again below with a listing of (numbered) titles only.

(2) Micah Chappell, MBA, CBO, Code Development Manager, Seattle Department of Construction and Inspections:

Committee member reason: "I just want to commend Mr. Pauls for bringing this proposal through on a regular basis for Code cycles. It just goes too far every time that's been mentioned several times. I do think he should come back with a portion. As one of the opponents talked about, there is a problem of not having backing when these things are necessary to install by choice. And maybe that's the proposal he needs to start with. This just goes too far."

(3) Eirene Knott, MCP, CBO, CFM, Director of Code Services, BRR Architecture:

Committee member reason: "One of the proponents provided the statement that this—the Code is a minimum standard and this requirement is going to raise that level of expectation of what a minimum standard is and I believe it goes beyond this. The second point I want to make is (that) my mother is somebody who is a fall risk and she made a choice to put her own grab bars within her own house, none of which were in the locations where Mr. Pauls is suggesting. So I don't believe this is ready for prime time."

Commenter Rebuttal: Many individuals sit on these code committees as experts. Expertise is the core of the development of good quality standards.

Proponent Rebuttal to All Three Committee Members Commenting: All of these Committee comments warrant responses which, given the current, highly limited testimony time in ICC hearings, can only be addressed—within the ICC process—in written public comments such as this one. For example, as there are two very different types of transfers—a *transfer from/to a wheeled mobility device* and *ambulatory transfers,* the bathing safety experts (as they are identified in the Bibliography for example) agree that the latter call for a minimum of two grab bars or stanchions. Within recent deliberations (over a decade or more) in multiple code development bodies, the frequent references to backing (blocking or reinforcement) have ***not*** been based on future provision of grab bars for *ambulatory transfers*; they are based on *transfers from/to wheeled mobility devices*. The two functions are very different.

Moreover, ambulatory transfers cover two dangerous aspects: (1) stepping over elevated—plus possibly slippery—surfaces and (2) stand-to-sit and sit-to-stand transfers also involving slippery surfaces. The originally submitted proposal, IBC G172-21, address the two types of "points of control" appropriate for both the access side of a bathtub or shower—where vertical grab bars or stanchions are most useful—and, in the case of tubs, the non access side (with the latter being especially relevant for the stand-to-sit and sit-to-stand transfers where *bilateral*, upper body points of control are very relevant. Moreover, as ambulatory transfers can be facilitated entirely by stanchions, there may be no need for holes to be made in bathtub surrounds. Thus "backing" is not a necessary prerequisite for future installation. Proposal G172-21 illustrates two stanchion options (along with six, wall-mounted, grab bar options) that completely meet the minimum requirements proposed. (The relevant illustration is just below the pie chart graphic.)

There were a couple of comments on ~~l~~level of expectation leading to many avoidable injuries (as well as leading to reduced or avoided uses of bathtubs as addressed by my proposal); it is clearly within the scope of the IBC to "raise expectations" to reduce the predictable and largely preventable million or so professionally treated injuries annually in the USA as well as to better facilitate the billions (with a "b") of uses of bathtubs and showers annually in the USA. Surely this is a "prime time" for ICC members and its code development process to respond positively.

Rebuttal Responses to the Committee Reasons in the Report of Hearing

Committee Reason (as reported by ICC). This statement is as follows except that, here (for clarity), sentences are separated, plus numbered, *and a comment has been added in italics about the accuracy, relevance, etc. of the summation.*

1. "**This proposal was disapproved because the committee had several concerns."**

Proponent Response: *Only items 2, 3, 4, and 5 were noted as reasons explicitly expressed by committee members; the other items came from opposition testimony which the Committee did not mention as reasons for disapproval.*

2. "Have there been any dwelling or sleeping units constructed with the proposed grab bar configurations so that the increase in safety can be verified?"

Proponent Response: This single, hugely-complex question posed by Committee member, NAHB representative, Henry Kelly (and underlining for emphasis): "<u>My question is how many units that have been built or retrofitted currently contain all the grab bars and stanchions as you propose in sections 1210.3 to 1210.3.4.5?</u>" The answer to Mr. Kelly's original question, was—correctly and appropriately, "I don't know." (The question, as originally asked reminds one of the historical practice in some parts of the US to have persons of color—seeking the right to vote in an election—compelled to answer a question about how many jelly beans were inside a large jar.) As an expert who occasionally has to testify under oath, "I do not know" is a correct—and sufficient—answer to an impossible-to-answer question which was for "<u>how many</u>," not the rephrasing of the question here as, "<u>Have there been any. . . ?</u>"

If supportive evidence were needed, reference would be made to the Canadian studies referenced in the Bibliography which date back a couple of decades.

3. **"Have their been any studies or empirical evidence that indicate that this will significantly improve safety?"**

Proponent Response: Yes, see the excerpted titles, below, of a large number of studies that were included, numbered, in the Bibliography listing in this proposal (and earlier ones submitted to ICC for the 2018 editions of the IBC and IRC).

Moreover, see the recorded meetings of experts that go well beyond the published research studies in providing state-of-the-art presentations by

Dr. Nancy Edwards and Dr. Alison Novak plus discussions with other injury prevention experts from Canada and the USA. For links to these freely streaming videos see section below, updating the Bibliography.

See also—after the general comments below—several excerpts from Bibliography item 30, published a decade ago, that provides a good summary of what was learned about use and performance of grab bars as well as attitudes of tested adults about their intention to install grab bars such as the ones used in the tests.

4. “**Requiring the installation in all bathrooms in all Group R units is going too far — perhaps blocking so that residents can add grab bars based on need.**”

Proponent Response: Generally, misconceptions about blocking need a powerful rebuttal, particularly the claim that “blocking” is the solution. First, the blocking still being specified for accessibility (by A117.1 and various codes), is not proposed for safety of ambulatory bathers who need points of control based on standing transfers. The blocking-facilitated grab bars are intended for transfers by wheel-using, seated persons needing to shift from a wheelchair seat to another seat in a bathtub or shower enclosure (and vice versa). The grab bars that make sense for such accessibility-related transfers are not high enough, suitably placed, and often vertically oriented to assist ambulatory users.

All of the currently installed blocking will only rarely be put into use, even for assistance to non-ambulatory bathers, let alone ambulatory users. Grab bars of incorrect position, orientation, height, etc. will be of limited use for the latter. Finally—for all situations—how easy will it be to find out if, and where, blocking has been installed and how is such blocking to be used in connection with all the recently and currently installed plastic surrounds for bathtubs and showers that the plumbing industry claims cannot have grab bars installed due to the flimsy nature—until reinforced—of the surrounds/enclosures. There is also the concern for water intrusion with the holes that must penetrate such membrane materials.

Both in Canada and the US, opponents have been outspoken about unsuitability, for grab bar installation, of industry’s products, whether plastic or fiberglass tubs and surrounds/enclosures. It turns out that the older ones bathtub is—likely with enamel-steel fabrication and with a structurally superior, tile (on solid backing) surround—the easier it might be to provide both the needed stanchions and/or, in some cases, conventional grab bars. The stanchions, for example, do not rely on blocking in either of the apartments where I have offices (in Toronto and in Maryland). Again, the IBC already requires provision for a 250-pound load for seats serving bathing and showering and that would include the bathtub rim in many cases.

5. **“The choices for grab bar installation should be based on individual residents needs and choices, which may not be this configuration.”**

Proponent Response: The proposed requirements, like those specified in established requirements in both the 2018 and 2021 editions of NFPA 101 and NFPA 5000, do not call for “this configuration.” Like what is proposed for ICC codes, there are multiple options that address various bathroom layouts and surroundings of the bathtub. Also, in treating stanchions and conventional grab bars as equally acceptable in the options, there is added choice about visual appearance which is especially discreet with stanchions which blend into the décor in a more-architectural fashion rather than looking institutional and an afterthought. Stanchions are also much more likely to serve other important usability and safety functions, notably for use of toilets located adjacent to bathtubs or showers. Conventional grab bars are not as versatile for such dual uses as are stanchions.

6. **“The locations specified can be an issue with the different types of tubs and showers on the market for design and structural strength.”**

Proponent Response: Wrong, the options include all manner of tub and shower shapes and sizes plus adjacent construction. Also, enamel steel bathtubs are still available and in stock at stores selling the more-expensive, less-durable plastic designs.

Furthermore, there is no need to install stanchions “into” bathtub rims. The same stores that sell steel bath tubs also sell the coated steel tubing and matching surface-mounted fixings needed—and structurally adequate—to mount the lower end of a stanchion “on” a bathtub rim, not “into” the rim using widely available, modern RTV adhesives (such as widely used in automobiles, even for water pumps) that have the strength to meet the 250-pound loading—in all directions—to satisfy the IBC structural requirement, even in very wet conditions. I have such an installation in my Toronto apartment which has served well for years, on a 50-year old steel bathtub. It easily passed a structural load test exceeding 300 pounds, sustained for hours and directed laterally to serve as the toughest test of the adhesive-based mounting “onto” the bathtub rim.

7. **“There is a concern about the grab bar location conflicting with the shower curtains so that water would end up on the room floor, thus creating a slip and fall hazard.”**

Proponent Response: This concern ~~-~~was both raised and solved by the G172 proposal with the very careful use of particular lateral locations of the vertical grab bar options for the control-end or head-end walls. The grab bars are thus clear of the standard shower curtain rod/track location over, or at, the inside wall of the bathtub at the approach side.

Getting into the details addressed: the issue had been thoroughly dealt with in specifying vertical grab bar centerlines (in Section 1210.3.1): “between 9 inches (230 mm) and 12 inches (305 mm) horizontally, inward from the access side of the bathtub” or “within 2 inches (51 mm) maximum inward, and within 6 inches (152 mm) maximum outward, from the access side of the bathtub. The grab bar or stanchion shall be located

2 inches (51 mm) minimum, horizontally, from the centerline of any shower curtain rod/track installation." Thus a minimum of 7 inches (178 mm) of lateral area was reserved for the shower curtain rod/track or other enclosure system (e.g., sliding safety glass panels in a metal frame) that effectively address the danger of water ending up on the bathroom floor. Also, these protection measures are easy for bathing users to undertake.

PROPONENT'S GENERAL COMMENTS in Response to "Disapproval" Vote.

As noted previously, below are selected, excerpted portions of a large number of studies that were included, numbered, in the Bibliography listing in this proposal (and earlier ones submitted to ICC for the 2018 editions of the IBC and IRC), See also the links for several listed, streaming videos that go well beyond the published research studies in providing very accessible, state-of-the-art presentations by Dr. Nancy Edwards and Dr. Alison Novak (two world experts in safety of bathing and grab bar effectiveness studies) plus discussions with other injury prevention experts from Canada and the USA including five highly knowledgeable members of A117 and NFPA committees plus relevant ICC staff. (All 11 participants in the March 1002016 meeting are identified in the three-part video with the first part accessible at https://vimeo.com/channels/866600/167609881.)

From Bibliography item 30, come the following relevant quotations that address some of the criticisms made by Committee members quoted above. (the full citation for this item is: Guitard P, Sveistrup H, Edwards N, Lockett D. **Use of different bath grab bar configurations following a balance perturbation**. *Assistive Technology* 2011;23:205-15.

". . . . the vertical bar was by far the bar most often used by participants to regain their balance when entering/exiting the tub during platform perturbed transfers. . . . Overall, older adults used grab bars to regain their balance (alone or in combination with a surrounding structure) in 212 of the 425 instances where they were present (49.8%). Older adults found grab bars to be very helpful, felt comfortable using bars, and felt safer when grab bars were present. Most participants indicated they would eventually install the grab bars tested (84.3% for CSA, 70% for OCC), . . . Younger adults also reported an increased sense of security in the presence of grab bars. . . . Nine percent of younger adults and 8% of older adults felt there was no difference in their sense of security when entering/exiting the tub in the presence or absence of grab bars. . . . Interestingly, 23 participants (41.8%) recommended grab bars to family members, colleagues, and/or friends. . . ."

". . . . The vertical bar was most often used when entering and exiting the bathtub. . . . Our results support the need for two grab bars to ensure safety during all phases of bathing, as recommended in previous studies (Aminzadeh *et al*., 2000; Sveistrup *et al.,* 2006). **Building codes should be revised to require a minimum of two bath grab bars to ensure safety during bath transfers and prevent falls: one adjacent to the rim on the side wall to facilitate entry/exit and one on the back wall to help during sitting and standing in the tub. . . "**

Bold added here as this pertains to the heart of the issue in this proposal and related comments. It is also the most direct rebuttal to those speaking at the ICC CAH, who argue that my proposal goes too far. The evidence from research reported here and in the other sources, some of which are described next (in video and text formats) supports **my** position and it is up to those opposed to my position that, now, need to come up with evidence as opposed to mere opinion or conjecture.

For this reason—*and others*, I once again extends an offer of free technical presentations to, and related discussion within, ICC Chapters that wish to have a virtual presentation and discussion opportunity on the topic of how the I-codes can better address bathroom safety, in addition to stairway safety. This is especially important during 2021 as the ICC A117 Committee will also be processing a proposal to add new requirements to ICC-A117.1 dealing with ambulatory accessible bathing, showering and toileting facilities, a proposal submitted by me, the longest serving Individual Member of the A117 Committee. Education of voting members of ICC is, ultimately, the best way to improve use of building codes as a key method of preserving, to a reasonable degree, the wellbeing and safety of the public—*including the families of ICC members.*

(From the slightly updated REASON statement): Approximately 50 internationally-produced scientific and technical references, on bathing/showering safety, were compiled by me, in 2016, for an American Public Health Association (APHA) draft policy highlighting, especially two Canadian research studies that also are addressed in three video presentations by Principal Investigators (Dr. Nancy Edwards, Dr. Alison Novak) for the research and posted, for free streaming viewing, starting at, https://vimeo.com/channels/866600/167609881, Accessed July 2, 2021. Beyond the three videos from the March 2016 meeting of experts, additional videos covering technical aspects of bathing and showering safety (including cost impact and benefit issues) are found at the following links (all of which are available, with descriptions, at http://www.bldguse.com/VideoPage.html

my Professional Practice Website, This selection, from a subset of about a dozen videos, of about 30 at the site, was accessed July 2, 2021.):

https://vimeo.com/237294479

https://vimeo.com/197742277

https://vimeo.com/193507768

https://vimeo.com/173883358

https://vimeo.com/175101448

Selected publication titles, especially related to this Comment

(from Proposal Bibliography and other cited references with in the Proposal and Comment text)

1. Access to bathtub grab bars: evidence of a policy gap.

3. Nonfatal Bathroom Injuries Among Persons Aged ≥15 Years United States, 2008.

4. Development and evaluation of an instrument to measure seniors' attitudes toward the use of bathroom grab bars.

5. Utilization of bathroom safety devices, patterns of bathing and toileting, and bathroom falls in a sample of community living older adults.

11. A systematic program to reduce the incidence and severity of bathtub and shower area injuries.

14. Practice Guideline for Prevention of Falls in Older Persons.

15. Risk factors for falls among elderly persons living in the community.

17. A population-based study of environmental hazards in the homes of older persons.

18. Environmental hazards and the risk of nonsyncopal falls in the homes of community-living older persons.

19. Prevalence of selected risk and protective factors for falls in the home.

20. Unintentional injuries in the home in the United States.

21. Home environmental hazards and the risk of fall injury events among community-dwelling older persons.

23. Patterns of use of different toilet grab bar configurations by community-living older adults Research Highlight.

24. Evaluation of bath grab bar placement for older adults.

27. Biomechanical investigation of grab bar use and balance control during bathing transfers.

28. Predictors of bath grab-bar use among community living older adults.

29. Evaluation of bath grab bar placement for older adults.

30. Use of different bath grab bar configurations following a balance pertubation

34. Characteristics of gait in stepping over obstacles.

37. Injury Prevention: What works? A Summary of cost-outcome analysis for injury prevention programs.

38. Interventions for preventing falls in elderly people.

39. Modification of the home environment for the reduction of injuries

40. Home safety education and provision of safety equipment for injury prevention.

41. Formulating a programme of repairs to structural home injury hazards in New Zealand.

42. Home modifications to reduce injuries from falls in the Home Injury Prevention Intervention (HIPI) study: a cluster-randomised controlled trial.

45. Check for Safety: A home fall prevention checklist for older adults.

--. Effect of bathroom aids and age on balance control during bathing transfers.

--. The Evaluation of Vertical Pole Configuration and Location on Assisting the Sit-to-Stand Movement in Older Adults with Mobility Limitations.

--. Toilet Grab-Bar Preference and Center of Pressure Deviation During Toilet Transfers in Healthy Seniors, Seniors With Hip Replacements, and Seniors Having Suffered a Stroke

--. A fresh look at the costs of non-fatal consumer product injuries.

Bibliography: See the very extensive bibliography provided with proposal G172-21 (with key documents listed, by title only, above); there are only three additional references for that listing of references on the problems of, and solutions to, injuries and flawed performance (in terms of usability as well as progress with model building code development) of bathtubs and showers as addressed by this comment.

Lawrence, B., Spicer, R., Miller, T. (2015) **A fresh look at the costs of non-fatal consumer product injuries.** *Injury Prevention. 21*, 23-9
Pauls, J.L. and Johnson, D.A (2018). **Applying Ergonomics to Bathing Safety: Including adoption of unorthodox practices for slip-resistant underfoot surfaces of bathtubs plus showers and provision of effective points of control.** *Proceedings of the 20th Congress of the International Ergonomics Association (IEA2018),* Vol II, Springer, pp. 486-500.

Pauls, J.L. and Johnson, D.A (2021). **Why, How, and How Effectively Do USA and Canadian Building Codes Address Two Leading Fall Sites in Homes?** *Proceedings of the 21st Congress of the International Ergonomics Association (IEA2021),* Vol V, Springer, pp. 674-681.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
While the "net effect" includes a very modest increase in the cost of dwelling unit construction—on the order of 0.001 (one in a thousand) of the overall unit construction cost of a unit, the payback of this investment should be realized within a few years of occupancy in terms of reduced societal cost of injuries, to the occupants, from falls associated with bathing and showering in bathtubs and showers. Thus, for the vast majority of the time (say a few decades) the unit is occupied, there is only net payback on the investment.

Beyond the significant reduction of injuries, there is a larger benefit to the well-being of the occupants in terms of reduced anxiety with some critical, relatively dangerous aspects of showering and bathing, namely the transfers in and out of the facility and, in the case of tubs especially, there are extraordinary challenges both underfoot conditions and with general need for postural control when people transfer between standing and sitting or, (with bathtubs) even lying down in the water-filled tub and, even more challenging, vice versa with transfers back to an upright posture with which one can step out of the facility.

For many occupants, especially in middle age, there will be increasing anxiety about, and even danger of, very serous injuries that, while averted for a time, have a growing probability of occurring. One common response is to reduce bathing and showering, especially with bathtubs. In other words, the cost of injuries—beyond direct pocketbook cost of comfort and safety—rises over time. Grab bars and stanchions—with their costs being almost entirely in the initial acquisition and installation—are an increasingly valuable investment for an individual and his/her co-occupants of the residential unit.

Thus over the life of a bathing/showering facility, the benefit-to-cost ratio is effectively reduced to the point where the initial acquisition and installation cost approaches nearly zero. Hence it could be argued that the best single response to the ICC's question for this little-to-no-cost impact section is "there is no cost impact" there is only benefit and that benefit grows over time as the value of well-being increases for each individual over time and the cost of recovering well-being—within the healthcare system, especially in the USA, increases faster than do construction cost.

Note that I am a member of the ICC Industry Advisory Committee Task Group on Cost Impact and he has been involved with benefit-cost impact issues for decades in a professional capacity including being a member of the International Benefit-Cost Analysis Society based in the USA. I also serve on several NFPA 101 committees and is a longest serving member on at least two of its Technical committees including those most responsible for the grab bar and stanchion requirements in NFPA 101 and NFPA 5000. I am also the longest serving Individual Member of the ANSI-approved A117 Committee for which ICC is the current Secretariat. A117.1 also has proposals for "Ambulatory Accessible" bathtubs and showers that parallel those in the above-noted ANSI-approved standard, NFPA 101.

Public Comment# 2975

G174-21

Proposed Change as Submitted

Proponents: Bryan P. Holland, MCP, CStd., National Electrical Manufacturers Association, representing National Electrical Manufacturers Association (bryan.holland@nema.org)

2021 International Building Code

Add new definition as follows:

GERMICIDAL IRRADIATION. The use of radiant energy to inactivate bacteria, mold spores, fungi, or viruses.

UPPER-ROOM AIR. The air in the room located above the occupied portion of the room that is subject to ultraviolet germicidal irradiation.

Revise as follows:

1201.1 Scope. The provisions of this chapter shall govern ventilation, temperature control, lighting, *yards* and *courts*, sound transmission, room dimensions, surrounding materials , ~~and~~ rodentproofing , and *germicidal irradiation* associated with the interior spaces of buildings.

Add new text as follows:

1210.4 Required disinfection.
Germicidal irradiation for disinfection shall be provided in employee and public toilet facilities in accordance with Section 1211.

SECTION 1211
GERMICIDAL IRRADIATION

1211.1 General.
The provisions of this section shall specify where *germicidal irradiation* for disinfection is required and shall apply to the design, installation, and operation of *germicidal irradiation* luminaires.

1211.2 Required spaces.
Germicidal irradiation for room disinfection shall be required in the following locations:

1. For all occupancies: employee and public toilet facilities.
2. For Group A-1 occupancies with multiple daily performances.
3. For Group A-2 occupancies.
4. For Group A-3 occupancies in buildings, or portions thereof, with occupant load factor of 15 square feet per occupant or less.
5. For Group B occupancies.
   5.1. Where patient care is rendered.
   5.2. In buildings, or portions thereof, with occupant load factor of 15 square feet per occupant or less.
6. For Group E and I-4 Occupancies.
   Exception: Within dwelling units.
7. For common areas in Group I-1, I-2 and I-3 occupancies in buildings, or portions thereof, with occupant load factor of 15 square feet per occupant or less.
8. For common areas in Group R-1, R-2 and R-4 with an occupant load of 50 or more.

