IMC

2021 GROUP A PROPOSED CHANGES TO THE I-CODES

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Virtual Committee Action Hearings

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2021 GROUP A – PROPOSED CHANGES TO THE INTERNATIONAL MECHANICAL CODE

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TENTATIVE ORDER OF DISCUSSION
2021 PROPOSED CHANGES TO THE INTERNATIONAL MECHANICAL CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation does not necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some M code change proposals may not be included on this list, as they are being heard by another committee.

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M1-21

IMC: SECTION 202

Proponents: Robby Schwarz, BUILDTank, Inc., representing BUILDTank, Inc. (robby@btankinc.com)

2021 International Mechanical Code

SECTION 202 GENERAL DEFINITIONS.

Revise as follows:

AIR-HANDLING UNIT. A blower or fan used for the purpose of distributing supply and return air to a room, space or area.

Reason Statement: Return air distribution and movement around the building is equally if not more important than distributing supply air around the building. Return air is under a negative pressure which may cause back drafting issues or pull air from outside or from adjacent assemblies or units. It is important to recognize that the air handler unit impacts both supply and return air distribution around any building and the potential consequences, good or bad, of that distribution.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
A air handler pushes and pull, blows and sucks, supplies and returns air. More fully defining what an air handler does will not impact the cost of construction since it already supplies and returns air back to it to be conditioned.

M2-21

IMC: SECTION 202

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

International Mechanical Code

2021 International Mechanical Code

Revise as follows:

CONDENSING UNIT. ~~A specific refrigerating machine combination for a given refrigerant, consisting of one or more power-driven compressors, condensers and, where required, liquid receivers, and the regularly furnished accessories.~~
A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more power-driven compressors, condensers, liquid receivers (where required) and factory-supplied accessories.

Reason Statement: There are two different definitions in the I-codes for “condensing unit”. The IECC definition does not identify the compressors as “power-driven”, whereas the IMC definition does. The proposed common definition for use in the I-codes is an amalgamation of the IECC and IMC definitions, which also correlate with the definition of this term in the two refrigeration standards referenced in the I-codes, ASHRAE 15 and UL 60335-2-40.

For information purposes, the following are the other definitions:

From the**IECC: CONDENSING UNIT**. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively cooled, or water-cooled), condenser fans and motors(where used) and factory-supplied accessories.
From the IMC: CONDENSING UNIT. A specific refrigerating machine combination for a given refrigerant, consisting of one or more power-driven compressors, condensers and, where required, liquid receivers, and the regularly furnished accessories.

From ASHRAE 15: CONDENSING UNIT a combination of one or more power-driven compressors, condensers, liquid receivers (when required), and regularly furnished accessories. From UL 60335-2-40: CONDENSING UNIT factory-made assembly that includes one or more motor-compressors, CONDENSER in cooling mode and motor-driven fan, blower or pump to circulate the heat transfer fluid through the CONDENSER with associated operational controls in addition to the necessary wiring

A change in Group B will be needed for IECC

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal only provides clarity and consistency for the use of this term throughout the I-codes.

M3-21

IMC: 202 (New)

Proponents: Tim Earl, representing The Gypsum Association (tearl@gbhinternational.com)

2021 International Mechanical Code

Add new definition as follows:

GYPSUM BOARD. A type of gypsum panel product consisting of a noncombustible core primarily of gypsum with paper surfacing.

GYPSUM WALLBOARD. A gypsum board used primarily as an interior surfacing for building structures.

Reason Statement: This defines terms already used in the code, using definitions already in the IBC and proposed for several other I-Codes this cycle that are also harmonized to ASTM and the industry.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a simple terminology update with no impact on cost.

M4-21 Part I

IMC: SECTION 202

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Delete and substitute as follows:

~~**HEAT PUMP.** A refrigeration system that extracts heat from one substance and transfers it to another portion of the same substance or to a second substance at a higher temperature for a beneficial purpose.~~

HEAT PUMP. A refrigeration system or factory-made appliance that utilizes refrigerant to transfer heat into a space or substance.

M4-21 Part II

IRC: SECTION 202

Proponents: Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Residential Code

Delete and substitute as follows:

~~**[MP] HEAT PUMP.** An *appliance* having heating or heating and cooling capability and that uses refrigerants to extract heat from air, liquid or other sources.~~

[MP] HEAT PUMP.
A refrigeration system or factory-made appliance that utilizes refrigerant to transfer heat into a space or substance.

Reason Statement: There are two different definitions in the I-codes for "heat pump". The IRC definition identifies heat pumps as an appliance, and the IMC identifies heat pumps as are refrigeration system. This definition is clarifying that a heat pump could be either an appliance or a refrigeration system. This definition is also simplified that a heat pump is transferring heat into a space or substance. The reference to "beneficial purpose" in the IMC is commentary. The proposed new common definition is closely aligned with the term used in the two refrigeration standards referenced in the I-codes, ASHRAE 15 and UL 60335-2-40.
For information purposes, the following are the other definitions:

From the IRC: [MP] HEAT PUMP. An appliance having heating or heating and cooling capability and that uses refrigerants to extract heat from air, liquid or other sources.

From the IMC: HEAT PUMP. A refrigeration system that extracts heat from one substance and transfers it to another portion of the same substance or to a second substance at a higher temperature for a beneficial purpose.

From ASHRAE 15: HEAT PUMP a refrigerating system used to transfer heat into a space or substance.
From UL 60335-2-40: HEAT PUMP appliance which takes up heat at a certain temperature and releases heat at a higher temperature

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction. This proposal provides clarity and consistency for the use of this term throughout the I-codes.

M5-21

IMC: SECTION 202

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

LOWER FLAMMABLE LIMIT (REFRIGERANT) (LFL). The minimum concentration of refrigerant ~~that is~~ at which a flame is capable of propagating ~~a flame~~ through a homogeneous mixture of refrigerant and air under specific test conditions in accordance with ASHRAE 34.

Reason Statement: The current definition implies that it is the concentration that is the substance capable of propagating the flame, instead of the flame being what is capable. This proposal clarifies that the flame propagation is determined under specific test conditions in ASHRAE 34.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The clarification of this definition does not change what is required by the code and as such, it doesn't change the materials or labor required to comply with the code.

M6-21

IMC: SECTION 202

Proponents: Tim Earl, representing GBH International (tearl@gbhinternational.com)

2021 International Mechanical Code

Revise as follows:

NONCOMBUSTIBLE MATERIALS. A material that passes ASTM E136. ~~Materials that, when tested in accordance with ASTM E136, have not fewer than three of four specimens tested meeting all of the following criteria:~~

1. ~~The recorded temperature of the surface and interior thermocouples shall not at any time during the test rise more than 54°F (30°C) above the furnace temperature at the beginning of the test.~~
2. ~~There shall not be flaming from the specimen after the first 30 seconds.~~
3. ~~If the weight loss of the specimen during testing exceeds 50 percent, the recorded temperature of the surface and interior thermocouples shall not at any time during the test rise above the furnace air temperature at the beginning of the test, and there shall not be flaming of the specimen.~~

Reason Statement: This proposal revises the definition of NONCOMBUSTIBLE to match the other codes. The current definition contains specific test details taken from ASTM E136 which is unnecessary. ASTM E136 contains clear pass/fail criteria, so the new definition is accurate, and consistent with the other ICC codes which were revised last cycle.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This simply revises the definition to make it simpler, with no impact on cost.

M7-21

IMC: SECTION 202

Proponents: Robert Schwarz, representing BUILDTank, Inc. (robby@btankinc.com)

International Mechanical Code

2021 International Mechanical Code

Revise as follows:

PLENUM. An enclosed portion of the building structure, other than an *occupiable space* being conditioned, that is designed to allow for passive *air transfer* ~~movement~~ or active, ducted, air transport from the *air handling unit*, and thereby serve as part of an air distribution system.

Reason Statement: The current definition of Plenum has led to its use in the code to define not only the space within buildings where wires, ducts, and pipes can be run, but also the portion of HVAC system that actually transports pressurized air around the building to heat, cool or ventilate the structure. These two examples of plenums are very different. The intent of the proposal it to ensure that building cavities are no longer used as pressurized duct systems, but rather as an enclosed area of the structure where duct can be run to move pressurized air from the air handling equipment. The proposal continues to allow for passive air transfer as defined in the IMC. This will create alignment between the IECC and the IMC. It is impossible to control the air that is being pushed and pulled through building cavities that are used as ducts. When you pan a floor system or used a drop ceiling as duct for example, the air that is returning to the furnace comes from many more places than the intended room. Air, being a transport mechanism for moisture, energy, and pollutants, needs to be better controlled than is possible by using building cavities as duct work, and therefore HVAC systems need to be fully ducted. The IECC recognizes the building durability, efficiency, and safety concerns associated with allowing building cavities to be used as pressurized duct systems and that we gain better control and predictability of air flow that is being pushed and pulled by the air handling equipment by prohibiting such practices. Moisture control, energy control, pollutant control, house and room pressure control are all gained by fully ducting HVAC systems and not allowing building cavities to be used as duct work.

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal may increase cost in commercial and multifamily projects higher than 3 stories as it is still somewhat common for plenums to carry pressurized air from or two the air handler. However, building durability, and health and safety is ensured by containing and controlling air that transports heat, moisture and pollutants.

M8-21 Part I

IMC: SECTION 202

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A THREE PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE AND PART III WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Delete and substitute as follows:

~~**REFRIGERANT.** A substance utilized to produce refrigeration by its expansion or vaporization.~~

REFRIGERANT. The fluid used for heat transfer in a refrigeration system that undergoes a change of state to absorb heat.

M8-21 Part II

IFC: SECTION 202

Proponents: Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A THREE PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE AND PART 3 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Fire Code

Revise as follows:

REFRIGERANT. The fluid used for heat transfer in a refrigeration system~~; the refrigerant~~ that undergoes a change of state to absorb heat.

M8-21 Part III

IRC: SECTION 202

Proponents: Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A THREE PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE AND PART 3 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Residential Code

Delete and substitute as follows:

~~**[MP] REFRIGERANT.** A substance used to produce refrigeration by its expansion or evaporation.~~

[MP] REFRIGERANT. The fluid used for heat transfer in a refrigeration system that refrigerant undergoes a change of state to absorb heat.

Reason Statement: There are three different definitions in the I-codes for “refrigerant”. This proposal is to use the current definition for the term in the IFC. The IFC definition provides the best detail as to what a refrigerant is, and aligns with ASHRAE 15, which is referenced in the IMC. The IRC and IMC definitions are not as precise.
For information purposes, the following are the other definitions:

From the IRC: [MP] REFRIGERANT. A substance used to produce refrigeration by its expansion or evaporation.

From the IMC: REFRIGERANT. A substance utilized to produce refrigeration by its expansion or vaporization.

From ASHRAE 15: REFRIGERANT the fluid used for heat transfer in a refrigerating system; the refrigerant absorbs heat and transfers it at a higher temperature and a higher pressure, usually with a change of state.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction. This proposal provides clarity and consistency for the use of this term throughout the I-codes.

M9-21

IMC: SECTION 202

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

REFRIGERANT SAFETY GROUP CLASSIFICATION. The ~~alphabetical/numerical~~ alphanumeric designation that indicates both the toxicity and flammability classifications of refrigerants in accordance with ASHRAE 34.

Delete without substitution:

~~**TOXICITY CLASSIFICATION (REFRIGERANT).** An alphabetical designation used to identify the toxicity of refrigerants. Class A indicates a refrigerant with low toxicity. Class B indicates a refrigerant with high toxicity.~~

~~**FLAMMABILITY CLASSIFICATION (REFRIGERANT).** The alphabetical/numerical designation used to identify the flammability of refrigerants.~~

Reason Statement: This proposal clarifies that the method for determining the various flammability and toxicity classifications are in accordance with Chapter 6 of ASHRAE 34. Relocating the definitions for “flammability classification” and “toxicity classification” as sub-definitions directly under the definition “refrigerant safety classification” provides for easier use and application of the code. These two relocated terms only apply to the main definition.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction. This proposal provides clarity as to what specific conditions differentiate between the various flammability and toxicity classes of refrigerants.

M10-21 Part I

IMC: SECTION 202; IFC: SECTION 202

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Revise as follows:

REFRIGERATION ~~REFRIGERATING~~ SYSTEM. A combination of interconnected parts in which a refrigerant is enclosed and ~~refrigerant-containing parts constituting one closed refrigerant circuit in which a refrigerant~~ is circulated for the purpose of extracting then rejecting heat.

2021 International Fire Code

Revise as follows:

[M] ~~REFRIGERATION~~ ~~(~~REFRIGERATION~~)~~ SYSTEM. A combination of interconnected parts in which a refrigerant is enclosed and ~~refrigerant-containing parts constituting one closed refrigerant circuit in which a refrigerant~~ is circulated for the purpose of extracting then rejecting heat.

M10-21 Part II

IRC: SECTION 202

Proponents: Joseph J. Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE AND FIRE CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Residential Code

Revise as follows:

[MP] ~~REFRIDGERATING~~ REFRIGERATION SYSTEM. A combination of interconnected parts ~~forming a closed circuit~~ in which refrigerant is enclosed and is circulated for the purpose of extracting, then rejecting, heat. ~~A direct refrigerating system is one in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. An indirect refrigerating system is one in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated.~~

Reason Statement: The proposal will better correlate the I-Codes with the industry standards, ASHRAE 15, for using the term refrigeration system rather than refrigerating systems. No technical change is intended.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction. This proposal provides clarity and consistency for the use of this term throughout the I-codes.

M11-21

IMC: 304.7.1 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Mechanical Code

Add new text as follows:

304.7.1 Garage conditioning. Where private garages are required to be conditioned, HVAC systems shall be dedicated to the garage and serve no other spaces. Return air from forced air systems shall be in accordance with Section 601.5.

Reason Statement: Reason. The IMC is silent when it comes to co-mingling HVAC systems with a private garage. The garage must not share supply or return air with the residence for obvious safety reasons. This language simply spells out that if the garage is to be conditioned it must be accomplished with its own dedicated system. Regardless of the fuel source, the return air requirements are the same.

Cost Impact: The code change proposal will decrease the cost of construction
There are no new requirements here to increase cost. This is editorial in nature.

M12-21

IMC: TABLE 305.4

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Revise as follows:

TABLE 305.4
PIPING SUPPORT SPACING[a]

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
ABS pipe	4	10[c]
Aluminum pipe and tubing	10	15
Cast-iron pipe[b]	5	15
Copper or copper-alloy pipe	12	10
Copper or copper-alloy tubing	8	10
CPVC pipe or tubing, 1 inch and smaller	3	10[c]
CPVC pipe or tubing, $1^1/_4$-inches and larger	4	10[c]
Lead pipe	Continuous	4
~~PB pipe or tubing~~	~~$2^2/_3$ (32 inches)~~	~~4~~
PE-RT 1 inch and smaller	$2^2/_3$ (32 inches)	10[c]
PE-RT $1^1/_4$ inches and larger	4	10[c]
PEX tubing 1 inch and smaller	$2^2/_3$ (32 inches)	10[c]
PEX tubing $1^1/_4$ inches and larger	4	10[c]
Polypropylene (PP) pipe or tubing, 1 inch and smaller	$2^2/_3$ (32 inches)	10[c]
Polypropylene (PP) pipe or tubing, $1^1/_4$ inches and larger	4	10[c]
PVC pipe	4	10[c]
Steel pipe	12	15
Steel tubing	8	10

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. See Section 301.18.

b. The maximum horizontal spacing of cast-iron pipe hangers shall be increased to 10 feet where 10-foot lengths of pipe are installed.

c. Mid-story guide.

Reason Statement: Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s. PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015. The referenced product standard, ASTM D3309 “Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems” was withdrawn in 2010.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
PB pipe or tubing is no longer available and has already been removed from other sections of the IMC.

M12-21

M13-21

IMC: 306.5

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Mechanical Code

Revise as follows:

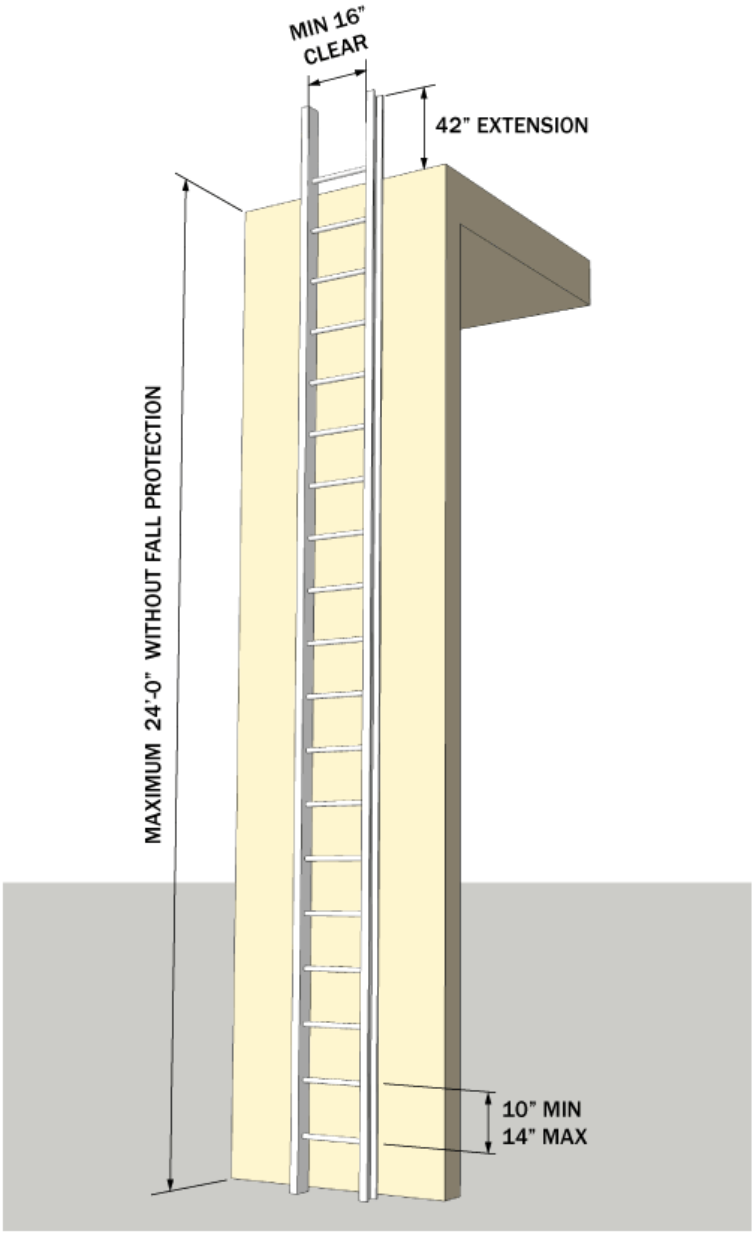
306.5 Equipment and appliances on roofs or elevated structures. Where *equipment* requiring access or *appliances* are located on an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade to access such *equipment* or *appliances*, an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) in height or walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Such access shall not require the use of portable ladders. Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.
Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge or landing platform not less than ~~30 inches (762 mm)~~. 42 inches (1067 mm)
2. Ladders shall have rung spacing not less than 10 inches (254 mm) and not to exceed 14 inches (356 mm) on center. The uppermost rung shall be not greater than 24 inches (610 mm) below the upper edge of the roof hatch, roof or parapet, as applicable.
3. Ladders shall have a toe spacing not less than ~~6 inches (152 mm)~~ 7 inches (178 mm) and not more than 12 inches (305 mm) deep
4. There shall be not less than ~~18 inches (457 mm)~~ 7 inches (178 mm) and not more than 12 inches (305 mm) between rails.
5. Rungs shall have a diameter not less than 0.75-inch (19.1 mm) and be capable of withstanding a 300-pound (136 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds per square foot (488 kg/m^2). Landing dimensions shall be not less than 18 inches (457 mm) and not less than the width of the ladder served. A guard rail shall be provided on all open sides of the landing.
7. Climbing clearance. The distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be not less than 30 inches (762 mm) measured perpendicular to the rungs. This distance shall be maintained from the point of ladder access to the bottom of the roof hatch. A minimum clear width of 15 inches (381 mm) shall be provided on both sides of the ladder measured from the midpoint of and parallel with the rungs except where cages or wells are installed.
8. Landing required. The ladder shall be provided with a clear and unobstructed bottom landing area having a minimum dimension of 30 inches (762 mm) by 30 inches (762 mm) centered in front of the ladder.
9. Ladders shall be protected against corrosion by *approved* means.
10. Access to ladders shall be provided at all times.

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 *occupancies*.

Reason Statement: · In 2018 OSHA revised its permanent ladder standards. Its time to revise the code to prevent confusion among designers and code officials as to what dimensions should be followed. Item #1 can be located in OSHA Standard Section 1910.23 (d) (7). Item 2 in Section 1910.27 (b) (1) (ii), Item 3 in Section1910.23 (12) (i). and item 4 in 1910.23 (b) (4).
· The American Ladder Institute estimates that about 500,000 ladder accidents happen each year in this country resulting in almost 300 deaths and 11 billion in medical costs. Its important for the code to keep up with the changing Standard in the name of safety.



Ladder Design Criteria - be sure to check the latest OSHA regulations

Cost Impact: The code change proposal will increase the cost of construction
There may be slight increases in cost as some of the dimensions have increased such as side rail height etc.

M13-21

M14-21

IMC: 306.5

Proponents: Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us); Nancy Swearengin, Pikes Peak Regional Building Department, representing Self

2021 International Mechanical Code

Revise as follows:

306.5 Equipment and appliances on roofs or elevated structures. Where *equipment* requiring access or *appliances* are located on an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade to access such *equipment* or *appliances*, an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) in height or walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Such access shall not require the use of portable ladders. Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.
Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than 30 inches (762 mm).
2. Ladders shall have rung spacing not to exceed 14 inches (356 mm) on center. The uppermost rung shall be not greater than 24 inches (610 mm) below the upper edge of the roof hatch, roof or parapet, as applicable.
3. Ladders shall have a toe spacing not less than 6 inches (152 mm) deep.
4. There shall be not less than 18 inches (457 mm) between rails.
5. Rungs shall have a diameter not less than 0.75-inch (19.1 mm) and be capable of withstanding a 300-pound (136 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds per square foot (488 kg/m^2). Landing dimensions shall be not less than 18 inches (457 mm) and not less than the width of the ladder served. A guard rail shall be provided on all open sides of the landing.
7. Climbing clearance. The distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be not less than 30 inches (762 mm) measured perpendicular to the rungs. This distance shall be maintained from the point of ladder access to the bottom of the roof hatch. A minimum clear width of 15 inches (381 mm) shall be provided on both sides of the ladder measured from the midpoint of and parallel with the rungs except where cages or wells are installed.
8. Landing required. The ladder shall be provided with a clear and unobstructed bottom landing area having a minimum dimension of 30 inches (762 mm) by 30 inches (762 mm) centered in front of the ladder.
9. Ladders shall be protected against corrosion by *approved* means.
10. Access to ladders shall be provided at all times.
11. <u>Top landing required. The ladder shall be provided with a clear and unobstructed landing on the exit side of the roof hatch having a minimum space of 30 inches deep and be of the same width as the hatch.</u>

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 *occupancies*.

Reason Statement: Safety for personnel is paramount. A person must have an area at the roof hatch opening that allows them to safely get onto and off of the roof.

- Without the proposed change the code official has nothing with which to enforce any requirement for a safe landing area for people attempting to access or exit the roof.
- The top of the permanent ladder is often 16 feet or more above the ground.
- Personnel should not be required to hang onto the top of a ladder, open the roof hatch and then try to figure out a safe way to step onto a roof.
- Balancing on the edge of the roof hatch opening is not an acceptable option for entry onto or exit off of a roof.
- Personnel should not find themselves staring into a parapet wall only inches from the roof hatch opening.
- Workers are often carrying supplies, wearing backpacks filled with tools or standing at the hatch using a rope to pull needed service items up to the roof. Not having a place to stand or set down tools, backpacks or repair parts at the top of the ladder creates a serious hazard.
- People are required to get on roofs in all types of weather including when it is raining and snowing. Roofs, especially rubber and metal ones, are slick and difficult to navigate when there is any type of moisture on them. Personnel deserve a safe area upon which to stand when getting onto or off of the roof.
- The ladder to the roof is often located in a dark area of the building. Upon opening the hatch personnel can momentarily be blinded by the sun and by reflections off of the roofing material. Not having a safe way to access the roof creates even more of a hazard.

- It is difficult to find the ladder rungs when coming through a roof hatch onto the fixed ladder. Not having a safe place to stand on the roof when attempting to find a ladder rung makes a difficult situation a dangerous one.

OSHA states that 20 percent of all fatal and lost workdays in general industry are due to falls from ladders. The American Ladder Institute estimates that about 500,000 ladder accidents occur annually in the United States resulting in almost 300 fatalities and $11 billion in injury costs.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There should be no additional cost associated with properly placing a roof hatch in a safe manner.

M14-21

M15-21

IMC: 307.2.5

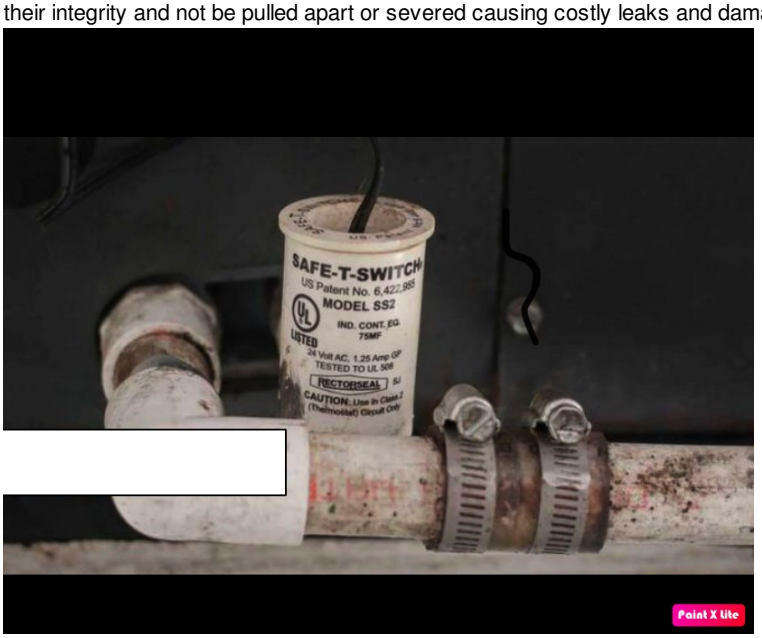
Proponents: Amanda Hickman, representing Rectorseal (amanda@thehickmangroup.com)

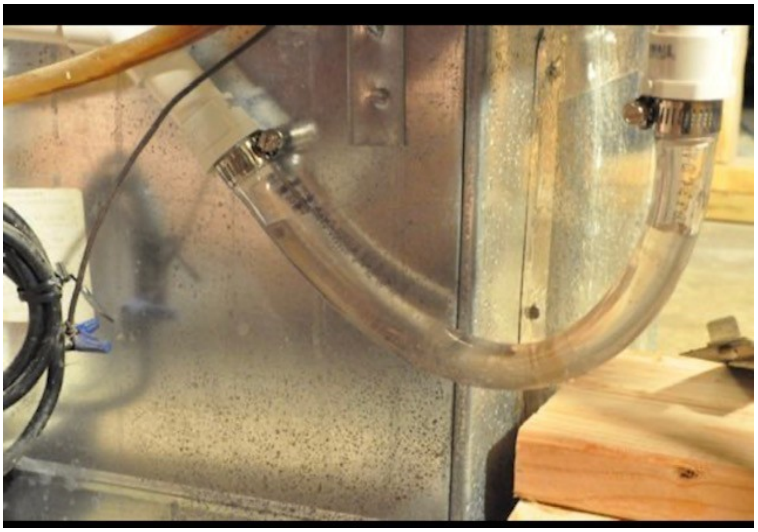
2021 International Mechanical Code

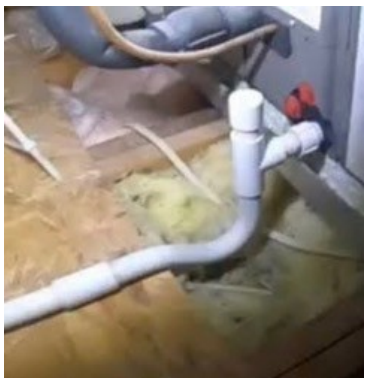
Revise as follows:

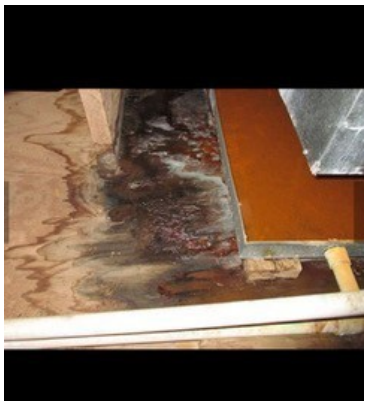
307.2.5 Drain line maintenance. Condensate drain lines shall be configured to ~~permit~~ allow access to ~~the~~ clear~~ing of~~ blockages in both directions of the drain line and to perform~~ance of~~ maintenance without requiring the drain line to be cut, severed, disconnected or pulled apart.

Reason Statement: Routine maintenance and the clearing of blockages is a common and routine occurrence for condensate lines. Unfortunately, due to typical configurations, service personnel often must pull apart lines to clear blockages and flush out the lines. This often leads to leaks which can cause damage to the surrounding area. This proposal will ensure that the proper configuration is installed so that condensate lines can maintain their integrity and not be pulled apart or severed causing costly leaks and damage when service is needed.









Cost Impact: The code change proposal will increase the cost of construction
The added materials may cost between $10-15.

M15-21

M16-21

IMC: 401.4, 501.3.1

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Mechanical Code

Revise as follows:

401.4 Intake opening location. Air intake openings shall comply with all of the following:

1. Intake openings shall be located not less than 10 feet (3048 mm) from lot lines or buildings on the same lot.
2. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, streets, alleys, parking lots and loading docks, except as specified in Item 3 or Section 501.3.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3048 mm) horizontally from streets, alleys, parking lots and loading docks provided that the openings are located not less than 25 feet (7620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured from the closest edge of the street or public way.
3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening. Separation is not required between intake air openings and living space *exhaust air* openings of an individual *dwelling unit* or *sleeping unit* where ~~an approved~~ factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the *appliance* manufacturer's instructions.
4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant *equipment*.

501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings that are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.
2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.
3. For all *environmental air* exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all *occupancies* other than Group U; and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious. Separation is not required between intake air openings and living space *exhaust air* openings of an individual *dwelling unit* or *sleeping unit* where ~~an approved~~ factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the *appliance* manufacturer's instructions.
4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the International Building Code for utilities and attendant *equipment*.
5. For specific systems, see the following sections:

    5.1. Clothes dryer exhaust, Section 504.4.

    5.2. Kitchen hoods and other kitchen exhaust *equipment*, Sections 506.3.13, 506.4 and 506.5.

    5.3. Dust, stock and refuse conveying systems, Section 511.2.

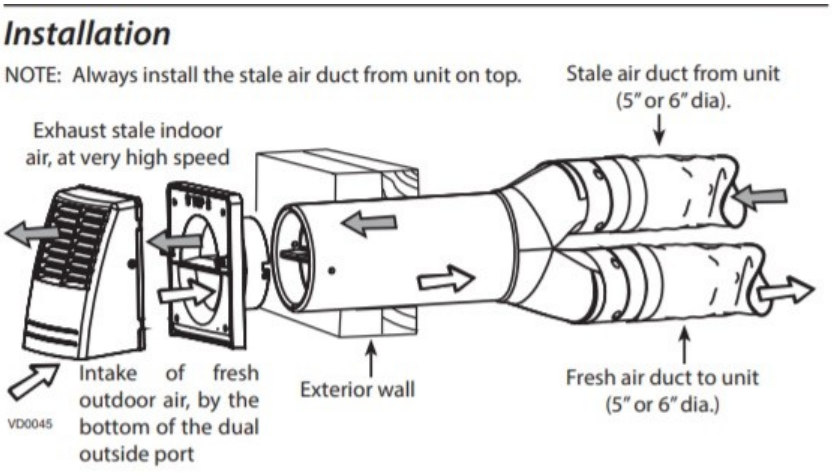
    5.4. Subslab soil exhaust systems, Section 512.4.

    5.5. Smoke control systems, Section 513.10.3.

    5.6. Refrigerant discharge, Section 1105.7.

    5.7. *Machinery room* discharge, Section 1105.6.1.

Reason Statement: Factory-built intake/exhaust combination termination fittings are regularly provided by manufacturers and installed by builders to separate mechanical air intakes from mechanical exhaust serving dwelling unit or sleeping unit mechanical ventilation systems. The included image from a ventilation system manufacturer's installation instructions provides an example of a typical fitting serving this purpose.



IMC Sections 401.4 and 501.3.1 approve the use of "approved factory-built intake/exhaust combination termination fittings" to separate the air streams associated with mechanical intake air openings and living space exhaust air, when the fitting is provided in accordance with manufacturer's instructions. Similarly, Section G2407.1 of the Fuel Gas Code (see below for reference) approves the use of concentric vent termination fittings to separate combustion air from flue gases provided that such fittings are installed "in accordance with the appliance manufacturer's instructions". Like the Fuel Gas Code's treatment of concentric vent termination fittings, no special approval should be required for factory-built intake/exhaust combination termination fittings when installed in accordance with appliance manufacturer's instructions.

Fuel Gas Code reference: "G2407.1 (304.1) General. ...Direct-vent appliances, gas appliances of other than natural draft design, vented gas appliances not designated as Category I and appliances equipped with power burners, shall be provided with combustion, ventilation and dilution air in accordance with the appliance manufacturer's instructions."

Cost Impact: The code change proposal will decrease the cost of construction
Removing requirements for special approval of factory-built intake/exhaust combination termination fittings can be expected to reduce labor costs for builders, contractors, and code officials.

M16-21

M17-21

IMC: 401.4

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

401.4 Intake opening location. Air intake openings shall comply with all of the following:

1. Intake openings shall be located not less than 10 feet (3048 mm) from lot lines or buildings on the same lot.
2. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, streets, alleys, parking lots and loading docks, except as specified in Item 3 or Section 501.3.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3048 mm) horizontally from streets, alleys, parking lots and loading docks provided that the openings are located not less than 25 feet (7620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured from the closest edge of the street or public way.
3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening. Separation is not required between intake air openings and living space *exhaust air* openings of an individual *dwelling unit* or *sleeping unit* where an approved factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions.
4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant *equipment*.
5. Dwelling unit outdoor air ventilation system intake openings that are installed on an exterior wall and have a louver, grille, or screen intake opening nominal size less than ½" shall be located to allow maintenance from an outdoor opening, an exterior egress or balcony, a deck, or without the use of a ladder, from the finished ground level.

Reason Statement: During normal operation, ventilation air intakes can become clogged with debris and should be installed to permit easy maintenance by occupants or service providers. Presumably, ventilation air intake openings located on roofs will be serviced by technicians who have access to the roof, and so no special requirements are proposed for access in this case. Ventilation air intake openings that are located on an exterior wall should be serviceable from either indoors (thought an outdoor opening), or from an exterior horizontal surface. An exception is provided for intake openings with louvers, grilles, or screens with an opening dimension of less than ½". Larger opening dimensions (i.e., those complying with Table 401.5 with a nominal opening size of ½") are less likely to clog with debris and should not require service as frequently.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 36A.

Cost Impact: The code change proposal will increase the cost of construction
In the case that providing access for maintenance requires installers to increase the length of the ventilation air intake duct to avoid the use of portable ladders or access equipment, the estimated increase in cost is $9.20/ft of supply duct. This cost is derived from Mechanical Costs with R.S. Means Data, 2020 edition, 23 33 46.10.1940, and is the total installed cost per foot for insulated 6" flex duct, including overhead and profit.

M18-21

IMC: SECTION 202, 403.1, 403.3.2.1

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

SUPPLY AIR SYSTEM. An assembly of connected ducts,*plenums*, fittings, registers and grilles through which air, ~~heated or cooled~~ conditioned or unconditioned is conducted from the supply unit to the space or spaces to be ~~heated or cooled~~ conditioned or unconditioned (see also Return air system).

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or *exhaust air* ~~except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 *occupancies* shall be provided by an exhaust system, supply system or combination thereof~~. The amount of supply air shall be approximately equal to the amount of return and *exhaust air*. The system shall not be prohibited from producing negative or positive pressure. The system to convey *ventilation air* shall be designed and installed in accordance with Chapter 6.

Exception: Systems that are in accordance with Section 403.3.2.1.

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each *dwelling unit*. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

$$Q_{OA} = 0.01 A_{floor} + 7.5(N_{br} + 1) \quad \textbf{(Equation 4-9)}$$

where:

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = floor area, ft^2

N_{br} = number of bedrooms; not to be less than one

Exceptions:

1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.
2. The minimum mechanical ventilation rate determined in accordance with Equation 4-9 shall be reduced by 30 percent provided that both of the following conditions apply:

   2.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

      2.1.1. Living room.

      2.1.2. Dining room.

      2.1.3. Kitchen.

   2.2. The whole-house ventilation system is a *balanced ventilation* system.

Reason Statement: Section 1020.5 of the IBC prohibits corridors from serving as “ventilation air ducts”. However, changes to the 2012 IMC introduced approval of mechanical ventilation systems that do not comply with this requirement. Specifically, when an exhaust-only ventilation system is specified to provide outdoor air for a dwelling unit whose entrance door is not located on an exterior wall (i.e., a dwelling unit opening onto a corridor that is not open to the atmosphere, referred to as a “corridor” within this rationale), we can expect much of the ventilation air to be conveyed through the corridor. This claim is supported by a study showing that for recently constructed dwelling units, approximately 40% of dwelling unit leakage area is to the corridor.* Operating an exhaust-only outdoor air ventilation system in a dwelling unit with an entrance door located on a corridor can be expected to establish a pressure differential with respect to the corridor, forcing a large percentage of the dwelling unit ventilation air to be conveyed by the corridor, in violation of IBC Section 1020.5. To coordinate IBC Section 1020.5 with IMC Sections 403.3.2.1 and 403.1, this proposal reestablishes the pre-2012 requirement for mechanical ventilation systems to supply outdoor ventilation air to the dwelling units without using the corridor to convey the outdoor ventilation air.

This proposal also modifies the IMC definition of “supply air system” to ensure that it can apply to ventilation systems as well as heating and cooling systems. The term “supply air system” is used only once within the body of the 2021 IMC, and its use is not italicized; so the definition of “supply air system” does not currently apply anywhere within the IMC and its modification would not affect any other section (see the Preface section of the IMC for more information on use of italicized terms).

This proposal coordinates the IBC Section 1020.5 requirements with the IMC while maintaining the ability to use exhaust-only ventilation systems for provision of outdoor air for a dwelling unit whose entrance door is located on an exterior wall. The IBC defines an Exterior Wall as follows: “EXTERIOR WALL. A wall, bearing or nonbearing, that is used as an enclosing wall for a building, other than a fire wall, and that has a slope of 60 degrees (1.05 rad) or greater with the horizontal plane.”

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 34.

Bibliography: Bohac D., and Sweeney L. 2020. Energy Code Field Studies: Low-Rise Multifamily Air Leakage Testing. Prepared by the Center for Energy and Environment, Ecotope, and The Energy Conservatory. Prepared for the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy. https://www.energycodes.gov/sites/default/files/documents/LRMF_AirLeakageTesting_FinalReport_2020-07-06.pdf. [See Table 45, which shows average leakage to “common” area of 42%. The report also notes, “for buildings in this study, “common areas” are made up almost completely of corridors and a few small rooms such as mechanical closets and elevator rooms.]

Cost Impact: The code change proposal will not increase or decrease the cost of construction
IBC Section 1020.5 prohibits corridors from serving as “ventilation air ducts”. So presumably, the more restrictive provision of this section of the IBC would prevail over the permissive language in IMC 403.3.2.1 that permits the use of an exhaust system for provision of outdoor air for any Group R-2, R-3, or R-4 dwelling unit. Because this change only coordinates IMC requirements with what the (more restrictive) IBC already requires, no additional material or labor costs are associated with this proposal.

M18-21

M19-21

IMC: 403.3.1, 403.3.2, 403.3.2.1

Proponents: Joseph Summers, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

403.3.1 Other buildings intended to be occupied. The design of local exhaust systems and ventilation systems for outdoor air for *occupancies* other than Group R-2, R-3 and R-4 ~~three stories and less above grade plane~~ shall comply with Sections 403.3.1.1 through 403.3.1.4.

403.3.2 Group R-2, R-3 and R-4 occupancies~~, three stories and less~~. The design of local exhaust systems and ventilation systems for outdoor air in Group R-2, R-3 and R-4 *occupancies* ~~three stories and less in height above grade plane~~ shall comply with Sections 403.3.2.1 through 403.3.2.5.

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each*dwelling unit*. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

$$Q_{OA} = 0.01 A_{floor} + 7.5(N_{br} + 1) \quad \textbf{(Equation 4-9)}$$

where:

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = <u>conditioned</u> floor area, ft^2

N_{br} = number of bedrooms; not to be less than one

Exceptions:

1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.
2. The minimum mechanical ventilation rate determined in accordance with Equation 4-9 shall be reduced by 30 percent provided that both of the following conditions apply:

   2.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

      2.1.1. Living room.

      2.1.2. Dining room.

      2.1.3. Kitchen.

   2.2. The whole-house ventilation system is a *balanced ventilation* system.

Reason Statement: Prior to 2015, the IMC used the same mechanical ventilation outdoor airflow rate calculation procedure for all R-2, R-3, and R-4 dwelling units. Beginning in 2015, a new calculation procedure was introduced in the IMC for low-rise R-2, R-3, and R-4 dwelling units. This 2015 calculation procedure was based on the airflow equation used in ASHRAE 62.2-2010, which was developed for leaky, detached, single-family homes (bad assumption!). Applying this ventilation equation and associated assumptions to tight, attached, low-rise R-2, R-3, and R-4 dwelling units results in extremely low flow rates that are a fraction of what was previously required by the IMC (1/3 less), what is currently required by ASHRAE 62.2 (1/3 less), and what is currently required by ASHRAE 62.1 (1/2 less).
Since 2015, ASHRAE 62.2 has revised its airflow rate calculation procedure for attached dwelling units, based on infiltration assumptions that are relevant to attached dwelling units, and the result is much closer to that required by required by the 2012 IMC for all private dwelling units and by the 2021 IMC for all private dwelling units that are not in low-rise R-2, R-3, and R-4 buildings. The rate required for IMC low-rise R-2, R-3, and R-4 dwelling units should also be revised to avoid under-ventilation that can lead to poor IAQ and negative health outcomes. Avoiding under-ventilating is especially important for IAQ in high-density multifamily dwelling units.

Following are calculations showing the outdoor airflow rate (QOA) required by various methods and demonstrating the deficiency of the ventilation rates for IMC low-rise R-2, R-3, and R-4 dwelling units. The rate calculated is for a 2-bedroom, 800 ft2 apartment with 8 ft ceilings (volume = 6400

ft3)

Method A: 2015-2021 IMC, dwelling units in low-rise R-2, R-3, and R-4 buildings (same equation used in ASHRAE 62.2-2010):

QOA = 0.01 cfm/ft2*ConditionedFloorArea + 7.5*(NumberBedrooms + 1)

= 0.01*800 + 7.5*(2+1)

= 8 + 22.5

= 30.5 cfm [This rate is 1/3 less than the 2012 IMC, 1/3 less than ASHRAE 62.2-2019, and ½ less than ASHRAE 62.1-2019]

Method B: 2012 IMC, all private dwelling units (same equation used in 2021 IMC for all private dwelling units that are not in low-rise R-2, R-3, and R-4 buildings):

QOA = Max [0.35 ACH, (15 cfm/person)*(2 persons for first bedroom and 1 person for second bedroom)]

= Max [0.35ACH*(6400 ft3)*(1-hr/60-min), 45]

= Max [37, 45]

= 45 cfm

Method C: ASHRAE 62.2-2019, all non-transient vertically attached dwelling units

QOA = 0.03 cfm/ft2*ConditionedFloorArea + 7.5*(NumberBedrooms + 1)

= 0.03*800 + 7.5*(2+1)

= 24 + 22.5

= 46.5 cfm [This method is proposed within this proposal. Note that this method produces values that are very close to those in Method B (i.e., the 2012 IMC for all private dwelling units and the 2021 IMC for all private dwelling units that are not in low-rise R-2, R-3, and R-4 buildings]

Method D: ASHRAE 62.1-2019, all transient dwelling units:

QOA = 0.06 cfm/ft2*ConditionedFloorArea + (5 cfm/person)*(2 persons for first bedroom and 1 person for second bedroom)

= 0.06*800 + 5*3

= 0.06*800 + 5*3

= 48 + 15

= 63 cfm

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 38.

Cost Impact: The code change proposal will increase the cost of construction
An increase in required ventilation rate could, in some situations, require a “step up” to the next size of ventilation equipment or a “step up” to the

next duct size in some parts of systems. Generally, next size “step-ups” will have some increased material costs but this would not always be the case for every project.

M19-21

M20-21

IMC: TABLE 403.3.1.1

Proponents: Julius Ballanco, representing Adult Changing Table Committee (JBEngineer@aol.com)

2021 International Mechanical Code

Revise as follows:

TABLE 403.3.1.1
MINIMUM VENTILATION RATES

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT ^{2} [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT ^{2} [a]	EXHAUST AIRFLOW RATE CFM/FT ^{2} [a]
Public spaces				
Corridors	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1.0
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—
Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Shower room (per shower head) [g]	—	—	—	50/20 [f]
Smoking lounges [b]	70	60	—	—
Toilet rooms — public [g]	—	—	—	50/70 [e]
Room with adult changing station			.	50/70[e]

For SI: 1 cubic foot per minute = 0.0004719 m ^{3}/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m ^{3}/(s • m ^{2}), °C = [(°F) – 32]/1.8, 1 square foot = 0.0929 m ^{2}.

a. Based on *net occupiable floor area.*

b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1 , Item 3).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems in enclosed parking garages shall comply with Section 404 .

e. Rates are per water closet, ~~or~~ urinal or adult changing station. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

g. Mechanical exhaust is required and recirculation from such spaces is prohibited . For occupancies other than science laboratories, where there is a wheel - type energy recovery ventilation (ERV) unit in the exhaust system design, the volume of air leaked from the exhaust airstream into the outdoor airstream within the ERV shall be less than 10 percent of the outdoor air volume. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1 , Items 2 and 4).

h. For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20 . Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

Reason Statement: This change is being submitted by the Adult Changing Table Committee of ICC A117.1. There are proposals to the Building Code and Plumbing Code related to the adult changing stations. The Committee believed that the ventilation requirements in the Mechanical Code needed to address the additional ventilation for an adult changing station. Since the station involves the changing of adult diapers, it was believed that the ventilation should mirror the requirements for a public toilet room. The proposed change is consistent with the ventilation required for each water closet and urinal. It adds "adult changing station" as the third item for determining the ventilation rate.

Cost Impact: The code change proposal will increase the cost of construction
This change will mandate a level of ventilation of a rooms having an adult changing station. The net increase in ventilation will add cost to construction.

M20-21

M21-21

IMC: TABLE 403.3.1.1

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Revise as follows:

TABLE 403.3.1.1
MINIMUM VENTILATION RATES

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT [2 a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT [2 a]	EXHAUST AIRFLOW RATE CFM/FT [2 a]
Animal Facilities				
Animal exam room (veterinary office)	20	10	0.12	-
Animal imaging (MRI/CT/PET)	20	10	0.18	0.9
Animal operating rooms	20	10	0.18	3.00
Animal postoperative recovery room	20	10	0.18	1.50
Animal preparation rooms	20	10	0.18	1.50
Animal procedure room	20	10	0.18	2.25
Animal surgery scrub	20	10	0.18	1.50
Large-animal holding room	20	10	0.18	2.25
Necropsy	20	10	0.18	2.25
Small-animal cage room (static cages)	20	10	0.18	2.25
Small-animal-cage room (ventilated cages)	20	10	0.18	1.50
Correctional facilities				
Booking/waiting	50	7.5	0.06	—
Cells without plumbing fixtures with plumbing fixtures [g]	25 25	5 5	0.12 0.12	— 1.0
Day room	30	5	0.06	—
Dining halls (see “Food and beverage service”)	—	—	—	—
Guard stations	15	5	0.06	—
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	—	—
Coin-operated laundries	20	7.5	0.12	—
Commercial dry cleaner	30	30	—	—
Commercial laundry	10	5	0.12	—
Storage, pick up	30	7.5	0.12	—
Education				
Art classroom [g]	20	10	0.18	0.7
Auditoriums	150	5	0.06	—
Classrooms (ages 5–8)	25	10	0.12	—
Classrooms (age 9 plus)	35	10	0.12	—
Computer lab	25	10	0.12	—
Corridors (see “Public spaces”)	—	—	—	—
Day care (through age 4)	25	10	0.18	—
Lecture classroom	65	7.5	0.06	—
Lecture hall (fixed seats)	150	7.5	0.06	—
Locker/dressing rooms [g]	—	—	—	0.25
Media center	25	10	0.12	—
Multiuse assembly	100	7.5	0.06	—
Music/theater/dance	35	10	0.06	—
Science laboratories [g]	25	10	0.18	1.0

Science laboratories	20	10	0.18	1.0
Smoking lounges [b]	70	60	—	—
Sports locker rooms [g]	—	—	—	0.5
Wood/metal shops [g]	20	10	0.18	0.5
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	—
Break rooms	25	5	0.06	-
Cafeteria, fast food	100	7.5	0.18	—
Coffee stations	20	5	0.06	-
Corridors	-	-	0.06	-
Dining rooms	70	7.5	0.18	—
Kitchens (cooking) [b]	20	7.5	0.12	0.7
Occupiable storage rooms for liquids or gels	2	5	0.12	-
Hotels, motels, resorts and dormitories				
Bathrooms/toilet—private [g]	—	—	—	25/50 [f]
Bedroom/living room	10	5	0.06	—
Conference/meeting	50	5	0.06	—
Dormitory sleeping areas	20	5	0.06	—
Gambling casinos	120	7.5	0.18	—
Laundry rooms, central	10	5	0.12	-
Laundry rooms within dwelling units	10	5	0.12	-
Lobbies/prefunction	30	7.5	0.06	—
Multipurpose assembly	120	5	0.06	—
Offices				
Break rooms	50	5	0.12	-
Conference rooms	50	5	0.06	—
Main entry lobbies	10	5	0.06	—
Occupiable storage rooms for dry materials	2	5	0.06	-
Office spaces	5	5	0.06	—
Reception areas	30	5	0.06	—
Telephone/data entry	60	5	0.06	—
Outpatient healthcare facilities[i,j]				
Birthing room	15	10	0.18	-
Class 1 imaging room	5	5	0.12	-
Dental operatory[k]	20	10	0.18	-
General examination room	20	7.5	0.12	-
Other dental treatment areas	5	5	0.06	-
Physical therapy exercise area	7	20	0.18	-
Physical therapy individual room	20	10	0.06	-
Physical therapeutic pool area	-	-	0.48	-
Prosthetics and orthotics room	20	10	0.18	-
Psychiatric consultation room	20	5	0.06	-
Psychiatric examination room	20	5	0.06	-
Psychiatric group room	50	5	0.06	-
Psychiatric seclusion room	5	10	0.06	-
Speech therapy room	20	5	0.06	

Speech therapy room	20	5	0.06	-
Urgent care examination room	20	7.5	0.12	-
Urgent care observation room	20	5	0.06	-
Urgent care treatment room	20	7.5	0.18	-
Urgent care triage room	20	10	0.18	-
Private dwellings, single and multiple				
Garages, common for multiple units [b]	—	—	—	0.75
Kitchens [b]	—	—	—	50 /100 [f]
Living areas [c]	Based on number of bedrooms. First bedroom, 2; each additional bedroom, 1	0.35 ACH but not less than 15 cfm/person	—	—
Toilet rooms and bathrooms [g]	—	—	—	25 /50 [f]
Public spaces				
Corridors	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1.0
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—
Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Shower room (per shower head) [g]	—	—	—	50/20 [f]
Smoking lounges [b]	70	60	—	—
Toilet rooms — public [g]	—	—	—	50/70 [e]
Retail stores, sales floors and showroom floors				
Dressing rooms	—	—	—	0.25
Mall common areas	40	7.5	0.06	—
Sales	15	7.5	0.12	—
Shipping and receiving	2	10	0.12	—
Smoking lounges [b]	70	60	—	—
Storage rooms	—	—	0.12	—
Warehouses (see "Storage")	—	10	0.06	—
Specialty shops				
Automotive motor fuel-dispensing stations[b]	—	—	—	1.5
Banks or lobbies	15	7.5	0.06	-
Barber	25	7.5	0.06	0.5
Beauty salons[b]	25	20	0.12	0.6
Embalming room[b]	—	—	—	2.0
Nail salons[b, h]	25	20	0.12	0.6
Pet shops (animal areas)[b]	10	7.5	0.18	0.9
Supermarkets	8	7.5	0.06	—
Sports and amusement				
Bowling alleys (seating areas)	40	10	0.12	—
Disco/dance floors	100	20	0.06	—
Game arcades	20	7.5	0.18	—
Gym, stadium, arena (play area)	7	20	0.18	—

Health club/aerobics room	40	20	0.06	—
Health club/weight room	10	20	0.06	—
Ice arenas without combustion engines	—	—	0.30	0.5
Spectator areas	150	7.5	0.06	—
Swimming pools (pool and deck area)	—	—	0.48	—
Storage				
Refrigerated warehouses/freezers (<50°F)	—	10	—	0.75
Repair garages, enclosed parking garages[b, d]	—	—	—	0.75
Warehouses	—	10	0.06	—
Theaters				
Auditoriums (see “Education”)	—	—	—	—
Lobbies	150	5	0.06	—
Stages, studios	70	10	0.06	—
Ticket booths	60	5	0.06	—
Transportation				
Platforms	100	7.5	0.06	—
Transportation waiting	100	7.5	0.06	—
Workrooms				
Bank vaults/safe deposit	5	5	0.06	—
Computer (without printing)	4	5	0.06	—
Copy, printing rooms	4	5	0.06	0.5
Darkrooms	—	—	—	1.0
Manufacturing where hazardous materials are not used	7	10	0.18	-
Manufacturing where hazarous materials are used (excludes heavy industrial and chemical processes)	7	10	0.18	-
Meat processing [c]	10	15	—	—
Pharmacy (prep. area)	10	5	0.18	—
Photo studios	10	5	0.12	—
Sorting, packing, light assembly	7	7.5	0.12	-
Telephone closets	-	-	0.00	-

For SI: 1 cubic foot per minute = 0.0004719 m^3/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 $m^3/(s \cdot m^2)$, °C = [(°F) – 32]/1.8, 1 square foot = 0.0929 m^2.

a. Based on *net occupiable floor area.*

b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1 , Item 3).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems in enclosed parking garages shall comply with Section 404 .

e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

g. Mechanical exhaust is required and recirculation from such spaces is prohibited . For occupancies other than science laboratories, where there is a wheel - type energy recovery ventilation (ERV) unit in the exhaust system design, the volume of air leaked from the exhaust airstream into the outdoor airstream within the ERV shall be less than 10 percent of the outdoor air volume. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1 , Items 2 and 4).

h. For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20 . Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

i. Outpatient facilities to which the rates apply are freestanding birth centers, urgent care centers, neighborhood clinics and physicians' offices, Class 1 imaging facilities, outpatient psychiatric facilities, outpatient rehabilitation facilities, and outpatient dental facilities.

j. The requirements of this table provide for acceptable IAQ. The requirements of this table do not address the airborne transmission or airborne viruses, bacteria, and other infectious contagions.

k. These rates are intended only for outpatient dental clinics where the amount of nitrous oxide is limited. They are not intended for dental operatories in institutional buildings where nitrous oxide is piped.