1211.3 Installation requirements.
Luminaires and systems shall be installed in accordance with Section 1211.3.1 and 1211.3.2.

1211.3.1 Safe Installation.
Germicidal irradiation luminaires and systems shall be listed and installed in accordance with Chapter 27, and manufacturer installation instructions, design requirements, and equipment markings. Consideration shall include suitability for occupied or unoccupied locations.

1211.3.2 Mounting conditions.
Luminaires for *germicidal irradiation* for *upper-room air* disinfection shall be mounted at the height specified in the manufacturer installation instructions, equipment markings and product listings.

1211.4 Ventilation requirements for germicidal irradiation for upper-room air disinfection.
Ventilation for the building shall be provided in accordance with Section 1202. Additional air-mixing may be required for effective germicidal irradiation

for upper-room air disinfection.

1211.5 General lighting.
Luminaires that emit *germicidal irradiation* shall be permitted to be installed as lighting for general illumination only where permitted by the product listing and indicated in the manufacturer installation instructions.

Reason: This code proposal will:
1. Increase building occupant health and safety from pathogens
2. Address safe installation and use in building spaces
3. Provide application flexibility for building design practitioners
4. Maintain simple enforceability for code officials

This proposal introduces provisions for building and building room disinfection through germicidal irradiation, which is not currently in the International Building Code. Current attention to healthy and well building environments, along with public health concerns of transmitted diseases, necessitates the IBC's need for germicidal irradiation.

Germicidal irradiation delivers the ability to inactivate human pathogens such as germs, fungi, mold spores, bacteria, viruses, harmful to humans. Various germicidal irradiation technologies have been available and used successfully in buildings for decades. Buildings such as hospitals, restaurants and grocery stores, commonly use germicidal irradiation as a disinfection process, reducing the risk of pathogen and disease spread in and from these environments. Examples of some germicidal irradiation techniques are upper air ultra-violet and air duct ultra-violet irradiation.

This code proposal ensures proper and safe installation of germicidal irradiation in buildings, while providing building design practitioners flexibility in determination and use of disinfection techniques most appropriate for a building's specific use. Building classifications and spaces required to utilize germicidal irradiation are selected based on criteria including:

- Occupant Load Factor of 15 square feet per occupant, or less
- occupant turn-over
- occupant load of 50 or more for R-1, R-2, and R-4 Classifications
- prevalence of high-touch surfaces
- spaces with immune-compromised occupants
- high pathogen load shed

The Occupant Load Factor of 15 square feet per occupant is selected to identify the spaces that most benefit from germicidal irradiation disinfection due to high occupant density.

This proposal requires that devices be listed and identified for germicidal irradiation, and requires installation adherence with manufacturer's installation instructions, Chapter 27 (NFPA-70), product listings and equipment markings. This ensures building occupant safety is maintained by restricting germicidal irradiation exposure to levels deemed acceptable by safety certification agencies.

Many studies and papers are available supporting the effectiveness and safe use of germicidal irradiation techniques in buildings, listed in the following bibliography.

Bibliography: Studies on germicidal irradiation disinfection effectiveness

Livingston SH, Cadnum JL, Benner KJ, Donskey CJ (2020) Efficacy of an ultraviolet-A lighting system for continuous decontamination of health care-associated pathogens on surfaces. Am. J. Infect. Control 48: 337-339. https://www.ajicjournal.org/article/S0196-6553(19)30746-1/pdf

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Rutala R, Kanamori J, Gergen MF, Sickbert-Bennet EE, Sexton DJ, Anderson DJ, Laux J, Weber DJ (2018) Antimicrobial activity of a continuous visible light disinfection system. Infect. Control & Hosp. Epidem. 39: 1250-1253. https://www.ncbi.nlm.nih.gov/pubmed/30160225

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Wekhof A. Disinfection with flash lamps [J]. PDA J Pharmaceut Sci Technol, 2000, 4 (3): 264–267.

Takeshita K, Yamanaka H, Sameshima T, et al. Sterilization effect of pulsed light on various microorganisms [J]. Journal of Antibacterial & Antifungal Agents Japan, 2002, 30.

Wang T, MacGregor SJ, Anderson JG., et al. Pulsed ultra-violet inactivation spectrum of Escherichia coli [J]. Water Research, 2005, 39 (13): 2921–2925.

Welch D, Buonanno M, Grilj V, et al. Far-UVC light: A new tool to control the spread of airborne-mediated microbial diseases [J]. Scientific Reports, 2018, 8: 2752, pp 1–7.

Yamano N, Kunisada M, Kaidzu S, et al. Long-term effects of 222 nm ultraviolet radiation C sterilizing lamps on mice susceptible to ultraviolet radiation [J]. Photochemistry and Photobiology, 2020. (open access)

Ushio. White Paper: Care 222® in the workplace: Testing effectiveness of long-range surface infection prevention.

Manuela Buonanno, David Welch, Igor Shuryak & David J. Brenner Far-UVC light (222 nm) efficiently and safely inactivates airborne human coronaviruses, Scientific Reports, 2020, 10:10285 | https://doi.org/10.1038/s41598-020-67211-2

Xiong P, Hu J. Inactivation/reactivation of antibiotic-resistant bacteria by a novel UVA/LED/TiO2 system [J]. Water Research, 2013, 47 (13): 4547–4555.

Nunayon S, Zhang H H, Lai A C K. Comparison of disinfection performance of UVC-LED and conventional upper-room UVGI systems [J]. Indoor Air, 2020, 30: 180–191.Mathebula T, Leuschner F W, Chowdhury S P. The Use of UVC-LEDs for the Disinfection of Mycobacterium Tuberculosis [C]// 2018 IEEE PES/IAS PowerAfrica, Cape Town, 2018, pp. 739–744.

Ali S, Yui S, Muzslay M, et al. Comparison of two whole-room ultraviolet irradiation systems for enhanced disinfection of contaminated hospital patient rooms [J]. Journal of Hospital Infection, 2017, 97 (2): 180–184.

Safety Standards and Whitepaper references

IEC 62471:2006 Photobiological safety of lamps and lamp systems

ICNIRP Guidelines On limits of exposure to Ultraviolet radiation of wavelengths between 180 nm and 400 nm (incoherent optical radiation) published in: HEALTH PHYSICS 87(2):171-186; 2004

IEC 62471-2 TR ed 1.0 – Photobiological safety of lamps and lamp systems. Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety

UL 867 – Standard for Safety for Electrostatic Air Cleaners, UL 867

UL 1598/CSA C22.2 No. 250.0 – Standard for Safety for Luminaires

UL/ IEC 61010-1 - Safety requirements for electrical equipment for measurement, control and laboratory use – General Requirements

UL 8750 -Standard for Safety for LED Equipment

UL 8802 Outline of investigation for Germicidal Systems

Global Lighting Association (GLA) Position statement on UV-C Germicidal Irradiation, May 2020, UVC Safety Guidelines

GLA Applications statement on UV-C Germicidal Irradiation, September 2020, Germicidal UV-C irradiation sources, products and applications

Cost Impact: The code change proposal will increase the cost of construction
Benefits noted above are expected to increase the cost of construction by requiring a germicidal irradiation system in the listed occupancies.

Staff Note: G173-21 and G174-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G174-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved. Germicidal irradiation is one method to address the health issues raised, and should not be mandated. Designers need to be able to use multiple options to address issues. Many of these systems are portable equipment and are not a building element. This needs a standards reference for compliance - NFPA 70 does not seem to have any specific information for these systems. Some studies say that UV light can be hazardous to people' eyes - this type of system needs to be studied further. (Vote 12-1)

Staff Analysis: G173-21 and G174-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G174-21

Individual Consideration Agenda

Public Comment 1:

IBC: 1201.1, 1210.4, SECTION 1211, APPENDIX P (New), SECTION P101 (New), P101.1 (New), SECTION P102 (New), P102.1 (New), (New), 202 (New), SECTION P103 (New), P103.1 (New), SECTION P104 (New), P104.1 (New), P104.1.1 (New), P104.1.2 (New), P104.2 (New), P104.3 (New)

Proponents: Bryan Holland, representing National Electrical Manufacturers Association (bryan.holland@nema.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

1201.1 Scope . The provisions of this chapter shall govern ventilation, temperature control, lighting, *yards* and *courts*, sound transmission, room dimensions, surrounding materials~~,~~ and rodent proofing~~, and *germicidal irradiation*~~ associated with the interior spaces of buildings.

~~**1210.4 Required disinfection** . *Germicidal irradiation* for disinfection shall be provided in employee and public toilet facilities in accordance with Section 1211.~~

~~SECTION 1211~~
~~GERMICIDAL IRRADIATION~~

APPENDIX P
GERMICIDAL IRRADIATION

SECTION P101
GENERAL

P101.1 ~~**1211.1**~~ **General .** The provisions of this section shall specify where germicidal irradiation for disinfection is required and shall apply to the ~~design,~~ installation~~, and operation~~ of germicidal irradiation luminaires and systems.

SECTION P102
DEFINITIONS

P102.1 General . The following words and terms shall, for the purpose of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

GERMICIDAL IRRADIATION . The use of radiant energy to inactivate bacteria, mold spores, fungi, or viruses.

UPPER-ROOM AIR . The air in the room located above the occupied portion of the room that is subject to ultraviolet germicidal irradiation.

SECTION P103
LOCATION

P103.1 ~~**1211.2**~~ **Required spaces .** Germicidal irradiation luminaires and systems for room disinfection shall be required in the following locations:

1. For all occupancies: employee and public toilet facilities.
2. For Group A-1 occupancies with multiple daily performances.
3. For Group A-2 occupancies.
4. For Group A-3 occupancies in buildings, or portions thereof, with occupant load factor of 15 square feet per occupant or less.
5. For Group B occupancies.
   5.1. Where patient care is rendered.
   5.2. In buildings, or portions thereof, with occupant load factor of 15 square feet per occupant or less.
6. For Group E and I-4 Occupancies.
   Exception: Within dwelling units.
7. For common areas in Group I-1, I-2 and I-3 occupancies in buildings, or portions thereof, with occupant load factor of 15 square feet per occupant or less.
8. For common areas in Group R-1, R-2, and R-4 with an occupant load of 50 or more.

SECTION P104
INSTALLATION REQUIREMENTS

P104.1 ~~**1211.3**~~ **Installation requirements .** Germicidal irradiation luminaires ~~Luminaires~~ and systems shall be installed in accordance with Section P104.1.1 ~~1211.3.1~~ and P104.1.2 ~~1211.3.2~~.

P104.1.1 ~~**1211.3.1**~~ **Safe installation .** Germicidal irradiation luminaires and systems shall be listed and where germicidal irradiation systems employ ultraviolet radiation, they shall comply with UL 8802. Germicidal irradiation systems shall be installed in accordance with Chapter 27, ~~and~~ the manufacturer's ~~manufacturer~~ installation instructions, ~~design requirements,~~ and equipment markings. Consideration shall include the suitability for use in occupied or unoccupied locations.

P104.1.2 ~~**1211.3.2**~~ **Mounting conditions .** Luminaires and systems for germicidal irradiation for upper-room air disinfection shall be mounted at the height specified in the manufacturer's installation instructions, equipment markings, and product listings.

P104.2 ~~**1211.4**~~ **Ventilation requirements for germicidal irradiation for upper-room air disinfection .** Ventilation for the building shall be provided in accordance with Section 1202. Additional air-mixing ~~may~~ shall be required for effective germicidal irradiation for upper-room air disinfection.

P104.3 ~~**1211.5**~~ **General lighting .** Luminaires that emit germicidal irradiation shall be permitted to be installed as lighting for general illumination only where permitted by the product listing and indicated in the manufacturer's installation instructions.

Commenter's Reason: For the reasons stated below and in the substantiation that accompanied our original proposal (G174-21), germicidal irradiation is an important tool to help ensure the health and safety of building occupants. Accordingly, we suggest this mandatory language be included in a voluntary appendix to allow Authorities Having Jurisdiction the ability to adopt the requirements as mandatory at their discretion. The requirements outlined in this public comment:
1. Increase building occupant health and safety from pathogens

2. Address safe installation and use in building spaces

3. Provide application flexibility for building design practitioners

4. Maintain simple enforceability for code officials

This comment introduces provisions for building and building room disinfection through germicidal irradiation, which is not currently in the International Building Code. Current attention to healthy and well building environments, along with public health concerns of transmitted diseases, necessitates the IBC's need for germicidal irradiation.

Germicidal irradiation delivers the ability to inactivate human pathogens such as germs, fungi, mold spores, bacteria, viruses, harmful to humans. Various germicidal irradiation technologies have been available and used successfully in buildings for decades. Buildings such as hospitals, restaurants, and grocery stores, commonly use germicidal irradiation as a disinfection process, reducing the risk of pathogen and disease spread in and from these environments. Examples of some germicidal irradiation techniques are upper air ultra-violet and air duct ultra-violet irradiation.

This comment to the original proposal ensures proper and safe installation of germicidal irradiation in buildings, while providing building design practitioners flexibility in determination and use of disinfection techniques most appropriate for a building's specific use. Building classifications and spaces required to utilize germicidal irradiation are selected based on criteria including:

· Occupant Load Factor of 15 square feet per occupant, or less

· Occupant turn-over

· Occupant load of 50 or more for R-1, R-2, and R-4 Classifications

· Prevalence of high-touch surfaces

· Spaces with immune-compromised occupants

· High pathogen load shed

The Occupant Load Factor of 15 square feet per occupant is selected to identify the spaces that most benefit from germicidal irradiation disinfection due to high occupant density.

This comment ensures luminaires and systems are to be listed and identified for germicidal irradiation, and requires installation adherence with manufacturer's installation instructions, Chapter 27 (NFPA-70), product listings and equipment markings. This ensures building occupant safety is maintained by restricting germicidal irradiation exposure to levels deemed acceptable by safety certification agencies.

Many studies and papers are available supporting the effectiveness and safe use of germicidal irradiation techniques in buildings, listed in the original proposal bibliography.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This public comment will not increase or decrease the cost of construction unless the new appendix is adopted by the local jurisdiction as a mandatory requirement. In this case, the cost of construction will be increased to cover the expenses associated with equipment acquisition, design of the system, and installation of the system.

Public Comment# 2533

Public Comment 2:

IBC: 202 (New), 1201.1, 1210.4, SECTION 1211 (New), 1211.1 (New), 1211.2 (New), 1211.3 (New), 1211.4 (New), 1211.5 (New)

Proponents: Megan Hayes, representing NEMA (megan.hayes@nema.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

GERMICIDAL IRRADIATION . The use of radiant energy to inactivate bacteria, mold spores, fungi, or viruses.

UPPER-ROOM AIR . The air in the room located above the occupied portion of the room that is subject to ultraviolet germicidal irradiation.

SECTION 1201
GENERAL

1201.1 Scope . The provisions of this chapter shall govern ventilation, temperature control, lighting, yards and courts, sound transmission, room dimensions, surrounding materials~~, and~~ rodentproofing , and germicidal irradiation associated with the interior spaces of buildings.

SECTION 1210
TOILET AND BATHROOM REQUIREMENTS

1210.4 Germicidal irradiation . Where germicidal irradiation luminaires and systems are provided in employee and public toilet facilities, they shall be installed in accordance with Section 1211.

SECTION 1211
GERMICIDAL IRRADIATION

1211.1 Installation requirements . Where germicidal irradiation luminaires and systems are provided, they shall be installed in accordance with

Sections 1211.2 through 1211.5.

1211.2 Safe installation . Germicidal irradiation luminaires and systems shall be listed. Germicidal irradiation systems employing ultraviolet radiation shall comply with UL 8802. Germicidal irradiation systems shall be installed in accordance with Chapter 27, the manufacturer's installation instructions, and equipment markings. Consideration shall include the suitability for use in occupied or unoccupied locations.

1211.3 Mounting conditions . Germicidal irradiation luminaires and systems for upper-room air disinfection shall be mounted at the height specified in the manufacturer's installation instructions, equipment markings, and product listings.

1211.4 Ventilation requirements for germicidal irradiation for upper-room air disinfection . Ventilation for the building shall be provided in accordance with Section 1202. Additional air-mixing shall be required for effective germicidal irradiation for upper-room air disinfection.

1211.5 General lighting . Luminaires that emit germicidal irradiation shall be permitted to be installed as lighting for general illumination only where permitted by the product listing and indicated in the manufacturer's installation instructions.

Commenter's Reason: For the reasons stated below, in the substantiation that accompanied our original proposal (G174-21), germicidal irradiation is an important tool to help ensure the health and safety of building occupants. Accordingly, we suggest that the IBC contain voluntary provisions to allow germicidal irradiation equipment installation. The requirements outlined in this public comment:

1. Increase building occupant health and safety from pathogens

2. Address safe installation and use in building spaces

3. Provide application flexibility for building design practitioners

4. Maintain simple enforceability for code officials

This comment introduces provisions for building and building room disinfection through germicidal irradiation, which is not currently in the International Building Code. Current attention to healthy and well building environments, along with public health concerns of transmitted diseases, necessitates the IBC's need for germicidal irradiation.

Germicidal irradiation delivers the ability to inactivate human pathogens such as germs, fungi, mold spores, bacteria, viruses, harmful to humans. Various germicidal irradiation technologies have been available and used successfully in buildings for decades. Buildings such as hospitals, restaurants, and grocery stores, commonly use germicidal irradiation as a disinfection process, reducing the risk of pathogen and disease spread in and from these environments. Examples of some germicidal irradiation techniques are upper air ultra-violet and air duct ultra-violet irradiation.

This comment to the original proposal ensures proper and safe installation of germicidal irradiation in buildings, while providing building design practitioners flexibility in determination and use of disinfection techniques most appropriate for a building's specific use.

This comment ensures luminaires and systems are to be listed and identified for germicidal irradiation, and requires installation adherence with manufacturer's installation instructions, Chapter 27 (NFPA-70), product listings and equipment markings. This ensures building occupant safety is maintained by restricting germicidal irradiation exposure to levels deemed acceptable by safety certification agencies.

Many studies and papers are available supporting the effectiveness and safe use of germicidal irradiation techniques in buildings, listed in the original proposal bibliography.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This public comment will not increase or decrease the cost of construction as the language is permissive in nature and simply provides technical guidance and pointers to applicable standards where germicidal irradiation equipment is installed by design consideration.

Public Comment# 2537

G176-21

Proposed Change as Submitted

Proponents: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com)

2021 International Building Code

Add new text as follows:

SECTION 2703
LIGHTNING PROTECTION SYSTEMS

2703.1 General.
Where provided, lightning protection systems shall comply with Sections 2703.2 through 2703.3.

2703.2 Installation.
Lightning protection systems shall be installed in accordance with NFPA 780 or UL 96A. UL 96A shall not be utilized for buildings used for the production, handling, or storage of ammunition, explosives, flammable liquids or gases, and other explosive ingredients including dust.

2703.2.1 Surge protection.
Where lightning protection systems are installed, surge protective devices shall also be installed in accordance with NFPA 70 and either NFPA 780 or UL 96A, as applicable.

2703.3 Interconnection of systems.
All lightning protection systems on a building or structure shall be interconnected in accordance with NFPA 780 or UL 96A, as applicable.

Add new standard(s) as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062

UL 96A-2016	Standard for Installation Requirements for Lightning Protection Systems

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 780-20	Standard for the Installation of Lightning Protection Systems

Reason:

- Requirements pertaining to Lightning Protection Systems are **not** currently found within the building code.
- This code change does not require the installation of lighting protection systems, but simply provides guidance to those that are installing lighting protection.
- NFPA 780 and UL 96A are two standards that are widely used within the industry, and are currently used for installations but are not very well known to code officials. These standards are in harmony with the provisions of the National Electrical Code, NFPA 70.
- UL 96A can be used for the installation and inspection of many lightning protection systems but the standard has limitations and these are identified in this proposal.
- This proposal is simply intended to provide the code official with assistance in addressing the installation of these types of systems if they are installed.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
These standards are already used with installations today so there would not be any change in the cost of construction.

Staff Analysis: A review of the standard proposed for inclusion in the code, UL 96A-2016, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021. UL 780-17 is currently referenced in the 2021 IFC. This is a new edition and a new occurrence of the reference.

Staff Note: G175-21 and G176-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G176-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: This proposal was approved as the committee felt that this provided direction and criteria if you wanted to add a lightning protection systems. The committee preferred this to the mandatory requirements in G175-21. (Vote: 13-0)

Staff Analysis: G175-21 and G176-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G176-21

Individual Consideration Agenda

Public Comment 1:

IBC: 2701.1, 2703.2.1, 2703.3

Proponents: Bryan Holland, representing National Electrical Manufacturers Association (bryan.holland@nema.org); Megan Hayes, representing NEMA (megan.hayes@nema.org) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

2701.1 Scope . The provisions of this chapter and NFPA 70 shall govern the design, construction, erection and installation of the electrical components, appliances, equipment and systems used in buildings and structures covered by this code. The International Fire Code, the International Property Maintenance Code and NFPA 70 shall govern the use and maintenance of electrical components, appliances, equipment and systems. The International Existing Building Code and NFPA 70 shall govern the alteration, repair, relocation, replacement and addition of electrical components, appliances, or equipment and systems. <u>Lightning protection systems shall comply with Section 2703.</u>

2703.2.1 Surge protection . Where lightning protection systems are installed, surge ~~protective devices~~ <u>protection</u> shall also be installed in accordance with NFPA 70 and either NFPA 780 or UL 96A, as applicable.

2703.3 Interconnection <u>and bonding</u> of systems . All lightning protection systems on a building or structure shall be interconnected <u>and bonded</u> in accordance with NFPA 780 or UL 96A, as applicable.