Reason Statement: This proposal seeks to update the existing ventilation rate table in the IMC. Standard 62.1 is the source material for this table, and this updates table 403.3.1.1 to match the appropriate ventilation rates in 62.1-2019.

Bibliography: ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality

Cost Impact: The code change proposal will decrease the cost of construction
This proposal revises ventilation rates for specific spaces within varying occupancy classifications. However, this does not dictate system design to meet those requirements and therefore does not increase the cost of construction.

M21-21

M22-21

IMC: TABLE 403.3.1.1

Proponents: Andrew Klein, representing Self Storage Association (andrew@asklein.com)

2021 International Mechanical Code

Revise as follows:

TABLE 403.3.1.1
MINIMUM VENTILATION RATES

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT ^{2} [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT ^{2} [a]	EXHAUST AIRFLOW RATE CFM/FT ^{2} [a]
Storage				
Refrigerated warehouses/freezers	—	10	—	0.75
Repair garages, enclosed parking garages[b, d]	—	—	—	0.75
Warehouses[i]	—	10	0.06	—

For SI: 1 cubic foot per minute = 0.0004719 m ^{3}/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m ^{3}/(s • m ^{2}), °C = [(°F) – 32]/1.8, 1 square foot = 0.0929 m ^{2}.

a. Based on *net occupiable floor area.*

b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1 , Item 3).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems in enclosed parking garages shall comply with Section 404 .

e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

g. Mechanical exhaust is required and recirculation from such spaces is prohibited . For occupancies other than science laboratories, where there is a wheel - type energy recovery ventilation (ERV) unit in the exhaust system design, the volume of air leaked from the exhaust airstream into the outdoor airstream within the ERV shall be less than 10 percent of the outdoor air volume. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1 , Items 2 and 4).

h. For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20 . Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

i. <u>The occupiable floor area in warehouses shall not include the floor area of self-storage units, floor areas under rack storage, or designated palletized storage floor areas.</u>

Reason Statement: This proposal clarifies the application of Section 403.3.1.1, regarding required minimum outdoor airflow rates, in storage occupancies. The current code language is inconsistently applied when there are fixed storage areas that do not change without a permit. Examples of such floor areas may include those dedicated to high-piled rack storage, self-storage facility units that are not fully partitioned off from interior corridors, and other floor areas that are designated solely for storage.
Ignoring the volume taken up by storage and the thermal mass it provides in helping with temperature regulation results in the oversizing of HVAC equipment, increasing energy use and limiting the effectiveness of humidity control that properly-sized systems provide. By adding this footnote, the minimum outdoor airflow rates for occupiable space in storage occupancies can be properly calculated and consistently enforced.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change is simply a clarificatoin of how occupiable floor area in storage occupancies is to be calculated. This code change proposal will decrease the cost of construction from when the occupiable floor area in warehouses was incorrectly calculated, due to smaller mechanical system requirements.

M22-21

M23-21

IMC: SECTION 202, 403.3.2.1

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Mechanical Code

Revise as follows:

BALANCED VENTILATION SYSTEM. ~~Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent of the total mechanical supply airflow rate.~~ A ventilation system where the total mechanical supply airflow and total mechanical exhaust airflow are simultaneously within 10 percent of their average. The balanced ventilation system airflow is the average of the mechanical supply and mechanical exhaust airflows.

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each *dwelling unit*. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

$$Q_{OA} = 0.01 A_{floor} + 7.5(N_{br} + 1) \quad \textbf{(Equation 4-9)}$$

where:

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = floor area, ft^2

N_{br} = number of bedrooms; not to be less than one

Exceptions:

1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.
2. The minimum mechanical ventilation rate determined in accordance with Equation 4-9 shall be reduced by 30 percent provided that both of the following conditions apply:

   2.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

      2.1.1. Living room.

      2.1.2. Dining room.

      2.1.3. Kitchen.

   2.2. The whole-house ventilation system is a *balanced ventilation* ~~system~~ *system*.

Reason Statement: The 2021 versions of the IMC and IRC introduced a 30% ventilation rate credit for dwelling units with systems providing balanced ventilation. Because these changes were based on the approval of multiple proposals, their approval resulted in different definitions for *balanced ventilation* and *balanced ventilation system* across the IRC and IMC. This proposal and its companion proposal to the IRC are correlation proposals that will align the terminology, definitions, and their application across both codes. The change that is proposed in Section 403.3.2.1 is italicizing the word "system" within the phrase "*balanced ventilation system*" so that the user is directed to the corresponding definition.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial and therefore will not increase or decrease the cost of construction.

M23-21

M24-21

IMC: TABLE 403.3.2.3

Proponents: Joseph Summers, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

TABLE 403.3.2.3
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR GROUP R-2, R-3 AND R-4 OCCUPANCIES

AREA TO BE EXHAUSTED	EXHAUST RATE CAPACITY
Kitchens	100 cfm intermittent or ~~25~~ 50 cfm continuous
Bathrooms and toilet rooms	50 cfm intermittent or ~~20~~ 25 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m^3/s.

Reason Statement: Consistency with IMC Table 403.3.1.1 (which is consistent with ASHRAE 62.1)
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 39.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Builders specifying exhaust equipment that is sized to meet the intermittent rate requirement will see no increase in the cost of construction. Builders specifying in-suite exhaust equipment that is sized to meet the continuous rate should also see no increase in the cost of exhaust fans, which typically have a nominal rated flow of at least 50 cfm. Builders electing to use central exhaust equipment serving multiple dwelling units and using the continuous rate may see an increase in the cost of equipment; however, such equipment is often provisioned with high speed settings that can achieve flow rates that are 2-3x that provided by the low speed setting. So, there are multiple paths to implement this code change proposal without increasing the cost of construction.

M24-21

M25-21

IMC: SECTION 403, 403.4 (New), 403.4.1 (New), 403.4.2 (New)

Proponents: Mark Lessans, Johnson Controls, representing Johnson Controls (mark.lessans@jci.com)

2021 International Mechanical Code

SECTION 403 MECHANICAL VENTILATION.

Add new text as follows:

403.4 Clean Air Delivery Capability. Each mechanical system shall meet the requirements in 403.4.1. Each occupiable space shall meet the requirements in 403.4.2.

Exception: Occupiable spaces where 100% of the supply air meets High-efficiency Particulate Air filtration.

403.4.1 Airflow for Increased Filtration. Mechanical systems shall be sized to accommodate a design airflow at a total static pressure drop which assumes the utilization of a supply air filter with a Minimum Efficiency Reporting Value of no less than 13.

403.4.2 Zonal Filtration or Disinfection Capability. Each occupiable space shall have 120-volt receptacles which provide at least 0.2 watts per square foot of occupiable space above the requirements of the National Electrical Code to support supplemental air cleaning devices.

Exception: Rooms with less than 500 square feet of occupiable space.

Reason Statement: This proposal seeks to “ready” buildings for retrofits and other changes if indoor clean air delivery needs to be increased – such as in response to mitigating an airborne contaminant – per ASHRAE and CDC guidance on reopening buildings during the COVID-19 pandemic. If the mechanical system is not designed with a MERV 13 filter, it would at least be sized to accommodate the use of one later on without having to redesign or replace the system. This is important, as MERV 13 filters are often at the balance point between filtration effectiveness and energy efficiency. However, these filters are thicker and have a larger airflow resistance when compared to conventional filters, and often existing systems cannot accommodate them. This proposal also requires that occupiable spaces be equipped with the electrical infrastructure needed to increase clean air delivery at the zonal level, such as using a HEPA room air cleaning machine.

Cost Impact: The code change proposal will increase the cost of construction
These additional requirements will result in a modest increase in construction costs, but this cost pales in comparison to the burden of adding them post-construction.

M26-21

IMC: 405.2 (New), 405.2.1 (New), 405.2.2 (New), 405.2.3 (New), 405.2.3.1 (New)

Proponents: Mark Lessans, Johnson Controls, representing Johnson Controls (mark.lessans@jci.com)

International Mechanical Code

2021 International Mechanical Code

Add new text as follows:

405.2 Demand Control Ventilation. Each occupiable space shall be equipped with a carbon dioxide sensor which meets the requirements in 405.2.1 and 405.2.3. Mechanical equipment serving each zone(s) shall be equipped with controls which meet the requirements in 405.2.2.

405.2.1 Carbon Dioxide Sensor Performance Specifications. Each carbon dioxide sensor installed in accordance with Section 405.2 shall meet the following carbon dioxide measurement specifications as certified by the equipment manufacturer:

1. Range lower bound less than or equal to 400 parts per million
2. Range upper bound greater than or equal to 2,000 parts per million
3. Accuracy within ±75 parts per million at a reading of 1,000 parts per million
4. Output resolution less than or equal to 5 parts per million

405.2.2 Mechanical System Controls. Controls installed in accordance with Section 405.2 shall:

1. Receive data from the carbon dioxide sensor in the occupiable zone(s) at least once per 5 minutes
2. Be calibrated to provide pre-established outdoor airflow rates, or be equipped with the necessary instrumentation to measure outdoor airflow
3. Be capable of adjusting the outdoor airflow in response to an adjustable outdoor airflow setpoint
4. Increase the amount of outdoor air provided to each occupiable zone until the carbon dioxide level in each occupiable zone falls below a maximum threshold as defined by the user

405.2.3 Ventilation Rate Alarming. When carbon dioxide levels are above a maximum level as defined by the user, sensors installed in accordance with Section 405.2 shall alert the occupants with a visual and audible indication in the zone or through a building monitoring system.

405.2.3.1 Default Carbon Dioxide Threshold Level. The threshold level for carbon dioxide measurement above which triggers an alert in accordance with Section 405.2.3 shall be set to 1,100 parts per million by default.

Reason Statement: Several recently published studies[1,2] have demonstrated that a large portion of indoor occupied spaces to not meet minimum requirements for ventilation as set in ASHRAE Standard 62.1, and have documented the impacts on occupant health, comfort, and productivity. Additionally, providing adequate ventilation is the most effective first step in mitigating the transmission of viruses carried by airborne particulates, an issue that has been highlighted during the COVID-19 pandemic.

This proposal seeks to ensure building occupants have access to adequate ventilation by bringing Demand Control Ventilation (DCV) to each occupiable zone and managing carbon dioxide levels – the best proxy we have for determining inadequate ventilation and/or above-normal occupancy. The proposal requires that every occupiable zone have a basic CO2 sensor, that the CO2 sensor communicate with the building mechanical system, and that the mechanical system be capable of adjusting airflow rates to keep CO2 levels (and therefore ventilation adequacy) within acceptable levels. It also requires that the CO2 sensor notify either the occupants, or the building manager, when ventilation is inadequate. This can be especially helpful first step in helping building occupants understand when indoor may be at unhealthy levels and take mitigating action.

If successfully deployed, this proposal would go a long way toward maintaining adequate ventilation, as well as assist in saving energy by preventing overventilation of spaces.

Bibliography: [1]University of California at Davis, Ventilation rates in California classrooms: Why many recent HVAC retrofits are not delivering sufficient ventilation, January 2020
[2]United States Government Accountability Office, School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement, June 2020

Cost Impact: The code change proposal will increase the cost of construction
This proposal will increase the cost of construction as additional sensors will be required.

M27-21

IMC: SECTION 408 (New), 408.1 (New), 408.2 (New), 408.3 (New), 408.3.1 (New), 408.3.2 (New), 408.3.3 (New), 408.3.4 (New), 408.4 (New), 408.5 (New), 408.6 (New), 408.7 (New), 408.8 (New), 408.9 (New), 502.21 (New), 502.21.1 (New), 502.21.2 (New), UL Chapter 15 (New)

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Add new text as follows:

SECTION 408 PROCESSING AND EXTRACTION FACILITIES.

408.1 General. Plant processing or extraction facilities shall comply with this section, the International Building Code and Chapter 39 of the International Fire Code. The extraction process includes the act of extraction of the oils and fats by use of a solvent, desolventizing of the raw material, production of the miscella, distillation of the solvent from the miscella and solvent recovery. Post-extraction processing includes winterization, solvent recovery, distillation, decarboxylation, isolation, chromatography and similar processes. The use, storage, transfilling and handling of hazardous materials in these facilities shall comply with this code, the International Building Code and the International Fire Code.

408.2 Existing buildings or facilities. Existing buildings or facilities used for the processing of plants shall comply with this code, the International Building Code and the International Fire Code. Existing extraction processes where the medium of extraction or solvent is changed shall comply with this section.

408.3 Mechanical ventilation. Natural ventilation shall not be permitted. Mechanical ventilation shall be designed and installed in accordance with Section 403 in this code and Chapter 39 of the International Fire Code. The exhaust airflow rate shall be provided in accordance with the requirements of 408.3.1 through 408.3.4.

408.3.1 Extraction processes using flammable gases or flammable liquids. Continuous mechanical exhaust ventilation shall provide a minimum airflow rate of not less than 5 cfm/ft2 (0.0038 m3/(s*m2)) of floor area to prevent an accumulation of flammable vapors from exceeding 25 percent of the lower explosive limit (LEL). Recirculation of such air shall be prohibited.

Exception: Where the registered design professional demonstrates that an engineered mechanical exhaust ventilation system design will prevent the maximum concentration of contaminants from exceeding 25% of the LEL, the minimum required rate of exhaust shall be reduced in accordance with such engineered system design.

408.3.2 Extraction processes using compressed asphyxiant or inert gases. Continuous mechanical exhaust ventilation shall be provided in accordance with Chapter 39 of the International Fire Code. Recirculation of such air shall be prohibited.

408.3.3 Post-extraction processes using flammable or combustible liquids or gases. Where flammable liquids, combustible liquids heated above their flashpoint, or flammable gases are used in post-extraction processing, the room or area shall be provided with continuous mechanical exhaust in accordance with Chapter 39 of the International Fire Code.

408.3.4 Interlocks. Electrical equipment and appliances used in processes that generate flammable vapors or gases shall be interlocked with ventilation fans so that the equipment cannot be operated unless the exhaust ventilation fans are in operation.

408.4 Exhaust fan discharge. Exhaust fans shall be positioned so that the discharge will not impinge on the roof, other equipment or appliances or parts of the structure. A vertical discharge fan shall be manufactured with an approved drain outlet at the lowest point of the housing to permit drainage of oils or byproducts to an approved location.

408.5 Exhaust fan mounting. Upblast fans serving plant processing or extraction facilities and installed in a vertical or horizontal position shall be hinged, supplied with a flexible weatherproof electrical cable to permit inspection and cleaning and shall be equipped with a means of restraint to limit the swing of the fan on its hinge. The ductwork shall extend not less than 18 inches (457 mm) above the roof surface.

408.6 Clearances. Exhaust equipment serving a plant processing or extraction facilities shall have a clearance to combustible construction of not less than 18 inches (457 mm).

Exception: Factory-built exhaust equipment installed in accordance with Section 304.1 and listed for a lesser clearance.

408.7 Termination location. The outlet of exhaust equipment serving plant processing or extraction facilities shall be in accordance with Section 501.3 of this code.

Exception: The minimum horizontal distance between vertical discharge fans and parapet-type building structures shall be 2 feet (610 mm), provided that such structures are not higher than the top of the fan discharge opening.

408.8 Ducts. Exhaust duct construction shall comply with Chapter 6.

408.9 Hazardous Exhaust Systems. When the exhaust system is determined to be a hazardous exhaust system by this code, the International Building Code or the International Fire Code, that system shall be installed in accordance with Section 510 of this code.

502.21 Processing and Extraction Facilities. Processing and extraction Facilities shall be provided with an exhaust system in accordance with of Section 408 of this code and Chapter 39 of the International Fire Code.

502.21.1 Operation. The exhaust system for processing and extraction Facilities shall have controls that operate the system continuously when the space is occupied.

502.21.2 Post-processing. Post-processing operations, including dispensing of flammable liquids between containers, shall be performed within a hazardous exhaust fume hood rated for exhausting flammable vapors and listed in accordance with UL 1805. Electrical equipment used within the hazardous exhaust fume hood shall be rated for use in flammable atmospheres.

Exception: A hazardous exhaust fume hood shall not be required where an approved exhaust system is installed in accordance with NFPA 91.

Add new standard(s) as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096

1805-2002: Standard for Laboratory Hoods and Cabinets (Ed.1)

Staff Analysis: A review of the standards proposed for inclusion in the code, UL 1805-2002: Standard for Laboratory Hoods and Cabinets, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: These facilities are becoming common in numerous states and these requirements are based of best practices and ensure basic fire and life safety measures. The requirements in this section provide requirements for hazardous and non-hazardous facilities. The development of these requirements was done in collaboration with the PMGCAC and FCAC. Most of these requirements are existing in current code we are only creating sections that provide an understandable path for compliance.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 10.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
These requirements already exist in the IBC and IFC. Adding these requirements to the IMC only provides guidance for the design and installation of systems that comply with existing code requirements. As such, this proposal does not require additional material or labor costs that would impact the cost of construction.

M27-21

M28-21

IMC: 501.3.1

Proponents: Brent Ursenbach, representing Utah Governor's Office of Energy Development (brentu@wc-3.com)

2021 International Mechanical Code

Revise as follows:

501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings that are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.
2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.
3. For all *environmental air* exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings<u>, except where the exhaust opening is located not less than 1 foot (305 mm) above the gravity air intake opening</u> into buildings for all *occupancies* other than Group U; and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious. Separation is not required between intake air openings and living space *exhaust air* openings of an individual *dwelling unit* or *sleeping unit* where an approved factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions.
4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the International Building Code for utilities and attendant *equipment*.
5. For specific systems, see the following sections:

    5.1. Clothes dryer exhaust, Section 504.4.

    5.2. Kitchen hoods and other kitchen exhaust *equipment*, Sections 506.3.13, 506.4 and 506.5.

    5.3. Dust, stock and refuse conveying systems, Section 511.2.

    5.4. Subslab soil exhaust systems, Section 512.4.

    5.5. Smoke control systems, Section 513.10.3.

    5.6. Refrigerant discharge, Section 1105.7.

    5.7. *Machinery room* discharge, Section 1105.6.1.

Reason Statement: With the increased popularity of multi-family units, many times with limited wall areas on the front and back of these dwellings, quite often it's difficult to find sufficient wall area to locate terminations compliant with the exhaust opening 3' clearance requirements in this section. The exhaust from dryers, bath fans and domestic ranges is not considered noxious or hazardous, and poses little if any health risk. Taking into account the buoyancy of the exhaust air, the chance of the exhaust air migrating down into an opening is minimal to none.
Imagine the simplification of the exhaust duct installation if terminations were allowed above windows with this 1' clearance requirement.

In IFGC 503.8 clearance requirements for direct vent gas appliance from these openings are in many cases less than these requirements for these environment exhausts. In fact the requirement for a through the wall direct vent termination < 10,000 Btu/hr. is 6" in any direction. These gas vents exhaust hazardous productions of combustion to outside, not *environment air.*

Meeting the current requirements often adds extra elbows and pipe to the exhaust duct system, reducing the airflow through the duct. This is a wasted expense of no value.

Cost Impact: The code change proposal will decrease the cost of construction
This proposal reduces materials and labor expense required to offset exhaust duct terminations away from windows.

M29-21 Part I

IMC: 501.6 (New)

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Add new text as follows:

501.6 Common ducts. The discharge from exhaust fans serving separate dwelling or sleeping units shall not be connected to a common duct or shaft, except where the common duct or shaft is maintained at a negative pressure.

M29-21 Part II

IRC: M1504.4 (New)

Proponents: Joseph J. Summers, Chair, representing Chair of PMGCAC (pmgcac@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Residential Code

Add new text as follows:

M1504.4 Common ducts. The discharge from exhaust fans serving separate dwelling or sleeping units shall not be connected to a common duct or shaft, except where the common duct or shaft is maintained at a negative pressure.

Reason Statement: Exhaust ducts that are under positive pressure cannot be joined because the airflow from one fan will leak out through the fan that is not running. Only if the fans that share an exhaust duct are all running simultaneously, could backflow be prevented. Backdraft dampers in common exhaust fans have a significant leakage rate, thus the fan that is not running will see backflow from the common duct and the exhaust air from one space will dump into another space. If the fans discharge to a common exhaust shaft that is under negative pressure, there is no problem and this proposal would not prevent that arrangement. It is extremely undesirable (and unthinkable) to use a common duct for fans that serve different dwelling and sleeping units because odors, smoke, pathogens, chemical irritants, etc. would be carried from one unit to another.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 4.

Cost Impact: The code change proposal will increase the cost of construction
This proposal will increase the cost of construction only where the cost of an additional roof, wall or soffit penetration is more than the cost of larger common ducts, tee and wye fittings, fasteners, sealants and hangers and the extra labor to assemble common duct arrangements. This proposal will increase the cost of construction if additional roof or wall penetrations cost more than combined exhaust discharge ducts. Combining ducts into a common duct adds material costs, as does making roof and wall penetrations.

M30-21

IMC: 502.20, 502.20.1 (New), 502.20.2 (New)

Proponents: Gary Sadler, Salon Safe, LLC, representing Salon Safe, LLC (garys@salonsafe.net)

2021 International Mechanical Code

Revise as follows:

502.20 Manicure and pedicure stations. Manicure and pedicure stations shall be provided with an exhaust system in accordance with Table 403.3.1.1, Note h. Manicure tables and pedicure stations not provided with factory-installed exhaust inlets shall be provided with exhaust inlets located not more than 12 inches (305 mm) horizontally and vertically from the point of chemical application. The source capture exhaust system shall be prohibited from recirculating air, shall discharge exhaust in accordance with Section 501.3 and shall comply with the provisions of Section 502.20.1.

Add new text as follows:

502.20.1 Makeup Air. Makeup air shall be supplied during the operation of source capture exhaust systems that are provided for manicure tables and pedicure stations . The amount of makeup air supplied to the building from all sources shall be approximately equal to the amount of exhaust air for all exhaust systems for the building. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. Mechanical makeup air systems shall be automatically controlled to start and operate simultaneously with the exhaust system. Makeup air intake opening locations shall comply with Section 401.4. and makeup air temperature shall comply with Section 502.20.2.

502.20.2 Makeup air temperature. The temperature differential between makeup air and the air in the conditioned space shall not exceed 10ºF (6ºC) except where the added heating and cooling loads of the makeup air do not exceed the capacity of the HVAC system.

Reason Statement: INTRODUCTION

"Many of us go to nail salons to relax and to be pampered. We don't think of these places as potentially hazardous work environments, yet for many manicurists, regular on-the-job exposure to toxic chemicals is a reality. Workers often experience headaches, dizziness, rashes and other acute symptoms. Some chemicals are known to cause cancer and reproductive, developmental, and respiratory harm" (a)

The intent of these suggested modifications is to (1) better clarify the requirements for a source capture exhaust system at manicure and pedicure stations where ambiguity exists, and to (2) better ensure the effectiveness of the exhaust system by specifically requiring makeup air and prohibiting the recirculation of exhausted air so as to provide a healthy, safe environment for nail salon workers and their clients.

1. PROPOSED MODIFICATION TO SECTION 502.20 Manicure and Pedicure Stations

REASON: It is important to clarify that source capture exhaust is to be discharged to the outdoors and not recirculated. This requirement is consistent with other exhaust systems regulated by the IMC. We are proposing a reference to existing Section 501.3 to better clarify this requirement.

2. PROPOSED NEW SUB-SECTIONS: 502.20.1 Makeup Air & 502.20.2 Makeup Air Temperature.

REASON: The suggested addition of a new sub-section 502.20.1 intends to recognize and reinforce the requirement for balancing the exhausted air with makeup air and help provide guidance on intake opening locations and makeup air temperature by referencing existing Sections 401.4 and adding new subsection 502.20.2 respectively.

Bibliography: Bibliography: a.) California Healthy Nail Salon Collaborative - website "THE NEED FOR HEALTHY NAIL SALONS" -

https://duc-luu-5y3x.squarespace.com/healthy-salons

Cost Impact: The code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction. These code change proposals will only remove ambiguity and provide better guidance for design professionals, the AHJ and end-users alike.

M31-21

IMC: 504.10

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Mechanical Code

Revise as follows:

504.10 Commercial clothes dryers. The installation of dryer exhaust ducts serving commercial clothes dryers shall comply with the *appliance* manufacturer's installation instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum *clearance* of 6 inches (152 mm) to combustible materials. Clothes dryer transition ducts used to connect the *appliance* to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be *listed* and *labeled* in accordance with UL 2158A ~~for the application~~. Transition ducts shall not be concealed within construction.

Reason Statement: Clothes dryer transition ducts for both domestic and commercial applications are required to be listed and labeled. Section 504.9.3 requires UL 2158A for listing these types of ducts to UL 2158A for domestic installations. This proposal would also require UL 2158A in Section 504.10 for commercial installations.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code already requires these products to be listed and labeled. This proposal clarifies what standard is used.

M32-21

IMC: 505.3, 505.7 (New), 505.8 (New)

Proponents: John Williams, Chair, representing Healthcare Committee (ahc@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be airtight and shall be equipped with a backdraft damper. Installations in Group I-1 and I-2 *occupancies* shall be in accordance with ~~the *International Building Code* and Section 904.14 of the International Fire Code~~ this section and Section 505.7 or 505.8.

Exceptions:

1. ~~In other than Groups I-1 and I-2, where~~ Where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, *listed* and *labeled* ductless range hoods shall not be required to discharge to the outdoors.
2. Ducts for domestic kitchen cooking *appliances* equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:

   2.1. The duct shall be installed under a concrete slab poured on grade.

   2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.

   2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.

   2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.

   2.5. The PVC ducts shall be solvent cemented.

Add new text as follows:

505.7 Group I-1 Occupancies. In Group I-1 occupancies, hood installations over domestic cooking equipment shall be installed in accordance with one of the following:

1. Domestic hoods over cooktops and ranges installed in accordance with Section 420.9 of the International Building Code shall comply with the following:
   1.1. Protection from fire shall be in accordance with Section 904.14 of the International Fire code.
   1.2. Mechanical ventilation shall be provided to the rooms or spaces containing the cooking facility in accordance with Section 403.3.1.
   1.3. Hood systems shall have a minimum air flow of 500 cfm (14,000 L/min).
   1.4. Listed and labeled ductless range hoods shall have a charcoal filter to reduce smoke and odors.
2. Commercial kitchen hoods complying with Section 507 shall be provided over cooktops and ranges serving greater than 30 care recipients.

505.8 Group I-2 Occupancies. In Group I-2 Occupancies, Hood installations over domestic cooking equipment shall be installed in accordance with one of the following:

1. Domestic hoods over cooktops and ranges installed in accordance with Section 407.2.7 of the International Building Code shall comply with the following:
   1.1. Protection from fire shall be in accordance with Section 904.14 of the International Fire code.
   1.2. Mechanical ventilation shall be provided to the rooms or spaces containing the cooking facility in accordance with Section 407.
   1.3. Hood systems shall have a minimum air flow of 500 cfm (14,000 L/min).
   1.4. Listed and labeled ductless range hoods shall have a charcoal filter to reduce smoke and odors.
2. Commercial kitchen hoods complying with Section 507 shall be provided over cooktops and ranges serving greater than 30 care recipients.

Reason Statement: In I-1 and I-2 Occupancies, Section 407.2.6 and 420.8 set up a number of safeguards that allow for meal preparation for up to 30 care recipients. These cooking operations are on a lower scale than commercial cooking facilities and do not generate the same level of smoke and vapors. The aroma of food cooking is beneficial to the care recipients who live in I-1 and I-2 occupancies as it stimulates appetite and signals them that mealtime is near.
The hoods in question are not your standard domestic range hood. Hoods for I-1 and I-2 Occupancies must comply with Section 904.14 of the

International Fire Code. This section requires hoods that are listed and labeled per UL 300A, have fire suppression built in, and have an interlock that cuts the fuel or power source upon activation of the extinguishing system. Stovetops must also have a timer that automatically turns off the cooking device after 120 minutes, preventing unattended cooking.

Federal Guidelines that govern I-2 Occupancies permit recirculating hoods with a charcoal filter and also require a higher airflow rate. This added language is being added to allow equivalent facilitation.