Commenter's Reason: This public comment adds a pointer to the new Section 2703 on Lightning Protection Systems in the scope of Chapter 27 under section 2701.1 which is missing from the original proposal. Under 2703.2.1, the terms “protective device” are replaced with “protection” as surge protection recognized in the NFPA 70, NFPA 780, and UL 96A includes surge-protective devices, surge protectors, and surge arresters. The current language is not inclusive of all three surge protection technologies that are required or permitted to be installed with a lightning protection system. And under 2703.3, the terms “and bonding” are added to the section title along with the terms “and bonded” to the section requirement to ensure all lightning protection systems installed on a building or structure are both mechanically (interconnected) and electrically (bonded) together to form a single system of protection against the hazard of lightning.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This public comment just adds clarity to the approved proposal and does not increase the cost of construction as the overall code change does not mandate the installation of a lightning protection system but rather points the user of the code to the proper codes and standards where a lightning protection system is going to be installed by design consideration.

Public Comment# 2526

G177-21

Proposed Change as Submitted

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

2021 International Building Code

Revise as follows:

3001.2 Emergency elevator communication systems ~~for the deaf, hard of hearing and speech impaired~~. An emergency elevator ~~two-way~~ communication system shall be provided~~. The system shall provide~~ that includes both visual ~~visible text~~ and audible communication modes ~~that meet all of the following~~ complying with the requirements in ASME A17.1/CSA B44.~~:~~

1. ~~When operating in each mode, include a live interactive system that allows back and forth conversation between the elevator occupants and emergency personnel.~~
2. ~~Is operational when the elevator is operational.~~
3. ~~Allows elevator occupants to select the text-based or audible mode depending on their communication needs to interact with emergency personnel.~~

Reason: The title was modified because this communication system needs to be useable by all people, not just the deaf, hard of hearing and speech impaired.
Added "elevator" to clarify that this applies to the communication system in the elevator since the title is not part of the requirement.

Deleted "two-way" for consistency with ASME A17.1/CSA B44 language.

The communication system is part of the elevator system requirements and the technical criteria for the communication system is provided in ASME A17.1/B44 Safety Code for Elevators and Escalators. As part of the elevator system, the communication system is inspected by elevator inspectors; therefore, the requirements belong in the elevator code. The requirements as currently written in the IBC are no longer needed because the elevator code contains significantly more detailed requirements to make the system accessible to the deaf, hard of hearing, and speech impaired. This proposal retains the base requirement for the system in the IBC but references the technical requirements in ASME A17.1-2019/CSA B44:19 elevator code which is referenced in IBC Chapter 35. The requirements in ASME A17.1-2019/CSA B44:19 were developed for consistency with the guidelines in the ADA Title III which is the regulation specifically for effective communication with the deaf, hard of hearing and speech impaired.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal will neither increase nor decrease the cost of construction because the requirements in the A17.1-2019/CSA B44:19 code already need to be complied with per Section 3001.3 Referenced Standards.

G177-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the committee felt that the revised text could be read to just apply to emergency elevators rather than all elevators. The language in the proposal should emphasize that the two-way communication in the elevator car is for everyone, including persons who have speaking or hearing disabilities. All of the testifiers seem to have the same intent - they need to work together to resolve the conflicts in the current language. ASME A17.1 has included criteria for these systems. The proposal needs to provide more specific direction. (Vote: 14-0)

G177-21

Individual Consideration Agenda

Public Comment 1:

IBC: 3001.2

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

3001.2 Elevator emergency ~~Emergency elevator~~ communication systems ~~for the deaf, hard of hearing and speech impaired~~ . An elevator emergency two-way communication system shall be provided~~. The system shall provide visible text~~ that includes both visual and audible communication modes~~ that meet all of the following requirements~~ complying with the requirements in ASME A17.1/CSA B44. They system shall provide a means to enable authorized personnel to verify:

1. The presence of someone in the car.
2. That the person(s) is trapped.

Once an entrapment is verified, the system shall enable authorized personnel to:

1. Determine if assistance is needed. ~~When operating in each mode, include a live interactive system that allows back and forth conversation between the elevator occupants and emergency personnel.~~
2. Communicate when help is on the way. ~~Is operational when the elevator is operational.~~
3. Communicate when help arrives on site. ~~Allows elevator occupants to select the text-based or audible mode depending on their communication needs to interact with emergency personnel.~~

Commenter's Reason: This code requirement was first introduced in the 2018 edition and it was revised in the 2021 edition in an effort to clarify the requirements; however, as written it does not provide the necessary technical requirements to ensure consistent implementation. Consistent implementation is vital to making the system usable by all people, not just those with hearing or speech loss. Traditionally, the building code has provided the scoping for elevators and the technical criteria for the elevators has been in the ASME A17.1/CSA B44 Safety Code for Elevators and Escalators (elevator code). The 2019 edition of the elevator code includes significant changes to address the concerns raised by the proponent of the original code change to the IBC and provides the needed technical guidance for the elevator manufacturer and the elevator inspection to ensure consistent implementation. The ASME committee that developed the requirements invited the proponent of the original IBC requirement and other members representing the disability community to participate in the code process. The resulting requirements were chosen in order to serve the broadest number of people who may not be able to communicate verbally. Suggestions for ASL and other methods were not as desirable because they would be limited to a small portion of the potential users. As written, the elevator code requirements also make the system more accessible to people who may speak a different language or who cannot speak for any due to a medical condition.
A key element of the new ASME requirements is the provision for a means (video) to show the entire floor area of the car. The concern raised by the proponent and with entrapments in the past that were not immediately answered because there was no response from the car. These concerns are alleviated by the visual means because the authorized person at the call center can see that someone is in the car and immediately dispatch help. This means would verify the presence of the person whether they could speak or not, including identifying someone who has suffered a medical situation and may be lying on the floor. The ASME requirements also provide for a means to ask question and receive responses from the persons in the car usually both audio and visual means. This can be in the form of questions with “yes” or “no” answers that can be answered by pressing the appropriate button or by providing a means in the car to text answers. The attached sheet shows one example of how this is currently being addressed in the field. The current language in 3001.2 only requires the system to be operational when the elevator is operational. Most entrapments occur because the elevator goes out of service but based on the 3001.2 language the system is not required to be functional at that time. The ASME language requires the system to be operational 24 hours per day/7 days a week which corrects this issue. .

Elevator emergency communication systems have been in the elevator code for many years. It is important to note that the intent of the system is to notify authorized personnel who can take action in case of an elevator entrapment. It is not designed for lengthy conversation. The communication system is required to be directed to authorized personnel 24 hours per day/7 days a week. The system must automatically relay the building location and elevator car number to authorized personnel without input from the passenger. The system is also required to do a daily self-check to ensure it is operating properly. The system does not automatically direct calls to the 911 system because the sheer volume of calls would overwhelm that system. Authorized personnel at call centers receive tens of millions of calls per year. Studies have shown that over 90% of these calls are nuisance calls (accidental due to crowded elevators, kids playing pranks, etc.).

The revised proposal below addresses concerns raised by opponents and the committee to the previous NEII proposal while providing more guidance for designers and building officials. It also aligns with the requirements in the elevator code. Specifically, this revised proposal:

· Updates the title to clarify that the system is for use by all passengers, not just those with hearing or speech loss.

· Relocates the word “elevator” before emergency two-way communications in the title and the text based on a concern expressed by the committee member that it could be perceived to only apply to emergency elevators, even though the original title had “elevator” after “emergency”.

· Retains “two-way” based on a concern raised by one of the opponents even though it is already addressed in the elevator code.

· Adds specific functions that the system must be able to provide to assess whether someone is in the car and that they are entrapped. Also provides the capability to determine if assistance is needed, to communicate when help is on the way and when help has arrived on site. These are the basic steps that are needed to assess the situation and take appropriate action.

· Directs users of the code to the elevator code requirements for a more detailed description of the system requirements.

Two-Way Elevator Emergency Communications Visual Device

For compliance to the latest codes

The device gives riders the option to communicate visually by answering on-screen questions.

The Two-Way Emergency Communications Visual Device easily integrates into your Schindler elevator.

Two-Way Emergency Communications Visual Device
The ASME A17.1-2019 and IBC 2018 codes require in-elevator two-way emergency communication systems for the hearing impaired.

The Two-Way Emergency Communications Visual Device is easily integrated into your Schindler elevator during the construction process and complies with these codes.

Easy-to-use interface
In the event of an emergency, riders can call for help using the call/phone button inside the elevator on the Two-Way Emergency Communications Visual Device.

Once the call is made, riders have the option to communicate with dispatchers via standard voice communications, or visually by answering questions that appear on the device's easy-to-read screen.

To answer the Yes or No questions on the device, riders simply use its red and green buttons.

Video camera for visual assessment inside the elevator
The Two-Way Emergency Communications Visual Device also includes a video camera that becomes activated when a rider makes a call for help using its call/phone button. The video camera quickly provides dispatchers a visual assessment of the situation inside of the elevator.

Programmable connectivity
The device can be programmed to connect to the Schindler Customer Service Network, or to another point of contact as designated by the building owner or operations manager.

For more information, please contact your Schindler sales representative.

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Schindler has received renewal to ISO 9001 and ISO 14001 certificates.

Schindler prints with vegetable-based ink on paper containing post-consumer waste fiber.
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Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal will neither increase nor decrease the cost of construction because the requirements in the A17.1-2019/CSA B44:19 code already need to be complied with per Section 3001.3 Referenced Standards and the proposal is clarifying requirements to ensure more consistent implementation.

Public Comment# 2617

G179-21

Proposed Change as Submitted

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

2021 International Building Code

3001.1 Scope. This chapter governs the design, construction, installation, *alteration* and repair of elevators and conveying systems and their components.

Add new text as follows:

3001.2 Structural Design Considerations.
Passenger elevators and escalators exposed to outdoor environments shall comply with Sections 1608, 1609, and 1614.

Revise as follows:

3001.3 ~~3001.5~~ Change in use. A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with Section 8.7 of ASME A17.1/CSA B44.

3001.4 ~~3001.3~~ Referenced standards. Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to the applicable standard specified in Table3001.4 ~~3001.3~~ and ASCE 24 for construction in *flood hazard areas* established in Section 1612.3.

TABLE 3001.4 ~~3001.3~~ ELEVATORS AND CONVEYING SYSTEMS AND COMPONENTS

TYPE	STANDARD
Automotive lifts	ALI ALCTV
Belt manlifts	ASME A90.1
Conveyors and related equipment	ASME B20.1
Elevators, escalators, dumbwaiters, moving walks, material lifts	ASME A17.1/CSA B44, ASME A17.7/CSA B44.7
Industrial scissor lifts	ANSI MH29.1
Platform lifts, stairway chairlifts, wheelchair lifts	ASME A18.1

3001.5 ~~3001.4~~ Accessibility. Passenger elevators required to be accessible or to serve as part of an*accessible* means of egress shall comply with Sections 1009 and 1110.8.

3001.6 ~~3001.2~~ Emergency elevator communication systems for the deaf, hard of hearing and speech impaired. An emergency two-way communication system shall be provided. The system shall provide visible text and audible modes that meet all of the following requirements:

1. When operating in each mode, include a live interactive system that allows back and forth conversation between the elevator occupants and emergency personnel.
2. Is operational when the elevator is operational.
3. Allows elevator occupants to select the text-based or audible mode depending on their communication needs to interact with emergency personnel.

Reason: To ensure outdoor elevator and escalator installations address the appropriate design conditions for the environments they may be exposed to. There have been many cases in south Florida where high wind loads were not considered in the design and installation of outdoors escalators and elevators, since it is not currently addressed. Additionally, in other areas, snow and ice loads should be considered.
The reorganization of the section is simply to group like items together.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal will not change the cost of construction since it is only intended to call attention to existing requirements.

G179-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the requirements for exterior elevator design needs to apply to all elevators, not just passenger elevators. (Vote: 10-4)

G179-21

Individual Consideration Agenda

Public Comment 1:

IBC: 3001.2

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

3001.2 Structural Design Considerations . ~~Passenger elevators~~ Elevators and escalators exposed to outdoor environments shall comply with Sections 1608, 1609, and 1614.

Commenter's Reason: This is an important change to ensure that architects and designers are aware of the requirements when installing elevator and escalator equipment outdoors. This change will not increase the cost of construction since the provisions already apply; however, it may save significant costs by preventing rework or replacement if the requirements are missed during the design process. Manufacturers and elevator inspectors have seen many cases where this has been an issue.
The one technical concern expressed during the CAH was that the proposed language would limit it to “passenger” elevators. The proposed further modification to remove the word “passenger” from the added text addresses that concern.

A question was raised regarding the renumbering during the Committee Action Hearings (CAH). The renumbering was done by ICC staff to group similar topics. The proposed change is adding a new section on Structural Design Considerations but does not alter the language in any of the other provisions.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There would be no change in the cost of construction since the referenced sections already apply; however, the proposal could prevent the requirements from being missed which may avoid potential rework costs.

Public Comment# 2599

G181-21 Part I

Proposed Change as Submitted

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

SECTION 3005
MACHINE ROOMS

Revise as follows:

3005.2 ~~Venting~~ Environment. Elevator machine rooms, machinery spaces that contain the driving machine, and control rooms or spaces that contain the operation or motion controller for elevator operation shall be provided with a natural or mechanical means ~~an independent *ventilation* or air-conditioning system to protect against the overheating of the electrical equipment. The system shall be~~ capable of maintaining temperatures and humidity within the range established for the elevator equipment as provided by the manufacturer.

Reason: Changed the titles of 3003.1.4 and 3005.2 to use a title consistent with 902.1.3. Clarification of the title to Section 3005 to reflect the content of the section. Modified the language in 3005.2 to reflect and align with the language used in ASME A17.1/CSA B44. Made changes in 3003.1.4 to correlate with the changes to 3005.2. There are cases, where the normal air exchange between the equipment location and building environment will be adequate to maintain the temperature and humidity within the specified range. In other cases, mechanical means would be required to maintain the specified range. The specified range is determined by the elevator equipment manufacturer. See also corresponding proposal for IFC 604.3.4.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal will not change the cost of construction since the changes are better aligning the language and requirements between the IBC and the elevator codes.

G181-21 Part I

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved because the committee was concerned that natural ventilation would allow for smoke to enter the cab. Removing the requirement to be an independent system will allow the use of the building's ventilation and mixing the air. (Vote: 14-0)

G181-21 Part I

Individual Consideration Agenda

Public Comment 1:

IBC: 3005.2

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

3005.2 ~~Venting~~ Temperature and Humidity Control . Elevator machine rooms, machinery spaces that contain the driving machine, and control rooms or spaces that contain the operation or motion controller for elevator operation shall be provided with an independent *ventilation*, ~~or~~ air-conditioning , or other means ~~to protect against the overheating of the electrical equipment. The system shall be~~ capable of maintaining temperatures and humidity within the range established for the elevator equipment as provided by the manufacturer.

Exception: An independent means is not required where the temperature and humidity in the room or space can be maintained within the specified range under all operating conditions without an independent means.

Commenter's Reason: The current title and language is misleading because the real purpose is to maintain the temperature and humidity in the room or space for proper operation of the elevator equipment. This may be done with ventilation, air condition or other means, including natural means. The following proposals updates the title to reflect the real purpose and revises the language to retain “independent” based on comments received during the Committee Action Hearing. As noted in the original proposal, humidity control is also important so that was added to the proposal and the range should be established by the equipment manufacture because it can vary based on the system design and components.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal and comment will not increase or decrease the cost because it is intended to clarify language and align the language with other codes.

Public Comment# 2605

G181-21 Part II

Proposed Change as Submitted

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

2021 International Fire Code

Revise as follows:

604.3.4 ~~Machine room ventilation~~ Environment. Where standby power is connected to elevators and an environmental control means is provided per Section 3005.2 of the International Building Code, the ~~machine room ventilation or air conditioning~~ environmental control means shall be connected to the standby power source.

2021 International Building Code

SECTION 3003
EMERGENCY OPERATIONS

Revise as follows:

[F] 3003.1.4 ~~Venting~~ Environment. Where standby power is connected to elevators~~,~~ and an environmental control means is provided per Section 3005.2, the ~~machine room ventilation or air conditioning~~ environmental control means shall be connected to the standby power source.

Reason: Changed the titles of 3003.1.4 and 3005.2 to use a title consistent with 902.1.3. Clarification of the title to Section 3005 to reflect the content of the section. Modified the language in 3005.2 to reflect and align with the language used in ASME A17.1/CSA B44. Made changes in 3003.1.4 to correlate with the changes to 3005.2. There are cases, where the normal air exchange between the equipment location and building environment will be adequate to maintain the temperature and humidity within the specified range. In other cases, mechanical means would be required to maintain the specified range. The specified range is determined by the elevator equipment manufacturer. See also corresponding proposal for IFC 604.3.4.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal will not change the cost of construction since the changes are better aligning the language and requirements between the IBC and the elevator codes.

G181-21 Part II

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved with concern with the need to specifically match the language with ASME A17.1/CSA B44 and the affect it will have on enforcement. Also it was noted that Part I of this proposal was disapproved. (Vote: 10-4)

G181-21 Part II

Individual Consideration Agenda

Public Comment 1:

IBC: [F] 3003.1.4; IFC: 604.3.4

Proponents: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

[F] 3003.1.4 ~~Venting~~ Temperature and Humidity Control . Where standby power is connected to elevators and a temperature and humidity control means is provided per Section 3005.2, the ~~machine room *ventilation* or air conditioning~~ temperature and humidity control means shall be connected to the standby power source.

2021 International Fire Code

604.3.4 ~~Machine room ventilation~~ Temperature and Humidity Control . Where standby power is connected to elevators and a temperature and humidity control means is provided per Section 3005.2 of the *International Building Code*, the ~~machine room ventilation or air conditioning~~ temperature and humidity control means shall be connected to the standby power source.

Commenter's Reason: The current title and language are misleading because the real purpose is to provide standby power for the means to maintain the temperature and humidity in the room or space for proper operation of the elevator equipment. This public comment to modify the proposal correlates with the public comment and proposal for IBC 3005.2. This revised proposals also address an editorial correction to the referenced code section in the original proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal will not change the cost of construction since the changes are better aligning the language and requirements between other sections of the IBC and other codes.

Public Comment# 2609

G185-21

Proposed Change as Submitted

Proponents: Curtis Gonzales, Smoke Guard, Inc., representing Smoke Guard, Inc. (curtis.gonzales@smokeguard.com); Amanda Hickman, representing SmokeGuard, Inc. (amanda@thehickmangroup.com)

2021 International Building Code

Add new definition as follows:

SMOKE PROTECTIVE CURTAIN ASSEMBLY FOR HOISTWAY. An automatic closing smoke and draft control curtain assembly.

Revise as follows:

3006.3 Hoistway opening protection. Where Section 3006.2 requires protection of the elevator hoistway door opening, the protection shall be provided by one of the following:

1. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway *shaft enclosure* doors from each floor by *fire partitions* in accordance with Section 708. In addition, doors protecting openings in the elevator lobby enclosure walls shall comply with Section 716.2.2.1 as required for *corridor* walls. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway *shaft enclosure* doors from each floor by *smoke partitions* in accordance with Section 710 where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the *smoke partitions* shall comply with Sections 710.5.2.2, 710.5.2.3 and 716.2.6.1. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
3. Additional doors shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such ~~door~~ doors shall comply with the smoke and draft control door assembly requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal.
4. The elevator hoistway shall be pressurized in accordance with Section 909.21.
5. A *smoke protective curtain assembly for hoistways* shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such curtain assemblies shall comply with the smoke and draft control requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal. Such curtain assemblies shall be equipped with a control unit listed to UL 864. Such curtain assemblies shall comply with section 2.11.6.3 of ASME A17.1/CSA B44. Installation and maintenance shall be in accordance with NFPA 105

Reason: *Smoke protective curtain assemblies for hoistways* are recognized and regulated in NFPA 105 Chapter 9 (2019). There are multiple manufactures of these assemblies in the market. These products have been in the market for 25 years with tens of thousands of successful installations. Smoke protective curtain assemblies provide a proven means for smoke and draft control at the hoistway door that enables design freedom and innovation. Smoke protective curtain assemblies for hoistways should be allowed to provide smoke and draft protection where enclosed elevator lobbies are not required.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The cost of this option for hoistway opening protection is offset by the cost of other forms of protection. As such, the cost of construction for adding option five does not raise or lower the cost of construction.

G185-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as this modification allows for smoke protective curtain assemblies to be used at elevator doors to meet the smoke protection requirements for rated corridors. The UL 864 listing for the controller is appropriate. Some committee members felt this option was already permitted as an alternative to Section 3006.3 Item 3. (Vote: 8-7)

G185-21

Public Comment 1:

IBC: SECTION 202, 3006.3

Proponents: Amanda Hickman, representing SmokeGuard, Inc. (amanda@thehickmangroup.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

SMOKE PROTECTIVE CURTAIN ASSEMBLY ~~FOR HOISTWAY~~. ~~An automatic closing~~ A listed smoke and draft control curtain assembly consisting of a curtain coil, control unit, and parameter sealing system.