For commercial cooking facilities, compliance with NFPA 96 is required. However, NFPA 96 (Chapter 13) allows for the use of re-circulating hoods in commercial cooking operations, there is no justification to prohibit the use in these domestic uses.The issue at hand is that sometimes, especially in a renovation of a multi-story building, it can be impractical or impossible to run an exhaust duct to the outside. By requiring a vented hood, it would prevent many communities from being able to provide better food quality and a social experience that can be critical to quality of life.

The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2020 the CHC held several virtual meeting, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at CHC.

Cost Impact: The code change proposal will decrease the cost of construction
The cost of a domestic hood is less than a commercial hood and associate duct work.

M32-21

M33-21

IMC: 505.3, 501.3

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Mechanical Code

Revise as follows:

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be airtight and shall be equipped with a backdraft damper. Installations in Group I-1 and I-2 *occupancies* shall be in accordance with the *International Building Code* and Section 904.14 of the International Fire Code.

Exceptions:

1. In other than Groups I-1 and I-2~~, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4,~~ *listed* and *labeled* ductless range hoods shall not be required to discharge to the outdoors~~.~~ , provided that the installation complies with all of the following:

   1.1. The equipment is installed in accordance with the manufacturer's instructions.

   1.2. Natural ventilation or a mechanical exhaust system is otherwise provided in the cooking area in accordance with Chapter 4.

   1.3. The installation is in an existing kitchen not having an existing range hood exhaust duct to the outdoors.

2. Ducts for domestic kitchen cooking *appliances* equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:

   2.1. The duct shall be installed under a concrete slab poured on grade.

   2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.

   2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.

   2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.

   2.5. The PVC ducts shall be solvent cemented.

501.3 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a public nuisance and not less than the distances specified in Section 501.3.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawl space, or be directed onto walkways.

Exceptions:

1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of *dwelling units* having private attics.
2. Commercial cooking recirculating systems.
3. ~~Where installed in accordance with the manufacturer's instructions and where mechanical or *natural ventilation* is otherwise provided in accordance with Chapter 4,~~ *l Listed* and *labeled* domestic ductless range hoods shall not be required to discharge to the outdoors, when provided in accordance with Exception 1 to Section 505.3.

Reason Statement: Cooking is typically the largest source of indoor air pollution in dwelling units, with concentrations of key pollutants frequently exceeding U.S. National Ambient Air Quality Standards. Over time, exposure to these pollutants has been shown to reduce duration and quality of life. Research has demonstrated that provision of kitchen ventilation in dwelling units is needed to comply with the Section 101.3 purpose of the IMC to "establish minimum requirements to provide a reasonable level of safety, health, property protection and general welfare." Unless captured at the source and exhausted to the exterior, cooking pollutants spread rapidly through a dwelling unit and deposit on surfaces, only to be released again into the breathing zone when disturbed at a later time. Like the current language in this section, this proposal does not permit ductless domestic range hoods to be installed in Group I-1 and I-2. In other occupancies, this proposal adds one more condition to the two conditions within this section that are required to approve ductless domestic range hoods: the installation of the ductless domestic range hood must be in an existing kitchen that does not have an existing range hood exhaust duct to the outdoors. This will ensure that where installed within new construction, domestic range hoods will be exhausted to the exterior. The exception permitting ductless range hoods for existing construction is provided in recognition of the high costs that could otherwise be associated with retrofitting a duct to the exterior. Within new construction, requiring a range hood to be ducted can be a very low-cost item with high returns in terms of occupant health. Please see the cost statement for more information.

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Cost Impact: The code change proposal will increase the cost of construction
There is no increase in construction costs for existing dwelling units.

Where new construction dwelling units are already provided with a range hood duct, there will not be any increase in construction cost.

Where new construction dwelling units are not currently provided with ducts for their range hoods, this proposal would increase the cost of construction. Installed duct costs can be estimated at ~ $7.10 per linear foot for 6" diameter galvanized steel duct (Mechanical Costs with RS Means Data. 2020. Section 23 31 13.16.5420), and a damper would cost about $25 retail.

M33-21

M34-21

IMC: 506.2

Proponents: Joseph J. Summers, Chair of the PMGCAC, representing Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

506.2 Corrosion protection. Ducts and exhaust equipment exposed to the outside atmosphere or subject to a corrosive environment shall be protected against corrosion in an *approved* manner.

Reason Statement: Any portion of the commercial kitchen hood ventilation duct system and exhaust equipment that is exposed to the outside atmosphere, regardless of whether for Type I or Type II applications, should be protected against corrosion.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3B.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Exhaust equipment (such as fans) that are *listed* for outdoor service are already protected against corrosion. The proposal is stating what is already required through the listing of the equipment. The equipment isn't any different than what is being selected for outdoor service.

M35-21

IMC: (New), 506.3, 506.3.1, 506.3.1.1, 506.3.2, 506.3.2.1, 506.3.2.2, 506.3.2.3, 506.3.2.4, 506.3.2.5, 506.3.3, 506.3.4, 506.3.5, 506.3.7, 506.3.7.1, 506.3.8, 506.3.8.1, 506.3.8.2, 506.3.9, 506.3.10, 506.3.11, 506.3.11.1, 506.3.11.2, 506.3.11.3, 506.3.12, 506.3.13, 506.5.1.2, 506.5.2, 506.5.4, 507.1, 507.2.4, 506.3.1.2

Proponents: Joseph J Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Add new definition as follows:

GREASE DUCT. A duct serving a Type I hood, or cooking appliances equipped with integral down-draft exhaust systems that produce grease, to convey grease-laden air from the hood or cooking appliance directly to the outdoors.

Revise as follows:

506.3 ~~Ducts serving Type I hoods~~ Grease duct systems. ~~Type I exhaust ducts shall be independent of all other exhaust systems except as provided in Section 506.3.5. Commercial kitchen~~ *Grease* duct systems ~~serving Type I hoods~~ shall be designed, constructed and installed in accordance with Sections 506.3.1 through 506.3.13.3.

Delete without substitution:

~~506.3.1 Duct materials.~~ ~~Ducts serving Type I hoods shall be constructed of materials in accordance with Sections 506.3.1.1 and 506.3.1.2.~~

Revise as follows:

~~506.3.1.1~~ 506.3.1 Grease duct materials. Grease ducts ~~serving Type I hoods~~ shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) or stainless steel not less than 0.0450 inch (1.14 mm) (No. 18 gage) in thickness.

Exception: Factory-built commercial kitchen grease ducts *listed* and *labeled* in accordance with UL 1978 and installed in accordance with Section 304.1.

506.3.2 Joints, seams and penetrations of grease ducts. Joints, seams and penetrations of grease ducts shall be made with a continuous liquid-tight weld or braze made on the external surface of the grease duct system.

Exceptions:

1. Penetrations shall not be required to be welded or brazed where sealed by devices that are *listed* for the application.
2. Internal welding or brazing shall not be prohibited provided that the joint is formed or ground smooth and is provided with ready access for inspection.
3. Factory-built commercial kitchen grease ducts *listed* and *labeled* in accordance with UL 1978 and installed in accordance with Section 304.1.

506.3.2.1 Grease ~~Duct~~ duct joint types. Grease duct ~~Duct~~ joints shall be butt joints, welded flange joints with a maximum flange depth of $^1/_2$ inch (12.7 mm) or overlapping duct joints of either the telescoping or bell type. Overlapping joints shall be installed to prevent ledges and obstructions from collecting grease or interfering with gravity drainage to the intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed $^1/_4$ inch (6.4 mm). The length of overlap for overlapping duct joints shall not exceed 2 inches (51 mm).

506.3.2.2 Grease ~~Duct~~ duct-to-hood joints. Grease ~~Duct~~ duct-to-hood joints shall be made with continuous internal or external liquid-tight welded or brazed joints. Such joints shall be smooth, accessible 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~~ the exhaust outlet of the hood 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 grease 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 grease 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 grease duct flange and the top of the hood.

    1.4. The grease 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 grease* duct-to-hood collar connections installed in accordance with Section 304.1.

506.3.2.3 Grease ~~Duct~~ duct-to-exhaust fan connections. Grease ~~Duct~~ duct-to-exhaust fan connections shall be flanged and gasketed at the base of the fan for vertical discharge fans; shall be flanged, gasketed and bolted to the inlet of the fan for side-inlet utility fans; and shall be flanged, gasketed and bolted to the inlet and outlet of the fan for in-line fans. Gasket and sealing materials shall be rated for continuous duty at a temperature of not less than 1,500ºF (816ºC).

506.3.2.4 Vibration isolation. A vibration isolation connector for connecting a grease duct to a fan shall consist of noncombustible packing in a metal sleeve joint of *approved* design or shall be a coated-fabric flexible grease duct connector *listed* and *labeled* for the application. Vibration isolation connectors shall be installed only at the connection of a grease duct to a fan inlet or outlet.

506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Grease ducts ~~Ducts~~ shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ~~ductwork~~ grease ducts from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. A light test shall be performed to determine that all welded and brazed joints are liquid tight.

A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ~~ductwork~~ grease ducts to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire grease duct system, including the hood-to-duct connection. The grease duct ~~work~~ system shall be permitted to be tested in sections, provided that every joint is tested. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

506.3.3 Grease duct supports. Grease duct bracing and supports shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the *International Building Code* . Bolts, screws, rivets and other mechanical fasteners shall not penetrate grease duct walls.

506.3.4 Air velocity. Grease duct systems ~~serving a Type I hood~~ shall be designed and installed to provide an air velocity within the grease duct system of not less than 500 feet per minute (2.5 m/s).

Exception: The velocity limitations shall not apply within grease duct transitions utilized to connect grease ducts to differently sized or shaped openings in hoods and fans, provided that such transitions do not exceed 3 feet (914 mm) in length and are designed to prevent the trapping of grease.

506.3.5 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood. A separate grease duct system is not required where all of the following conditions are met:

1. All interconnected hoods are located within the same story.
2. All interconnected hoods are located within the same room or in adjoining rooms.
3. Interconnecting grease ducts do not penetrate assemblies required to be fire-resistance rated.
4. The grease duct system does not serve solid-fuel-fired *appliances*.

506.3.7 Prevention of grease accumulation in grease ducts. ~~Duct~~ Grease duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in 12 units horizontal (2-percent slope) toward the hood or toward a grease reservoir designed and installed in accordance with Section 506.3.7.1. Where horizontal grease ducts exceed 75 feet (22 860 mm) in length, the slope shall be not less than one unit vertical in 12 units horizontal (8.3-percent slope).

Exception: Factory-built grease ducts shall be installed at a slope that is in accordance with the listing and manufacturer's installation instructions.

506.3.7.1 Grease duct reservoirs. Grease duct reservoirs shall:

1. Be constructed as required for the grease duct they serve.
2. Be located on the bottom of the horizontal grease duct or the bottommost section of the grease duct riser.
3. Extend across the full width of the grease duct and have a length of not less than 12 inches (305 mm).
4. Have a depth of not less than 1 inch (25 mm).
5. Have a bottom that slopes to a drain.
6. Be provided with a cleanout opening constructed in accordance with Section 506.3.8 and installed to provide direct access to the reservoir. The cleanout opening shall be located on a side or on top of the grease duct so as to permit cleaning of the reservoir.
7. Be installed in accordance with the manufacturer's instructions where manufactured devices are utilized.

506.3.8 Grease duct cleanouts and openings. Grease duct cleanouts and openings shall comply with all of the following:

1. Grease ducts shall not have openings except where required for the operation and maintenance of the system.
2. Sections of grease ducts that are inaccessible from the hood or discharge openings shall be provided with cleanout openings spaced not more than 20 feet (6096 mm) apart and not more than 10 feet (3048 mm) from changes in direction greater than 45 degrees (0.79 rad).
3. Cleanouts and openings shall be equipped with tight-fitting doors constructed of steel having a thickness not less than that required for the grease duct.
4. Cleanout doors shall be installed liquid tight.
5. Door assemblies including any frames and gaskets shall be approved for the application and shall not have fasteners that penetrate the grease duct.
6. Gasket and sealing materials shall be rated for not less than 1,500ºF (816ºC).
7. Listed door assemblies shall be installed in accordance with the manufacturer's instructions.

506.3.8.1 Personnel entry. Where a grease duct ~~ductwork~~ is large enough to allow entry of personnel, not less than one *approved* or *listed* opening having dimensions not less than 22 inches by 20 inches (559 mm by 508 mm) shall be provided in the horizontal sections, and in the top of vertical risers. Where such entry is provided, the grease duct and its supports shall be capable of supporting the additional load, and the cleanouts specified in Section 506.3.8 are not required.

506.3.8.2 Cleanouts serving in-line fans. A cleanout shall be provided for both the inlet side and outlet side of an in-line fan except where a grease duct does not connect to the fan. Such cleanouts shall be located within 3 feet (914 mm) of the fan duct connections.

506.3.9 Grease duct horizontal cleanouts. Cleanouts serving horizontal sections of grease ducts shall:

1. Be spaced not more than 20 feet (6096 mm) apart.
2. Be located not more than 10 feet (3048 mm) from changes in direction that are greater than 45 degrees (0.79 rad).
3. Be located on the bottom only where other locations are not available and shall be provided with internal damming of the opening such that grease will flow past the opening without pooling. Bottom cleanouts and openings shall be approved for the application and installed liquid tight.
4. Not be closer than 1 inch (25 mm) from the edges of the grease duct.
5. Have opening dimensions of not less than 12 inches by 12 inches (305 mm by 305 mm). Where such dimensions preclude installation, the opening shall be not less than 12 inches (305 mm) on one side and shall be large enough to provide access for cleaning and maintenance.
6. Be located at grease reservoirs.
7. Be located within 3 feet (914 mm) of horizontal discharge fans.

506.3.10 Underground grease duct installation. Underground grease duct installations shall comply with all of the following:

1. Underground grease ducts shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) and shall be coated to provide protection from corrosion or shall be constructed of stainless steel having a minimum thickness of 0.0450 inch (1.140 mm) (No. 18 gage).
2. The underground grease duct system shall be tested and approved in accordance with Section 506.3.2.5 prior to coating or placement in the ground.
3. The underground grease duct system shall be completely encased in concrete with a minimum thickness of 4 inches (102 mm).
4. Ducts shall slope toward grease reservoirs.
5. A grease reservoir with a cleanout to allow cleaning of the reservoir shall be provided at the base of each vertical grease duct riser.

6. Cleanouts shall be provided with access to permit cleaning and inspection of the grease duct in accordance with Section 506.3.

7. Cleanouts in horizontal grease ducts shall be installed on the topside of the grease duct.

8. Cleanout locations shall be legibly identified at the point of access from the interior space.

506.3.11 Grease duct enclosures. A commercial kitchen grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed space shall be enclosed from the point of penetration to the outlet terminal. In-line exhaust fans not located outdoors shall be enclosed as required for grease ducts. A grease duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code* . The grease duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Grease duct ~~Duct~~ enclosures shall be a shaft enclosure in accordance with Section 506.3.11.1, a field-applied enclosure assembly in accordance with Section 506.3.11.2 or a factory-built grease duct enclosure assembly in accordance with Section 506.3.11.3. Grease duct ~~Duct~~ enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated and not less than 1 hour. Fire dampers and smoke dampers shall not be installed in grease ducts.

Exception: A grease duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.

506.3.11.1 Shaft enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be permitted to be enclosed in accordance with the *International Building Code* requirements for shaft construction. Such grease duct systems and exhaust *equipment* shall have a *clearance* to combustible construction of not less than 18 inches (457 mm), and shall have a *clearance* to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 6 inches (152 mm). Shaft ~~Duct~~ enclosures shall be sealed around the grease duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings.

506.3.11.2 Field-applied grease duct enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a *listed* and *labeled* field-applied grease duct enclosure material, systems, product, or method of construction specifically evaluated for such purpose in accordance with ASTM E2336. The surface of the grease duct shall be continuously covered on all sides from the point at which the grease duct originates to the outlet terminal. Grease duct ~~Duct~~ penetrations shall be protected with a through-penetration firestop system tested and *listed* in accordance with ASTM E814 or UL 1479 and having a “F” and “T” rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure and firestop system shall be installed in accordance with the listing and the manufacturer’s instructions. Partial application of a field-applied grease duct enclosure shall not be installed for the sole purpose of reducing *clearances* to combustibles at isolated sections of grease duct. Exposed duct-wrap systems shall be protected where subject to physical damage.

506.3.11.3 Factory-built grease duct enclosure assemblies. Factory-built grease ducts incorporating integral enclosure materials shall be *listed* and *labeled* for use as grease duct enclosure assemblies specifically evaluated for such purpose in accordance with UL 2221. Grease duct ~~Duct~~ penetrations shall be protected with a through-penetration firestop system tested and *listed* in accordance with ASTM E814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure assembly and firestop system shall be installed in accordance with the listing and the manufacturer’s instructions.

506.3.12 Grease duct fire-resistive access opening. Where cleanout openings are located in grease ducts within a fire-resistance-rated enclosure, access openings shall be provided in the enclosure at each cleanout point. Access openings shall be equipped with tight-fitting sliding or hinged doors that are equal in fire-resistive protection to that of the shaft or enclosure. An *approved* sign shall be placed on access opening panels with wording as follows: “ACCESS PANEL. DO NOT OBSTRUCT.”

506.3.13 Exhaust outlets ~~serving Type I hoods~~. Exhaust outlets for grease ducts ~~serving Type I hoods~~ shall conform to the requirements of Sections 506.3.13.1 through 506.3.13.3.

506.5.1.2 In-line fan location. Where enclosed grease duct systems are connected to in-line fans not located outdoors, the fan shall be located in a room or space having the same fire-resistance rating as the grease duct enclosure. Access shall be provided for servicing and cleaning of fan components. Such rooms or spaces shall be ventilated in accordance with the fan manufacturer’s installation instructions.

506.5.2 Pollution-control units. The installation of pollution-control units shall be in accordance with all of the following:

1. Pollution-control units shall be *listed* and *labeled* in accordance with UL 8782.
2. Fans serving pollution-control units shall be *listed* and *labeled* in accordance with UL 762.
3. Bracing and supports for pollution-control units shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the *International Building Code*.
4. Pollution-control units located indoors shall be *listed* and *labeled* for such use. Where enclosed grease duct systems, as required by Section 506.3.11, are connected to a pollution control unit, such unit shall be *listed* and *labeled*, in accordance with UL 2221 or ASTM E2336, for location in an enclosure having the same fire-resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of the unit. The space or enclosure shall be ventilated in accordance with the manufacturer’s installation instructions.
5. *Clearances* shall be maintained between the pollution-control unit and combustible material in accordance with the listing.
6. Roof-mounted pollution-control units shall be listed for outdoor installation and shall be mounted not less than 18 inches (457 mm) above the roof.

7. Exhaust outlets for pollution-control units shall be in accordance with Section 506.3.13.

8. An airflow differential pressure control shall be provided to monitor the pressure drop across the filter sections of a pollution-control unit. When the airflow is reduced below the design velocity, the airflow differential pressure control shall activate a visual alarm located in the area where cooking operations occur.

9. Pollution-control units shall be provided with a factory-installed fire suppression system.

10. Service space shall be provided in accordance with the manufacturer's instructions for the pollution control unit and the requirements of Section 306.

11. Wash-down drains shall discharge through a grease interceptor and shall be sized for the flow. Drains shall be sealed with a trap or other approved means to prevent air bypass. Where a trap is utilized it shall have a seal depth that accounts for the system pressurization and evaporation between cleanings.

12. Protection from freezing shall be provided for the water supply and fire suppression systems where such systems are subject to freezing.

13. Grease duct ~~Duct~~ connections to pollution-control units shall be in accordance with Section 506.3.2.3. Where water splash or carryover can occur in the transition duct as a result of a washing operation, the transition duct shall slope downward toward the cabinet drain pan for a length not less than 18 inches (457 mm). Grease ducts ~~Ducts~~ shall transition to the full size of the unit's inlet and outlet openings.

14. Extra-heavy-duty *appliance* exhaust systems shall not be connected to pollution-control units except where such units are specifically designed and listed for use with solid fuels.

15. Pollution-control units shall be maintained in accordance with the manufacturer's instructions.

506.5.4 Exhaust fan mounting. Upblast fans serving Type I hoods and installed in a vertical or horizontal position shall be hinged, supplied with a flexible weatherproof electrical cable to permit inspection and cleaning and shall be equipped with a means of restraint to limit the swing of the fan on its hinge. The grease duct system ~~ductwork~~ shall extend not less than 18 inches (457 mm) above the roof surface.

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, grease ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.

507.2.4 Type I supports. Type I hoods shall be secured in place by noncombustible supports. Type I hood supports shall be adequate for the applied load of the hood, the unsupported grease duct system ~~ductwork~~, the effluent loading and the possible weight of personnel working in or on the hood.

~~**506.3.1.2**~~ **508.1.2 Makeup air ducts.** *Makeup air* ducts connecting to or within 18 inches (457 mm) of a Type I hood shall be constructed and installed in accordance with Sections 603.1, 603.3, 603.4, 603.9, 603.10 and 603.12. Duct insulation installed within 18 inches (457 mm) of a Type I hood shall be noncombustible or shall be *listed* for the application.

Reason Statement: This proposal addresses four issues for the purpose of clarifying the code. There are no technical substantive changes.

1. **Terminology** – The term "grease ducts" is a common term throughout the IMC, used 60 times throughout Sections 506 and 507. By definition, a "duct serving Type I hoods" is a "grease duct". It is redundant for the code to state "grease ducts serving Type I hoods", because they have no other purpose. This proposal clarifies the code by clearly defining what a "grease duct" is, and by using the term consistently in all the locations that apply to these specific types of ducts. The term "ductwork" is replaced with "grease duct" or "grease duct system", depending on the context of each application, in order to provide clarity.
2. **Grease ducts independent of other exhaust systems –** Section 506.3.5 already requires grease ducts to be independent of all other exhaust systems, except where four conditions are met. This is unnecessary language in the code, because the second sentence of this

Section already requires compliance of these grease ducts to Section 506.3.5. This also removes a conflict, because there are no exceptions to Section 506.3.5.

3. **Ducts for cooking appliances equipped with integral down-draft exhaust systems** - Exception 3 of Section 507.1 exempts cooking appliances equipped with integral down-draft exhaust systems from the requirements for Type I hoods, but does not identify any requirements for the duct system serving these appliances. This proposal is intended to provide direction on the type of duct system to be used for these installations. NFPA 96 requires the duct system serving these cooking appliances to comply with the requirements for grease ducts.
4. **Makeup air duct construction relocation** - Section 506.3.1.1 is regarding the construction and installation of the makeup air ducts, not grease ducts that are serving Type I hoods. Thus, this requirement belongs in Section 508, not as a sub-section for Section 506.3.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3A.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal only clarifies/reorganizes the current code requirements. No additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code. As such, there is no impact to the cost of construction.

M35-21

M36-21

IMC: 506.5.2

Proponents: Richard Grace, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA) (richard.grace@fairfaxcounty.gov)

2021 International Mechanical Code

Revise as follows:

506.5.2 Pollution-control units. The installation of pollution-control units shall be in accordance with all of the following:

1. Pollution-control units shall be *listed* and *labeled* in accordance with UL 8782.
2. Fans serving pollution-control units shall be *listed* and *labeled* in accordance with UL 762.
3. Bracing and supports for pollution-control units shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the *International Building Code*.
4. Pollution-control units located indoors shall be *listed* and *labeled* for such use. ~~Where enclosed duct systems, as required by Section 506.3.11, are connected to a pollution control unit, such unit shall be *listed* and *labeled*, in accordance with UL 2221 or ASTM E2336, for location in an enclosure having the same fire-resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of the unit. The space or enclosure shall be ventilated in accordance with the manufacturer's installation instructions.~~
5. Clearances shall be maintained between the pollution-control unit and combustible material in accordance with the listing. Where enclosed duct systems, as required by Section 506.3.11, are connected to a pollution control unit installed indoors, all of the following shall apply:

   5.1. The unit shall be listed and labeled, in accordance with UL 2221 or ASTM E2336, for location in an enclosure.

   5.2. The unit shall be installed in a dedicated room or space enclosure, constructed as required by Section 506.3.11, having the same fire-resistance rating as the duct enclosure.

   5.3. Access shall be provided for servicing and cleaning of the unit.

   5.4. The dedicated room or space enclosure shall be ventilated in accordance with the manufacturer's installation instructions.

~~5~~ 6. *Clearances* shall be maintained between the pollution-control unit and combustible materials in accordance with the listing.

~~6~~ 7. Roof-mounted pollution-control units shall be listed for outdoor installation and shall be mounted not less than 18 inches (457 mm) above the roof.

~~7~~ 8. Exhaust outlets for pollution-control units shall be in accordance with Section 506.3.13.

~~8~~ 9. An airflow differential pressure control shall be provided to monitor the pressure drop across the filter sections of a pollution-control unit. When the airflow is reduced below the design velocity, the airflow differential pressure control shall activate a visual alarm located in the area where cooking operations occur.

~~9~~ 10. Pollution-control units shall be provided with a factory-installed fire suppression system.

~~10~~ 11. Service space shall be provided in accordance with the manufacturer's instructions for the pollution control unit and the requirements of Section 306.

~~11~~ 12. Wash-down drains shall discharge through a grease interceptor and shall be sized for the flow. Drains shall be sealed with a trap or other approved means to prevent air bypass. Where a trap is utilized it shall have a seal depth that accounts for the system pressurization and evaporation between cleanings.

~~12~~ 13. Protection from freezing shall be provided for the water supply and fire suppression systems where such systems are subject to freezing.

~~13~~ 14. Duct connections to pollution-control units shall be in accordance with Section 506.3.2.3. Where water splash or carryover can occur in the transition duct as a result of a washing operation, the transition duct shall slope downward toward the cabinet drain pan for a length not less than 18 inches (457 mm). Ducts shall transition to the full size of the unit's inlet and outlet openings.

~~14~~ 15. Extra-heavy-duty appliance exhaust systems shall not be connected to pollution-control units except where such units are specifically designed and listed for use with solid fuels.

~~15~~ 16. Pollution-control units shall be maintained in accordance with the manufacturer's instructions.

Reason Statement: This change serves to clarify the multiple conditions listed in item four.
1. The first sentence in item four was left to remain, however we have no objections to deleting it all together should there be consensus. Reason - item one states that pollution-control units be listed and labeled in accordance to UL 8782. It is our understanding that this standard covers listing and labeling of pollution-control units installed indoors, as well as outdoors, thereby making the first sentence redundant. The remainder of the section was extracted and rewritten.

2. The second sentence as written doesn't express precisely it's intent, and was separated into 5.1 and 5.2. Multiple interpretations can be derived from this sentence. One interpretation is that the PCU has to be listed and labeled for location within an enclosure, but no longer actually requires that an enclosure be provided. Note - “shall be located in a room or space …” was deleted when this language was added. Another interpretation is that the unit itself is listed and labeled through UL 2221 or ASTM E2336 as an enclosure, so an additional enclosure is not required. A third interpretation is that the PCU can be wrapped in a UL 2221 or ASTM E2336 duct wrap system that can serve as the enclosure. We don’t believe any of these interpretations are correct, but that the intent was to have the PCU, installed for indoor use, use only the test methods contained within UL 2221 or ASTM E2336 to evaluate the enclosure's effect on the pollution control unit. Subsection b brings back the requirement for the PCU to be installed in a rated room or space. It also adds the distinction of a "dedicated" room or space in order to discourage installation of a PCU in a rated trash room or machinery room or similar room which can create more hazard should there be a fire with in the grease duct system.

3. Subsection 5.3. has not changed.

4. Subsection 5.4. clarified the existing language of "space or enclosure" to be in line with subsection 5.2.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code requirements are not proposed to be changed but rather clarified as to the intent of the current code.

M36-21

M37-21

IMC: 506.3.2.5

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Revise as follows:

506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. A ~~light test~~ water spray test shall be performed to determine that all welded and brazed joints are liquid tight. Alternative tests shall be subject to approval in accordance with the requirements of Section 105.