3006.3 Hoistway opening protection. Where Section 3006.2 requires protection of the elevator hoistway door opening, the protection shall be provided by one of the following:

1. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway *shaft enclosure* doors from each floor by *fire partitions* in accordance with Section 708. In addition, doors protecting openings in the elevator lobby enclosure walls shall comply with Section 716.2.2.1 as required for *corridor* walls. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway *shaft enclosure* doors from each floor by *smoke partitions* in accordance with Section 710 where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the *smoke partitions* shall comply with Sections 710.5.2.2, 710.5.2.3 and 716.2.6.1. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
3. Additional doors shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such doors shall comply with the smoke and draft control door assembly requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal.
4. The elevator hoistway shall be pressurized in accordance with Section 909.21.
5. ~~A~~ An *automatic closing smoke protective curtain assembly* ~~*for hoistways*~~ shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such smoke protective curtain assemblies shall comply with the smoke and draft control requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal. Such smoke protective curtain assemblies shall be equipped with a control unit listed to UL 864. Such smoke protective curtain assemblies shall comply with section 2.11.6.3 of ASME A17.1/CSA B44. Installation and maintenance shall be in accordance with NFPA 105

Commenter's Reason: The committee approved this proposal. However, there were comments made regarding the definition and so we offer this public comment to satisfy the feedback that was received during the hearing. Smoke protective curtain assemblies for hoistways are recognized and regulated in NFPA 105 Chapter 9 (2019). There are multiple manufactures of these assemblies in the market. These products have been in the market for 25 years with tens of thousands of successful installations. Smoke protective curtain assemblies provide a proven means for smoke and draft control at the hoistway door that enables design freedom and innovation. Smoke protective curtain assemblies for hoistways working in conjunction with fire resistive rated hoistway doors should be allowed to provide smoke and draft protection where enclosed elevator lobbies are required.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This comment is editorial and will not affect the cost of construction.

Public Comment# 2859

G191-21

Proposed Change as Submitted

Proponents: Marcelo Hirschler, GBH International, representing self (mmh@gbhint.com)

2021 International Building Code

Revise as follows:

3105.2 Design and construction. *Awnings* and *canopies* shall be designed and constructed to withstand wind or other lateral *loads* and *live loads* as required by Chapter 16 with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration. *Awnings* shall have frames of noncombustible material, *fire-retardant-treated wood*, or heavy timber complying with Section 2304.11~~, or 1-hour construction with combustible or noncombustible covers~~ and shall be either fixed, retractable, folding or collapsible.

Reason: The statement that the awnings or canopies shall be constructed with "combustible or noncombustible materials" is meaningless since there is no other option for a material: it is either combustible or it is noncombustible. The requirement for the frame of an awning to comply with a fire resistance rating (which is what 1-hour construction means) is not an adequate requirement for two reasons. Firstly, fire resistance ratings are intended to assess (as the IBC definition states): "The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703." Secondly, fire resistance ratings are applied to "assemblies of masonry units" and similar assemblies but not to individual materials which are not separating one compartment from another one.
The section contains all the appropriate requirements in terms of structural performance, including the fact that wind and other loads must be able to be withstood.

The awnings being regulated are not separating compartments and, therefore, requiring a fire resistance rating is not appropriate.

Pictures of awnings illustrate the issue:

For information, the first section of the scope of the test used to assess fire resistance ratings (ASTM E119) reads as follows:

1.1 The test methods described in this fire-test-response standard are applicable to assemblies of masonry units and to composite assemblies of structural materials for buildings, including loadbearing and other walls and partitions, columns, girders, beams, slabs, and composite slab and beam assemblies for floors and roofs. They are also applicable to other assemblies and structural units that constitute permanent integral parts of a finished building.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
No additional requirements are being added.

G191-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as submitted based on the provided reason statement. The committee did express concerns that additional justification would be beneficial. (Vote: 8-7)

G191-21

Individual Consideration Agenda

Public Comment 1:

IBC: 3105.2

Proponents: Jonathan Siu, representing Washington Association of Building Officials Technical Code Development Committee; Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

3105.2 Design and construction . *Awnings* and *canopies* shall be designed and constructed to withstand wind or other lateral *loads* and *live loads* as required by Chapter 16 with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration. *Awnings* shall have frames of noncombustible material, *fire-retardant-treated wood*, ~~or~~ heavy timber complying with Section 2304.11 , or 1-hour construction, and shall be either fixed, retractable, folding or collapsible.

Commenter's Reason: This public comment restores the option of 1-hour construction for awning frames, which was removed in the original proposal. It will leave intact the deletion of the text referring to combustible or non-combustible covers (is there any other kind?)
The reason statement for FS29 says that the fire rating is "inappropriate" because awnings don't serve to separate compartments. We don't understand this rationale for eliminating the option of providing rated construction. Framing in other structures such as steel moment frames (beams and columns) do not serve to separate compartments, yet the elements are required to have a fire-resistance rating in Table 601.

More importantly, under the current code, the 1-hour construction is just one of several options that a designer can utilize--the designer can choose framing that is non-combustible, fire-retardant treated wood, or heavy timber. 1-hour construction is easily equivalent (or better, in some cases) than the other three listed methods, so there is no technical reason why it should not be an option.

While there is some technical merit in deleting the combustible/noncombustible language, if the membership does not want to make a change for such a minor editorial issue (which is the ultimate result if this proposal is approved as modified by this public comment), we would recommend voting for Disapproval for the whole code change proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Although it could be argued that by eliminating an option the original code change might increase the cost of construction in some cases, restoring that option via this public comment will result in no technical change to the code provisions from the previous code edition, and therefore, no increase or decrease in the cost of construction.

Public Comment# 2382

G193-21

Proposed Change as Submitted

Proponents: Larry Sherwood, on behalf of Sustainable Energy Action Committee, representing Interstate Renewable Energy Council (Larry@irecusa.org); Kevin Reinertson, representing California Fire Chiefs Association FPO (kevin.reinertson@fire.ca.gov); Benjamin Davis, CA Solar & Storage Association, representing CA Solar & Storage Association (ben@calssa.org); Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA), representing SEIA (JoeCainPE@gmail.com)

2021 International Building Code

Add new definition as follows:

PHOTOVOLTAIC (PV) PANEL SYSTEM, GROUND-MOUNTED. . An independent photovoltaic (PV) panel system without useable space underneath, installed directly on the ground.

PHOTOVOLTAIC (PV) SUPPORT STRUCTURE, ELEVATED. . An independent photovoltaic (PV) panel support structure designed with useable space underneath with minimum clear height of 7 feet 6 inches (2286 mm), intended for secondary use such as providing shade or parking of motor vehicles.

Add new text as follows:

3111.3.5 Elevated photovoltaic (PV) support structures.
Elevated PV support structures shall comply with either 3111.3.5.1 or 3111.3.5.2.

Exception: *Elevated PV support structures* that are installed over agricultural use.

3111.3.5.1 PV panels installed over open-grid framing or non-combustible deck.
Elevated PV support structures with PV panels installed over open-grid framing or over a noncombustible deck shall have PV panels tested, *listed*, and *labeled* with a fire type rating in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. Photovoltaic panels marked “not fire rated” shall not be installed on *elevated PV support structures*.

3111.3.5.2 PV panels installed over a roof assembly.
Elevated PV support structures with a PV panel system installed over a roof assembly shall have a fire classification in accordance with Section 1505.9.

Revise as follows:

~~**3111.3.5**~~ **3111.3.6 Ground-mounted photovoltaic (PV) panel systems.** Ground-mounted photovoltaic panel systems shall be designed and installed in accordance with Chapter 16 and the *International Fire Code*.

~~**3111.3.5.1**~~ **3111.3.6.1 Fire separation distances.** Ground-mounted photovoltaic panel systems shall be subject to the *fire separation distance* requirements determined by the local jurisdiction.

Reason: The primary purpose of this proposal is to establish appropriate fire testing and listing criteria for overhead photovoltaic (PV) support structures that could have people or vehicles in the space beneath them. Sometimes referred to as “solar shade structures,” they are most commonly constructed over vehicle parking spaces of surface parking lots, are sometimes built on the uppermost level of parking garages, but could be built in a variety of locations with or without cars parked beneath.
Overhead PV structures are referenced in 2021 IBC Section 1607.14.4, and in 2019 California Building Code Section 503.1, but without any definitions.

In 2021 IBC Section 1607.14.4.3, these structures are described as “Structures with open grid framing and without a roof deck or sheathing supporting photovoltaic panel systems.”

In 2019 California Building Code Section 503.1, Exception 2, these structures are described as: “… solar photovoltaic panels supported by a structure with no use underneath…” In Exception 3, there is a more-specific description by location: “… solar photovoltaic panels supported by a structure over parking stalls …”

Ground-mounted photovoltaic panel systems are referenced in the 2021 I-codes, in IBC Sections 1607.4.4 and 3111.3.5; in IRC Section R324.7; and in IFC Section 1205.5.

For the proposed definition of Elevated PV Support Structure note the minimum height threshold of 7’-6” is consistent with IBC 1003.2.

Most PV panels in the marketplace have been fire tested and assigned a “type rating” in accordance with UL 1703. However, some PV panels might not have that fire testing, and could be marked “not fire rated.” This proposal clarifies that PV panels marked “not fire rated” cannot be used on elevated/overhead PV structures that could have people or cars beneath them, with or without a full roof assembly.

Where elevated PV structures have PV panels mounted over open-grid framing with no roof deck or sheathing cannot achieve a “fire classification” because there is no combustible roof covering to ignite in a UL 2703 spread-of-flame or burning brand test. Therefore, it is sufficient protection to install only type-rated modules. The same is true when PV panels are installed directly over noncombustible metal sheathing without a stand-off mounting system.

Where elevated PV structures have a roof assembly and PV panels are rooftop mounted over that roof assembly, then those structures must have a fire classification according to Section 1505.9.There are several different stakeholder groups that will benefit from this proposal.

This proposal was prepared by the Sustainable Energy Action Committee (SEAC), a forum for all stakeholders (including, but not limited to, AHJs, designers, engineers, contractors, first responders, manufacturers, suppliers, utilities, and testing labs) to collaboratively identify and find solutions for issues that affect the installation and use of solar energy systems, energy storage systems, demand response, and energy efficiency. The purpose is to facilitate the deployment and use of affordable, clean and renewable energy in a safe, efficient, and sustainable manner.

All recommendations from SEAC are approved by diverse stakeholders through a consensus process.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
It encourages the use of solar without adversely impacting safety.

Staff Note: G192-21 and G193-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G193-21

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as submitted per the provided reason statement. The proposal represents an extension coordinate effort of those involved. (Vote: 13-1)

Staff Analysis: G192-21 and G193-21 addresses requirements in a different or contradicting manner. The committee is urged to make their intentions clear with their actions on these proposals.

G193-21

Individual Consideration Agenda

Public Comment 1:

Proponents: C Ray Allshouse, City of Shoreline, WA, representing Washington Association of Building Officials Technical Code Development Committee (rallshouse@shorelinewa.gov); Micah Chappell, representing Washington Association of Building Officials (micah.chappell@seattle.gov) requests Disapprove

Commenter's Reason: Reason Statement. This proposal was touted as further clarification to that which was proposed by G104-21. However, G104 was ultimately unanimously rejected by the Committee largely based on concerns that it went well beyond the California Building Code from which it was modeled, but also because it exempted installations of rooftop PV panels from constituting a story. G104 included language under subsection 503.1.1.2 that appeared to allow use underneath that would otherwise constitute a story. Specifically, a flat roof is included under a “roof slope < 2:12”. Rejection of G104 was largely founded on a need to roll it back to the California scope to avoid this consequence.
The Committee approval by a 13-1 margin of G193 flies in the face of their earlier action and direction on G104. Of major concern to WABO TCD is that by the proposed definition, Elevated PV Support Structures include “…useable space…intended for secondary use such as ***providing shade or*** parking of motor vehicles” [emphasis ours]. This is the same flaw we pointed out in testimony against G104. G193 provides language that would be construed as potentially allowing rooftop “solar shade structures” over uses that should and ought to be a story. For example, our members have seen project proposals with solar panel arrays “shading” all or a portion of an occupied/occupiable roof on multi-story apartment buildings. While the text in G193-21 does not specifically exempt these spaces from the story count, having this text in the definition is likely to cause confusion and conflicts between designers and regulators.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No change to code.

G196-21

Proposed Change as Submitted

Proponents: John-Jozef Proczka, representing self (john-jozef.proczka@phoenix.gov)

2021 International Building Code

Add new text as follows:

3115.3 Intermodal shipping container physical identification.
Intermodal shipping containers shall have the physical markings and data plate required by Sections 3115.3.1 and 3115.3.2 and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner and building official.

Where approved by the building official, the markings and existing data plate are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.

Revise as follows:

~~3115.3~~ 3115.3.1 Intermodal shipping container ~~information~~ data plate. *Intermodal shipping containers* shall bear an existing plate labelled as "CSC SAFETY APPROVAL" in English or French containing the following information. ~~as required by ISO 6346 CSC and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner.~~

1. ~~Manufacturer's name or identification number.~~ Abbreviated country of approval, abbreviated approval agency, and approval agency reference number.
2. Date manufactured.
3. ~~Safety approval number.~~
4. ~~3.~~ Manufacturer's Identification number.
5. ~~4.~~ Maximum operating gross mass ~~or weight~~ (kg) (lbs).
6. ~~5.~~ Allowable stacking load for 1.8G (kg) (lbs).
7. ~~6.~~ Transverse racking test force (Newtons).
8. ~~7.~~ ~~Valid~~ Required maintenance examination date.

~~Where approved by the *building official*, the markings and existing data plate are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.~~

Add new text as follows:

3115.3.2 Intermodal shipping container markings.
Intermodal shipping containers shall have markings, separate from the data plate, containing the following information. Refer to Figure 3115.3.2 for an example layout of the markings.

1. An owner code consisting of three letters.
2. An equipment category identifier that shall be the letter U. This equipment category identifier is grouped with and immediately follows the owner code.
3. A six digit serial number.
4. A check digit in a box.
5. A two digit size code.
6. A type code of two letters. The first letter shall be G, V, U, B, or S. This type code is grouped with and immediately follows the size code.
7. Maximum gross mass (kgs) (lbs).
8. Tare mass (kgs) (lbs).

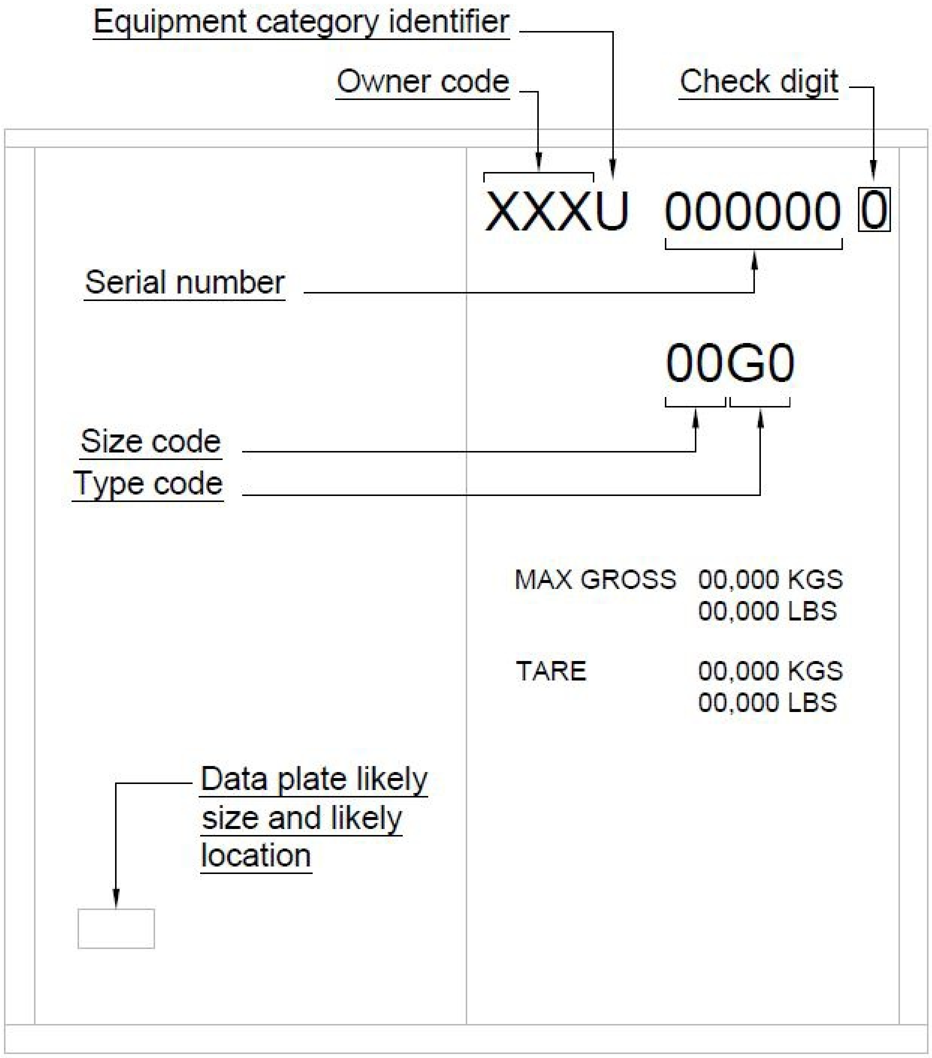

FIGURE 3115.3.2 MARKING IDENTIFICATION AND LIKELY LAYOUT

3115.4 Protection against decay and termites. Wood structural floors of *intermodal shipping containers* shall be protected from decay and termites in accordance with the applicable provisions of Section 2304.12.1.1.

3115.5 Under-floor ventilation. The space between the bottom of the floor joists and the earth under any *intermodal shipping container*, except spaces occupied by basements and cellars, shall be provided with ventilation in accordance with Section 1202.4.

3115.6 Roof assemblies. *Intermodal shipping container* roof assemblies shall comply with the applicable requirements of Chapter 15.

Exception: Single-unit, stand-alone intermodal shipping containers not attached to, or stacked vertically over, other intermodal shipping containers, buildings or structures.

3115.7 Joints and voids. Joints and voids that create concealed spaces between connected or stacked *intermodal shipping containers* at fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved *fire-resistant joint system* in accordance with Section 715.

Revise as follows:

3115.8 Structural. Intermodal shipping containers that conform tointernational standards that test certain structural properties of the containers~~ISO 1496-1~~, as identified by the required markings in Section 3115.3.2, and are repurposed for use as buildings or structures, or as a part of buildings or structures, shall be designed in accordance with Chapter 16 ,and the material specific chapters, ~~and~~ except for the provisions specifically stated in Section 3115.8.1 through 3115.8.4.3 ~~this section~~.

3115.8.1 Foundations and stacking. *Intermodal shipping containers* repurposed for use as a permanent building or structure shall be supported on foundations, other *intermodal shipping containers*, or other supporting structures designed and constructed in accordance with Chapters 16 through 23.

3115.8.1.1 Anchorage. *Intermodal shipping containers* shall be anchored to foundations or other supporting structures as necessary to provide a continuous load path for all applicable design and environmental *loads* in accordance with Chapter 16.

Delete without substitution:

~~**3115.8.2 Welds.** New welds and connections shall be equal to or greater than the original connections.~~

Revise as follows:

~~3115.8.3~~ 3115.8.2 Structural design. The structural design for the *intermodal shipping containers* repurposed for use as a building or structure, or as part of a building or structure, shall comply with Section ~~3115.8.4~~ 3115.8.3 or ~~3115.8.5~~ 3115.8.4.

~~3115.8.4~~ 3115.8.3 Detailed design procedure. A structural analysis meeting the requirements ofChapter 16, the applicable material chapters, and Section 3115.8.3.1 through 3115.8.3.4.2 ~~this section~~ shall be provided to the *building official* to demonstrate the structural adequacy of the intermodal shipping containers.

Exception: Intermodal shipping containers designed in accordance with Section 3115.8.4 ~~3115.8.5.~~

~~3115.8.4.1~~ 3115.8.3.1 Steel Material properties. Structural material properties for existing *intermodal shipping container* steel components shall be established by Section 2202.~~material testing where the steel grade and composition cannot be identified by the manufacturer's designation as to manufacture and mill test.~~

~~3115.8.4.2~~ 3115.8.3.2 Seismic design parameters. The seismic force-resisting system shall be designed and detailed in accordance with one of the following:

1. Where all or portions of the ~~corrugated~~ profiled steel panel container sides are considered to be the vertical seismic force-resisting system, design and detailing shall be in accordance with AISI S100 ~~the~~ and ASCE 7, Table 12.2-1 requirements for ~~light-frame bearing wall systems with shear panels of all other materials.~~ steel systems not specifically detailed for for seismic resistance, excluding cantilever column systems.
2. Where portions of the ~~corrugated~~ profiled steel panel container sides are retained, but are not considered to be the vertical seismic force-resisting system, an independent seismic force-resisting system shall be selected, designed and detailed in accordance with ASCE 7, Table 12.2-1.
3. Where portions of the ~~corrugated~~ profiled steel panel container sides are retained and integrated into a vertical seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

~~3115.8.4.3~~ 3115.8.3.3 Allowable shear value. The allowable shear values for the*intermodal shipping container* ~~corrugated~~ profiled steel ~~sheet~~ panel side walls and end walls shall be demonstrated by testing and analysis accordance with Section 104.11. Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

Exceptions: The allowable shear values shall be obtained from Section 3115.8.4.3 where the seismic design category is A, and the following two items are met:

1. The *intermodal shipping container* top and bottom rails, corner fittings, and columns or any portion thereof are not notched, cut, or removed in any manner.
2. The *intermodal shipping container* is erected in a level and horizontal position with the floor located at the bottom.

Add new text as follows:

3115.8.3.4 Tested structural components.
Where they are not altered, the structural components identified in Section 3115.8.3.4.1 and 3115.8.3.4.2 can be used with the load combinations of Section 1605.3 based on the testing performed during the *intermodal shipping container* certification process. This certification shall have been verified by the data plate and markings in Section 3115.3.

The components names are labeled in Figure 3115.8.3.4.