~~A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls.~~

A water test shall be performed by simulating a grease duct cleaning operation by use of a pressure washer that is designed for grease duct cleaning, and that operates at a pressure of not less than 1200 psi. The water temperature shall be not less than the ambient air temperature to prevent condensation on the exterior surfaces of the duct. ~~A~~ The water test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. Fluorescent dyes shall be used for locations that are deemed inconclusive. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

Reason Statement: Based upon information from industry, code officials and end users, there are alternative methods of duct leakage testing currently being used successfully in the field. The intent of the proposed language is to present the water test as the main requirement and allow any alternatives that are “approved” by the AHJ. It neither limits the user to one specific test nor prohibits other approved methods from being used. As an example, the State of Minnesota 2015 Mechanical and Fuel Gas Code allows a choice of water, light, or air test. ASHRAE Standard 154-2016 “Ventilation for Commercial Cooking Operations” amended the standard to the water test based on reports that light testing failed to identify pinhole leaks and leaks around over-lapping joints.
ASHRAE SSPC 154 has received comments from members of the International Kitchen Exhaust Cleaning Association (IKECA) regarding the effectiveness of leak testing using water spray versus light. Indeed, Multiple ANSI/IKECA standards[3,4,5] recognize the water test provisions in ANSI/ASHRAE 154-2016[1] and recommend their use. Some commenters specifically expressed that in their experience, light tests have been ineffective in identifying pinhole leaks covered by slag, issues that would then be revealed when pressure washing (without detergent) is performed prior to wrapping the duct.

The water spray test applies the same conditions that kitchen exhaust ducts will ultimately be exposed to during future routine cleaning and therefore should not be a matter of concern for contractors. In fact, many contractors have come to realize that water spray testing is a more proactive method for ensuring duct performance and preventing future maintenance requests.

Bibliography: 1. ANSI/ASHRAE Standard 154-2016 “Ventilation for Commercial Cooking Operations”.
2. NFPA 96 Standard “Ventilation Control & Fire Protection of Commercial Cooking Operations".
3. ANSI/IKECA M10-2019 “Standard for the Methodology for Maintenance of Commercial Kitchen Exhaust Systems”.
4. ANSI/IKECA C10-2016 “Standard for the Methodology for Cleaning Commercial Kitchen Exhaust Systems”.
5. ANSI/IKECA I10-2015 “Standard for the Methodology for Inspection of Commercial Kitchen Exhaust Systems”.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposed water test does not change how the duct is constructed or built. There may be some additional costs associated with moving to a new test method, but the use of a representative vs. a subjective test method provides great value in ensuring safety and liquid-tight construction.

M38-21

IMC: 506.3.2.5, 506.3.2.5.3.1 (New), 506.3.2.5.2 (New)

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

506.3.2.5 Grease duct test. A field test shall be performed ~~Prior~~ prior to the use or concealment of any portion of a grease duct system~~, a leakage test shall be performed~~. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. ~~A light test shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls.~~ A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds. The test shall be performed in accordance with either Section 506.3.2.5.1 or Section 506.3.2.5.2.

Add new text as follows:

506.3.2.5.3.1 Light test. A duct test shall be performed by passing a lamp having not less than 1600 lumens, through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A successful test shall be where the light from the lamp is not visible at any point on the exterior of the duct.

506.3.2.5.2 Water spray test. A duct test shall be performed by simulating a cleaning operation, of the interior of the duct. A water pump, capable of a flowing outlet pressure of not less than 1200 psi (8,274 kPa) shall be used, along with any necessary hoses and spray nozzles, to apply high pressure water to the inside surfaces of the duct. A successful test shall be where there is no evidence of cleaning water at any point on the exterior of the duct.

Reason Statement: There are several reasons for this proposal.
Some installers are using LED lamps for testing and such lamps are not rated, in terms of light output, in watts of power but instead in lumens of visible light. LED lamps are more rugged that incandescent lamps and are often preferred for field use.
The ASHRAE 154 (Ventilation for Commercial Cooking Standard) committee is moving away from light testing of grease ducts to simulated duct cleaning using water. Actual duct cleaning in the future should not result in water damage to the structure or to any materials that are used to wrap the duct. Furthermore, if a water leak is present, then almost certainly, grease will be present on the exterior of the duct. Grease on the exterior of a duct presents a fire hazard.

The installer has a choice as to which test to use.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 14.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal adds an alternative for testing grease ducts. Although the alternative for water spray testing would cost more to perform than the light test, the alternative will not be mandated by the code and therefore, the proposal does not add any labor or material to impact the cost of construction.

M39-21

IMC: 506.5.1, 506.5.2

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Mechanical Code

Revise as follows:

506.5.1 Exhaust fans. Exhaust fan housings serving a Type I hood shall be constructed as required for grease ducts in accordance with Section 506.3.1.1.

Exception: Fans *listed* and *labeled* in accordance with ~~UL 762.~~ UL 705

506.5.2 Pollution-control units. The installation of pollution-control units shall be in accordance with all of the following:

1. Pollution-control units shall be *listed* and *labeled* in accordance with UL 8782.
2. Fans serving pollution-control units shall be *listed* and *labeled* in accordance with ~~UL 762.~~ UL 705.
3. Bracing and supports for pollution-control units shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the *International Building Code*.
4. Pollution-control units located indoors shall be *listed* and *labeled* for such use. Where enclosed duct systems, as required by Section 506.3.11, are connected to a pollution control unit, such unit shall be *listed* and *labeled*, in accordance with UL 2221 or ASTM E2336, for location in an enclosure having the same fire-resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of the unit. The space or enclosure shall be ventilated in accordance with the manufacturer's installation instructions.
5. *Clearances* shall be maintained between the pollution-control unit and combustible material in accordance with the listing.
6. Roof-mounted pollution-control units shall be listed for outdoor installation and shall be mounted not less than 18 inches (457 mm) above the roof.
7. Exhaust outlets for pollution-control units shall be in accordance with Section 506.3.13.
8. An airflow differential pressure control shall be provided to monitor the pressure drop across the filter sections of a pollution-control unit. When the airflow is reduced below the design velocity, the airflow differential pressure control shall activate a visual alarm located in the area where cooking operations occur.
9. Pollution-control units shall be provided with a factory-installed fire suppression system.
10. Service space shall be provided in accordance with the manufacturer's instructions for the pollution control unit and the requirements of Section 306.
11. Wash-down drains shall discharge through a grease interceptor and shall be sized for the flow. Drains shall be sealed with a trap or other approved means to prevent air bypass. Where a trap is utilized it shall have a seal depth that accounts for the system pressurization and evaporation between cleanings.
12. Protection from freezing shall be provided for the water supply and fire suppression systems where such systems are subject to freezing.
13. Duct connections to pollution-control units shall be in accordance with Section 506.3.2.3. Where water splash or carryover can occur in the transition duct as a result of a washing operation, the transition duct shall slope downward toward the cabinet drain pan for a length not less than 18 inches (457 mm). Ducts shall transition to the full size of the unit's inlet and outlet openings.
14. Extra-heavy-duty *appliance* exhaust systems shall not be connected to pollution-control units except where such units are specifically designed and listed for use with solid fuels.
15. Pollution-control units shall be maintained in accordance with the manufacturer's instructions.

Reason Statement: The requirements for UL 762 have been completely incorporated into UL 705. The product certification listings are moving from UL 762 to UL 705.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The product testing and certification requirements have only been relocated, not changed.

M40-21

IMC: 507.1, 507.1.1, 507.1.2, 507.4, 507.4.1, 507.4.2, 507.6, 507.6.1, 507.5.1, 507.5.2, 507.5.3, 507.5, 509.1, 507.3, 507.3.4 (New), 507.5.4, 507.5.5

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I hood shall be installed at or above appliances in accordance with Section 507.2. ~~or~~ A Type II hood shall be installed at or above *appliances* in accordance with ~~Sections 507.2 and~~ Section 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, and 508 ~~and 509~~.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.1.6 507.2.3, 507.2.5, 507.2.8, 507.2.10 507.3.1, and 507.3.3~~, 507.4 and 507.5~~.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.1.6 507.2.3, 507.2.5, 507.2.8, 507.2.10 507.3.1, and 507.3.3~~, 507.4 and 507.5~~. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.

507.1.1 Operation. Commercial kitchen exhaust hood systems shall operate during the cooking operation. The hood exhaust rate shall comply with either the listing of the hood Section 507.2.10, or ~~shall comply with~~ Section 507.3.4 ~~507.5~~. The exhaust fan serving a Type I hood shall have automatic controls that will activate the fan when any *appliance* that requires such Type I hood is turned on, or a means of interlock shall be provided that will prevent operation of such *appliances* when the exhaust fan is not turned on. Where one or more temperature or radiant energy sensors are used to activate a Type I hood exhaust fan, the fan shall activate not more than 15 minutes after the first *appliance* served by that hood has been turned on. A method of interlock between an exhaust hood system and *appliances* equipped with standing pilot burners shall not cause the pilot burners to be extinguished. A method of interlock between an exhaust hood system and cooking *appliances* shall not involve or depend on any component of a fire-extinguishing system.
The net exhaust volumes for hoods shall be permitted to be reduced during part-load cooking conditions, where engineered or *listed* multispeed or variable speed controls automatically operate the exhaust system to maintain capture and removal of cooking effluents as required by this section. Reduced volumes shall not be below that required to maintain capture and removal of effluents from the idle cooking *appliances* that are operating in a standby mode.

507.1.2 Domestic cooking appliances used for commercial purposes. Domestic cooking *appliances* utilized for commercial purposes shall be provided with either Type I or Type II hoods as required for the type of *appliances* and processes in accordance with Sections 507.2 and 507.3. Domestic cooking *appliances* utilized for domestic cooking shall comply with Section 505.

~~507.4~~ 507.1.6 Hood size and location. Hoods shall comply with the overhang, setback and height requirements in accordance with Sections ~~507.4.1~~ 507.6.1 and ~~507.4.2~~ 507.1.6.2, based on the type of hood.

~~507.4.1~~ 507.1.6.1 Canopy size and location. The inside lower edge of canopy-type Type I and II commercial hoods shall overhang or extend a horizontal distance of not less than 6 inches (152 mm) beyond the edge of the top horizontal surface of the *appliance* on all open sides. The vertical distance between the front lower lip of the hood and such surface shall not exceed 4 feet (1219 mm).

Exception: The hood shall be permitted to be flush with the outer edge of the cooking surface where the hood is closed to the *appliance* side by a noncombustible wall or panel.

~~507.4.2~~ 507.1.6.2 Noncanopy size and location. Noncanopy-type hoods shall be located not greater than 3 feet (914 mm) above the cooking surface. The edge of the hood shall be set back not greater than 1 foot (305 mm) from the edge of the cooking surface.

~~507.6~~ 507.1.7 Performance test. A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving *commercial cooking appliances*. The test shall verify the rate of exhaust airflow required by Section ~~507.5~~ 507.2.10 or Section 507.3.4, makeup airflow required by Section 508 and proper operation as specified in this chapter. The permit holder shall furnish the necessary test

equipment and devices required to perform the tests.

~~**507.6.1**~~ **507.1.7.1 Capture and containment test.** The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all *appliances* under the hood at operating temperatures, with all sources of outdoor air providing *makeup air* for the hood operating and with all sources of recirculated air providing conditioning for the space in which the hood is located operating. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as that provided by smoke generators. .

~~**507.5.1**~~ **507.2.2.10.1 Extra-heavy-duty cooking appliances.** The minimum net airflow for hoods~~, as determined by Section 507.1,~~ used for *extra-heavy-duty cooking appliances* shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	Not allowed
Double island canopy (per side)	550
Eyebrow	Not allowed
Single island canopy	700
Wall-mounted canopy	550

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

~~**507.5.2**~~ **507.2.2.10.2 Heavy-duty cooking appliances.** The minimum net airflow for hoods~~, as determined by Section 507.1,~~ used for *heavy-duty cooking appliances* shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	400
Double island canopy (per side)	400
Eyebrow	Not allowed
Single island canopy	600
Wall-mounted canopy	400

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

~~**507.5.3**~~ **507.2.2.10.3 Medium-duty cooking appliances.** The minimum net airflow for hoods~~, as determined by Section 507.1,~~ used for *medium-duty cooking appliances* shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	300
Double island canopy (per side)	300
Eyebrow	250
Single island canopy	500
Wall-mounted canopy	300

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

~~**507.5**~~ **507.2.10 Capacity of Tye I hoods.** Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections ~~507.5.1~~ 507.2.10.1 through ~~507.5.5~~ 507.2.10.4. The net quantity of *exhaust air* shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of *heavy-duty, medium-duty* and *light-duty cooking appliances* are utilized under a single hood, the exhaust rate required by this section for the heaviest duty *appliance* covered by the hood shall be used for the entire hood.

~~**509.1**~~ **507.2.11 ~~Where required~~ Fire suppression systems.** ~~*Cooking appliances* required by Section 507.2 to have~~ a Type I hood shall be provided with an *approved* automatic fire suppression system complying with Section 904.12 of the *International Building Code* and the *International Fire Code* .

507.3 Type II hoods. Type II hoods shall be installed above *light-duty cooking appliances* dishwashers and *appliances* that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such *appliances* are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all *appliances* that produce products of combustion and do not produce grease or smoke as a result of the cooking process. Spaces containing cooking *appliances* that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00356 $m^3/(s \cdot m^2)$. For the purpose of determining the floor area required to be exhausted, each individual *appliance* that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m^2). Such additional square footage shall be provided with exhaust at a rate of

0.70 cfm per square foot [0.00356 $m^3/(s \cdot m^2)$].

Add new text as follows:

507.3.4 Capacity of Type II hoods. Type II hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections 507.3.4.1 through 507.3.4.2. The net quantity of exhaust air shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood.

Revise as follows:

~~**507.5.4**~~ **507.3.4.1 Light-duty cooking appliances.** The minimum net airflow for hoods~~, as determined by Section 507.1,~~ used for *light-duty* cooking *appliances* and food service preparation shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	250
Double island canopy (per side)	250
Eyebrow	250
Single island canopy	400
Wall-mounted canopy	200

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

~~**507.5.5**~~ **507.3.4.2 Dishwashing appliances.** The minimum net airflow for Type II hoods used for dishwashing *appliances* shall be 100 cfm per linear foot (155 L/s per linear meter) of hood length.

Exception: Dishwashing *appliances* and *equipment* installed in accordance with Section 507.3.

Reason Statement: This proposal is intended to reorganize the existing requirements in Section 507 into a logical order of application, while not making any substantive technical changes. There are other proposals from the PMGCAC that are intended to address specific technical issues within the existing requirements. This proposal:

1. Reorganized Section 507 into three main sections –
   Section 507.1 addresses general requirements that apply to both Type I and Type II hoods

   Section 507.2 addresses additional requirements that apply to Type I hoods

   Section 507.3 addresses additional requirements that apply to Type II hoods

2. Added “light duty cooking appliances to Section 507.3 (Type II hoods) because the existing code requirements do not include these appliances specifically under either Type I or Type II hoods.
3. Removed the pointer in the sections containing the prescriptive code calculations to determine hood capacities (originally under Section 507.5), because there is nothing in Section 507.1 regarding the determination.4. Relocated the requirement in Section 509 to Section 507.2 because Section 509 has only one application, which is for use in Type I hoods. This section should be included with all the other requirements for Type I hoods in Section 507.2.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3C.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Because this proposal only clarifies/reorganizes the current code requirements, no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code. As such, there is no impact to the cost of construction.

M40-21

M41-21

IMC: 507.1, 507.3

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. ~~Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.~~

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.

507.3 Type II hoods. Type II hoods shall be installed above dishwashers and *appliances* that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such *appliances* are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all *appliances* that produce products of combustion and do not produce grease or smoke as a result of the cooking process. A Type I hood shall be permitted to be installed for a required Type II hood provided that the Type I hood installation complies with all of the requirements for a Type I hood installation. Where such a Type I hood serves only dishwashers and appliances that require a Type II hood, the Type I hood shall not be required to have fire suppression or grease filters. Spaces containing cooking *appliances* that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00356 $m^3/(s \cdot m^2)$. For the purpose of determining the floor area required to be exhausted, each individual *appliance* that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m^2). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [0.00356 $m^3/(s \cdot m^2)$].

Reason Statement: The deleted sentence in 507.1 has been widely misunderstood since it was added to the code many cycles ago. There is a market for pre-owned Type I hoods. Commercial kitchen outfitters commonly utilize used kitchen equipment for new and remodeled kitchens. However, where the application only requires a Type II hood, installers have been known to only install Type II ductwork to the hood. Should a reorganization of the kitchen locate an appliance requiring a Type I hood under this hood, the ductwork (usually concealed) would not comply with that required for a Type I hood. This is dangerous. The sentence was reworded for clarity and placed in the Type II hood paragraph where it belongs.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3J.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The allowance (along with the requirements) are in the existing code but were difficult to understand. This proposal only clarifies the code and clarifications do not impact material or labor costs.

M42-21

IMC: 507.1

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above*appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. A hood shall not be required at or above any of the following:

   22.1. Factory-built commercial cooking recirculating systems ~~that are~~ listed and labeled in accordance with UL 710B, and installed in accordance with Section 304.1~~, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5~~. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual appliance shall be considered as occupying not less than 100 square feet (9.3 m2).

   3 2.2. ~~Where~~ cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96~~, a hood shall not be required at or above them~~.

   4 2.3. Smoker ovens with integral exhaust systems~~, provided~~ that ~~the appliance is installed in accordance with the manufacturer's installation instructions, is~~ are listed and tested for the application~~, and complies with Chapter 5~~.

Reason Statement: The purpose of this proposal is to clarify the three existing exceptions for Section 507.1 where because of the particular type of product or cooking operation, a hood is not required above the product or cooking operation.

1. Factory-built commercial cooking recirculating systems listed and labeled in accordance with UL 710B include a hood to capture and contain the cooking effluents, which are processed through a series of filters. The filtered air is returned back into the same space as the system. Thus, these systems are an alternative to all the requirements in Section 507, and do not require an additional hood or any grease duct system. There is no need to identify all the sections that these systems are exempt.
2. The exception for cooking appliances that are equipped with integral down-draft exhaust systems. ovens with integral exhaust systems is revised editorially.
3. The exception for smoker ovens with integral exhaust systems is revised editorially. Section 304.1 of the IMC already requires listed equipment and appliances to be installed in accordance with the manufacturer's installation instructions. The general reference to compliance with Chapter 5 does not provide specific direction. Section 507 provides hood requirements. Section 506 will apply to the grease duct and exhaust equipment that is serving these types of smoker ovens.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3D.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Because this proposal only clarifies the current code requirements, no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code. As such, there is no impact to the cost of construction.

M43-21

IMC: 507.1

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.
5. Ovens listed and labeled for use with wood fuel in accordance with UL 2162 and vented in accordance with the manufacturer's instructions.

Reason Statement: Some solid fuel-fired ovens that are listed and labeled in accordance with UL 2162 have integral venting/exhaust combination. The manufacturer's installation instructions for these types of cooking equipment provide specifics on what venting and exhaust systems are to be used, and that they are to be vented directly outside. Typically what is used is a factory built chimney that has been tested and listed to both UL 103 (factory built chimneys) and UL 1978 (grease ducts). A hood above these types of oven installations would be redundant.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3E.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Because this proposal only provides an alternative to the current code requirements, there is no additional labor, materials, equipment, appliances or devices mandated beyond what is currently required by the code. Alternatives generally lower the cost of construction. As such, there is no impact to the cost of construction.

M44-21

IMC: 507.1, 507.2

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.
5. An electric cooking appliance listed and labeled in accordance with UL 197 for reduced grease emissions.

507.2 Type I hoods. Type I hoods shall be installed where cooking *appliances* produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over *medium-duty, heavy-duty* and *extra-heavy-duty cooking appliances*.

~~**Exception:** A Type I hood shall not be required for an electric cooking *appliance* where an approved testing agency provides documentation that the *appliance* effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with UL 710B.~~

Reason Statement: The exception in Section 507.2 for electric cooking appliances that the effluent emitted from the contains 5 mg/m3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m3/s) in accordance with UL 710B should be relocated as an additional exception to Section 507.1. A hood above these types of appliances would be redundant. The requirements for “reduced grease emissions” evaluation and testing for cooking appliances have been moved to an appendix of UL 197, which contains specific details on how to run these tests with this criteria, as well as providing product marking requirements. Providing documentation of a test performed of a particular product does not demonstrate that the specific product installed at the jobsite is constructed in the same manner with the same materials as the sample that was originally tested, whereas a listing (certification) mark does.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3F.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Because this proposal only provides an alternative to the current code requirements, there is no additional labor, materials, equipment, appliances or devices mandated beyond what is currently required by the code. Alternatives generally lower the cost of construction. As such, there is no impact to the cost of construction.

M45-21

IMC: 507.1, UL Chapter 15 (New)

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.
5. Commercial electric dishwashers incorporating a self-contained condensing system listed and labeled in accordance with UL 921.

Add new standard(s) as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096

921-20: Standard for Commercial Dishwashers

Staff Analysis: A review of the standards proposed for inclusion in the code, UL 921-2020: Standard for Commercial Dishwashers, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: UL 921 includes requirements for evaluating and certifying self-contained condensing systems that do not require a Type II hood above. A hood above a UL 921 dishwasher would be redundant.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3G.

Cost Impact: The code change proposal will decrease the cost of construction
This proposal provides an alternative to providing Type II hoods for specific appliances. Not having to provide and install a Type II hood for UL 921 dishwashers saves significant material costs and labor costs for Type II hoods.

M45-21

M46-21

IMC: 507.1, 507.3, 507.5.5

Proponents: Joseph Summers, Chair, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above *appliances* in accordance with Sections 507.2 and 507.3. Where any cooking *appliance* under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust *equipment* and *makeup air* system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are *listed* and *labeled* in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are *listed* and *labeled* in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual *appliance* shall be considered as occupying not less than 100 square feet (9.3 m^2).
3. Where cooking *appliances* are equipped with integral down-draft exhaust systems and such *appliances* and exhaust systems are *listed* and *labeled* for the application in accordance with NFPA 96, a hood shall not be required at or above them.
4. Smoker ovens with integral exhaust systems, provided that the *appliance* is installed in accordance with the manufacturer's installation instructions, is listed and tested for the application, and complies with Chapter 5.
5. Where the heat and moisture loads from dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process are incorporated into the HVAC system design or into the design of a separate removal system. Spaces containing such cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00356 m3/(s • m2). For the purpose of determining the floor area required to be exhausted, each individual appliance that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m2). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [0.00356 m3/(s • m2)].

507.3 Type II hoods. Type II hoods shall be installed above dishwashers and *appliances* that produce heat or moisture and do not produce grease or smoke as a result of the cooking process~~, except where the heat and moisture loads from such *appliances* are incorporated into the HVAC system design or into the design of a separate removal system~~. Type II hoods shall be installed above all *appliances* that produce products of combustion and do not produce grease or smoke as a result of the cooking process.~~ Spaces containing cooking *appliances* that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00356 $m^3/(s \cdot m^2)$. For the purpose of determining the floor area required to be exhausted, each individual *appliance* that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m^2). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [0.00356 $m^3/(s \cdot m^2)$].~~

507.5.5 Dishwashing appliances. The minimum net airflow for Type II hoods used for dishwashing *appliances* shall be 100 cfm per linear foot (155 L/s per linear meter) of hood length.

~~**Exception:** Dishwashing *appliances* and *equipment* installed in accordance with Section 507.3.~~

Reason Statement: Where the heat and moisture loads from dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process are incorporated into the HVAC system, a Type II hood above is not needed. This “exception”, that is currently within Section 507.3, should be included with all the other exceptions for not requiring a hood in Section 507.1.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 1-3H.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal provides an alternative to the provision of Type II hoods for specific appliances. Not having to install a Type II hood will significantly lower material and labor costs however increasing the exhaust rate for some spaces could require slightly larger ventilation equipment or ductwork sizes in some situations. The larger ventilation equipment and ductwork might slightly increase costs but not as much as the cost savings for deletion of the hoods.

M47-21

IMC: 507.1.3

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Mechanical Code

Delete and substitute as follows:

~~**507.1.3 Fuel-burning appliances.** Where vented fuel-burning *appliances* are located in the same room or space as the hood, provisions shall be made to prevent the hood system from interfering with normal operation of the *appliance* vents.~~

507.1.3 Fuel-burning appliances. Appliances equipped with draft hoods or atmospheric burners shall not be located in the same room or space containing a Type I or Type II hood except where the appliance is located in a sealed enclosure equipped with a self-closing device with combustion air obtained from the outdoors or from other spaces in the building in accordance with Chapter 7 or the International Fuel Gas code.

Reason Statement: It's an unfair competition for a draft hood appliance or an appliance with an open atmospheric burner to be located in a space with exhaust systems as large as that associated with commercial kitchens. It doesn't take much to overcome a gravity vent system. As little as 5 pascals can affect a vent system. Kitchens do not stay balanced very long as many things affect the dynamics over time often leading to negative pressures that can that can affect the gravity system. This can be a dangerous situation leading to combustion products spilling into the space. This language is the "provisions" the original section speaks of and will eliminate the subjectivity of this section by replacing it with mandatory language.

Cost Impact: The code change proposal will increase the cost of construction
This change could possibly increase cost if combustion air must be obtained from the outdoors where it might not have under the existing language.

M48-21

IMC: 507.2

Proponents: Richard Grace, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA) (richard.grace@fairfaxcounty.gov)

2021 International Mechanical Code

Revise as follows:

507.2 Type I hoods. Type I hoods shall be installed where cooking *appliances* produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over *medium-duty, heavy-duty* and *extra-heavy-duty cooking appliances*.

Exception: A Type I hood shall not be required for an electric cooking *appliance* where an approved testing agency provides documentation that the *appliance* effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with the emission test section required in UL 710B. Space ventilation shall be provided in accordance with Section 507.3.

Reason Statement: This is a clarification that not all of UL 710B is required for this exception, but simply the testing section pertaining to just the effluent emissions section.
It is understood that when this section is utilized that the space the appliances are located have now become kitchen areas and must be ventilated as such. Exception #2 in Section 507.1 clearly states that space ventilation is still required, as a kitchen, when Type I hoods are omitted. The fundamental concept is that while it is true a Type I hood is not required when low emission appliances are utilized per 507.2, that does not eliminate Type II provisions as well. In fact, logic would automatically direct the user to the Type II hood section of 507.3 when the Type I hood is omitted because you are still installing heat/moisture producing appliances that are performing cooking operations. These appliances are not classed as smoke and grease producing, which omits Type I requirements, however they still fall well within the requirements for Type II systems for heat/moisture removal. Several methods are available to comply with the space ventilation rates of 507.3. It can be in the form of hoods, simple space type exhaust fans or local exhaust fans utilizing manual or automatic switches, timers or sensors. Or the most effective allowable method may be to incorporate the needed ventilation into the HVAC system. As long as it can be demonstrated the additional heat and moisture can be accounted for by the system and still comply with the energy code.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code requirements are not proposed to be changed but rather clarified as to the intent of the current code.

M49-21

IMC: 508.1.1

Proponents: Joseph Summers, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Delete and substitute as follows:

~~**508.1.1 Makeup air temperature.** The temperature differential between *makeup air* and the air in the conditioned space shall not exceed 10°F (6°C) except where the added heating and cooling loads of the *makeup air* do not exceed the capacity of the HVAC system.~~

508.1.1 Makeup air temperature. HVAC systems that serve the kitchen space shall have the additional capacity necessary for the latent and sensible loads that are introduced by the makeup air supplied to the kitchen space, or the makeup air shall be conditioned by dedicated systems such that the difference in temperature between the makeup air supplied to the kitchen space and the design setpoint temperature in the kitchen space is not greater than 10 degrees F (6 degrees C).

Exception: Makeup air supplied to a compensating hood shall not not be required to be conditioned.

Reason Statement: This rewrite of the section intends to clarify the intent which was to either design the HVAC system for the kitchen to handle makeup air loads, or to have a dedicated makeup air conditioning system. It is also clarified that the 10 degree differential applies to the thermostat setpoint temperature in the kitchen, not the temperature of the kitchen as it happens to be at any given point in the day. If the HVAC system can handle the loads from makeup air, then the kitchen space temperature will reflect the thermostat setpoint. If a dedicated makeup air system is installed, then it must adhere to the delta 10 degree criterion. The exception recognizes that makeup air fed directly to the integral makeup air plenum of a hood or directly into the mouth of a hood need not be conditioned, since it might not affect the comfort of the employees.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 5.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal will not increase the cost of construction because no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code.