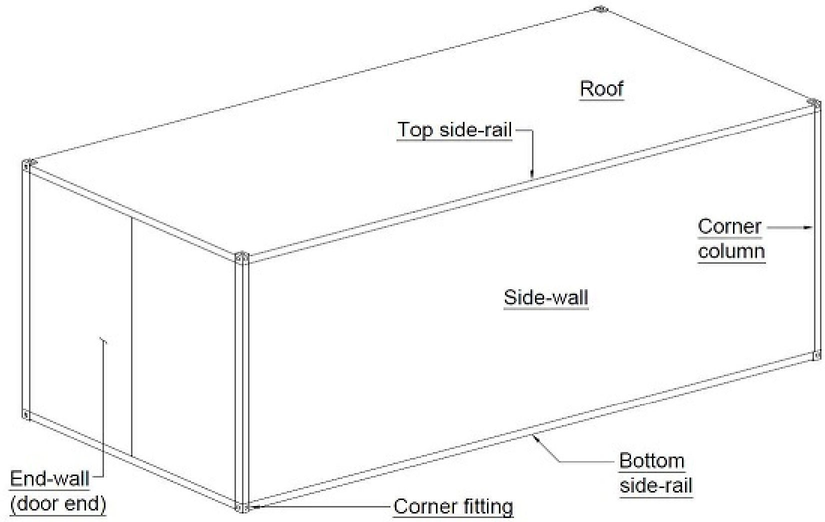

FIGURE 3115.8.3.4 CONTAINER ELEMENT IDENTIFICATION

3115.8.3.4.1 Floors.

Where the floor is not structurally altered from its state as a shipping container, the allowable superimposed out-of-plane design load for the floor is permitted to be calculated in accordance with Equation 31-1. The design load of the bottom rails to span from corner to corner shall not be obtained using similar methods. The ability for the floors and bottom rails to sustain these out-of-plane loads in combination with other forces shall be determined by the structural analysis.

Exceptions:

1. The capacity of the shipping container bottom side rails, in their original vertical orientation, to span from corner to corner under gravity loads can be obtained from Equation 31-2, where the floor, walls directly above, top rail directly above, corner columns, and roof are not structurally altered from their state as a shipping container.
2. The capacity of the shipping container bottom end rails, in their original vertical orientation, to span from corner to corner under gravity loads can be obtained from Equation 31-3, where the floor, walls directly above, top rail directly above, corner columns, and roof are not structurally altered from their state as a shipping container.

$q_a = 0.8(R-T)/(LW)$ **(Equation 31-1)**

where:

q_a = Allowable superimposed design load using ASD load combinations, in lb/ft^2 (kg/m^2)

R = Maximum gross mass, as marked on the container and its CSC Safety Approval Plate, in lbs (kgs)

T = Tare mass, as marked on the container and its CSC Safety Approval Plate, in lbs (kgs)

L = Interior floor length dimension of the shipping container, in feet (meters)

W = interior floor width dimension of the shipping container, in feet (meters)

$w_a = 0.8(R-T)/W$ **(Equation 31-2)**

where:

w_a = Allowable superimposed design load using ASD load combinations, in lb/ft (kg/m)

The other variables are defined as in Equation 31-1.

$w_a = 0.8(R-T)/L$ **(Equation 31-3)**

where:

The variables are defined as in Equation 31-1 and 31-2.

3115.8.3.4.2 Side-wall and end-wall.

Where the side-wall is not structurally altered from its state as a shipping container, the allowable out-of-plane design load for the side-wall is permitted to be calculated in accordance with Equation 31-4. The ability for the side-wall to sustain these out-of-plane loads in combination with other forces shall be determined by the structural analysis.

Where the end-wall is not structurally altered from its state as a shipping container, the allowable out-of-plane design load for the end-wall is permitted to be calculated in accordance with Equation 31-5. The ability for the end-wall to sustain these out-of-plane loads in combination with other forces shall be determined by the structural analysis.

q_a =0.24(R-T)/HL **(Equation 31-4)**

where:

H = The interior height dimension of the wall, in feet (meters)

The other variables are defined as in equation 31-1.

q_a = 0.16(R-T)/HW **(Equation 31-5)**

where:

The variables are defined as in Equation 31-1 and 31-4.

Revise as follows:

3115.8.4 **~~3115.8.5~~ Simplified structural design of single-unit containers.** Single-unit*intermodal shipping containers* conforming to the limitations of Section 3115.8.5.1 shall be permitted to be designed in accordance with the simplified structural design provisions of Section 3115.8.5.2.

3115.8.4.1 **~~3115.8.5.1~~ Limitations.** The use of Section 3115.8.5 is subject to the following limitations:

1. The *intermodal shipping container* shall be a single-unit, stand-alone unit supported on a foundation and shall not be in contact with or supporting any other shipping container or other structure.
2. The *intermodal shipping container* top and bottom rails, corner castings, and columns or any portion thereof shall not be notched, cut, or removed in any manner.
3. The *intermodal shipping container* shall be erected in a level and horizontal position with the floor located at the bottom.
4. The *intermodal shipping container* shall be located in Seismic Design Category A, B, C or D.

~~3115.8.5.2~~ 3115.8.4.2 Simplified structural design. Where permitted by Section~~3115.8.5.1~~ 3115.8.4.1, single-unit, stand-alone intermodal shipping containers shall be designed using the following assumptions for the ~~corrugated~~ profiled steel panel shear walls:

1. The appropriate detailing requirements contained in Chapters 16 through 23.
2. Response modification coefficient, R = 2.
3. Overstrength factor, Ω_0 = 2.5.
4. Deflection amplification factor, C_d = 2.
5. Limits on structural height, h_n = 9.5 feet (2900 mm).

~~3115.8.5.3~~ 3115.8.4.3 Allowable shear. The allowable shear for the ~~corrugated~~ profiled steel panel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section ~~3115.8.5.2~~ 3115.8.4.2 shall be in accordance with Table ~~3115.8.5.3~~ 3115.8.4.3, provided that all of the following conditions are met:

1. The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure ~~3115.8.5.3(1)~~ 3115.8.4.3(1).
2. Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure ~~3115.8.5.3(2)~~ 3115.8.4.3(2) .
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure ~~3115.8.5.3(3)~~ 3115.8.4.3(3).
4. Where openings are made in container walls, floors or roofs, for doors, windows and other openings:

4.1 The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.

4.2 The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.

5. A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm^2) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing *intermodal shipping container* vents shall not be considered a penetration, as shown in Figure ~~3115.8.5.3(4)~~ 3115.8.4.3(4).
6. End wall doors designated as part of the lateral force-resisting system shall be welded closed.

TABLE ~~3115.8.5.3~~ 3115.8.4.3 ALLOWABLE SHEAR VALUES FOR INTERMODAL SHIPPING CONTAINER ~~CORRUGATED~~ PROFILED STEEL PANEL WALLS FOR WIND OR SEISMIC LOADING

~~CONTAINER DESIGNATION[b]~~	CONTAINER DIMENSION (nominal length)	~~CONTAINER DIMENSION (nominal height)~~	ALLOWABLE SHEAR VALUES (PLF)~~[a, e]~~	
			Side Wall	End Wall
~~1EEE~~	45 feet	~~9.5 feet~~	75	843
~~1EE~~		~~8.5 feet~~		
~~1AAA~~	40 feet	~~9.5 feet~~	84	
~~1AA~~		~~8.5 feet~~		
~~1A~~		~~8.0 feet~~		
~~1AX~~		~~< 8.0 feet~~		
~~1BBB~~	30 feet	~~9.5 feet~~	112	
~~1BB~~		~~8.5 feet~~		
~~1B~~		~~8.0 feet~~		
~~1BX~~		~~< 8.0 feet~~		
~~1CC~~	20 feet	~~8.5 feet~~	168	
~~1C~~		~~8.0 feet~~		
~~1CX~~		~~< 8.0 feet~~		
~~1D~~	~~10 feet~~	~~8.0 feet~~	~~337~~	
~~1DX~~		~~< 8.0 feet~~		

For SI: 1 foot = 304.8 mm.

~~a. The allowable strength shear for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.~~

~~b. Container designation type is derived from ISO 668.~~

~~c.~~ a. Limitations of Section 3115.8.4.1 ~~3115.8.5.1~~ shall apply.

Delete without substitution:

ISO

International Organization for Standardization
Chemin de Blandonnet 8 CP 401 1214 Vernier
Geneva, Switzerland

~~**ISO 668—2013**~~	~~Series 1 Freight Containers—Classifications, Dimensions and Ratings~~
~~ISO 1496-1—2013~~	~~Series 1 Freight Containers—Specification and Testing - Part 1: General Cargo Containers for General Purposes~~
~~ISO 6346—1995~~	~~Freight Containers—Code, Identification and Marking with Amendment 3 - 2012~~

Reason: Intermodal international shipping containers are primarily governed by two standards that would affect portions of how they behave structurally: The International Maritime Organization's (IMO) International Convention for Safe Containers (CSC) of 1972, amended in 1993, and ISO 1496-1. ISO 6346 contains the marking requirements for containers that meet various ISO standards, including 1496-1.
Re 3115.3: Both CSC and ISO 6346 require different physical identifiable information to be present on the container. The CSC requires the data plate, and ISO 6346 requires much larger markings, that are usually painted on. Both need to be present in order to verify both CSC and 1496-1 have been met.

Re 3115.3.1: This section is adjusted to remove the reference to ISO 6346 for the data plate, which was both incorrect and unnecessary, as the user of the code does not need to actually read CSC or ISO 6346 to verify the items written.

Re 3115.3.2: This section is added such that the requirements that ISO 6346 requires be marked on the containers are verified, and have the correct type code, such that conformance to ISO 1496-1 can be determined by these markings.

Re 3115.8: The reference to ISO 1496-1 is removed, as the user of the code does not need to read ISO 1496-1, as it does not contain information that is used for design in this code. The user is informed that the markings that were required in 3115.3.2 verify that international standards have been met. The inclusion of the material specific chapters, is that many of the components of shipping containers cannot be structurally verified purely by the tests that have been conducted as part of the international certification process, so they would need to be analyzed in accordance with the steel and wood chapters. The final statement is in recognition that Section 3115 is modifying the provisions found elsewhere in the code that, unless specifically stated, would still apply.

Re 3115.8.1: Clarifying that containers can be stacked

Re 3115.8.2: The statement on welds could have multiple interpretations, and doesn't seem to add any value with any of them. It would require welds to be held to some vague and arbitrary standard of equality to existing welds. If this section was intended for weld replacements, or weld fixes, it should be modified as such, but its purpose would still seem dubious. It could also be interpreted that every weld taking place on a container would need to meet this vague equality requirement, which once again doesn't seem to have a purpose.

Re 3115.8.4: The inclusion of the material specific chapters, is that many of the components of shipping containers cannot be structurally verified purely by the tests that have been conducted as part of the international certification process, so they would need to be analyzed in accordance with the steel and wood chapters.

Re 3115.8.4.1: The requirements of Section 2202 already have provisions for identifying unknown steel, and so they should not be recreated or differently stated.

Re 3115.8.4.2: The sides of containers do not meet the definition for *light-frame construction* as used in the IBC or in the AISI standards, so they should not be using light-frame construction methods.They are cold-formed steel profiled panels, as such AISI S100, which invokes AISI S310 for profiled steel panels being used as diaphragms is therefore the correct reference. All of their components are steel, as required by the definition of intermodal shipping containers, so its clearly follows that they are steel systems which have not been detailed for seismic resistance. This would be in line with AISI S310 design methods as invoked by AISI S100.

Re 3115.8.4.3: A name change to be consistent with the AISI standards governing profiled steel deck diaphragm panels, AISI S100 and AISI S310. The exception proposed follows the logic used to justify the floor tested components, as the static racking strength in the longitudinal and transverse directions has been verified by tests in accordance with ISO 1496-1.

Re 3115.8.4.4: As the containers have already undergone certification that involves structural testing they can be trusted for their structural capacity in certain specific ways. The challenge comes with cutting parts out of them, or leaving their doors open, as is done when converting them into buildings. Therefore, the components that can be trusted must only be done so under certain circumstances, as laid out in this section. With some clever deductive reasoning the provisions of this section could potentially be expanded.

Re 3115.8.4.4.1: One of the easiest components of the certified containers to trust based on their testing are the floor members that typically span from side-wall to side-wall. These floors have had two primary tests conducted on them as required by both CSC and ISO 1496-1: Being loaded such that the total mass of the container and its contents reaches two times the maximum gross mass marked on the containers, and having a 16 kip 2 wheeled vehicle driven around inside of them all while only supported from their corner fittings, that project further down than their side rails. As such, equation 31-1 recognizes the tested capacity of the floors, with factors of safety. The value that the floor is required to hold during its tests is 2(R-T). As such the allowance for 0.8(R-T) is using a factor of safety of 2.5, as used for tested components in 1709.3.1. The international standard for serviceability that these containers meet is: no permanent deformation that would render them incapable of being used for their designed purpose, as such factor of safety of 2.5 should suffice for maintaining serviceability under live loading scenarios, even though the containers have never had proper serviceability limit states in accordance with the IBC. The allowance for the bottom side rails to span is similar to the floor members themselves, however the bottom side rails are braced against buckling by the adjacent floors and walls above, so the adjacent members become critical components. The bottom side rails are also aided to a very large extent in their spanning capabilities by acting as deep beams with the walls and top rail above. Therefore, their capacity can only be relied on in the cases where all of their bracing and composite action bestowing components have remained in place.

Re 3115.8.4.4.2: Similar to the floors, the walls of the containers have been tested under the international standards that the containers are certified to. The side walls are tested under a load equal to 0.6 times the mass of the net contents multiplied by the acceleration due to gravity. This is further reduced here by a factor of safety of 2.5.
The end walls are tested under a load equal to 0.4 times the mass of the net contents multiplied by the acceleration due to gravity. This is further reduced here by a factor of safety of 2.5.

Re 3115.8.5.2 and 3115.8.5.3: Simply a name change to be consistent with the AISI standards governing profiled steel deck diaphragm panels, AISI S100 and AISI S310.

Re Table 3115.8.5.3: Containers that are 10 feet long, with designations of 1D or 1DX have not been tested to transverse or longitudinal racking force resistance, in accordance with ISO 1496-1, so they cannot be trusted to have this strength, and are removed from the table. The container designation and container height provide no useful information, and are also removed.

Re ISO Standard 668, 1496-1, and 6346: The code does not require the user to go to these reference standards in order to design a building or structure, as such their inclusion as referenced standards is inconsistent with how the other reference standards are used, where they provide design information to be used in conjunction with the IBC.

Bibliography: CSC (1996), *International Convention for Safe Containers,* CSC, International Maritime Organization, 4 Albert Embanklment, London SE1 7SR, United Kingdom of Great Britain and Northern Ireland.
ISO (2013), *Series 1 freight containers - Specification and testing - Part 1: General cargo containers for general purposes,* ISO 1496-1, International Organization for Standardization, Chemin de Blandonnet 8, CP 401-1214 Vernier, Geneva, Switzerland

ISO (1995), *Freight containers - Coding, identification and marking,* ISO 6346, International Organization for Standardization, Chemin de Blandonnet 8, CP 401-1214 Vernier, Geneva, Switzerland

AISI (2020), *North American Specification for the Design of Cold-Formed Steel Structural Members,* AISI S100-16 w/S2-20, American Iron and Steel Institute, 25 Massachusettes Avenue, NW, Suite 800, Washington, DC 20001

AISI (2020), *North American Specification for the Design of Profiled Steel Diaphragm Panels,* AISI S310-20, American Iron and Steel Institute, 25 Massachusettes Avenue, NW, Suite 800, Washington, DC 20001

Cost Impact: The code change proposal will decrease the cost of construction
By recognizing some of the tests that containers have already been certified to under international standards, some of the structural components do not need to be verified by material testing or structural investigation.

G196-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the proposal has inconsistencies. The committee encouraged the proponent to review with and propose future updates. (Vote: 14-0)

G196-21

Individual Consideration Agenda

Public Comment 1:

IBC: 3115.8.1, 3115.8.1.1, 3115.8.1.2 (New)

Proponents: John-Jozef Proczka, representing self (john-jozef.proczka@phoenix.gov); Truong Huynh, City of Long Beach, representing ICC Los Angeles Basin Chapter (truong.huynh@longbeach.gov); Jon-Paul Cardin, representing American Iron and Steel Institute (jcardin@steel.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

3115.8.1 Foundations <u>and supports</u> . *Intermodal shipping containers* repurposed for use as a permanent building or structure shall be supported on foundations or other supporting structures designed and constructed in accordance with Chapters 16 through 23.

3115.8.1.1 Anchorage . *Intermodal shipping containers* shall be anchored to foundations or other supporting structures as necessary to provide a continuous load path for all applicable design and environmental *loads* in accordance with Chapter 16.

<u>**3115.8.1.2 Stacking .** *Intermodal shipping containers* used to support stacked units shall comply with Section 3115.8.4.</u>

Commenter's Reason: The original intent was not to prohibit stacking. Stacking of intermodal shipping containers was never clearly addressed in the 2021 IBC. This proposal clarifies that stacking is allowed and which section is required for the design of stacked containers.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Simply clarification that stacking is allowed under the detailed structural design procedure

G198-21

Proposed Change as Submitted

Proponents: Julie Furr, Rimkus Consulting Group, Inc., representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (jfurr@rimkus.com); Kelly Cobeen, Wiss Janney Elstner Associates, Inc., representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (kcobeen@wje.com); Michael Mahoney, Federal Emergency Management Agency, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov); Ronald LaPlante, representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (ron.laplante@dgs.ca.gov)

2021 International Building Code

Revise as follows:

3115.8.2 Welds. The strength of new ~~New~~ welds and connections shall be no less ~~equal to or greater~~ than the strength provided by the original connections. All new welds and connections shall be designed and constructed in accordance with Chapters 16, 17, and 22.

3115.8.4 Detailed design procedure. A structural analysis meeting the requirements of this section shall be provided to the*building official* to demonstrate the structural adequacy of the intermodal shipping containers.

Exception: Structures using an intermodal ~~Intermodal~~ shipping container ~~containers~~ designed in accordance with Section 3115.8.5.

3115.8.4.2 Seismic design parameters. The seismic force-resisting system shall be designed and detailed in accordance with ASCE 7 and one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the ASCE 7, Table 12.2-1 requirements for light-frame bearing-wall systems with shear panels of all other materials. ASCE 7 seismic provision exceptions, related to light-frame construction, shall not apply to the design of structures using intermodal shipping containers. The allowable shear values shall be determined in accordance with Section 3115.8.4.3.
2. Where all or portions of the corrugated steel container sides are ~~retained, but are~~ not considered to be part of the seismic force-resisting system, an independent seismic force-resisting system shall be selected~~, designed~~ and detailed in accordance with ASCE 7, Table 12.2-1.
3. Where all or portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

3115.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section 3115.8.5.2 shall be in accordance with Table 3115.8.5.3, provided that all of the following conditions are met:

1. The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure 3115.8.5.3(1).
2. Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3115.8.5.3(2).
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3115.8.5.3(3). The existing door interlocking mechanism shall not be considered as a component of the required load path.
4. Where openings are made in container walls, floors or roofs, for doors, windows and other openings:

   4.1 The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.

   4.2 The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.
5. A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm^2) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing *intermodal shipping container* vents shall not be considered a penetration, as shown in Figure 3115.8.5.3(4).
6. End wall doors designated as part of the lateral force-resisting system shall be welded closed~~.~~ around the full perimeter of the door panels.

Reason: Section 3115.8.2 is not clear as to what welds and connections this applies to, nor does it clarify what is meant by "equal to or greater than" (strength, size, or other). This change clarifies that it is the "strength" of the welds and connections that should be assessed for equivalency. The proposed language clarifies that new welds shall comply with minimum design standards as already specified elsewhere in the IBC.
Section 3115.8.4.2 is modified to include direct reference to ASCE 7 to capture the seismic design provisions, such as combination of seismic force-

resisting systems, regardless of which of the 3 design items are selected. The first proposed change to Item 1 is to not permit simplified and relaxed requirements in ASCE 7, intended specifically for light-frame construction, to be applied to steel shipping containers since these containers may not exhibit similar seismic response characteristics as light-frame construction. The second proposed change to Item 1 is to tie the system seismic parameters to the system capacity by direct reference to Section 3115.8.4.3. This is also intended to further clarify that the allowable shear values contained in the simplified procedure shown in Table 3115.8.5.3 are not intended to be permitted with the detailed design procedure. The proposed changes in Items 2 and 3 are editorial to be consistent with Item 1.

Section 3115.8.5.3 is modified to ensure that the allowable shear in Table 3115.8.5.3 for the end wall with doors is based on an adequate load path between the door panels and boundary elements, as determined by established design theory. The perimeter welds of the end door panels are to be designed per Section 3115.8.2 and may be continuous or intermittent as required by design. These changes further clarify that the original mechanical locking mechanisms shall not be relied upon to function as a lateral force-resisting system component of the repurposed shipping container.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
These changes are editorial in nature and intended to clarify the design requirements.

G198-21

Public Hearing Results

Committee Action: **As Modified**

Committee Modification:

3115.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section 3115.8.5.2 shall be in accordance with Table 3115.8.5.3, provided that all of the following conditions are met:

1. The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure 3115.8.5.3(1).
2. Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3115.8.5.3(2).
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3115.8.5.3(3). The existing door interlocking mechanism shall not be considered as a component of the required load path.
4. Where openings are made in container walls, floors or roofs, for doors, windows and other openings:

   4.1 The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.

   4.2 The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.

5. A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm^2) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing *intermodal shipping container* vents shall not be considered a penetration, as shown in Figure 3115.8.5.3(4).
6. End wall doors designated as part of the lateral force-resisting system shall be <u>intermittently</u> welded closed around the full perimeter of the door panels.