M50-21

IMC: 512.1, 512.2, 512.3, 512.4, 512.5, AARST (New), ANSI/AARST CC-1000-2018 (New)

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 Mechanical Code

Revise as follows:

512.1 General. Where a subslab soil exhaust system is provided, ~~the duct shall conform to the requirements of this section.~~ the system shall comply with ANSI/AARST CC1000.

Delete without substitution:

~~**512.2 Materials.** Subslab soil exhaust system duct material shall be air duct material *listed* and *labeled* to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the *International Plumbing Code* as building sanitary drainage and vent pipe: cast iron; galvanized steel; copper or copper-alloy pipe and tube of a weight not less than type DWV; and plastic piping.~~

~~**512.3 Grade.** Exhaust system ducts shall not be trapped and shall have a minimum slope of one-eighth unit vertical in 12 units horizontal (1-percent slope).~~

~~**512.4 Termination.** Subslab soil exhaust system ducts shall extend through the roof and terminate not less than 6 inches (152 mm) above the roof and not less than 10 feet (3048 mm) from any operable openings or air intake.~~

~~**512.5 Identification.** Subslab soil exhaust ducts shall be permanently identified within each floor level by means of a tag, stencil or other *approved* marking.~~

Add new standard(s) as follows:

AARST

The American Association of Radon Scientists and Technologists
527 N Justice Street
Hendersonville NC 28739
USA

ANSI/AARST CC-1000-2018 Soil Gas Control Systems in New Construction of Buildings.

Staff Analysis: A review of the standards proposed for inclusion in the code, AARST CC 1000-2018: Soil Gas Control Systems in New Construction of Buildings, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: The purpose of this proposed change is to update the legacy code language for soil exhaust systems in section 512 to the relevant consensus standard for soil gas exhaust systems, which includes additional specifications for materials, grade/slope, termination, and identification in the existing language as well as other essential components of soil gas control that are not now included in section 512.
The standard included in this proposal has been vetted and approved by EPA, multiple regulatory states, and HUD. It can be viewed for free 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.

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.

M51-21

IMC: 601.5

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Mechanical Code

Revise as follows:

601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. Return air for heating or air-conditioning systems shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
4. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.
5. Return air taken from one *dwelling unit* shall not be discharged into another *dwelling unit*.
6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
7. Return air for heating or air-conditioning systems shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.
8. Return air for heating or air-conditioning systems shall not be taken from indoor swimming pool enclosures and associated deck areas.

Exceptions:

1. Where the air from such spaces is dehumidified in accordance with Section 403.2.1, Item 2.
2. Dedicated HVAC systems serving only such spaces.

Exceptions:

1. Taking return air for heating or air-conditioning systems from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
2. Taking return air for heating or air-conditioning systems from a kitchen is not prohibited in a *dwelling unit* where the kitchen and living spaces are in a single room and the cooking *appliance* is electric and located not less than 5 feet (1524 mm) in any direction from the return air intake opening.
3. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

Reason Statement: The IMC defines return air as "Air removed from an approved conditioned space or location and recirculated or exhausted." The IMC defines exhaust air as "Air being removed from any space, appliance or piece of equipment and conveyed directly to the atmosphere by means of openings or ducts."

Based on these definitions, exhaust air may be considered as a subset of return air.

Section 601.5 establishes requirements for return air for "heating, ventilation, and air-conditioning systems" that are clearly not meant to apply to exhaust air from ventilation systems. For example, 601.5.7 requires that "Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic." Clearly, this section is not meant to prohibit taking exhaust air from kitchens, garages, bathrooms, etc., since exhaust of these spaces is required elsewhere in the code. This proposal is meant to clarify the intent of this section without changing its meaning.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal is editorial and therefore will not increase or decrease the cost of construction.

M52-21

IMC: 601.5

Proponents: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Myself (joe@buildingscience.com)

2021 International Mechanical Code

Revise as follows:

601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. Return air shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
4. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.
5. Return air taken from one *dwelling unit* shall not be discharged into another *dwelling unit*.
6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
7. Return air shall not be taken from a closet, ~~bathroom,~~ toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.
8. Return air shall not be taken from indoor swimming pool enclosures and associated deck areas.

Exceptions:

1. Where the air from such spaces is dehumidified in accordance with Section 403.2.1, Item 2.
2. Dedicated HVAC systems serving only such spaces.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
2. Taking return air from a kitchen is not prohibited in a *dwelling unit* where the kitchen and living spaces are in a single room and the cooking *appliance* is electric and located not less than 5 feet (1524 mm) in any direction from the return air intake opening.
3. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

Reason Statement: Return air from bathrooms is necessary to control bathroom moisture levels during cooling periods.
Increasing air change with the rest of the occupied space results in lower moisture levels in the bathroom and allows the air conditioning system to remove moisture. Relying on bathroom exhaust fans exhausting to the exterior to control bathroom moisture does not effectively reduce bathroom moisture levels. Exhaust ventilation in bathrooms should be used to control odors not moisture. Exhaust ventilation results in increasing air change in the entire occupied space and increasing moisture loads due to infiltration of exterior humid air throughout the occupied space. This higher air change rate (infiltration) supplies more moisture than the air conditioning system can remove. Odors are still controlled by bathroom exhaust fans exhausting air to the exterior. These bathroom exhaust fans do not have to operate continuously to control odors. Only providing supply air to bathrooms exacerbates the problem by making roof surfaces colder.

This is one of six separate proposed changes related to controlling mold in closets, bathrooms and mechanical room. The six changes fix problems caused by an increase in code thermal resistance over the past several code cycles.

For a more detailed explanation see:

https://www.buildingscience.com/documents/building-science-insights/bsi-109-how-changing-filters-led-condensation-and-mold-problem

https://www.buildingscience.com/documents/building-science-insights-newsletters/bsi-006-no-good-deed-shall-go-unpunished

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal increases the cost of construction. The cost is the cost of adding the return duct.

M53-21

IMC: 601.5

Proponents: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Myself (joe@buildingscience.com)

2021 International Mechanical Code

Revise as follows:

601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. Return air shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
4. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.
5. Return air taken from one *dwelling unit* shall not be discharged into another *dwelling unit*.
6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
7. Return air shall not be taken from a ~~closet,~~ bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.
8. Return air from a closet shall serve only the closet and shall not require a dedicated closet supply duct.
9. Return air taken from a closet smaller than 30 ft^2 (2.8 m^2) shall require the closet door be undercut not less than1 $\frac{1}{2}$ inches (38 mm), or be either a louvered door or include an air transfer grille both having a net free area of not less than 30 in^2 (19355 m^2)

~~8~~ 10. Return air shall not be taken from indoor swimming pool enclosures and associated deck areas.

Exceptions:

1. Where the air from such spaces is dehumidified in accordance with Section 403.2.1, Item 2.
2. Dedicated HVAC systems serving only such spaces.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
2. Taking return air from a kitchen is not prohibited in a *dwelling unit* where the kitchen and living spaces are in a single room and the cooking *appliance* is electric and located not less than 5 feet (1524 mm) in any direction from the return air intake opening.
3. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

Reason Statement: Mold growth is now common in closets due to higher interior moisture loads and less heat gain in closets. Allowing a limited amount of return air provides a means of controlling closet moisture levels. Providing supply air to a closet exacerbates the problem by making closet surfaces colder.
This is one of six separate proposed changes related to controlling mold in closets, bathrooms and mechanical room. The six changes fix problems caused by an increase in code thermal resistance over the past several code cycles.

For a more detailed explanation see:

https://www.buildingscience.com/documents/building-science-insights/bsi-109-how-changing-filters-led-condensation-and-mold-problem

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal increases the cost of construction. The cost is the cost of adding the return duct. However, this *code change is not a requirement. It gives builders an option to solve and avoid problems.*

M54-21

IMC: 601.5

Proponents: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Myself (joe@buildingscience.com)

2021 International Mechanical Code

Revise as follows:

601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. Return air shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
4. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.
5. Return air taken from one *dwelling unit* shall not be discharged into another *dwelling unit*.
6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
7. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.

   Exception: Taking return air from a boiler room, furnace room or mechanical room shall be permitted provided that the return air serves only those rooms, the combustion equipment is sealed combustion, and the pressure differential across the room is limited to 0.01 inch WC (2.5 pascals) or less by undercutting the door, installing a louvered door, a transfer grille, or by some other means. A dedicated supply duct shall not be required for those rooms.

8. Return air shall not be taken from indoor swimming pool enclosures and associated deck areas.

   Exceptions:

   1. Where the air from such spaces is dehumidified in accordance with Section 403.2.1, Item 2.
   2. Dedicated HVAC systems serving only such spaces.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
2. Taking return air from a kitchen is not prohibited in a *dwelling unit* where the kitchen and living spaces are in a single room and the cooking *appliance* is electric and located not less than 5 feet (1524 mm) in any direction from the return air intake opening.
3. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

Reason Statement: Mold growth is now common in boiler rooms, furnace rooms or mechanical rooms due to higher interior moisture loads and less heat gain in such rooms. Allowing a limited amount of return air provides a means of controlling room moisture levels. Providing supply air to such a space exacerbates the problem by making room surfaces colder.
This is one of six separate proposed changes related to controlling mold in closets, bathrooms and mechanical room. The six changes fix problems caused by an increase in code thermal resistance over the past several code cycles.

For a more detailed explanation see:

https://www.buildingscience.com/documents/building-science-insights/bsi-109-how-changing-filters-led-condensation-and-mold-problem

https://www.buildingscience.com/documents/building-science-insights-newsletters/bsi-006-no-good-deed-shall-go-unpunished

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal increases the cost of construction. The cost is the cost of adding the return duct. However, this code change is not a requirement. It gives builders an option to solve and avoid problems.

M55-21

IMC: 602.1, 602.1.1 (New), 602.1.2 (New), 602.1.3 (New), 602.2, 602.3, 602.2.1.4, 602.2.1.4.1, 602.2.1.4.2, 602.2.1, 602.2.1.1, 602.2.1.2, 602.2.1.3, 602.2.1.5, 602.2.1.6, 602.2.1.7, 602.2.1.8, 602.3.10 (New)

Proponents: Joseph Summers, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

602.1 General. Supply, return, exhaust, relief and ventilation air *plenums* shall be in accordance with this section. ~~limited to uninhabited crawl spaces,areas above a ceiling or below the floor, attic spaces, mechanical *equipment* rooms and the framing cavities addressed in Section 602.3. *Plenums* shall be limited to one fire area. Air systems shall be ducted from the boundary of the fire area served directly to the air-handling *equipment*.~~ Fuel-fired *appliances* shall not be installed within a *plenum*.

Add new text as follows:

602.1.1 Locations limited. Plenums shall be limited to uninhabited crawl spaces, above a ceiling or below the floor, attic spaces, mechanical equipment rooms and the framing cavities addressed in Section 602.2.

602.1.2 Limited to a fire area. . Plenums shall be limited to one fire area. Air systems shall be ducted from the boundary of the fire area served directly to the air-handling equipment.

602.1.3 Fuel fired appliances. . Fuel-fired appliances shall not be installed within a plenum.

Revise as follows:

602.2 Construction of plenums.. *Plenum* enclosure construction materials that are exposed to the airflow shall comply with the requirements of Section 703.3 of the International Building Code or such materials shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.
The use of gypsum boards to form *plenums* shall be limited to systems where the air temperatures do not exceed 125ºF (52ºC) and the building and mechanical system design conditions are such that the gypsum board surface temperature will be maintained above the airstream dew-point temperature. Supply air *plenums* formed by gypsum boards shall not be incorporated in air-handling systems utilizing *direct evaporative cooling* systems.

~~**602.3**~~ **602.2.1 Stud cavity and joist space plenums.** Stud wall cavities and the spaces between solid floor joists to be utilized as air *plenums* shall comply with the following conditions:

1. Such cavities or spaces shall not be utilized as a *plenum* for supply air.
2. Such cavities or spaces shall not be part of a required fire-resistance-rated assembly.
3. Stud wall cavities shall not convey air from more than one floor level.
4. Stud wall cavities and joist space *plenums* shall comply with the floor penetration protection requirements of the *International Building Code*.
5. Stud wall cavities and joist space *plenums* shall be isolated from adjacent concealed spaces by *approved* fireblocking as required in the *International Building Code*.
6. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air *plenums*.

Delete without substitution:

~~**602.2.1.4 Electrical equipment in plenums.** Electrical *equipment* exposed within a *plenum* shall comply with Sections 602.2.1.4.1 and 602.2.1.4.2.~~

~~**602.2.1.4.1 Equipment in metallic enclosures.** Electrical *equipment* with metallic enclosures exposed within a *plenum* shall be permitted.~~

~~**602.2.1.4.2 Equipment in combustible enclosures.** Electrical *equipment* with combustible enclosures exposed within a *plenum* shall be *listed* and *labeled* for such use in accordance with UL 2043.~~

Revise as follows:

~~**602.2.1**~~ **602.3 Materials within plenums.** ~~Except as required by Sections 602.2.1.1 through 602.2.1.8, m~~Materials within *plenums* shall be noncombustible or shall be in compliance with the applicable requirements in Sections 602.3.1 through 602.3.10. ~~*listed* and *labeled* as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.~~

Exception~~s~~: This section shall not apply to the following:

1. ~~Rigid and flexible ducts and connectors shall conform to Section 603.~~ Materials exposed within plenums in one- and two-family dwellings.

2. ~~Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.~~ Combustible materials fully enclosed within one of the following:

3. ~~This section shall not apply to materials exposed within *plenums* in one- and two-family dwellings.~~

4. ~~This section shall not apply to smoke detectors.~~

5. ~~Combustible materials fully enclosed within one of the following:~~

   5.1. 2.1 Continuous noncombustible raceways or enclosures.

   5.2. 2.2 Approved gypsum board assemblies.

   5.3. 2.3 Materials *listed* and *labeled* for installation within a *plenum* and listed for the application.

6.3. Materials in Group H, Division 5 fabrication areas and the areas above and below the fabrication area that share a common air recirculation path with the fabrication area.

~~602.2.1.1~~ **602.3.3 Wiring.** Combustible electrical wires and cables and optical fiber cables exposed within a *plenum* shall be *listed* and *labeled* as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with NFPA 262, or shall be installed in metal raceways or metal sheathed cable. Combustible optical fiber and communication raceways exposed within a *plenum* shall be *listed* and *labeled* as having a peak optical density not greater than 0.5, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 2024. Only plenum-rated wires and cables shall be installed in plenum-rated raceways.

~~602.2.1.2~~ **602.3.4 Fire sprinkler piping.** Plastic fire sprinkler piping exposed within a *plenum* shall be used only in wet pipe systems and shall be *listed* and *labeled* as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 1887.

~~602.2.1.3~~ **602.3.5 Pneumatic tubing.** Combustible pneumatic tubing exposed within a *plenum* shall be *listed* and *labeled* as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 1820.

~~602.2.1.5~~ **602.3.6 Discrete electrical, plumbing and mechanical products in plenums.** Where discrete electrical, plumbing and mechanical products and appurtenances are located in a *plenum* and have exposed combustible material, they shall be *listed* and *labeled* for such use in accordance with UL 2043.
Exception: Electrical equipment with metallic enclosures exposed within a plenum.

~~602.2.1.6~~ **602.3.7 Foam plastic in plenums as interior finish or interior trim.** Foam plastic in *plenums* used as interior wall or ceiling finish or interior trim shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, and shall be tested in accordance with NFPA 286 and meet the acceptance criteria of Section 803.1.2 of the International Building Code. As an alternative to testing to NFPA 286, the foam plastic shall be approved based on tests conducted in accordance with Section 2603.9 of the International Building Code.

Exceptions:

1. Foam plastic in *plenums* used as interior wall or ceiling finish or interior trim shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the *plenum* by a thermal barrier complying with Section 2603.4 of the International Building Code.
2. Foam plastic in *plenums* used as interior wall or ceiling finish or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the *plenum* by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm).
3. Foam plastic in *plenums* used as interior wall or ceiling finish or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the *plenum* by not less than a 1-inch (25 mm) thickness of masonry or concrete.

~~602.2.1.7~~ **602.3.8 Plastic plumbing piping and tubing.** Plastic piping and tubing used in plumbing systems shall be *listed* and *labeled* as having a flame spread index not greater than 25 and a smoke-developed index not greater than 50 when tested in accordance with ASTM E84 or UL 723.

Exception: Plastic water distribution piping and tubing *listed* and *labeled* in accordance with UL 2846 as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm), and installed in accordance with its listing.

~~602.2.1.8~~ **602.3.9 Pipe and duct insulation within plenums.** Pipe and duct insulation contained within *plenums*, including insulation adhesives, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84

or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Pipe and duct insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Pipe and duct insulation shall be *listed* and *labeled*. Pipe and duct insulation shall not be used to reduce the maximum flame spread and smoke-developed indices except where the pipe or duct and its related insulation, coatings, and adhesives are tested as a composite assembly in accordance with Section ~~602.2.1.7~~ 602.3.9.

Add new text as follows:

602.3.10 Other combustible materials. Other combustible materials not covered by Section 602.3 shall be listed and labeled as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

Reason Statement: The intent of this code proposal is to provide clarity as to what various materials are permitted within a plenum under specific conditions. The current Sections 602.2 and 602.3 are requirements for the constructing the plenum, and thus the current Section 602.3 should be a subsection of Section 602.2. Section 602.2.1 and its subsections are not for the construction of the plenum, but what materials are permitted within the plenum, and thus should not be a subsection of Section 602.2.
Section 602 is reformatted to provide clarity as to four aspects regarding plenums –

- 602.1 – General requirements – provides the charging language for plenums, with the scope and limitations of where plenums are permitted to be used.
- 602.2 – Construction of the plenum – provides the requirements for the construction of the plenum.
- 602.3 – Materials within the plenum – provides the requirements for materials that are permitted to be within the plenum, but are not required for the plenum to function, or are part of the construction of the plenum

"Construction" of the plenums is currently covered in both Section 602.2 (but not its subsections) and 602.3. Thus, the current Section 602.3 should be a subsection of Section 602.2. Section 602.2.1 and its subsections are not for the construction of the plenum, but what materials are permitted within the plenum, and thus should not be a subsection of Section 602.2.

"Materials permitted within" (Section 602.2.1 and following subsections) is currently written as several exceptions for a number of different materials. Reorganizing this section provides a straightforward list of requirements for specific materials, while retaining "the effect of applying" all the original requirements.

The following is the outline of proposed reorganization for the materials permitted within the plenum:

Section does not apply to (original exceptions):

1. Materials in one and two family dwellings

1. Combustible materials fully enclosed

1. Materials in Group H, Division 5

Section does apply to (combustible materials that are permitted within the plenum, under specific conditions):

1. Ducts, connectors, linings, and tapes – IMC Sections 603 and 604

1. Smoke detectors and sampling tubes – UL 268

1. Wiring – NFPA 262 or UL 2024

1. Nonmetallic sprinkler pipe – UL 1887

1. Pneumatic tubing – UL 1820

1. Discrete electrical, plumbing, and mechanical devices – UL 2043

1. Foam plastic insulation – ASTM E84/UL 723 or NFPA 286

1. Plastic plumbing pipe – ASTM E84/UL 723 or UL 2846

1. Pipe and duct insulation – ASTM E84/UL 723 with ASTM E2231

1. Any other combustible materials – ASTM E84/UL 723

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal is purely editorial for the purposes of clarifying existing requirements by better organizing the text. Material or labor to comply with the requirements are not different and as such, there is no to impact on the cost of construction.

M55-21

M56-21

IMC: 602.2, 602.2.1 (New), 602.3

Proponents: Joseph Summers, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Mechanical Code

Revise as follows:

602.2 Construction <u>of plenums</u>. ~~*Plenum* enclosure construction materials that are exposed to the airflow shall comply with the requirements of Section 703.3 of the International Building Code or such materials shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.~~ <u>Plenums shall be constructed in accordance with Section 602.2.1 and Section 602.2.2.</u> The use of gypsum boards to form *plenums* shall be limited to systems where the air temperatures do not exceed 125ºF (52ºC) and the building and mechanical system design conditions are such that the gypsum board surface temperature will be maintained above the airstream dew-point temperature. Supply air *plenums* formed by gypsum boards shall not be incorporated in air-handling systems utilizing *direct evaporative cooling* systems.

Add new text as follows:

<u>602.2.1 Plenum materials. .</u> <u>Plenum enclosure construction materials that are exposed to the airflow shall comply with the requirements of Section 703.3 of the International Building Code or such materials shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.</u>

<u>Exception:</u> <u>Stud cavity and joist space plenums</u>

Revise as follows:

~~602.3~~ <u>602.2.2</u> Stud cavity and joist space plenums. Stud wall cavities and the spaces between solid floor joists to be utilized as air*plenums* shall comply with the following conditions:

1. Such cavities or spaces shall not be utilized as a *plenum* for supply air.
2. Such cavities or spaces shall not be part of a required fire-resistance-rated assembly.
3. Stud wall cavities shall not convey air from more than one floor level.
4. Stud wall cavities and joist space *plenums* shall comply with the floor penetration protection requirements of the *International Building Code*.
5. Stud wall cavities and joist space *plenums* shall be isolated from adjacent concealed spaces by *approved* fireblocking as required in the *International Building Code*.
6. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air *plenums*.

Reason Statement: The intent of this code proposal is to provide clarity as to how plenums are permitted to be constructed under specific conditions. The current Sections 602.2 and 602.3 are requirements for the constructing the plenum, and thus the current Section 602.3 should be a subsection of Section 602.2. The text struck in 602.2 was moved in its entirety to the new 602.2.1. The language regarding the use of gypsum board in plenums was left in the charging paragraph, because it is a general requirement that applies to all plenums.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 32.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal is purely editorial for the purposes of clarifying existing requirements by better organizing the text. Material or labor to comply with the requirements are not different and as such, there is no impact on the cost of construction.

M57-21

IMC: 602.2.1.7

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

2021 International Mechanical Code

Revise as follows:

602.2.1.7 Plastic plumbing piping and tubing. Plastic piping and tubing used in plumbing systems shall be *listed* and *labeled* as having a flame spread index not greater than 25 and a smoke-developed index not greater than 50 when tested in accordance with ASTM E84 or UL 723. Testing shall be conducted on a flat sheet of the material to be used for the piping or tubing at the thickness intended for use.

Exception: Plastic water distribution piping and tubing *listed* and *labeled* in accordance with UL 2846 as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm), and installed in accordance with its listing.

Reason Statement: This proposal revisits an issue presented in earlier code cycles and disapproved.
However, this issue still presents an unnecessary concern for fire safety. ASTM E84 (Steiner tunnel test) does not contain any option that would allow testing of plastic pipes at other than as a sheet of the material tested at full width of the tunnel and at use thickness. By testing as specified in ASTM E84 the fire performance of the material used for the plastic piping or tubing material can be compared appropriately to the fire performance of any other material accepted for use in plenums.

Note that the charging paragraph for this section states:

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.8, materials within plenums shall be noncombustible or shall be listed and labeled as having a flame spread index of not more than

25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

The IMC provides multiple alternate options for plastic piping and tubing materials, as shown below:

1. The exception to section 602.2.1.7 allows materials to be tested to UL 2846, for plastic water distribution piping. UL 2846 was developed specifically to offer an option so that a pair of plastic pipes, intended for water distribution, can be tested as pipes, mounted on a special tray inside the Steiner tunnel. This option is, appropriately, widely used for plastic pipes used as pairs for water distribution.

2. Exception 5.1 to section 602.2.1 allows the use of "combustible materials fully enclosed within continuous noncombustible raceways or enclosures". This option is also widely used, appropriately, because the materials contained within the enclosure are "not exposed to the airflow".

3. Exception 5.2 to section 602.2.1 allows the use of "combustible materials fully enclosed within gypsum board assemblies". Again, just as the exception above, this option is widely used and addresses materials that are not exposed to the airflow.

4. Exception 5.3 to section 602.2.1 allows the use of "combustible materials fully enclosed within materials listed and labeled for installation within a plenum and listed for the application". Again, another fully appropriate and safe use.

However, in spite of all the fire safe options available for installation of highly combustible plastic piping and tubing, it has become evident that listings have been issued for plastic pipe or tubing for use in plenums based on testing that has been conducted using one or two pipes in the middle of the ASTM E84 tunnel, while the pipe is full of water during the test (circulating water, typically). This is not an option that the code allows (since it is not an option that either ASTM E84 or UL 723 allow) and such testing is not conducted in accordance with ASTM E84 or UL 723.

The following arguments have been presented in opposition to requiring testing of sheets for piping materials:

1. Plastic pipes will always be full of water during use. That is only true for some pipes but is not true for pipes transporting other fluids, such as various oils or other combustibles, and the IMC code section applies to any plastic pipe used for plumbing any fluid. Moreover, plastic pipes will likely be empty during construction and/or repair.

2. Manufacturers cannot generate test specimens that are sheets 24 feet long and 2 feet wide, for testing. The same argument would apply (and has been rejected in ICC codes) for manufacturers of any type of product required to be tested using a standard test specimen. Note that ASTM E84 testing is required for products as diverse as plastic signs, light transmitting plastics, water-resistive barriers, insulating materials, interior wall and ceiling materials, interior trim materials, laminated panels, site-fabricated stretch systems, MCM systems, and so on. All must be tested as indicated in the ASTM E84 standard. Why should plastic pipes be the exception?

A number of special standard mounting methods exist (and are referenced in ICC codes and in ASTM E84) for some products. The IMC contains one example, in a reference to ASTM E2231 for specimen preparation and mounting of pipe and duct insulation materials. However, plastic pipes

(other than those that can be tested to UL 2846) need to be tested strictly to ASTM E84 or UL 723. In summary, this proposal simply requires testing in accordance with the ASTM E84 or UL 723 standard.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This just clarifies a testing protocol that is being misapplied.

M57-21

M58-21

IMC: SECTION 602, 602.3

Proponents: Robby Schwarz, BUILDTank, Inc., representing BUILDTank, Inc. (robby@btankinc.com); Gil Rossmiller, representing Self (gilrossmiller@coloradocode.net); Hope Medina, representing Self (hmedina@coloradocode.net)

2021 International Mechanical Code

SECTION 602 PLENUMS.

Revise as follows:

602.3 Stud cavity and joist space plenums. Stud wall cavities and the spaces between solid floor joists shall be allowed for transfer air between rooms on the same level. ~~to be utilized as air *plenums* shall comply with the following conditions:~~

1. ~~Such cavities or spaces shall not be utilized as a *plenum* for supply air.~~
2. ~~Such cavities or spaces shall not be part of a required fire-resistance-rated assembly.~~
3. ~~Stud wall cavities shall not convey air from more than one floor level.~~
4. ~~Stud wall cavities and joist space *plenums* shall comply with the floor penetration protection requirements of the *International Building Code.*~~
5. ~~Stud wall cavities and joist space *plenums* shall be isolated from adjacent concealed spaces by *approved* fireblocking as required in the *International Building Code.*~~
6. ~~Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air *plenums*.~~

Reason Statement: The IECC does not allow building cavities to be used as ductwork that is seeing pressure from the air handling unit. (R403.3.5 Building Cavities (Mandatory. Building framing cavities shall not be used as ducts or plenums) Issues that we see in residential buildings when building cavities are used are compounded in commercial buildings and stacked multifamily buildings because the air handler blowers are bigger and move more air. Ultimately, it is the random and uncontrolled movement of air that is the issue with building durability, health and safety. An example of this can be illustrated in multifamily construction where often the air handler is installed within the same building cavity that is used to return air. This pressurized cavity pulls air from any location the cavity is connected to, including adjacent units, halls, floor, stair wells, and elevator shafts. It is impossible to control the air that is being pushed and pulled through building cavities that are used as ducts. When you pan a floor system or used a drop ceiling as duct for example, the air that is returning to the furnace comes from many more places than the intended room. Air, being a transport mechanism for moisture, energy, and pollutants, needs to be better controlled than is possible by using building cavities as duct work, and therefore HVAC systems need to be fully ducted. The IECC recognizes the building durability, efficiency, and safety concerns associated with allowing building cavities to be used as pressurized duct systems and that we gain better control and predictability of air flow that is being pushed and pulled by the air handling equipment by prohibiting such practices. Moisture control, energy control, pollutant control, house and room pressure control are all gained by fully ducting HVAC systems and not allowing building cavities to be used as duct work.

The Department of Energy (D.O.E.) has published statistics indicating that the average duct system leaks between 20% and 40%. This leakage is often connected directly to the outdoors through building cavities. When the building cavity is positively or negatively pressurized by air handling equipment the connections to outside are heightened causing pressure differentials in buildings that create building safety, durability, health, and efficiency issues.

When you google “Building Cavities as Ductwork” you find several articles from nationally recognized building scientist as well as trade groups, DOE, EnergyStar, code groups and others that all point out that utilizing building cavities to carry pressurize air from the supply or the return side of the furnace is a bad idea.

I have summarized these concerns and provided links to resources for the information below to support and provide evidence that duct leakage through building cavities is a problem. I urge you to do your own research for I am sure you will conclude as I have that using a building cavity as the duct system in a building is more detrimental that beneficial. By simply installing a true duct in the cavity or plenum the issue is solved.

Bibliography: Building Cavities Not Used as Supply or Return Ducts

- https://basc.pnnl.gov/resource-guides/building-cavities-not-used-supply-or-return-ducts

Perhaps the Worst HVAC Duct Idea Ever — The Panned Joist Return,. Allison Bailes on August 18, 2011

- **https://www.energyvanguard.com/blog/43723/Perhaps-the-Worst-HVAC-Duct-Idea-Ever-The-Panned-Joist-Return**

From Building Science Corporation:

Inof-801: What’s Wrong With this Practice? Using unsealed wall cavitied or panned floor joists as return plenum

- https://buildingscience.com/documents/information-sheets/information-sheet-wrong-using-unsealed-wall-cavities-or-panned-floor-joists-as-return-plenum

Info-603 Duct sealing

- https://buildingscience.com/documents/information-sheets/information-sheet-duct-sealing

DOE Building Technologies Program Study Measure Guideline: Sealing and Insulating of Ducts in Existing Homes

- https://www.nrel.gov/docs/fy12osti/53494.pdf

Washington State University, “Improving Forced Air Heating Systems”

- https://docplayer.net/30025411-Supplement-a-improving-forced-air-heating-systems.html

According to Energy Star:

- https://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts
- http://www.norbord.com/na/blog/supply-or-return-ducting-in-building-cavities/

Building Code Assistant Project

- https://bcapcodes.org/tools/code-builder/residential/ducts/

U.S. Threatened by Leaky Ducks

- https://www.energy.gov/energysaver/articles/us-threatened-leaky-ducks

DOE: Leaky Ducts are Top Energy Waster

- https://www.achrnews.com/articles/124595-doe-leaky-ducts-are-top-energy-waster

Minimizing Energy Losses in Ducts

- https://www.energy.gov/energysaver/minimizing-energy-losses-ducts

Duct Leakage Can Create 3 Big Problems in Your Home

- https://www.hydesac.com/duct-leakage-can-create-3-big-problems-in-your-home/

Cost Impact: The code change proposal will decrease the cost of construction
This code change proposal will increase the cost of construction only for commercial buildings and residential building over 3 stories that are governed by the commercial codes. It is estimated that the cost increase is low as must stud and joist cavity use is small in these buildings, which means that only small segments of additional duct would need to be added. Building durability moisture and comfort issues will be reduced which will be a cost savings for the project offsetting all or most additional cost.

M58-21

M59-21

IMC: 603.1, 603.5.1

Proponents: Robert Schwarz, representing BUILDTank, Inc. (robby@btankinc.com)

2021 International Mechanical Code

Revise as follows:

603.1 General. An air distribution system shall be designed and installed to supply and return the required distribution of air. The installation of an air distribution system shall not affect the fire protection requirements specified in the *International Building Code* . Ducts shall be constructed, braced, reinforced and installed to provide structural strength and durability.

~~**603.5.1 Gypsum ducts.** The use of gypsum boards to form air shafts (ducts) shall be limited to return air systems where the air temperatures do not exceed 125°F (52°C) and the gypsum board surface temperature is maintained above the airstream dew-point temperature. Supply air ducts formed by gypsum boards shall not be incorporated in air-handling systems utilizing *direct evaporative cooling* systems.~~

Reason Statement: From Manual D:
"The following components pertain to potential space pressure problems, air quality problems, duct system efficiency and air delivery problems caused by panned construction. If the practitioner chooses to use this type of construction, the practitioner assumes full responsibility for all unintended consequences" Manual D then lists nine different issues with panned joist and stud spaces.

Gypsum used to create a ducted cavity that is air tight to withstand the negative pressure introduced by the air handling equipment is not possible. duct leakage testing has established that. In addition, although there is an attempt to minimize the impact of moisture related health and building durability issues in section 603.5.1, moisture issues are still possible and likely. Humidified air enters the return air flow after being created by showering, cooking, or by being added directly to the structure in dryer climates or when people are treating colds or flue like symptoms. dew point temperatures continually change and are also governed by surface temperature of the gypsum which is governed by the conduction or convection of the outside surface of the gypsum duct and what that outside surface is adjacent to or exposed to. This section does not address where or how to install gypsum ducts. there are plenty of regularly used alternatives to gypsum duct that do not have issues and have been proven to work well.

Bibliography: From Building Science Corporation:

- https://buildingscience.com/documents/information-sheets/information-sheet-wrong-using-unsealed-wall-cavities-or-panned-floor-joists-as-return-plenum

Info-603 Duct sealing

- https://buildingscience.com/documents/information-sheets/information-sheet-duct-sealing

DOE Building Technologies Program Study Measure Guideline: Sealing and Insulating of Ducts in Existing Homes

- https://www.nrel.gov/docs/fy12osti/53494.pdf

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is not cost increase associated with this proposal because there are many alternative duct installation approaches defined in this section of the code.

M60-21

IMC: 604.3

Proponents: Cory Wasniewski, Roberts Environmental Control Corp, representing Roberts Environmental Control Corp (CJW@RobertsHVAC.com)

2021 International Mechanical Code

Revise as follows:

604.3 Coverings and linings. Duct coverings ~~and linings~~, including adhesives where used, shall have a flame spread index not more than 25 and a smoke-developed index not more than ~~50~~ 450, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. ~~Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C).~~ Coverings shall be *listed* and *labeled*.

Duct linings, including adhesives where used, shall have a flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Linings shall be *listed* and *labeled*.

~~Exception~~ Exceptions:

1. Polyurethane foam insulation that is spray applied to the exterior of ducts in attics and crawl spaces shall be subject to all of the following requirements:
   1. The foam plastic insulation shall have a flame spread index not greater than 25 and a smoke-developed index not greater than 450, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231.
   2. The foam plastic insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C).
   3. The foam plastic insulation complies with the requirements of Section 2603 of the International Building Code.
   4. The foam plastic insulation is protected against ignition in accordance with the requirements of Section 2603.4.1.6 of the International Building Code.
2. Ductwork coverings and linings, including adhesives where used, located in a plenum rated cavity, shall have a flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be *listed* and *labeled*.

Reason Statement: ***Specific to ductwork insulation coverings not in Plenum-Rated Spaces.***

1. Ductwork coverings both indoors and outdoors, not located within a plenum rated space, are not in the air stream. They are in the same building space as all other construction materials.
2. Weatherproof and protective barriers that are atop of ductwork coverings (insulations) are required per section IMC 603.16, however, per IMC Sections 604.12 these barriers are not classified for a required flame and smoke index rating. This forces you to reference back to the IBC and NFPA 90A, allowing IBC Class A which defines a flame and smoke rating as ASTM E84 **25**/**450** equal to everything else in the building.
   1. *IBC allows all building insulation products, materials, and facings, again outside of a plenum-rated cavity, in its highest classification (Class A, I) to have an ASTM E84 rating of* ***25****/****450.*** *With the ONLY exception being materials within a plenum rated cavity.*
   2. *NFPA 90A Section 4.3.3.1.2 Specifically states the flame spread and smoke-developed index requirements of section 4.3.3.1.1 shall NOT apply to air duct weatherproof coverings where they are located entirely outside of a building, do not penetrate a wall or roof, and do not create an exposure hazard.*
3. There is a direct conflict of the NFPA 90A Section 4.3.3.1.2 allowing weather covering directly atop of the ductwork covering to meet ASTM E84 25/**450.** But then per IMC 604.3 not allowing the covering itself to meet the same specifications of ASTM E84 25/**450**. The covering and the weatherproof barrier would become the same assembly but then have conflicting requirements.
4. There is a conflict of the IBC allowing all interior and exterior to the building materials (with the only exception being materials within a plenum space) to meet the IBC Class A, I specification of ASTM E84 **25**/**450**. But the IMC section 604.3 ductwork coverings, that are in the same building space, do not follow the same NFPA and IBC specifications.

Bibliography:

- IBC
- IMC
- NFPA 90A

Cost Impact: The code change proposal will decrease the cost of construction

- Closed Cell (polyisocyanurates) foams that meet IBC Class A/I and NFPA specifications (ASTM E84 **25**/**450**) for use in ductwork coverings would reduce costs and improve energy efficiencies.
- Closed Cell (polyisocyanurates) foams have some of the highest R-values per inch and the lowest costs in the current markets when compared to other board insulations.
- Closed Cell (polyisocyanurates) foams are Green Building, GreenGuard, and LEED qualified building materials.
- Closed Cell (polyisocyanurates) foams when compared to equivalent R-Value Fiber Board insulations are not only more cost-effective, they have a 50% or more reduced weight load.
- Achieving a R-6.5 @ 1", R-9.8 @ 1.5", R-13.1 @ 2"
- Closed Cell (polyisocyanurates) foams weigh significantly less leading to installation cost savings.
- Closed Cell (polyisocyanurates) foams meet equivalent R-Values to FIber Board are 50% thickness. Saving space, time, and efficiency during construction.

M60-21

M61-21

IMC: SECTION 912, 912.1, 912.3, 912.2, UL Chapter 15 (New)

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Mechanical Code

Revise as follows:

SECTION 912 ~~INFRARED RADIANT~~ ELECTRIC SPACE HEATERS.

912.1 General. Permanently installed electric ~~infrared radiant~~ space heaters shall ~~comply~~ be listed and labeled in accordance with ~~UL 499~~ UL 2021, and installed in accordance with the manufacturer's instructions.

912.3 Clearances. Heaters shall be installed with *clearances* from combustible material in accordance with the manufacturer's installation instructions.

Revise as follows:

912.2 Support. ~~Infrared radiant~~ Electric space heaters shall be fixed in a position independent of ~~fuel and~~ electric supply lines. Hangers and brackets shall be noncombustible material.

Add new standard(s) as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096

UL 2021-15: Fixed and Location-Dedicated Electric Room Heaters (with revisions through December 14, 2016)

Staff Analysis: A review of the standards proposed for inclusion in the code, UL 2021: Fixed and Location-Dedicated Electric Room Heaters (with revisions through December 14, 2016), with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: UL 499 is a general heating appliance and equipment standard, whereas UL 2021 is specifically for electric space heaters that are fixed in place and dedicated to a room. Infrared is a technology, not an application. There are other means for providing the heat. The reference to fuel lines is removed from Section 912.2, because the fuel-fired infrared heaters are covered in Section 630 of the IFGC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Clarifies the use of the standards to list these types of heaters.

M61-21

M62-21

IMC: (New), SECTION 931 (New), 931.1 (New)

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Mechanical Code

Add new definition as follows:

STEAM BATH EQUIPMENT. Includes steam bath generators, combination room and steam generator systems, and steam bath cabinets intended for high-humidity concentrated heating at elevated temperatures for personal bathing

Add new text as follows:

SECTION 931 STEAM BATH EQUIPMENT.

931.1 General. Steam bath equipment shall be *listed* and *labeled* in accordance with UL 499 and shall be installed in accordance with their listing and the manufacturer's instructions.

Reason Statement: This proposal provides introduces requirements for steam bath equipment listings, and installation criteria. This section is being proposed since steam bath equipment is acting as a boiler and not a water heater and therefore should be located in the IMC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This does not require the installation of steam bath equipment, but provides requirements where installed.

M63-21

IMC: 1001.1

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Mechanical Code

Revise as follows:

1001.1 Scope. This chapter shall govern the installation,*alteration* and repair of boilers, water heaters and pressure vessels.

Exceptions:

1. Pressure vessels used for unheated water supply.
2. Portable unfired pressure vessels and Interstate Commerce Commission containers.
3. Containers for bulk oxygen and medical gas.
4. Unfired pressure vessels having a volume of 5 cubic feet (0.14 m^3) or less operating at pressures not exceeding 250 pounds per square inch (psi) (1724 kPa) and located within *occupancies* of Groups B, F, H, M, R, S and U.
5. Pressure vessels used in refrigeration systems that are regulated by Chapter 11 of this code.
6. Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables and other similar humidity control systems.
7. Any boiler or pressure vessel subject to inspection by federal or state inspectors.
8. Pressure vessels used in specific appliances and equipment that are regulated by Chapter 9 of this code.

Reason Statement: The specific appliances and equipment that are regulated by Chapter 9 of the IMC have specific requirements within the referenced standards that address any pressure vessels or parts subject to pressure within those appliances and equipment. This aligns with the Exception 5 in this section.
The applicable referenced standards in Chapter 9 that address the requirements for Pressure Vessels and Parts Subject to Pressure are UL 197 (Section 41), UL 499 (Section 30), UL 1261 (Section 6), UL 1995 (Section 34), and UL 60335-2-40 (Section 22).

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The requirements for pressure vessels are already covered with the referenced standards for the specific appliances and equipment regulated by Chapter 9.

M64-21

IMC: 1002.4 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Mechanical Code

Add new text as follows:

1002.4 Water heater pan required. Where a storage type water heater or a hot water storage tank is installed in a location where water leakage from the tank will cause damage, the tank shall be installed in a pan constructed by one of the following:

1. Galvanized steel or aluminum of not less than 0.0236 inch (0.6010 mm) in thickness.
2. Plastic of not less than 0.036 inch (0.9 mm) in thickness.
3. Other approved materials.
4. A plastic pan installed beneath a water heater shall be constructed of material having a flame spread index of 25 or less and a smoked developed index of 450 or less when tested in accordance with ASTM E-84 or UL-723

Reason Statement: REASON: This language will make the IMC consistent with the IPC, IRC and IFGC regardless of the fuel or energy source. Water heaters are notorious for leaking at some point. The IMC is silent on this matter.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial in nature and is for consistency reasons only. There are no new requirements.

M65-21

IMC: 1006.6

Proponents: Chris Haldiman, Watts Water Technologies, representing Watts Water Technologies (chris.haldiman@wattswater.com)

2021 International Mechanical Code

Revise as follows:

1006.6 Safety and relief valve discharge. Safety and relief valve discharge pipes shall be of rigid pipe that is *approved* for the temperature of the system. High-pressure-steam safety valves shall be vented to the outside of the structure. The discharge piping serving pressure relief valves, temperature relief valves and combinations of such valves shall:

1. Not be directly connected to the drainage system.
2. Discharge through an air break located in the same room as the *appliance*.
3. Not be smaller than the diameter of the outlet of the valve served and shall discharge full size to the air break.
4. Serve a single relief device and shall not connect to piping serving any other relief device or *equipment*.
5. Discharge to the floor, to the pan serving the boiler or storage tank, to a waste receptor or to the outdoors.
6. Discharge in a manner that does not cause personal injury or structural damage.
7. Discharge to a termination point that is readily observable by the building occupants. Where the discharge termination point is not readily observable, discharge monitoring is required.
8. Not be trapped.
9. Be installed so as to flow by gravity.
10. Not terminate more than 6 inches (152 mm) above the floor or waste receptor.
11. Not have a threaded connection at the end of such piping.
12. Not have valves or tee fittings.
13. Be constructed of those materials listed in Section 605.4 of the *International Plumbing Code* or materials tested, rated and approved for such use in accordance with ASME A112.4.1.

Reason Statement: Continuous low-level discharge (“dribble”) of T&P valve due to over-pressure (failed expansion tank, lack of secondary pressure relief device for thermal expansion, etc.) with hard water conditions can cause build-up of scale in the relief valve discharge port. Such obstruction of discharge port can compromise the relieving capacity of the valve and pose a safety risk to building occupants. Remote monitoring of relief valve discharge will ensure that the condition is immediately known.

Cost Impact: The code change proposal will increase the cost of construction
If the discharge piping is not readily visible this addition will increase the cost of construction but will also provide added safety for the occupants.

M66-21 Part I

IMC: 1006.6

Proponents: Joseph Summers, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Revise as follows:

1006.6 Safety and relief valve discharge. Safety and relief valve discharge pipes shall be of rigid pipe that is *approved* for the temperature of the system. High-pressure-steam safety valves shall be vented to the outside of the structure. The discharge piping serving pressure relief valves, temperature relief valves and combinations of such valves shall:

1. Not be directly connected to the drainage system.
2. Discharge through an air break located in the same room as the *appliance*.
3. Not be smaller than the diameter of the outlet of the valve served and shall discharge full size to the air break.
4. Serve a single relief device and shall not connect to piping serving any other relief device or *equipment*.
5. Discharge to the floor, to the pan serving the boiler or storage tank, to a waste receptor or to the outdoors.
6. Discharge in a manner that does not cause personal injury or structural damage.
7. Discharge to a termination point that is readily observable by the building occupants.
8. Not be trapped.
9. Be installed so as to flow by gravity.
10. ~~Not terminate~~ Terminate not more than 6 inches (152 mm) and not less than two times the discharge pipe diameter above the floor or flood level rim of the waste receptor.
11. Not have a threaded connection at the end of such piping.
12. Not have valves or tee fittings.
13. Be constructed of those materials listed in Section 605.4 of the *International Plumbing Code* or materials tested, rated and approved for such use in accordance with ASME A112.4.1.

M66-21 Part II

IRC: M2002.4, M2002.4.1 (New)

Proponents: Joseph J. Summers, representing Chair of PMGCAC (pmgcac@iccsafe.org)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Residential Code

Revise as follows:

M2002.4 Pressure relief valve. Boilers shall be equipped with pressure relief valves with minimum rated capacities for the equipment served. Pressure relief valves shall be set at the maximum rating of the boiler. ~~Discharge shall be piped to drains by gravity to within 18 inches (457 mm) of the floor or to an open receptor.~~

M2002.4.1 Requirements for discharge pipe. . The discharge piping serving a pressure relief valve, temperature relief valve or combination valve shall:

1. Not be directly connected to the drainage system.
2. Discharge through an air gap located in the same room as the boiler.
3. Not be smaller than the diameter of the outlet of the valve served and shall discharge full size to the air gap.
4. Serve a single relief device and shall not connect to piping serving any other relief device or equipment.
5. Discharge to the floor, to the pan serving the water heater or storage tank, to a waste receptor or to the outdoors.
6. Discharge in a manner that does not cause personal injury or structural damage.
7. Discharge to a termination point that is readily observable by the building occupants.
8. Not be trapped.
9. Be installed to flow by gravity.
10. Terminate not more than 6 inches (152 mm) and not less than two times the discharge pipe diameter above the floor or waste receptor flood level rim.
11. Not have a threaded connection at the end of the piping.
12. Not have valves or tee fittings.
13. Be constructed of those materials indicated in Section P2906.5 or materials tested, rated and approved for such use in accordance with ASME A112.4.1.
14. Be one nominal size larger than the size of the relief-valve outlet, where the relief-valve discharge piping is installed with insert fittings. The outlet end of such tubing shall be fastened in place.
15. The end of the discharge pipe shall be cut at a 45-degree angle.

Reason Statement: Part I REASONING: The text for the requirements for a discharge pipe from any pressure (or temperature) relief valve should be identical between all the codes that have such requirements. It doesn't matter what the relief valve is protecting. Uniformity across the codes on these requirements will improve compliance.
PART II REASONING: Oddly, Section M2002.4 has minimal requirements for pressure relief valve discharge pipes. A boiler doesn't "know" what type of building it is located in. The requirements for a pressure relief valve discharge pipe should be identical to what is in the IMC for the same application. Uniformity across the codes on these requirements will improve compliance.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). 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: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 31.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The relief valve piping already has to be installed and if relief valve manufacturers' instructions are being followed, many of these requirements are already being followed.

M67-21

IMC: 1006.6

Proponents: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Self (JBENGINEER@aol.com)

2021 International Mechanical Code

Revise as follows:

1006.6 Safety and relief valve discharge. Safety and relief valve discharge pipes shall be of rigid pipe that is *approved* for the temperature of the system. High-pressure-steam safety valves shall be vented to the outside of the structure. The discharge piping serving pressure relief valves, temperature relief valves and combinations of such valves shall:

1. Not be directly connected to the drainage system.
2. Discharge through an air break located in the same room as the *appliance*.
3. Not be smaller than the diameter of the outlet of the valve served and shall discharge full size to the air break.
4. Serve a single relief device and shall not connect to piping serving any other relief device or *equipment*.
5. Discharge to the floor, to the pan serving the boiler or storage tank, to a waste receptor or to the outdoors.
6. Discharge in a manner that does not cause personal injury or structural damage.
7. Discharge to a termination point that is readily observable by the building occupants.
8. Not be trapped.
9. Be installed so as to flow by gravity.
10. Not terminate more than 6 inches (152 mm) above the floor or waste receptor.
11. Not have a threaded connection at the end of such piping.
12. Not have valves or tee fittings.
13. ~~Be constructed of those materials listed in Section 605.4 of the *International Plumbing Code* or materials tested, rated and approved for such use in accordance with ASME A112.4.1.~~ Utilize piping material complying with Section 1202.

Reason Statement: It is inappropriate to reference the Plumbing Code potable water piping section to regulate the piping material for boiler relief valves. The appropriate reference is to the hydronic piping section in the Mechanical Code. One of the differences is the allowance of black steel pipe. Prior to the change made during the last cycle, black steel pipe was always permitted to be used for a relief valve discharge pipe. This material has been used on boilers for relief valve discharge for many years. No problem were presented during the last cycle whereby black steel pipe did not properly perform as a discharge pipe for a relief valve. There were only perceptions that galvanized steel pipe should be used rather than black steel pipe. Section 1202, referenced in the new text, is the hydronic piping material section.

Cost Impact: The code change proposal will decrease the cost of construction
Black steel pipe costs less than galvanized steel pipe. Hence, the allowance of black steel pipe will lower the cost of construction.

M67-21

M68-21

IMC: 1101.1, 1101.6, SECTION 202

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

2021 International Mechanical Code

Revise as follows:

1101.1 Scope. This chapter shall govern the design, installation, construction and repair of refrigeration systems ~~that vaporize and liquefy a fluid during the refrigerating cycle~~. Permanently installed refrigerant storage systems and other components shall be considered as part of the refrigeration system to which they are attached.

1101.6 Maintenance. ~~Mechanical r~~Refrigeration systems shall be maintained in proper operating condition, free from accumulations of oil, dirt, waste, excessive corrosion, other debris and leaks.

Delete without substitution:

~~**REFRIGERATION SYSTEM, MECHANICAL.** A combination of interconnected refrigeration-containing parts constituting one closed refrigerant circuit in which a refrigerant is circulated for the purpose of extracting heat and in which a compressor is used for compressing the refrigerant vapor.~~

Reason Statement: Changes are intended for clarity and simplification. The scope of Chapter 11 needn't repeat what is already in the definition of "refrigeration/refrigerating system" and includes the concept of fluid phase change. This recommendation is consistent with revised definitions related to refrigeration submitted by PMGCAC, but was not picked up in time for PMGCAC to address the revision in their changes.
In addition, following PMGCAC's work on the topic, I noticed that the term "refrigeration system, mechanical" contains an inaccuracy related to only being a single circuit, but rather than fixing that, it made more sense to simply delete the definition. The term is only used once in the code (1101.6), and it really doesn't belong there as a limitation. All refrigeration systems, whether mechanical, absorption, or whatever, should be properly maintained per the requirements in 1101.6.

Although I represent IIAR on some issues related to refrigeration systems, this proposal is submitted on my own behalf. It does not impact IIAR and IIAR had no input to this submittal.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal has no connection to construction, so there is no construction cost impact.

M69-21

IMC: 1101.1.1, IIAR Chapter 15 (New)

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

2021 International Mechanical Code

Revise as follows:

1101.1.1 Refrigerants other than ammonia. Refrigerant piping design and installation for systems containing a refrigerant other than ammonia, including pressure vessels and pressure relief devices, shall comply with this chapter and ASHRAE 15. Refrigeration systems containing carbon dioxide as the refrigerant shall also comply with BSR/IIAR CO2.

Add new standard(s) as follows:

IIAR

International Institute of Ammonia Refrigeration
1001 N. Fairfax Street, Suite 503
Arlington VA 22314

BSR/IIAR CO2-2021: Safety Standard for Closed-Circuit Carbon Dioxide Refrigeration Systems

Staff Analysis: A review of the standards proposed for inclusion in the code, BSR/IIAR CO2: Safety Standard for Closed-Circuit Carbon Dioxide Refrigeration Systems, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: BSR/IIAR CO2 is in the process of completion for issuance in 2021. It is a new standard governing refrigeration systems that use carbon dioxide as the refrigerant, and it is designed to be a companion to ASHRAE 15, providing additional design requirements that are unique to carbon dioxide systems to supplement ASHRAE 15 and going beyond the scope of ASHRAE 15 by regulating the complete life-cycle of carbon dioxide systems. Carbon dioxide has become increasingly popular as an industrial refrigerant because it is considered efficient and climate friendly. Including IIAR's new standard will assure that these systems are properly regulated.

Cost Impact: The code change proposal will increase the cost of construction
The new standard includes requirements that reflect industry good practice but are not currently mandatory. By including the standard as a mandatory reference standard in the IMC, following industry good practice will no longer be optional for carbon dioxide systems.

M70-21

IMC: 1101.1.2, IIAR Chapter 15 (New)

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

2021 International Mechanical Code

Revise as follows:

1101.1.2 Ammonia refrigerant. Refrigeration systems using ammonia as the refrigerant shall comply with IIAR 2, IIAR 3, IIAR 4, ~~and~~ IIAR 5, and IIAR 6 and shall not be required to comply with this chapter.

Add new standard(s) as follows:

IIAR

International Institute of Ammonia Refrigeration
1001 N. Fairfax Street, Suite 503
Arlington VA 22314

ANSI/IIAR 6-2019: Standard for Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems

Staff Analysis: A review of the standards proposed for inclusion in the code, IIAR 6: Standard for Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: IIAR 6 is a new standard covering inspection, testing and maintenance of closed-circuit ammonia refrigeration systems and is part of the suite of IIAR standards regulating ammonia refrigeration systems referenced by the IFC and IMC. Because this standard addresses system maintenance, which is part of the IMC scope in Section 101.2, it is important to have the standard referenced by the IMC. It adds mandatory system maintenance regulations covering ammonia refrigeration to the IMC to help assure safe operation of these systems and provides inspectors with a needed tool for ensuring compliance.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposed standard is scoped to inspection, testing and maintenance and does not impact construction.

M71-21

IMC: 1101.2, TABLE 1101.2

Proponents: Julius Ballanco, representing Daikin US (JBENGINEER@aol.com)

2021 International Mechanical Code

1101.2 Factory-built equipment and appliances. *Listed* and *labeled* self-contained, factory-built *equipment* and *appliances* shall be tested in accordance with the applicable standards specified in Table 1101.2. Such *equipment* and *appliances* are deemed to meet the design, manufacture and factory test requirements of this code if installed in accordance with their listing and the manufacturer's instructions.