Committee Reason: The proposal was approved as modified by Furr-2 based on the committee actions on G197. The proposal, and modification, coordinate and clarify the welding, shear and seismic provisions. The proposal adds a pointer to ASCE 7 seismic provisions. The modification Furr-2 clarifies intermediate welding for Section 3115.8.5.3 item #6. (Vote: 14-0)

G198-21

Individual Consideration Agenda

Public Comment 1:

IBC: 3115.8.4.2, 3115.8.4.1, 3115.8.4.3

Proponents: Julie Furr, representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (jfurr@rimkus.com); Truong Huynh, City of Long Beach, representing ICC Los Angeles Basin Chapter (truong.huynh@longbeach.gov); Jon-Paul Cardin, representing American Iron and Steel Institute (jcardin@steel.org); John-Jozef Proczka, representing self (john-jozef.proczka@phoenix.gov); Michael Mahoney, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

3115.8.4.2 Seismic design parameters . The seismic force-resisting system shall be designed and detailed in accordance with ASCE 7 and one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with AISI S100 and,~~the~~ ASCE 7, Table 12.2-1 requirements for steel systems not specifically detailed for seismic resistance, excluding cantilever column systems.~~light-frame bearing-wall systems with shear panels of all other materials. ASCE 7 seismic provision exceptions, related to light-frame construction, shall not apply to the design of structures using intermodal shipping containers. The allowable shear values shall be determined in accordance with Section 3115.8.4.3.~~
2. Where all or portions of the corrugated steel container sides are not considered to be part of the seismic force-resisting system, an independent seismic force-resisting system shall be selected and detailed in accordance with ASCE 7, Table 12.2-1.
3. Where all or portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

3115.8.4.1 Material properties . Structural material properties for existing *intermodal shipping container* steel components shall be established by Section 2202. ~~material testing where the steel grade and composition cannot be identified by the manufacturer's designation as to manufacture and mill test~~.

3115.8.4.3 Allowable shear value . The allowable shear values for the *intermodal shipping container* corrugated steel sheet panel side walls and end walls shall be determined in accordance with the design approach selected in Section 3115.8.4.2. ~~demonstrated by testing and analysis accordance with Section 104.11.~~ Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

Commenter's Reason: This modification addresses two issues that have posed barriers to effective use of the Detailed Design Procedure, pertaining to how users must determine allowable shear values. This change was developed in collaboration with industry representatives and multiple interested parties.
As currently written:

1. Users must determine allowable shear capacities of the profiled steel panels by testing.
2. Users must comply with ASCE 7 seismic provisions for light-frame bearing wall systems, which are only applicable to light-frame stud and wood sheathing/gypsum board shear wall assemblies.

As modified:

1. Users are provided the option to use established industry standard methodologies to determine allowable shear capacities, requiring testing only if those methodologies are not applicable.
2. Users are directed to AISI S100, which is directly applicable to profiled steel panel shear wall assemblies.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
This change reduces mandatory material testing requirements under the detailed design procedure.

Public Comment# 2267

G199-21 Part I

Proposed Change as Submitted

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Building Code

SECTION 3301
GENERAL

Revise as follows:

3301.1 Scope. The provisions of this chapter shall govern safety during construction and the protection of adjacent public and private properties. Fire safety during construction shall also comply with the applicable provisions of Chapter 33 of the International Fire Code.

3301.2
Storage and placement of construction equipment and materials
. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

[BS]
3301.3 ~~3301.2.1~~
Roof ~~Structural and construction~~ loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment*loads* that will be encountered during installation of the system.

3301.4 ~~3302.1~~
Maintenance of exits, existing structural elements, fire protection devices and sanitary safeguards~~Alterations, repairs and additions~~.
Required *exits*, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during *alterations*, *repairs* or *additions* to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required where the existing building is not occupied.

3301.5 ~~3302.2~~
Removal of waste materials~~Manner of removal~~. Waste materials shall be removed in a manner that prevents injury or damage to persons, adjoining properties and public rights-of-way.

Delete without substitution:

~~**3302.3 Fire safety during construction.** Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code.~~

Revise as follows:

SECTION 3302
OWNER'S RESPONSIBILITY FOR FIRE PROTECTION~~CONSTRUCTION SAFEGUARDS~~

Add new text as follows:

3302.1 Site Safety Plan.
The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of an approved, written site safety plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration or demolition work. The plan shall be submitted and approved before a building permit is issued, Any changes to the plan shall address the requirements of this chapter and other applicable portions of the International Fire Code, the duties of staff, and staff training requirements. The plan shall be submitted for approval in accordance with the *International Fire Code.*

3302.1.1 Components of site safety plans.
Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where approved, and signage locations in accordance with the *International Fire Code.*
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
11. Provisions for site security and, where required, for a fire watch.
12. Changes that affect this plan.
13. Other site-specific information required by the *International Fire Code*.

3302.2 Site safety director.
The owner shall designate a person to be the site safety director. The site safety director shall be responsible for ensuring compliance with the site safety plan. The site safety director shall have the authority to enforce the provisions of this chapter and other provisions as necessary to secure the intent of this chapter. Where guard service is provided in accordance with the International Fire Code, the site safety director shall be responsible for the guard service.

3302.3 Daily fire safety inspection.
The site safety director shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on-site until a certificate of occupancy has been issued. Documentation shall be immediately available on-site inspection and review.

1. Any contractors entering the site to perform hot work each day have been instructed in the hot work safety requirements in the *International Fire Code*, and hot work is performed only in areas approved by the site safety director.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. Flammable liquids and other hazardous materials are stored in locations that have been approved by the site safety director when not involved in work that is being performed.
6. Fire apparatus access roads required by the *International Fire Code* are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet (6096 mm).
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3311.
10. Portable fire extinguishers are available in locations required by Sections 3309 and for roofing operations in accordance with the *International Fire Code.*
11. Where a fire watch is required, fire watch records complying with the International Fire Code are up-to-date.

3302.3.1 Violations.
Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 114.1 and shall result in the issuance of a notice of violation to the site safety director in accordance with Section 114.2. Upon the third offense, the Building Official is authorized to issue a stop work order in accordance with Section 115, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the Building Official.

2021 International Existing Building Code

SECTION 1501

GENERAL

Revise as follows:

[BG] 1501.1 Scope. The provisions of this chapter shall govern safety during construction and the protection of adjacent public and private properties. <u>Fire safety during construction shall also comply with the applicable provisions of Chapter 33 of the International Fire Code</u>

[BG] 1501.2 Storage and placement <u>of construction equipment and materials</u>. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

[BS] ~~1501.2.1~~ <u>1501.3</u> ~~Structural and construction~~ <u>Roof</u> loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

[BG] ~~1501.3~~ <u>1501.4</u> ~~Alterations, repairs and additions~~ <u>Maintenance of exit s, existing structural elements, fire protection devices and sanitary safeguards</u>. Required exits, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during*alterations*, *repairs* or *additions* to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required where the *existing building* is not occupied.

[BG] ~~1501.4~~ <u>1501.5</u> <u>Removal of waste materials</u> ~~Manner of removal~~. Waste materials shall be removed in a manner that prevents injury or damage to persons, adjoining properties and public rights-of-way.

Delete without substitution:

~~**[BG] 1501.5 Fire safety during construction.** Fire safety during construction shall comply with the applicable requirements of the *International Building Code* and the applicable provisions of Chapter 33 of the International Fire Code.~~

Add new text as follows:

<u>SECTION 1502</u>
<u>OWNER'S RESPONSIBILITY FOR FIRE PROTECTION</u>

<u>1502.1</u> <u>Site Saf et y Plan</u>.
<u>The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of an approved, written site safety plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration or demolition work. The plan shall be submitted and approved before a building permit is issued, Any changes to the plan shall address the requirements of this chapter and other applicable portions of the International Fire Code, the duties of staff, and staff training requirements. The plan shall be submitted for approval in accordance with the International Fire Code.</u>

<u>1502.1.1</u> <u>Components of site safety plans</u>.
<u>Site safety plans shall include the following as applicable:</u>

1. <u>Name and contact information of site safety director.</u>
2. <u>Documentation of the training of the site safety director and fire watch personnel.</u>
3. <u>Procedures for reporting emergencies.</u>
4. <u>Fire department vehicle access routes.</u>
5. <u>Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.</u>
6. <u>Smoking and cooking policies, designated areas to be used where approved, and signage locations in accordance with the International Fire Code.</u>
7. <u>Location and safety considerations for temporary heating equipment.</u>
8. <u>Hot work permit plan.</u>
9. <u>Plans for control of combustible waste material.</u>
10. <u>Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.</u>
11. <u>Provisions for site security and, where required, for a fire watch.</u>
12. <u>Changes that affect this plan.</u>
13. <u>Other site-specific information required by the International Fire Code.</u>

1502.2 Site safety director.
The owner shall designate a person to be the site safety director. The site safety director shall be responsible for ensuring compliance with the site safety plan. The site safety director shall have the authority to enforce the provisions of this chapter and other provisions as necessary to secure the intent of this chapter. Where guard service is provided in accordance with the International Fire Code, the site safety director shall be responsible for the guard service.

1502.3 Daily fire safety inspect ion.
The site safety director shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on-site until a certificate of occupancy has been issued. Documentation shall be immediately available on-site inspection and review.

1. Any contractors entering the site to perform hot work each day have been instructed in the hot work safety requirements in the International Fire Code, and hot work is performed only in areas approved by the site safety director.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. Flammable liquids and other hazardous materials are stored in locations that have been approved by the site safety director when not involved in work that is being performed.
6. Fire apparatus access roads required by the International Fire Code are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet (6096 mm).
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 1506.
10. Portable fire extinguishers are available in locations required by Sections 1504 and for roofing operations in accordance with the International Fire Code.
11. Where a fire watch is required, fire watch records complying with the International Fire Code are up-to-date.

1502.3.1 Violations.
Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 114.1 and shall result in the issuance of a notice of violation to the site safety director in accordance with Section 114.2. Upon the third offense, the Building Official is authorized to issue a stop work order in accordance with Section 115, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the Building Official.

SECTION 1503
SANITARY

Revise as follows:

[BG] ~~1501.7~~ 1503.1 Facilities required. Sanitary facilities shall be provided during construction or demolition activities in accordance with the *International Plumbing Code* .

Add new text as follows:

SECTION 1504 PROTECTION OF PEDESTRIANS.
(Renumber 1501.6 through 1501.6.7 as 1504 subsections)

Reason: Correlation with IFC for provisions for construction site safety that a building inspector can reasonably verify and enforce while onsite doing other scheduled inspections. Clearly, building inspectors are plenty busy with scheduled inspections, and we are not looking to bog them down with additional work touring the site for safety violations. But, having them verify that required owner/manager site safety inspections are being documented is a minimal step to improving construction site safety. Also, IFC reference is moved to the scope for improved visibility and provisions have been added to clarify that a fire watch, where required, and associated records should be part of the safety play and records inspection.
It is recommended that the new section be scoped to the Fire Code for maintenance.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Provisions being modified in the IBC are already in the IFC. Changes are for clarity and coordination between the codes.

G199-21 Part I

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: The proposal was approved as submitted as the proposal is a good coordinated change and providing a link to the Chapter 33 of the International Fire Code in the scoping statement of Section 3301.1. (Vote: 12-2)

G199-21 Part I

Individual Consideration Agenda

Public Comment 1:

IEBC: 1502.3.1; IBC: 3302.3.1

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com) requests As Modified by Public Comment

Modify as follows:

2021 International Existing Building Code

~~**1502.3.1 Violations .** Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 114.1 and shall result in the issuance of a notice of violation to the site safety director in accordance with Section 114.2. Upon the third offense, the Building Official is authorized to issue a stop work order in accordance with Section 115, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the Building Official.~~

2021 International Building Code

~~**3302.3.1 Violations .** Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 114.1 and shall result in the issuance of a notice of violation to the site safety director in accordance with Section 114.2. Upon the third offense, the Building Official is authorized to issue a stop work order in accordance with Section 115, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the Building Official.~~

Commenter's Reason: It is exceedingly bad practice to put administrative penalties in technical sections of the code. This would create a precedent where any section of the code could have requirements for fines, citations, castigations, public floggings, etc. within the technical content. Note that this requirement also prevents the building official from issuing a stop work order until the 3rd violation, which limits the authority the code official is already granted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This pc does not affect construction, but it could save some AHJ $.

Public Comment# 2489

NOTE: G199-21 PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

G199-21 Part II

Proposed Change as Submitted

Proponents: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

2021 International Fire Code

Revise as follows:

3303.1.1 Components of site safety plans. *Site safety plans* shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with Section 3305.8.
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other hazardous materials.
11. Provisions for site security <u>and, where required, for a fire watch</u>.
12. Changes that affect this plan.
13. Other site-specific information required by the *fire code official*.

3303.3 Daily fire safety inspection. The site safety director shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on-site until a certificate of occupancy has been issued. Documentation shall be immediately available on-site for presentation to the*fire code official* upon request.

1. Any contractors entering the site to perform hot work each day have been instructed in the hot work safety requirements in Chapter 35, and hot work is performed only in areas *approved* by the site safety director.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. *Flammable liquids* and other hazardous materials are stored in locations that have been *approved* by the site safety director when not involved in work that is being performed.
6. Fire apparatus access roads required by Section 3311 are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet (6096 mm).
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3313.1.
10. Portable fire extinguishers are available in locations required by Sections 3316 and 3318.3.
11. <u>Where a fire watch is required in accordance with Section 3305.5, fire watch records required by that section are up-to-date.</u>

Reason: Correlation with IFC for provisions for construction site safety that a building inspector can reasonably verify and enforce while onsite

doing other scheduled inspections. Clearly, building inspectors are plenty busy with scheduled inspections, and we are not looking to bog them down with additional work touring the site for safety violations. But, having them verify that required owner/manager site safety inspections are being documented is a minimal step to improving construction site safety. Also, IFC reference is moved to the scope for improved visibility and provisions have been added to clarify that a fire watch, where required, and associated records should be part of the safety play and records inspection.
It is recommended that the new section be scoped to the Fire Code for maintenance.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Provisions being modified in the IBC are already in the IFC. Changes are for clarity and coordination between the codes.

G199-21 Part II

Public Hearing Results

Committee Action: **As Submitted**

Committee Reason: This proposal was approved based upon the reason statement. It was suggested that perhaps the phrase "up-to-date" could be revised in Section 3303.3. (Vote: 13-0)

G199-21 Part II

G200-21

Proposed Change as Submitted

Proponents: Homer Maiel, PE, CBO, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay) (hmaiel@gmail.com)

THIS CODE CHANGE WILL BE HEARD BY THE MEANS OF EGRESS CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

Revise as follows:

3310.1 Stairway required. ~~Where building construction exceeds 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access, a temporary or permanent *stairway* shall be provided~~. As construction progresses, ~~such *stairway* shall be extended to within one~~ all stairways approved per plan shall be extended to the floor of the highest point of construction having secured decking or flooring. A temporary stairway shall be provided and approved for each permitted stairway that is not completed in construction.

2021 International Fire Code

Revise as follows:

[BE] 3312.1 Stairways required. ~~Where building construction exceeds 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access, a temporary or permanent *stairway* shall be provided.~~ As construction progresses, ~~such *stairway* shall be extended to within one~~ all stairways approved per plan shall be extended to the floor of the highest point of construction having secured decking or flooring. A temporary stairway shall be provided and approved for each permitted stairway that is not completed in construction.

2021 International Existing Building Code

Revise as follows:

[BE] 1505.1 Stairways required. ~~Where building construction exceeds 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access, a temporary or permanent stairway shall be provided.~~ As construction progresses, ~~such stairway shall be extended to within one~~ all stairways approved per plan shall be extended to the floor of the highest point of construction having secured decking or flooring. A temporary stairway shall be provided and approved for each permitted stairway that is not completed in construction.

Reason: As many trade workers, building inspectors, superintendent's, engineers all navigate these floors while they are under construction, there are notably many stairways that are not roughed in for use. Many of them remain incomplete until much further into the advanced stages of the project. The Axis Appartment fire that happend in Houston Texas On March 25, 2014 (link is provided here) shows how a construction worker jumps from one balcony to balcony below to save his life. A stairway in this case would have made the rescue much easier.
https://www.khou.com/article/news/investigations/video-shows-new-perspective-of-dramatic-fire-rescue/285-215404218

Stairways are completed to the point where they are useable going up or down, and they are used as staging areas for fire extinguishers and other fire protection equipment. Unfortunately, with changing conditions and just a guardrail at some of these stair shafts, the fire extinguishing equipment is tossed aside with nowhere to be placed while construction is going on. The fire extinguishers need a home while construction is going on, and the landings at each level in the stairwells are their designation per IFC, IBC and OSHA. Per OSHA Safety and Health regulations for Construction, Subpart Fire Protection and Prevention, 1926.150(c)(1)(iv) One or more fire extinguishers, rated not less than 2A, shall be provided on each floor. In multistory buildings, at least one fire extinguisher shall be located adjacent to stairway.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The cost of construction should not be impacted since these stairways have to be built anyway.

G200-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved for several reasons. The phrase 'approved per plan' is not good code language - perhaps 'approved construction documents.' Are these temporary or permanent stairways. This will be difficult to sequence with having the stairway installers return at each floor. This will increase inspections for coming back for each stair flight. There is no justification for the same number of stairs for fire department and construction access as there is for a fully occupied building. Is this just to steps, or does this also include handrails and guards? What about damage during construction of finish materials? (Vote: 13-0)

G200-21

Individual Consideration Agenda

Public Comment 1:

IBC: 3310.1; IFC: [BE] 3312.1; IEBC: [BE] 1505.1

Proponents: Homer Maiel, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay) (hmaiel@gmail.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

3310.1 Stairway required . ~~. As construction progresses , all~~ In Type III through Type V construction and buildings of 3 stories or more above grade plane, as construction progresses , all required stairways approved per construction documents, ~~plan~~ shall be extended to the floor of the highest point of construction having secured decking or flooring. ~~A temporary stairway shall be provided and approved for each permitted stairway that is not completed in construction.~~

> **Exception:** When approved by the Building Official, a temporary stairway may be provided for each required stairway which is not being extended during the course of the building floor construction

2021 International Fire Code

[BE] 3312.1 Stairways required. ~~As construction progresses , all~~ In Type III through Type V construction and buildings of 3 stories or more above grade plane, as construction progresses , all required stairways approved per construction documents ~~plan~~ shall be extended to the floor of the highest point of construction having secured decking or flooring~~. A temporary stairway shall be provided and approved for each permitted stairway that is not completed in construction.~~

> **Exception:** When approved by the Building Official, a temporary stairway may be provided for each required stairway which is not being extended during the course of the building floor construction

2021 International Existing Building Code

[BE] 1505.1 Stairways required. ~~As construction progresses , all~~ In Type III through Type V construction and buildings of 3 stories or more above grade plane, as construction progresses , all required stairways approved per construction documents, ~~plan~~ shall be extended to the floor of the highest point of construction having secured decking or flooring. ~~A temporary stairway shall be provided and approved for each permitted stairway that is not completed in construction.~~

> **Exception:** When approved by the Building Official, a temporary stairway may be provided for each required stairway which is not being extended during the course of the building floor construction

Commenter's Reason: In modifying this proposal, all committee concerns were taken into account. Also considering that this issue is more of a problem in combustible construction, Types I and II were excluded.
As many trade workers, building inspectors, superintendent's, engineers all navigate these floors while they are under construction, there are notably many stairways that are not roughed in for use. Many of them remain incomplete until much further into the advanced stages of the project. The Axis Appartment fire that happend in Houston Texas On March 25, 2014 (link is provided here) shows how a construction worker jumps from one balcony to balcony below to save his life. A stairway in this case would have made the rescue much easier.
https://www.khou.com/article/news/investigations/video-shows-new-perspective-of-dramatic-fire-rescue/285-215404218

Stairways are completed to the point where they are useable going up or down, and they are used as staging areas for fire extinguishers and other fire protection equipment. Unfortunately, with changing conditions and just a guardrail at some of these stair shafts, the fire extinguishing equipment is tossed aside with nowhere to be placed while construction is going on. The fire extinguishers need a home while construction is going on, and the landings at each level in the stairwells are their designation per IFC, IBC and OSHA. Per OSHA Safety and Health regulations for Construction, Subpart Fire Protection and Prevention, 1926.150(c)(1)(iv) One or more fire extinguishers, rated not less than 2A, shall be provided on each floor. In multistory buildings, at least one fire extinguisher shall be located adjacent to stairway.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction
The increase cost maybe offset by reduced rental cost of temporary stairs.

G201-21

Proposed Change as Submitted

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

Add new text as follows:

APPENDIX Q
TEMPORARY STRUCTURES AND USES TO SERVE EMERGENCIES

Q101
GENERAL

Q101.1 Scope.
The provisions of this appendix shall apply to the use, construction, installation, alteration, relocation and location of emergency need based temporary structures and any service utilities or systems that serve such temporary structures.

Q101.1.1 Objectives.
The objective of this Appendix is intended to provide flexibility to permit the use of innovative approaches and techniques to establish temporary structures and uses in a timely fashion while encountering unusual circumstances and maintain the level of safety intended by the code.

Q101.1.2 Temporary use.
Temporary use during emergencies may exceed 180 days. Judgement shall be used by the code official to allow for temporary uses and conditions to continue for the duration of the emergency based on the needs of the emergency. The building official is authorized to grant extensions for demonstrated cause.

Q102
DEFINITIONS

Q102.1 Definitions.
The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

Add new definition as follows:

EMERGENCY. .
Any event declared by local, state, or federal entities that temporarily overwhelms response capabilities, and may require the suspension or modification of regulations, codes, or standards to facilitate response to such an event.

TEMPORARY STRUCTURES. .
That which is built, constructed or erected for a period of less than 180 days.

TEMPORARY USE.
An activity or practice that is established at designated location for a period of less than 180 days. Uses include, but are not limited to, those functional designations listed within the occupancy group descriptions in Section 302.1 of this code.

Add new text as follows:

Q103
SUBMITTAL DOCUMENTS

Q103.1 General.
Submittal documents shall be of sufficient clarity to indicate the location, nature and extent of the work or use proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the code official.

Q104
CONFORMANCE

Q104.1 Conformance.
Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this section as necessary to provide a reasonable level of safety, health and general welfare.

Q104.2 Changes over time.
As an emergency evolves, and more resources become available, plans should be made to bring structures and temporary uses in line with the main body of the code.

Q105
PERMITS

Q105.1 Required permits.
Temporary structures other than tents and other membrane structures that occupy an area greater than 120 square feet (11.16 m^2), shall not be erected, operated or maintained for any purpose without obtaining a permit from the code official. Tents and membrane structures should be permitted in accordance with the International Fire Code.

Q106
GENERAL STANDARDS FOR EMERGENCY STRUCTURES

Q106.1 Scope.
The provisions of Sections Q106.2 through Q106.7 shall apply to all structures constructed, erected or relocated during emergencies.

Q106.2 Intent.
The intent of this section is to provide a base level of safety in a structure built or repurposed for emergency use.

Q106.3 Change of occupancy.
Existing buildings used in a way that was not originally intended by occupancy class or use shall be allowed without formally changing the occupancy class. The previous occupancy class shall be restored upon the conclusion of the emergency.

Q106.4 Fire Safety Provisions.
Determine fire safety requirements in accordance with Section Q106.4.1 through Q106.4.5 in order to make determinations of safe conditions rather than strict adherence to the provisions of International Fire Code.

Q106.4.1 Fire safety and evacuation plans.
Fire Safety and evacuation plans shall be provided in accordance with Section 403 and 404 of the International Fire Code. Plans should be updated where there are any physical changes to the layout of the structure.

Q106.4.2 Training and practice drills.
Training of staff and practice drills shall comply with Section 405 and 406 of the International Fire Code. Structures in place for longer than 30 days shall conduct evacuation drill in accordance with Section 405.3 of the International Fire Code based on the temporary use.

Q106.4.3 Fire Protection.
An evaluation shall be performed to decide on fire protection needed utilizing NFPA 550.

Q106.4.4 Emergency Access.
Emergency vehicle access roads shall be approved by the fire code official.

Q106.4.5 Fire Watch.
A fire watch in accordance with Section 403.11.1 of the International Fire Code shall be permitted to be provided in lieu of other fire protection system.

Q106.5 Means of Egress.
Means of Egress shall comply with Sections 1004, 1005, 1006, 1007, 1008 and 1010 of the International Building Code in addition to Sections Q106.5.1 through Q106.5.3.

Q106.5.1 Exit Discharge.
Exits shall provide access to a public way, or to a safe dispersal area in accordance with 1028.5.

Q106.5.2 Means of Egress Lighting.
The means of egress shall be illuminated when the space is occupied.

> **Exception:** Sleeping areas.

Q106.5.3 Exit Signs.
Exit signs shall be provided where the means of egress is not readily identifiable. Exit signs shall be permitted to be illuminated by the lighting provided in the structure.

Q106.6 Accessibility.
A facility that is constructed to be accessible shall be maintained accessible during occupancy.

Q106.7 Temporary connection.

The code official shall have the authority to authorize the temporary connection of the building or system to the utility, the source of energy, fuel, or power, or the water system or sewer system in accordance with Section 112. Water closets and lavatories shall be either permanent plumbing fixtures installed within the structure, or temporary water closets or lavatories, such as chemical toilets or other means approved by the code official.

Q106.7.1 Portable heating and cooling equipment.
Portable heating and cooling equipment shall be used in accordance with their listing, and manufacturer's instructions.

Q107
Use Specific Standards

Q107.1 Increased occupant load.
Temporary waivers for allowing for additional occupants in existing building shall comply with Section Q107.1.1 through Q107.1.3.

Q107.1.1 Authorization.
The code official is authorized to allow for an increase in the number of occupants or a change of use in a building or portion of a building during an emergency.

Q107.1.2 Maintenance of the means of egress.
The existing a means of egress shall be maintained.

Q107.1.3 Sleeping areas.
Where a space is used for sleeping purposes, the space shall be equipped with smoke alarms in accordance with Section 907.2.11 or be provided with a fire watch in accordance with Section 403.11.1 of the International Fire Code. Carbon monoxide detectors shall be installed in accordance with Section 915 where the structure uses any fossil fuel or wood burning appliances.

Q107.2 Temporary healthcare facilities. . Temporary health care facilities shall comply with Section Q107.2.1 and Q107.2.2.

Q107.2.1 General. Temporary health care facilities shall be erected, maintained and operated to minimize the possibility of a fire emergency requiring the evacuation of occupants.

Q107.2.2 Membrane structures under projections. . Membrane structures of less than 100 square fe et (9.3 m^2) may be placed under projections of a permanent building provided the permanent building is protected with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

Q107.3 Use of tiny houses or manufactured housing. . Tiny houses or manufactured housing used for temporary housing shall comply with Section Q107.3.1 through Q107.3.5.

Q107.3.1 Fire separation distances. Tiny houses or manufactured housing shall be separated by not less than 5 feet (1524 mm) between structures.

Q107.3.2 Fire breaks. Tiny houses and manufactured housing shall not be located in groups of more than 20 units. Fire breaks of at least 20 feet (6096 mm) shall be provided between each group.

Q107.3.3 Smoke alarms. Tiny houses and manufactured housing used for sleeping purposes shall be equipped with a smoke alarm complying with Section 907.2.11. Smoke detectors are not required to be hard wired.

Q107.3.4 Carbon monoxide detectors. Carbon monoxide detectors shall be installed in accordance with Section 915, where the tiny house or manufactured housing uses any fossil fuel or wood burning appliances.

Q107.3.5 Structures located in a wildland urban interface zone. Tiny houses and manufactured housing that are located in a wildland urban interface area shall be provided with defensible space in accordance with the Section 603 of the International Wildland Urban Interface Code.

Q107.4 Tents and membrane structures used as sleeping accommodations. Tents or membrane structures used as sleeping accommodations shall comply with the same requirements as tiny homes in Section Q107.3.1 through Q107.3.5 and Chapter 31 of the International Fire Code.

Q107.5 Temporary emergency shelters during/after a natural disaster – wildfire, tornado, flood. . Where emergency shelters are planned, the process of organizing, planning, implementing, and evaluating a program for mass evacuation, sheltering, and re-entry shall comply withNFPA 1660.

SECTIONQ108
REFERENCED STANDARDS

Q108.1 General. SeeTable Q108.1for standards that are referenced in various sections of this appendix.Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix referenced in the standard.

Add new text as follows:

TABLE Q108.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
NFPA 550-2017	Guide to the Fire Safety Concepts Tree	Q106.5.3
NFPA 1660 - 2022	Standard on Community Risk Assessment, Pre-Incident Planning, Mass Evacuation, Sheltering, and Re-entry Programs.	Q107.5

Reason: The purpose of the proposed Appendix is to provide regulatory options to users based on trends that don't fit squarely in the IBC. Code users are facing diverse challenges never encountered before. Examples include setting up medical facilities in gymnasiums, or in tents in a park or parking lot. With the wildfires in the Western United States, emergency temporary housing is needed for displaced residents, as well as First Responders from other areas who are providing assistance. The Appendix format allows for Jurisdictional adoption with or without amendments, creating solutions for these types of uses, providing the AHJ with wide flexibility while ensuring public health, safety and general welfare for the end users
There will be related proposals submitted in group B.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
These options mirror established ICC codes sections and standards.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 550-2017 and NFPA 1660-2022, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G201-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the proposal has a lack of enforceable language. The proposal does not provide full guidance in an emergency. With extensive work, the topic has potential. (Vote: 9-5)

G201-21

Individual Consideration Agenda

Public Comment 1:

IBC: (New), APPENDIX Q, Q101, Q101.1, Q101.1.1, Q101.1.2, Q102 , Q102.1, , Q103, Q103.1, Q104, Q104.1, Q104.2, Q105 , Q105.1, Q106, Q106.1, Q106.2, Q106.3, Q106.4, Q106.4.1, Q106.4.2, Q106.4.3, Q106.4.4, Q106.4.5, Q106.5 , Q106.5.1 , Q106.5.2, Q106.5.3 , Q106.6, Q106.7, Q106.7.1, Q107 , Q107.1, Q107.1.1, Q107.1.2, Q107.1.3, Q107.2, Q107.2.1, Q107.2.2, Q107.3, Q107.3.1, Q107.3.2, Q107.3.3, Q107.3.4, Q107.3.5, Q107.4, Q107.5, SECTIONQ108, Q108.1, TABLE Q108.1

Proponents: Mike Nugent, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

User notes: . · **About this appendix:** The primary purpose for Appendix Q is to provide guidance for designers, engineers, architects, fire and building code officials, plans reviewers and inspectors to establish temporary emergency uses of existing building or temporary structures with respect to contemporary code minimums. The intent of this appendix is to not become code language. Rather, it should serve as that template or checklist for use during a time of urgency. A template to assure a path forward that references the relevant code concerns.

APPENDIX Q
TEMPORARY EMERGENCY STRUCTURES AND EMERGENCY USES ~~TO SERVE EMERGENCIES~~

Q101
GENERAL

Q101.1 Scope . The provisions of this appendix shall apply to the use, construction, installation, alteration, relocation and location of emergency need based temporary structures and any service utilities or systems that serve such temporary structures.

Q101.1.1 Objectives . The objective of this Appendix is intended to provide flexibility to permit the use of innovative approaches and techniques to establish temporary structures and uses in a timely fashion while encountering unusual circumstances and maintain the level of safety intended by the code.

Q101.1.2 Temporary use . Where temporary ~~Temporary~~ use during emergencies ~~may~~ exceed 180 days , judgement ~~Judgement~~ shall be used by the code official to allow for temporary uses and conditions to continue for the duration of the emergency based on the needs of the emergency. The building official is authorized to grant extensions for demonstrated cause.

Q102
DEFINITIONS

Q102.1 Definitions . The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

EMERGENCY . Any event declared by local, state, or federal entities that temporarily overwhelms response capabilities, and ~~may~~ that require the suspension or modification of regulations, codes, or standards to facilitate response to such an event.

TEMPORARY STRUCTURES . That which is built, constructed or erected for a period of less than 180 days.

TEMPORARY USE . An activity or practice that is established at designated location for a period of less than 180 days. Uses include, but are not limited to, those functional designations listed within the occupancy group descriptions in Section 302.1 of this code.

Q103
SUBMITTAL DOCUMENTS

Q103.1 General . Submittal documents shall be of sufficient clarity to indicate the location, nature and extent of the work or use proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the code official.

Q104
CONFORMANCE

Q104.1 Conformance . Temporary use of existing buildings and temporary structures ~~and uses~~ shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this ~~section~~ code as necessary to provide a reasonable level of safety, health and general welfare. Tents and other membrane structures shall comply with Section 3102 and 3103.

Q104.2 Changes over time . As an emergency evolves, ~~and more resources become available,~~ plans should be made to bring ~~structures and~~ temporary uses in ~~line~~ compliance with the ~~main body~~ requirements of the code.

Q105
PERMITS

Q105.1 Required permits . Temporary structures other than tents and other membrane structures that occupy an area greater than 120 square feet (11.16 m^2), shall not be erected, operated or maintained for any purpose without obtaining a permit from the code official. Tents and membrane structures should be permitted in accordance with the International Fire Code.

Q106
GENERAL STANDARDS FOR EMERGENCY STRUCTURES

Q106.1 Scope . The provisions of Sections Q106.2 through Q106.7 shall apply to all existing structure being repurposed or temporary structures constructed, erected or relocated ~~during~~ to support needs for a response to emergencies.

Q106.2 Intent . The intent of this section is to provide a base level of safety in a structure built or repurposed for emergency use.

Q106.3 Change of occupancy . Existing buildings used in a way that was not originally intended by occupancy class or use shall be allowed without formally changing the occupancy class. The previous occupancy class shall be restored upon the conclusion of the emergency. Where the temporary live load of the floor is more than that required by Section 1607 for the original use, the area designated for the temporary live load shall be posted with placards for the approved live load.

Q106.4 Fire Safety Provisions . Determine fire safety requirements in accordance with Section Q106.4.1 through Q106.4.5 in order to make determinations of safe conditions rather than strict adherence to the provisions of International Fire Code.

Q106.4.1 Fire safety and evacuation plans . Fire Safety and evacuation plans shall be provided in accordance with Section 403 and 404 of the International Fire Code. Plans should be updated where there are any physical changes to the layout of the structure.

Q106.4.2 Training and practice drills . Training of staff and practice drills shall comply with Section 405 and 406 of the International Fire Code. Structures in place for longer than 30 days shall conduct evacuation drill in accordance with Section 405.3 of the International Fire Code based on the temporary use.

Q106.4.3 Fire Protection . An evaluation shall be performed to decide on fire protection needed utilizing NFPA 550.

Q106.4.4 Emergency Access . Emergency vehicle access roads shall be approved by the fire code official.

Q106.4.5 Fire Watch . A fire watch in accordance with Section 403.11.1 of the International Fire Code shall be permitted to be provided in lieu of other fire protection system.

Q106.5 Means of Egress . Means of Egress shall comply with Sections 1004, 1005, 1006, 1007, 1008 and 1010 of the International Building Code in addition to Sections Q106.5.1 through Q106.5.3.

Q106.5.1 Exit Discharge . Exits shall provide access to a public way, or to a safe dispersal area in accordance with 1028.5.

Q106.5.2 Means of Egress Lighting . The means of egress shall be illuminated when the space is occupied.

Exception: Sleeping areas.

Q106.5.3 Exit Signs . Exit signs shall be provided where the means of egress is not readily identifiable. Exit signs shall be permitted to be illuminated by the lighting provided in the structure.

Q106.6 Accessibility . A facility that is constructed to be accessible shall be maintained accessible during occupancy.

Q106.7 Temporary connection . The code official shall have the authority to authorize the temporary connection of the building or system to the utility, the source of energy, fuel, or power, or the water system or sewer system in accordance with Section 112. Water closets and lavatories shall be either permanent plumbing fixtures installed within the structure, or temporary water closets or lavatories, such as chemical toilets or other means approved by the code official.

Q106.7.1 Portable heating and cooling equipment . Portable heating and cooling equipment shall be used in accordance with their listing, and manufacturer’s instructions.

Q107
Use Specific Standards

Q107.1 Increased occupant load . ~~Temporary waivers for allowing~~ Allowing for additional occupants in existing building shall comply with Section Q107.1.1 through Q107.1.3.

Q107.1.1 Authorization . The code official is authorized to allow for an increase in the number of occupants or a change of use in a building or portion of a building during an emergency.

Q107.1.2 Maintenance of the means of egress . The existing a means of egress shall be maintained.

Q107.1.3 Sleeping areas . Where a space is used for sleeping purposes, the space shall be equipped with smoke alarms in accordance with Section 907.2.11 or be provided with a fire watch in accordance with Section 403.11.1 of the International Fire Code. Carbon monoxide detectors shall be installed in accordance with Section 915 where the structure uses any fossil fuel or wood burning appliances.

Q107.2 Temporary healthcare facilities . Temporary health care facilities shall comply with Section Q107.2.1 and Q107.2.2.

Q107.2.1 General . Temporary health care facilities shall be erected, maintained and operated to minimize the possibility of a fire emergency requiring the evacuation of occupants.

Q107.2.2 Membrane structures under projections . Membrane structures of less than 100 square feet (9.3 m^2)~~may~~ shall be permitted to be placed under projections of a permanent building provided the permanent building is protected with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

Q107.3 Use of tiny houses or manufactured ~~housing~~ homes . Tiny houses or manufactured ~~housing~~ homes used for temporary housing shall comply with Section Q107.3.1 through Q107.3.5.

Q107.3.1 Fire separation distances . Tiny houses or manufactured ~~housing~~ homes shall be separated by not less than 5 feet (1524 mm) betweenstructures.

Q107.3.2 Fire breaks . Tiny houses and manufactured ~~housing~~ homes shall not be located in groups of more than 20 units. Fire breaks of at least 20 feet (6096 mm) shall be provided between each group.

Q107.3.3 Smoke alarms . Tiny houses and manufactured ~~housing~~ homes used for sleeping purposes shall be equipped with a smoke alarm complying with Section 907.2.11. Smoke detectors are not required to be hard wired.

Q107.3.4 Carbon monoxide detectors . Carbon monoxide detectors shall be installed in accordance with Section 915, where the tiny house or manufactured ~~housing~~ homes uses any fossil fuel or wood burning appliances.

Q107.3.5 Structures located in a wildland urban interface zone . Tiny houses and manufactured ~~housing~~ homes that arelocated in a wildland urban interface area shall be provided with defensible space in accordance with the Section 603 of the International Wildland Urban Interface Code.

Q107.4 Tents and membrane structures used as sleeping accommodations . Tents or membrane structures used as sleeping accommodations shall comply with the same requirements as tiny ~~homes~~ houses in Section Q107.3.1 through Q107.3.5 and Chapter 31 of the International Fire Code.

~~**Q107.5 Temporary emergency shelters during/after a natural disaster – wildfire, tornado, flood.**~~ **.** ~~Where emergency shelters are planned, the process of organizing, planning, implementing, and evaluating a program for mass evacuation, sheltering, and re-entry shall comply withNFPA 1660.~~

SECTIONQ108
REFERENCED STANDARDS

Q108.1 General . SeeTable Q108.1for standards that are referenced in various sections of this appendix.Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix referenced in the standard.

TABLE Q108.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
NFPA 550-2017	Guide to the Fire Safety Concepts Tree	Q106.5.3
~~NFPA 1660 - 2022~~	~~Standard on Community Risk Assessment, Pre-Incident Planning, Mass Evacuation, Sheltering, and Re-entry Programs.~~	~~Q107.5~~

Commenter's Reason: The intent of this appendix is to provide guidance when there are emergencies that exceed the emergencies that the community has planned for. Response must be immediate, so there is not time for the typical plan review and inspection. Existing buildings will be used for occupancies other than they were intended, and temporary structures may need to be erected or brought in to address immediate needs. Recent examples were the housing needs due to mass evacuations during the west coast fires and how hard Covid hit many community health care systems.

The user note for this Appendix emphasizes that this is a guidance document for emergencies that exceed pre-planned emergency responses. The code officials are the people with the experience and knowledge base to identify what can be done and still maintain public health and safety. This idea is emphasized in Section Q101.1.2 and the definition of emergency for this appendix, as well as the modification to the title.

The following revisions were incorporated based on the input received during the hearing:

· The user note states this is a guidance appendix. The idea is used in IFC appendix E and G.

· The title was modified for clarity.

· Q101.1.2 – better code language

· Definition for emergency – better code language

· Q104.1 was modified to mirror Section 3103.1. This is already permitted by the code. Q104.1 has an added sentence clarify that tents and other membrane structures are required to comply with Section 3102 and 3103. These sections also incorporate Chapter 16.

· Q104.2 – re-evaluation is not always dependent on additional resources – it could be people being able to return or moving to family.

· Q106.1 – This change clarifies that this appendix is applicable to what is happening due to the emergency – not other construction that happens to be occurring at the same time that is not related.

· Q106.3 – this modification allows for temporary uses with heavier loading – such as storage of emergency supplies in an office building – where the safe limits are addressed. The change to Q104.1 and Q106.3 are to address concerns raised by structural engineers about loads.

· Q107.1 – the modification removed 'temporary waives for'. The criteria was not related to waivers.

· Q107.2.2 – better code language

· Q107.3 – use defined term for manufactured homes.

· Q107.4 – change 'tiny homes' to 'tiny houses' for consistent terminology

· Q107.5 and NFPA 1660 have been removed as they apply to previously anticipated emergencies. This appendix will only address where these plans are exceeded.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
These options mirror established ICC codes sections and standards.

Public Comment# 2657

G202-21

Proposed Change as Submitted

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Building Code

Add new text as follows:

APPENDIX P
3D PRINTED BUILDING CONSTRUCTION

SECTION P101
GENERAL

P101.1 Scope.
Buildings, structures and building elements fabricated in whole or in part using 3D printed construction techniques shall be designed, constructed and inspected in accordance with the provisions contained in this Appendix and other applicable requirements in this code.

> **Exception:** Where approved, 3D printed buildings, structures and building elements are permitted to be evaluated in accordance with engineering practices judged equivalent to the design, construction, inspection and integrity of construction requirements in this Appendix in accordance with Section 104.11.

SECTION P102
DEFINITIONS

P102.1 Definitions.
The following words and terms shall, for the purposes of this Appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

Add new definition as follows:

3D PRINTED BUILDING CONSTRUCTION.
A process for fabricating buildings, structures and building elements from 3D model data using automated equipment that deposits construction material in a layer upon layer fashion.

ADDITIVE MANUFACTURING MATERIALS.
Materials used by the 3D printer to produce the building structure or system components of the building.

FABRICATION PROCESS.
Preparation of the job site and construction material, and the deposition, curing, finishing, insertion of components and other methods used to construct building elements such as walls, partitions, roof assemblies and structural components, and the means used to connect assemblies together.

PRODUCTION EQUIPMENT.
The equipment, including 3D printer, its settings, nozzles and other accessories used in the fabrication process.

REPORT OF FINDINGS.
A report issued by an approved agency that provides a technical basis for accepting prefabricated or 3D printed building assemblies. It describes the building assembly construction covered, and provides a summary of the test results, ratings, material properties, and/or material performance characteristics established by evaluation or test.

Add new text as follows:

SECTION P103
BUILDING DESIGN

P103.1 Design.
3D printed buildings, structures and building elements shall be designed by an organization certified in accordance with UL 3401 by an approved agency and approved by the *building official*

P103.2 Design approval.
The structural design, construction documents, and UL 3401 *report of findings* shall be submitted for review and approval in accordance with

Section 104.11.

SECTION P104
BUILDING CONSTRUCTION

P104.1 Construction.
3D printed buildings, structures, and building elements shall be constructed in accordance with Sections P104.2 through P104.4.

P104.2 Construction method.
The building construction method, consisting of the manufacturer's *production equipment* and fabrication process shall be in accordance with the UL 3401 *report of findings* . The unique identifier of the construction method used shall match the identifier in the UL 3401 *report of findings* .

P104.3 Additive manufacturing materials.
Only the listed *additive manufacturing materials* identified in the UL 3401 *report of findings* shall be used to fabricate the building structure. Containers of the *additive manufacturing materials* shall be labeled.

P104.4 Depositing of manufacturing materials.
Manufacturing materials shall only be deposited where ambient temperature and environmental conditions at the job site are within limits specified in the UL 3401 *report of findings* . The maximum number of layers permitted, specified curing time and any surface preparation of finishing shall be performed as specified in the UL 3401 *report of findings* .

SECTION P105
SPECIAL INSPECTIONS

P105.1 Initial inspection. .
An initial inspection of the *production equipment* , including the 3D printer, and the fabrication process shall be performed after the *production equipment* is located onsite and before building fabrication has begun. The inspection shall be conducted by the representatives of the approved agency that evaluated the fabrication process for compliance with UL 3401. The inspection shall verify that the fabrications process, including *production equipment* , 3D printing parameters and *additive manufacturing materials* are in accordance with the UL 3401 *report of findings*, and the proprietary information in the UL 3401 detailed *report of findings* .

> **Exception:**
> Where approved by the building official, inspection of the *production equipment* , including 3D printer, and the fabrication process used in replicable buildings shall be permitted to be conducted on the first building to be constructed, and on a selected number of subsequent buildings, where the same equipment, equipment operators and fabrication process are used on all buildings. The number of inspections to be performed shall be determined by the building official.

SECTION P106
REFRENCED STANDARDS

P106.1 General.
See Table P106.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, the standard title and the section or sections of this appendix that reference the standard.

P106.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
UL 3401-19	Outline of Investigation for 3D Printed Building Construction	P103.2, P104.2, P104.3, P104.4, P105.1

Reason: 3D building construction has moved from a conceptual stage to reality, and projects are being proposed in an increasing number of jurisdictions. Unfortunately the prescriptive design and construction requirements in the IBC are not applicable to 3D printed fabrication techniques, so code officials have to approve this construction based on limited equivalency evaluations that may not take into account variations in material properties introduced by the 3D printing process, or variances in the physical characteristics of the construction materials used.
This proposal introduces an Appendix P, which is not mandatory unless specifically referenced in an adopting ordinance. The Appendix includes definitions, and requirements for 3D printed building design, construction and special inspections, which rely on the design being evaluated in advance by an approved agency for compliance with UL 3401. The resulting report of findings includes the information needed by the contractor and code official to verify compliance with applicable code requirements, and to verify that the 3D printing process and materials used on site are the same as those used during the UL 3401 evaluation and testing. The special inspection requirements are necessary because the portions of the fabrication process such as 3D printer settings, deposition rates and thickness, and curing processes, require special expertise to evaluate, especially when they include proprietary formulations, equipment and settings.

The exception to Section P101 recognizes there may be other published standards that evaluate 3D printed building construction, although we are not aware of any such standard for 3D printed building construction that is as comprehensive as UL 3401.

A similar Appendix was added to the 2021 International Residential Code. At present one company has received coverage for UL 3401 certification, and several others are in process.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal covers a construction technique that is not currently addressed in the code.

Staff Analysis: A review of the standard proposed for inclusion in the code, UL 3401-19, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2021.

G202-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the proposed Appendix, on 3D printed building construction, is incomplete and lacking clarity on materials. (Vote: 13-0)

G202-21

Individual Consideration Agenda

Public Comment 1:

IBC: P101.1, P101.2 (New), P103.1,

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com) requests As Modified by Public Comment

Modify as follows:

2021 International Building Code

P101.1 Scope . Buildings, structures and building elements fabricated in whole or in part using 3D printed construction techniques shall be designed, constructed and inspected in accordance with the provisions contained in this Appendix and other applicable requirements in this code.

> ~~**Exception:** Where approved, 3D printed buildings, structures and building elements are permitted to be evaluated in accordance with engineering practices judged equivalent to the design, construction, inspection and integrity of construction requirements in this Appendix in accordance with Section 104.11.~~

P101.2 Alternative materials, design and methods of construction . The provisions of this Appendix are not intended to prevent the installation of any additive manufacturing material or to prohibit any design or method of 3D construction not covered in this Appendix, provided that any such alternative has been *approved* in accordance with Section 104.11 of this code.

P103.1 Design . 3D printed buildings, structures and building elements shall be designed by a registered design professional and constructed by an organization certified in accordance with UL 3401 by an approved agency and approved by the *building official*

REPORT OF FINDINGS . A report issued by an approved agency that provides a technical basis for accepting ~~prefabricated or~~ 3D printed building assemblies. It describes the building assembly construction covered, and provides a summary of the test results, ratings, material properties, and/or material performance characteristics established by evaluation or test.

Commenter's Reason: This public comments addresses concerns raised at the committee action hearings including the following:

1. A new Section P101.2 has been added that recognizes there may be alternative designs and other published standards that evaluate 3D printed building construction, although we are not aware of any such standard for 3D printed building construction that is as comprehensive as UL 3401. If someone chooses to use an acceptance criteria or a future standard for 3D printed building construction, this can certainly be accepted.
2. Concern was raised about the reference to prefabricated construction, which was removed.
3. Additionally, a revision was made to Section P103.1 regarding the need for the structural design of 3D printed building construction to be performed by a registered design professional.
4. Concern was expressed about how UL 3401 can be used to evaluate cementitious based 3D printed construction. It was pointed out that considerable time and effort is needed to develop these requirements. Comments on this concern are as follows:
    1. UL 3401 includes references to a number of material property tests that are referenced in ACI 318, including tests for compressive strength, slump, flexural bond strength freeze/thaw and others. These requirements are very similar to those included in AC 509.
    2. In addition to the material property tests, UL 3401 includes an evaluation of the 3D printing process, equipment, and environmental conditions to verify that the overall fabrication process produces building elements with consistent properties. Variation in printing parameters can have a significant impact on material performance and durability.
    3. Testimony was provided that it is going to take considerable time to develop an effective way to test and evaluate 3D printed concrete construction. We assume this referred to an ACI committee that is exploring 3-D Printing with Cementitious Materials. We applaud this effort, and feel that that their findings will correlate well with the overall UL 3401 evaluation process when it is finalized.

Make no mistake, 3D printed building construction is here now and is growing at a rapid rate. Buildings are being 3D printed around the country, including a housing development that is being produced by a UL 3401 certified company. Guidance on how this innovative construction can be designed and approved is needed now, not in the 2027 IBC. Since the proposal is for an Appendix, jurisdictions may or may not choose to adopt this criteria. However. Waiting until the 2027 codes are published to have any criteria that can be referenced in the Code leaves a huge void.

A similar Appendix was added to the 2021 International Residential Code. At present one company has received coverage for UL 3401 certification, and several others are in process.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
The proposal covers a construction technique that is not currently addressed in the code.

Public Comment# 2555

G203-21

Proposed Change as Submitted

Proponents: Jane Malone, American Association of Radon Scientists and Technologists, representing American Association of Radon Scientists and Technologists; Thomas Bowles, representing EPA (bowles.thomas@epa.gov); Ruth Mcburney, representing CRCPD (rmcburney@crcpd.org); Jonathan Wilson, National Center for Healthy Housing, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, American Lung Association, representing American Lung Association (Kevin.Stewart@Lung.org); Tobie Bernstein, representing Environmental Law Institute (bernstein@eli.org); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com)

2021 International Building Code

Add new text as follows:

APPENDIX S
SOIL GAS CONTROL

SECTION S101
GENERAL

S101.1 Venting requirements.
Soil gas control systems shall comply with ANSI-AARST CC-1000.

Exception:
Radon control systems in one- and two-family dwellings and townhouse shall comply with Appendix F of the International Residential Code or ANSI-AARST RRNC.

SECTION S102
REFERENCED STANDARDS

S102.1 General.
See Table S102.1 for standards that are referenced in various sections of this appendix. Standards listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

TABLE S102.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ANSI-AARST CC-1000-2018 [a]	Soil Gas Control Systems in New Construction of Buildings	S101.1
ANSI-AARST RRNC-2020 [a]	Rough-In of Radon Control Components In New Construction Of 1 & 2 Family Dwellings And Townhouses	S101.1

a. AARST - American Association of Radon Scientists and Technologists

Add new standard(s) as follows:

AARST

American Association of Radon Scientists and Technologists
527 N Justice Street
Hendersonville, NC 28739
USA

AARST ANSI-AARST CC-1000-2018:
Soil Gas Control Systems in New Construction of Buildings

AARST ANSI-AARST RRNC-2020:
Rough-In of Radon Control Components In New Construction Of 1 & 2 Family Dwellings And Townhouses

Reason: Several states (Illinois, Maine, Minnesota, Nebraska, New Jersey, Oregon, Rhode Island, Washington) require soil gas control in new buildings that cannot possibly be addressed through Appendix F of the International Residential Codes, such as schools, child day care facilities, and multifamily housing. Even where there are no requirements, builders are including some form of soil gas control in buildings. The IBC lacks any meaningful provision to oversee soil gas control systems in larger buildings.

The proposed new Appendix to the IBC will position the current standard for soil gas control in large buildings available as an enforcement tool for code officials and provide consistency among builders, architects, and developers and across jurisdictions.

Radon is present in indoor air everywhere, regardless of building type or radon zone. Radon-induced lung cancer takes 21,000 lives in the US each year. Chemical vapor is an increasingly documented hazard that also enters buildings from the soil.

It is more efficient and cost-effective to establish soil gas control from the ground up during construction than to retrofit a structure later to seal up the interface between structure and soil and position suction points, ventilation piping and other components.

The exception allows the use of Appendix F of the IRC, or the applicable current consensus standard ANSI-AARST RRNC, to be used for one- and two-family homes.

The standards included in this proposal have been vetted and approved by EPA, multiple regulatory states, and HUD. They are posted for public access at **https://standards.aarst.org/CC-1000-2018/index.html** and **https://standards.aarst.org/RRNC-2020/index.html**
In 2020, an addendum to ASHRAE 189.1 - 2017 was approved to incorporate a requirement for ANSI-AARST CC-1000 to replace the standard's existing soil gas requirement.

Cost Impact: The code change proposal will increase the cost of construction
This proposal does not add a requirement to install a radon control system. The proposal will add incremental cost to construction where radon control systems are installed if the builder is not already following the standard practice.
According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260. The cost of a system for a nonresidential commercial building will range from $2500 to higher depending on the footprint, volume and type of HVAC system.

Staff Analysis: A review of the standard proposed for inclusion in the code, AARST RRNC-2020 and AARST CC1000-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G203-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved. The AARST standard has suggestive language, not enforceable language. There is no specific directions for testing and is not clear for how to comply. The language in the proposed appendix appears to conflict with the International Residential Code. (Vote 14-0)

G203-21

Individual Consideration Agenda

Public Comment 1:

IBC: APPENDIX S, SECTION S101, S101.1 (New), S101.2 (New)

Proponents: Jane Malone, representing American Assocation of Radon Scientists and Technologists; Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Kevin Stewart, representing American Lung Association (kevin.stewart@lung.org); David Kapturowski, representing Spruce Environmental Technologies, Inc. (dave@spruce.com); Thomas Bowles, representing Indoor Environments Division (bowles.thomas@epa.gov); Warren Friedman, representing Office of Lead Hazard Control and Healthy Homes (warren.friedman@hud.gov); Ruth McBurney, representing CRCPD (rmcburney@crcpd.org) requests As Modified by Public Comment

Replace as follows:

2021 International Building Code

APPENDIX S
SOIL GAS CONTROL

SECTION S101
GENERAL

S101.1 Radon level . Occupiable spaces shall have indoor radon level below 4 picocuries per liter (pCi/L).

S101.2 Testing . Radon levels shall be determined by an approved testing method. Radon levels 4 pCi/L or more shall be reduced by an approved mitigation method. A radon test report indicating satisfactory test results shall be provided to the code official.

Commenter's Reason: This comment responds to the Committee's reasons by omitting the applicable ANSI standard and adding general direction to use approved methods for testing and mitigation.
The requirement to deliver a compliant test report to the code official is consistent with IRC Appendix F.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
This proposal does not add a requirement to install a radon control system. The proposal will add incremental cost to construction where radon control systems are installed if the builder is not already following approved methods.
According to the Home Innovation Research Labs' Radon-Resistant Construction Practices in New U.S. Homes, the average reported per-unit installation cost of an active radon system in a multifamily dwelling in 2018 was $845, lower than $865 in 2017 but higher than $757 in 2016. The same paper indicates that in 2018 the average multifamily dwelling had an average selling price of $229,260. The cost of a system for a nonresidential commercial building will range from $2500 to higher depending on the footprint, volume and type of HVAC system.

Public Comment# 2829

G204-21

Proposed Change as Submitted

Proponents: Thomas Wysocki, Fire Suppression Systems Association, representing Fire Suppression Systems Association, Technical Director (twysocki@gsifire.com)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2021 International Building Code

Add new text as follows:

[F] 403.4.8.1.1 Generator rooms.
Emergency and standby equipment rooms that have a generator set within high-rise buildings as required by Section 2702.2.11, shall be protected with an alternative automatic fire-extinguishing systems in accordance with Section 904.

2021 International Fire Code

Add new text as follows:

914.3.8 Generator rooms.
Emergency and standby equipment rooms that have a generator set within high-rise buildings as required by Section 2702.2.11 of the *International Building Code*, shall be protected with an alternative automatic fire-extinguishing systems in accordance with Section 904.

Reason: History of fires
The February 2013 NFPA research study written by John R. Hall, Jr., titled - Non-Home Structure Fires By Equipment Involved In Ignition, states on page 7 line 224, that there were 333 fires on average per year started in Generators. The direct property damage cost, on average, $58,000,000.00 annually. This data was reported to U.S. Fire Department between 2007-2011 and was sourced from the National Fire Incident Reporting System.

Further information on fires originating in areas related to generators is found in the November 2016 NFPA document written by Marty Ahrens, titled - High-Rise Building Fires. The report states, on page 18, that 2% of all fires in high-rise buildings started in switchgear area or transformer vaults often associated with generators. Additionally, on page 18 machinery room or area or elevator machinery room which, by definition, includes generator rooms were responsible for 9% of all fires. There are other ignition sources mentioned in the report which potentially could also be associated with generators; for example, on page 23 in office high-rise buildings, 15% of fires were ignited via electrical distribution and lighting equipment.

Importance of generators

At almost a fire a day (333 fires on average per year), the damage caused by a generator fire has significant impact considering the critical nature of these generators to provide continued function of elevators, emergency lighting, life support systems, fire pumps, fire alarms, smoke control systems, and other services essential to life safety. Generators are required in many facilities and this proposal is only applicable to those facilities where generators are required.

Costs associated with a fire

Generator fires have a significant cost impact due to the presence of ignitable fuel being pumped under pressure. While the generator itself can cost upwards of several million dollars, loss of generator capability due to fire can result in loss of hundreds of millions of dollars if the facility is not able to function properly or to protect the life safety of occupants.

Solutions

Having an Alternative Automatic Fire-Extinguishing System (AAFES) in place using current technology provides for detection of a fire event at the early stages and rapid discharge of an extinguishing media to extinguish the fire prior to it causing significant damage to the generator itself or the building.

AAFES are shown to be the most effective solution for these unique fire hazards. Examples of AAFES specifically tested and listed for this type of hazard with the applicable listing/testing protocols include:

- Water Mist Systems per Factory Mutual Standard FM 5560
- Hybrid Systems per Factory Mutual Standard FM 5580
- Clean Agent Systems per Underwriters Laboratories Standard UL 2166 or UL 2167.

Additional effective alternatives include dry chemical, carbon dioxide, and foam.

Rapid detection and extinguishment of fire in a generator room by AAFES will allow the generator to get back into fully functional order quickly, minimize down time, business interruption, and protect building occupants.

Generator fires often involve ignition of ignitable liquids such as fuel oil or lubricating oil. Fires in such fuels can produce thick black smoke, severely limiting firefighter visibility. The use of AAFES to extinguish such fires by automatic means eliminates the need to expose firefighters to an extraordinarily high risk environment.

Bibliography: "High Rise Building Fires" Marty Ahrens, November, 2016, NFPA No. USS30 Copyright © 2016, National Fire Protection Association, Quincy, MA
"Non Home Structure Fires by Equipment by Equipment Involved in Ignition" John R. Hall, Jr., February, 2013, NFPA No. USS88 Copyright© 2013, National Fire Protection Association, Quincy, MA

Cost Impact: The code change proposal will increase the cost of construction
Cost estimates for material and labor to install four types of AAFES in a 9,240 cubic foot (40' X 15' X 15.4') generator room were generated. Average labor costs for the Greater New York City area based on prices effective in December 2020 were used in the estimates. The range of the cost estimates is $13,287 to $22,200 with the average estimated cost being $18,906.

Details of the cost estimates for the four systems are available at: https://spaces.hightail.com/space/F0QOHsHdwa

G204-21

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee stated that the reason for the disapproval was that there was some confusion and disagreement about the relationship between the current and the proposed requirement to provide protection in these rooms. (Vote: 14-0)

G204-21

Individual Consideration Agenda

Public Comment 1:

IFC: 914.3.8; IBC: [F] 403.4.8.1.1

Proponents: Thomas Wysocki, representing Fire Suppression Systems Association, Technical Director (twysocki@gsifire.com) requests As Modified by Public Comment

Modify as follows:

2021 International Fire Code

914.3.8 Generator rooms . ~~Emergency and standby equipment rooms that have~~ Where a generator set within ~~high-rise buildings as~~ a high-rise building provides the emergency and standby power required by Section 2702.2.11 of the International Building Code, the generator set shall be protected with an ~~alternative automatic fire-extinguishing systems in accordance with Section 904.~~ automatic sprinkler system or an alternative automatic fire extinguishing system.

2021 International Building Code

[F] 403.4.8.1.1 Generator rooms . ~~Emergency and standby equipment rooms that have~~ Where a generator set within ~~high-rise buildings as~~ a high-rise building provides the emergency and standby power required by Section 2702.2.11 of the International Building Code, the generator set shall be protected with an ~~alternative automatic fire-extinguishing systems in accordance with Section 904.~~ automatic sprinkler system or an alternative automatic fire extinguishing system.

Commenter's Reason: During the committee discussion, members of the IFC did not object to the concept of providing automatic fire extinguishing systems for generator sets installed to meet 2702.2.11 in high-rise buildings. *Rather members of the IFC suggested that the proposal needed clarification before it should be permitted to go forward. This Public Comment seeks to provide the desired clarification*.
Clean Copy of Public Comment Text: *Where a generator set within a high-rise building provides the emergency and standby power required by Section 2702.2.11 of the International Building Code, the generator set shall be protected with an automatic sprinkler system or an alternative automatic fire extinguishing system*.

When provisions of the code (IBC and IFC) require a building to be equipped throughout with an automatic sprinkler system, Section 903.3.1.1 gives the installation requirements and *gives an exception permitting* omission of sprinklers in certain rooms, including generator rooms. Thus, a generator set is permitted to be installed with no automatic fire suppression system in a building which is otherwise required to be fully sprinklered. This exception may be applied to all types of generator rooms including those supplying emergency power for life safety functions in high-rise buildings.

This comment seeks to require automatic fire suppression systems specifically to protect emergency generator sets providing the emergency power required by IBC 2702.2.11 for high-rise buildings.

Considering

- the fire history averaging nearly one fire per day in generator rooms as detailed in the substantiation for proposal G-204
- generators frequently provide the emergency power required in high-rise buildings by IBC Section 2702.2.11 for numerous life safety features
- generators may be located on various floors of the high-rise
- the most common fires associated with emergency generator sets are flammable liquid fires (typically diesel oil fires) which expose fire fighters to thick, oily, black smoke and extreme temperatures
- an uncontrolled flammable liquid fire within a high rise building can lead to structural damage and eventual collapse of the building
- fires can cause severe damage to a generator set while awaiting extinguishment by manual means
- loss of generator functionality can leave an entire high-rise building without emergency and standby power for life safety features including emergency lighting, emergency voice/alarm communications, elevators, automatic fire detection systems, fire alarm systems, electrically powered fire pumps, fire command center, emergency ventilation
- automatic sprinklers and alternative automatic fire extinguishing systems are recognized by NFPA Standard 37 for protection of stationary combustion engines and turbines such as those driving generators
- alternative automatic fire extinguishing systems are available at nominal cost (see Cost Impact Statement),

automatic fire protection in the form of either an automatic sprinkler system or an alternative automatic fire extinguishing system should be required for generator sets installed to comply with IBC Section 2702.2.11 in high-rise buildings.

There are alternative automatic fire extinguishing systems listed specifically for protection of generators. Since NFPA 37 recognizes both automatic sprinkler systems and alternative automatic fire extinguishing systems for generator protection, this public comment permits either automatic sprinklers or an alternative automatic fire extinguishing system to be installed to meet this new code requirement. For additional information on the protection of generators, please feel free to contact the Fire Suppression Systems Association (FSSA) at admin@fssa.net.

Bibliography: *High Rise Building Fires*, Marty Aherns, 2016, National Fire Protection Association, Quincy, Massachusetts 02169
Non-Home Structure Fires By Equipment Involved In Ignition, John R. Hall, Jr., February 2013, National Fire Protection Association, Quincy, Massachusetts 02169

Understanding the Hazard: Emergency and Standby Generator Fuel Fires in High-Rise Buildings, FM Global, 2014

NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, 2018 Edition, National Fire Protection

Association, Quincy, Massachusetts 02169

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
Cost estimates for material and labor to install four types of AAFES in a 9,240 cubic foot (40' X 15' X 15.4') generator room were generated. Average labor costs for the Greater New York City area based on prices effective in December 2020 were used in the estimates. The range of the cost estimates for equipment and installation labor is $13,287 to $22,200 with the average estimated cost being $18,906. Details of the cost estimates for the four systems are given at: https://spaces.hightail.com/space/F0QOHsHdwa.

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