Revise as follows:

TABLE 1101.2
FACTORY-BUILT EQUIPMENT AND APPLIANCES

EQUIPMENT	STANDARDS
~~Refrigeration fittings, including press-connect, flared and threaded~~	~~UL 109 and UL 207~~
Air-conditioning equipment	UL 1995 or UL/CSA 60335-2-40
Packaged terminal air conditioners and heat pumps	UL 484 or UL/CSA 60335-2-40
Split-system air conditioners and heat pumps	UL 1995 or UL/CSA 60335-2-40
Dehumidifiers	UL 474 or UL/CSA 60335-2-40
Unit coolers	UL 412 or UL/CSA 60335-2-89
Commercial refrigerators, freezers, beverage coolers and walk-in coolers	UL 471 or UL/CSA 60335-2-89
Refrigerating units and walk-in coolers	UL 427 or UL 60335-2-89
Refrigerant-containing components and accessories	UL 207

Reason Statement: This table was added during the last cycle at the same time that the refrigerant piping rewrite was added. This resulted in refrigerant fitting requirements appearing in two locations. The appropriate location for referencing fitting requirements in in Section 1107. It should be noted that UL 207 is included in 1107.5. By deleting this row, it avoids confusion in which section applies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial in nature. As such, it has no impact on the cost of construction.

M71-21

M72-21

IMC: 1101.2.1 (New), UL Chapter 15

Proponents: Helen Walter-Terrinoni, AHRI, representing AHRI; Julius Ballanco, representing Daikin US (JBENGINEER@aol.com); Andrew Klein, representing The Chemours Company (andrew@asklein.com); Joe Nebbia, Newport Partners, representing Natural Resources Defense Council (jnebbia@newportpartnersllc.com)

2021 International Mechanical Code

Add new text as follows:

1101.2.1 Group A2L, A2, A3 and B1 high probability equipment. High probability equipment using Group A2L, A2, A3, or B1 refrigerant shall comply with UL 484, UL/CSA 60335-2-40, or UL/CSA 60335-2-89.

Revise as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096

UL/CSA 60335-2-40—~~17~~ 2019: Household and Similar Electrical Appliances—Safety—Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers

Staff Analysis: A review of the standards proposed for inclusion in the code, UL/CSA 60335-2-40-2019: Household and Similar Electrical Appliances—Safety—Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: During the last code cycle, Table 1101.2 was added to reference all of the appropriate standard for factory-built equipment. Included in the list are standards that regulate the use of Group A2L, A2, A3, and B1 refrigerants. However, that is not separated out in the table. To assist the code official, this new section will add the appropriate reference to the standards that regulate equipment using these refrigerant in high probability systems. The application of these refrigerants include the use of Group A2L in equipment providing human comfort. Group A2l, A2, A3, and B1 refrigerants are also used in high probability equipment such as water coolers, refrigeration equipment in supermarkets, and freezers and cooler in restaurants and similar facilities. There are strict limitation on the charge size of these refrigerants specified in the standards referenced.

The reference to ASHRAE 15-2019 opened the code to the use of Group A2L refrigerants in high probability systems for human comfort. ASHRAE 15 has since added specific reference to the standards regulating equipment using Group A2L refrigerants. Thus, this proposal is consistent with the requirements in the addendums to ASHRAE 15.The 2019 edition of UL/CSA 60335-2-40 added additional safety requirements for equipment using Group A2L, A2, A3, and B1 refrigerants.
The update to the 2019 edition of UL/CSA 60335-2-40 includes additional safety requirements. This edition added electrical and refrigerant safety requirements. There are provisions for refrigerant detection systems, UL-C germicidal lamp systems, CO2 systems, photovoltaic systems and new marking requirements. With the increased use of Group A2L A2, and A3 refrigerants, it is important to reference the latest edition of the standard.

NRDC Reason:

By adding a requirement for A2L, A2, A3, and B1 to comply with UL 484, UL/CSA 60335-2-40 or UL/CSA 60335-2-89, the code will clarify for the user what safety standards should be used for equipment with these refrigerants. The proposed update of referenced standard UL 484, UL/CSA 60335-2-40 to the 2019 version provides new safety measures for equipment using the A2L refrigerant class, which were not separately addressed in earlier versions of the standard. These changes are especially important in the case of A2L refrigerants, which are expected to increase in use as a substitute for hydrofluorocarbon (HFC) refrigerants. HFCs are extremely potent greenhouse gases and in December 2020 the U.S. Congress passed a new law that will require an 85% economy-wide phasedown of HFC refrigerants over the next 15 years. The phasedown is expected to avoid HFC emissions of 900 million metric tons of CO2-equivalent by 2035. In addition, 9 states - 8 of which adopt the ICC codes - have already prohibited the use of HFC refrigerants in several high volume applications.1 Human comfort systems account for more HFC use than any other end-use application in the U.S., so a large portion of the HFC reductions are expected to come from them. A2L refrigerants have significantly lower global warming potential than A1-class HFCs, so A2L use is a key part of the HFC reduction plan. These restrictions on the supply of HFC refrigerant will drive up consumption of A2L substitutes. Permitting use of alternative refrigerants, including A2L refrigerants, in high probability systems for human comfort will enable states and local jurisdictions to meet their heating and cooling needs while also complying with applicable HFC regulations. Without this change, jurisdictions adopting the code will be forced to enact their own amendments to the code in order to support their HFC reduction goals. This change allows the ICC to provide an off the shelf solution to those jurisdictions.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is a clarification of the requirements for listing factory-built equipment. Therefore, there is no increase or decrease in the cost of construction. The code user still has the option as to what type of refrigeration equipment to install.

M73-21

IMC: 202 (New), 1101.7, 1102.2.1

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Add new definition as follows:

Refrigerant Designation. The unique identifying alphanumeric value or refrigerant number assigned to an individual refrigerant and published in ASHRAE Standard 34.

Delete and substitute as follows:

~~**1101.7 Change in refrigerant type.** The type of refrigerant in refrigeration systems having a refrigerant circuit containing more than 220 pounds (99.8 kg) of Group A1 or 30 pounds (13.6 kg) of any other group refrigerant shall not be changed without prior notification to the code official and compliance with the applicable code provisions for the new refrigerant type.~~

1101.7 Changing Refrigerant. Changes of refrigerant in an existing system to a refrigerant with a different refrigerant designation shall only be allowed where in accordance with the following:

1. The change of refrigerant shall be approved by the owner.
2. The change in refrigerant shall be in accordance with one of the following.
   2.1 Written instructions of the original equipment manufacturer.
   2.2 An evaluation of the system by a registered design professional or by an approved agency that validates safety and suitability of the replacement refrigerant.
   2.3 Approved by the code official.
3. Where the replacement refrigerant is classified into the same safety group, requirements that were applicable to the existing system shall continue to apply.
4. Where the replacement refrigerant is classified into a different safety group, the system shall comply with the requirements of this standard for a new installation, and the change of refrigerant shall require code official approval.

~~**1102.2.1 Mixing.** Refrigerants, including refrigerant blends, with different designations in ASHRAE 34 shall not be mixed in a system.~~

~~**Exception:** Addition of a second refrigerant is allowed where permitted by the *equipment* or *appliance* manufacturer to improve oil return at low temperatures. The refrigerant and amount added shall be in accordance with the manufacturer's instructions.~~

1102.2.1 Mixing.
Refrigerants with different refrigerant designations shall only be mixed in a system in accordance with both of the following:

1. The addition of a second refrigerant is allowed by the equipment manufacturer and is in accordance with the manufacturer's written instructions.
2. The resulting mixture does not change the refrigerant safety group.

Reason Statement: With the onset of flammable refrigerants, the need to address change of refrigerant from one safety class to another was identified. ASHRAE published addendum e to ASHRAE 15-2016 to address this concern (which is now part of the ASHRAE 15-2019 version, Section 5.3).

Bibliography: 1. ANSI/ASHRAE 15-2019, Safety Standard for Refrigeration Systems
2. ANSI/ASHRAE 34-2019, Designation and Safety Classification of Refrigerants

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal provides a clarification to address the use of new systems but does not introduce any additional requirements that would impact cost.

M74-21

IMC: TABLE 1103.1

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Revise as follows:

TABLE 1103.1
REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE						OEL[g]
				RCL			LFL			
				~~Pounds per 1,000 cubic feet~~ lb/MCf	ppm	g/m^3	lb/MCf	ppm	g/m^3	~~OEL[g]~~ ppm
R-11[d,c]	CCl_3F	trichlorofluoromethane	A1	0.39	1,100	~~6.2~~ 6.1				~~C~~1,00
R-12[d,c]	CCl_2F_2	dichlorodifluoromethane	A1	5.6	18,000	90				1,000
R-13[d,c]	$CClF_3$	chlorotrifluoromethane	A1	—	—	—				1,000
R-13B1[d,c]	$CBrF_3$	bromotrifluoromethane	A1	—	—	—				1,000
R-13I1	CF_3I	trifluoroiodomethane	A1	1.0	2,000	16				500
R-14	CF_4	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400				1,000
R-22	$CHClF_2$	chlorodifluoromethane	A1	13	59,000	210				1,000
R-23	CHF_3	trifluoromethane (fluoroform)	A1	7.3	41,000	120				1,000
R-30	CH_2Cl_2	dichloromethane (methylene chloride)	B1	—	—	—				—
R-31	CH_2ClF	chlorofluoromethane	—	—	—	—				—
R-32	CH_2F_2	difluoromethane (methylene fluoride)	A2L~~A2~~[e]	4.8	36,000	77	19.1	144,000	306	1,000
R-40	CH_3Cl	chloromethane (methyl chloride)	B2	—	—	—				—
R-41	CH_3F	fluoromethane (methyl fluoride)	—	—	—	—				—
R-50	CH_4	methane	A3	—	—	—		50,000		1,000
R-113[d,c]	CCl_2FCClF_2	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20				1,000
R-114[d,c]	$CClF_2CClF_2$	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140				1,000
R-115	$CClF_2CF_3$	chloropentafluoroethane	A1	47	120,000	760				1,000
R-116	CF_3CF_3	hexafluoroethane	A1	34	97,000	550				1,000
R-123	$CHCl_2CF_3$	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57				50
R-124	$CHClFCF_3$	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56				1,000
R-125	CHF_2CF_3	pentafluoroethane	A1	23	75,000	370				1,000
R-134a	CH_2FCF_3	1,1,1,2-tetrafluoroethane	A1	13	50,000	210				1,000
R-141b	CH_3CCl_2F	1,1-dichloro-1-fluoroethane	—	0.78	2,600	12	17.8	60,000	287	500
R-142b	CH_3CClF_2	1-chloro-1,1-difluoroethane	A2	5.1	20,000	~~83~~ 82	20.4	80,000	329	1,000
R-143a	CH_3CF_3	1,1,1-trifluoroethane	A2L~~A2~~[e]	~~4.5~~ 4.4	21,000	70	17.5	82,000	282	1,000
R-152a	CH_3CHF_2	1,1-difluoroethane	A2	2.0	12,000	32	8.1	48,000	130	1,000
R-170	CH_3CH_3	ethane	A3	0.54	7,000	~~8.7~~ 8.6	2.4	31,000	38	1,000
R-E170	CH_3OCH_3	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	4.0	34,000	64	1,000
R-218	$CF_3CF_2CF_3$	octafluoropropane	A1	43	90,000	690				1,000

R-227ea	CF_3CHFCF_3	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580				1,000
R-236fa	$CF_3CH_2CF_3$	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340				1,000
R-245fa	$CHF_2CH_2CF_3$	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190				300
R-290	$CH_3CH_2CH_3$	propane	A3	~~0.56~~ 0.59	5,300	9.5	2.4	21,000	38	1,000
R-C318	$-(CF_2)_4-$	octafluorocyclobutane	A1	41	80,000	~~660~~ 650				1,000
R-400~~d~~ c	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160				1,000
R-400~~d~~ c	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170				1,000
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110				1,000
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120				1,000
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84				1,000
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270				1,000
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240				1,000
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120				1,000
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	~~70,000~~ 68,000	290				1,000
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500				1,000
R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/42.5)	—	16	57,000	260				1,000
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	~~25~~ 75	18.8	82,000	301.9	1,000
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300				1,000
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330				1,000
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290				1,000
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250				1,000
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280				1,000
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320				1,000
R-407G	zeotrope	R-32/125/134a (2.5/2.5/95.0)	A1	13	52,000	210				1,000
R-407H	zeotrope	R-32/125/134a (32.5/15.0/52.5)	A1	19	92,000	300				1,000
R-407I	zeotrope	R-32/125/124a (19.5/8.5/72.0)	A1	16	71,100	250				1,000
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	~~95,000~~ 94,000	~~340~~ 330				1,000
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110				1,000
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120				1,000
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420				1,000
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430				1,000
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	11.6	55,000	185.6	~~990~~ 970
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	14.8	70,000	238.3	~~980~~ 940
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	20.5	87,000	328.6	1,000
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	~~94~~ 93	23.4	88,000	374.9	1,000
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100				1,000
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	~~95~~ 96				1,000
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	11.7	56,000	187.9	1,000

~~R-415A~~	~~zeotrope~~	~~R-22/152a (82.0/18.0)~~	~~A2~~	~~2.9~~	~~14,000~~	~~47~~	~~11.7~~	~~56,000~~	~~187.9~~	~~1,000~~
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	8.4	47,000	135.1	1,000
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62				1,000
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	~~56~~ 55				1,000
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	~~70~~ 69				1,000
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87				1,000
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	19.2	89,000	308.4	1,000
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	16.7	60,000	268.6	1,000
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	18.5	69,000	297.3	1,000
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	~~45,000~~ 44,000	~~190~~ 180				1,000
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280				1,000
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330				1,000
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290				1,000
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250				1,000
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290				1,000
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260				1,000
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260				1,000
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	~~310~~ 300				1,000
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100				~~970~~ 990
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260				1,000
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83				990
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290				1,000
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	~~83,000~~ 84,000	370				1,000
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	3.2	25,000	83.8	1,000
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	5.2	32,000	44.0	1,000
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	~~0.69~~ 0.68	5,500	11	2.7	22,000	38.6	1,000
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	2.4	22,000	39.2	~~700~~ 550
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	2.4	20,000	32.4	~~880~~ 760
R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	~~0.51~~ 0.39	~~4,500~~ 3,500	~~8.1~~ 6.3	2.0	18,000	32.1	950
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	~~3,600~~ 3,700	~~6.6~~ 6.5	2.0	18,000	83.8	790
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320				1,000
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	4.3	34,000	68.2	1,000
~~R-436A~~	~~zeotrope~~	~~R-290/600a (56.0/44.0)~~	~~A3~~	~~0.50~~	~~4,000~~	~~8.1~~	~~2.0~~	~~16,000~~	~~32.3~~	~~1,000~~

~~R-436A~~	~~zeotrope~~	~~R-290/600a (56.0/44.0)~~	~~A3~~	~~0.50~~	~~4,000~~	~~8.1~~	~~2.0~~	~~16,000~~	~~32.3~~	~~1,000~~
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	~~8.1~~ 8.2	2.0	16,000	32.7	1,000
R-436C	zeotrope	R-290/600a (95.0/5.0)	A3	0.57	5,000	9.1	2.3	20,000	36.5	1,000
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	~~5.0~~ 5.1	19,000	82				990
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79				990
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	18.9	104,000	303.3	~~990~~ 1,000
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	7.8	46,000	124.7	1,000
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	2.0	16,000	31.7	1,000
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330				1,000
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	2.2	20,000	35.6	~~580~~ 640
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2L~~A2~~*	5.1	21,000	81	19.9	82,000	324.8	850
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2L~~A2~~*	4.3	23,000	69	17.3	93,000	277.3	~~890~~ 930
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2L~~A2~~*	4.2	16,000	67	2.7	63,000	347.4	930
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2L~~A2~~*	2.5	16,000	39	13.5	62,000	217.4	960
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2L~~A2~~*	2.6	16,000	42	18.9	65,000	303.5	~~900~~ 960
R-447B	zeotrope	R-32/125/1234ze(E) (68.0/8.0/24.0)	A2L~~A2~~*	~~23~~ 2.6	~~30,000~~ 16,000	~~360~~ 42	20.6	121,000	312.7	970
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390				~~890~~ 860
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370				~~830~~ 840
R-449B	zeotrope	R-32/125/1234yf/134a (25.2/24.3/23.2/27.3)	A1	23	100,000	370				850
R-449C	zeotrope	R-32/125/1234yf/134a (20.0/20.0/31.0/29.0)	A1	23	98,000	360				800
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320				880
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2L~~A2~~*	~~5.3~~ 5.0	18,000	81	20.3	70,000	326.6	~~520~~ 530
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2L~~A2~~*	~~5.3~~ 5.0	18,000	81	20.3	70,000	326.6	530
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	~~10,000~~ 100,000	440				~~780~~ 790
R-452B	zeotrope	R-32/125/1234yf (67.0/7.0/26.0)	A2L~~A2~~*	~~23~~ 4.8	30,000	~~360~~ 77	19.3	119,000	310.5	870
R-452C	zeotrope	R-32/125/1234yf (12.5/61.0/26.5)	A1	27	100,000	430				~~800~~ 810
R-453A	zeotrope	R-32/125/134a/227ea/600/601a (20.0/20.0/53.8/5.0/0.6/0.6)	A1	7.8	34,000	120				1,000
R-454A	zeotrope	R-32/1234yf (35.0/65.0)	A2L~~A2~~*	~~28~~ 3.2	16,000	~~450~~ 52	18.3	63,000	293.9	690

R-454B	zeotrope	R-32/1234yf (68.9/31.1)	A2L~~A2~~[e]	~~22~~ 3.1	19,000	~~360~~ 49	22.0	77,000	352.6	850
R-454C	zeotrope	R-32/1234yf (21.5/78.5)	A2L~~A2~~[e]	~~29~~ 4.4	19,000	~~460~~ 71	18.0	62,000	289.5	620
R-455A	zeotrope	R-744/32/1234yf (3.0/21.5/75.5)	A2L~~A2~~[e]	~~23~~ 4.9	~~30,000~~ 22,000	~~380~~ 79	26.9	118,000	432.1	650
R-456A	zeotrope	R-32/134a/1234ze(E) (6.0/45.0/49.0)	A1	20	77,000	320				900
R-457A	zeotrope	R-32/1234yf/152a (18.0/70.0/12.0)	A2L~~A2~~[e]	~~25~~ 3.4	15,000	~~400~~ 54	13.5	60,000	216.3	650
R-457B	zeotrope	R-32/1234yf/152a (35.0/55.0/10.0)	A2L	3.7	19,000	59	14.9	76,000	239	730
R-458A	zeotrope	R-32/125/134a/227ea/236fa (20.5/4.0/61.4/13.5/0.6)	A1	18	76,000	280				1,000
R-459A	zeotrope	R-32/1234yf/1234ze(E) (68.0/26.0/6.0)	A2L~~A2~~[e]	~~23~~ 4.3	27,000	~~360~~ 69	17.4	107,000	278.7	870
R-459B	zeotrope	R-32/1234yf/1234ze(E) (21.0/69.0/10.0)	A2L~~A2~~[e]	30	~~16,000~~ 25,000	~~470~~ 92	23.3	99,000	373.5	640
R-460A	zeotrope	R-32/125/134a/1234ze(E) (12.0/52.0/14.0/22.0)	A1	24	92,000	380				~~650~~ 950
R-460B	zeotrope	R-32/125/134a/1234ze(E) (28.0/25.0/20.0/27.0)	A1	25	120,000	400				950
R-460C	zeotrope	R-32/125/134a/1234ze(E) (2.5/2.5/46.0/49.0)	A1	20	73,000	310				900
R-461A	zeotrope	R-125/143a/134a/227ea/600a (55.0/5.0/32.0/5.0/3.0)	A1	17	61,000	270				1,000
R-462A	zeotrope	R-32/125/143a/134a/600 (9.0/42.0/2.0/44.0/3.0)	A2	3.9	16,000	62	16.6	105,000	265.8	1,000
R-463A	zeotrope	R-744/32/125/1234yf/134a (6.0/36.0/30.0/14.0/14.0)	A1	19	98,000	300				990
R-464A	zeotrope	R-32/125/1234ze(E)/227ea (27.0/27.0/40.0/6.0)	A1	27	120,000	430				930
R-465A	zeotrope	R-32/290/1234yf (21.0/7.9/71.1)	A2	2.5	12,000	40	10.0	98,000	160.9	660
R-466A	zeotrope	R-32/125/13I1 (49.0/11.5/39.5)	A1	6.2	30,000	99				860
R-467A	zeotrope	R-32/125/134a/600a (22.0/5.0/72.4/0.6)	A2L	6.7	31,000	110				1,000
R-468A	zeotrope	R-1132a/32/1234yf (3.5/21.5/75.0)	A2L	4.1	18,000	66				610
R-469A	zeotrope	R-744/R-32/R-125 (35.0/32.5/32.5)	A1	8	53,000					1,600
R-470A	zeotrope	R-744/32/125/134a/1234ze(E)/227ea (10.0/17.0/19.0/7.0/44.0/3.0)	A1	17	77,000	270				1,100
R-470B	zeotrope	R-744/32/125/134a/1234ze(E)/227ea (10.0/17.0/19.0/7.0/44.0/3.0)	A1	16	72,000	270				1,100
R-471A	zeotrope	R-1234ze(E)/227ea/1336mzz(E) (78.7/4.3/17.0)	A1	9.7	31,000	160				710
R-472A	zeotrope	R-744/32/134a (69.0/12.0/19.0)	A1	4.5	35,000	72				2,700
R-500[e] [d]	azeotrope	R-12/152a (73.8/26.2)	A1	~~7.6~~ 7.4	~~30,000~~ 29,000	120				1,000
R-501[d] [c]	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210				1,000

R-502~~e~~ d	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330				1,000
R-503~~e~~ d	azeotrope	R-23/13 (40.1/59.9)	—	—	—	—				1,000
R-504~~d~~ c	azeotrope	R-32/115 (48.2/51.8)	—	28	140,000	450				1,000
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	~~520~~ 510				1,000
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220				1,000
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200				1,000
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	~~390~~ 380				1,000
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	3.5	29,000	56.1	1,000
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	2.4	21,000	38.0	1,000
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	7.7	45,000	123.9	1,000
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320				650
R-513B	azeotrope	R-1234yf/134a (58.5/41.5)	A1	21	74,000	330				640
R-514A	azeotrope	R-1336mzz(S)/1130(E) (74.7/25.3)	B1	0.86	2,400	14				320
R-515A	azeotrope	R-1234ze(E)/227ea (88.0/12.0)	A1	19	~~62,000~~ 63,000	300				810
R-515B	azeotrope	R-1234ze(E)/227ea (91.1/8.9)	A1	18	61,000	290				810
R-516A	azeotrope	R-1234yf/134a/152a (77.5/8.5/14.0)	A2	~~7.0~~ 3.2	~~27,000~~ 13,000	~~110~~ 52	13.1	50,000	210.1	590
R-600	$CH_3CH_2CH_2CH_3$	butane	A3	0.15	1,000	2.4	3.0	20,000	48	1,000
R-600a	$CH(CH_3)_2CH_3$	2-methylpropane (isobutane)	A3	0.59	4,000	~~9.6~~ 9.5	2.4	16,000	38	1,000
R-601	$CH_3CH_2CH_2$ CH_2CH_3	pentane	A3	0.18	1,000	2.9	2.2	12,000	35	600
R-601a	$(CH_3)_2CHCH_2CH_3$	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	2.4	13,000	38	600
R-610	$CH_3CH_2OCH_2CH_3$	ethoxyethane (ethyl ether)	—	—	—	—				400
R-611	$HCOOCH_3$	methyl formate	B2	—	—	—				100
R-717	NH_3	ammonia	B2L	0.014	320	0.22	7.2	167,000	116	25
R-718	H_2O	water	A1	—	—	—				—
R-744	CO_2	carbon dioxide	A1	4.5	40,000	72				5,000
R-1130(E)	CHCl=CHCl	trans-1,2-dichloroethene	~~B1~~ B2	0.25	1,000	4	16	65,000	258	200
R-1132a	$CF_2=CH_2$	1,1-difluoroethylene	A2	2.0	13,000	33	8.1	50,000	131	500
R-1150	$CH_2=CH_2$	ethene (ethylene)	A3	—	—	—	2.2	31,000	36	200
R-1224yd(Z)	$CF_3CF=CHCl$	(Z)-1-chloro-2,3,3,3-tetrafluoroethylene	A1	23	60,000	~~360~~ 370				1,000
R-1233zd(E)	$CF_3CH=CHCl$	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85				800
R-1234yf	$CF_3CF=CH_2$	2,3,3,3-tetrafluoro-1-propene	A2L~~A2~~ ~~e~~	~~4.7~~ 4.5	16,000	75	18.0	62,000	289	500
R-1234ze(E)	$CF_3CH=CHF$ $CF_3CH=CFH$	trans-1,3,3,3-tetrafluoro-1-propene	A2L~~A2~~ ~~e~~	4.7	16,000	~~75~~ 76	18.8	65,000	303	800
R-1270	$CH_3CH=CH_2$	Propene (propylene)	A3	0.1	1,000	1.7				500
R-1336mzz(E)	$CF_3CHCHCF_3$	trans 1,1,1,4,4,4-hexafluoro-2-butene	A1	3.0	7,200	48				400
R-1336mzz(Z)	$CF_3CHCHCF_3$	cis-1,1,1,4,4,4-hexaflouro-2-butene	A1	~~5.4~~ 5.2	13,000	~~87~~ 84				500

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m^3

a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.

b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.

c. ~~The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.~~

c d. Class I ozone depleting substance; prohibited for new installations.

d e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighed average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.

Reason Statement: The Refrigerant Classifications (except Degrees of Hazard) are determined by ASHRAE SSPC 34 and published in ASHRAE Standard 34. This proposal seeks to update the refrigerant table with the new refrigerants added to Standard 34 since the last code cycle. The reasons for the additions of new refrigerants can be found at https://www.ashrae.org/standards-research--technology/standards-addenda. All proposed changes are either incorporated into ASHRAE Standard 34-2019 or the published addenda to ASHRAE Standard 34-2019 located at the link above.

Bibliography: ASHRAE Standard 34-2019, Designation and Safety Classification of Refrigerants, with addenda c, d, e, f, g, h, l, m, p, t, u, x, y - https://www.ashrae.org/standards-research--technology/standards-addenda

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Updating the table of refrigerants that could be used in systems does not add labor or material costs because the choice of refrigerant is up to the owner and designer.

M74-21

M75-21

IMC: 1104.3.1, 1104.3.2, TABLE 1104.3.2

Proponents: Helen Walter-Terrinoni, AHRI, representing AHRI (helen.a.walter-terrinoni@outlook.com); Julius Ballanco, representing Daikin US (JBENGINEER@aol.com); Andrew Klein, representing The Chemours Company (andrew@asklein.com); Joe Nebbia, Newport Partners, representing Natural Resources Defense Council (jnebbia@newportpartnersllc.com)

International Mechanical Code

2021 International Mechanical Code

Revise as follows:

1104.3.1 Air conditioning for human comfort. ~~In other than industrial occupancies where the quantity in a single independent circuit does not exceed the amount in Table 1103.1, Group B1, B2 and B3 refrigerants shall not be used in high-probability systems for air conditioning for human comfort.~~

High probability systems used for human comfort shall use Group A1 or A2L refrigerant.

Exceptions:

1. Listed equipment for residential occupancies containing a maximum of 6.6 pounds (3 kg) of refrigerant.
2. Listed equipment for commercial occupancies containing a maximum of 22 pounds (10 kg) of refrigerant.
3. Industrial occupancies.

1104.3.2 ~~Nonindustrial occupancies~~ Group A3 and B3 refrigerants. ~~Group A2 and B2 refrigerants shall not be used in high-probability systems where the quantity of refrigerant in any independent refrigerant circuit exceeds the amount shown in Table 1104.3.2.~~ Group A3 and B3 refrigerants shall not be used except where *approved*.

~~**Exception**~ **Exceptions:** This section does not apply to :

1. ~~laboratories~~ Laboratories where the floor area per occupant is not less than 100 square feet (9.3 m2).
2. Listed self contained systems having a maximum of 0.331 pounds (150 g) of Group A3 refrigerant.
3. Industrial occupancies.

Delete without substitution:

~~TABLE 1104.3.2~~
~~MAXIMUM PERMISSIBLE QUANTITIES OF REFRIGERANTS~~

~~TYPE OF REFRIGERATION SYSTEM~~	~~MAXIMUM POUNDS FOR VARIOUS OCCUPANCIES~~			
	~~Institutional~~	~~Public a ssembly~~	~~Residential~~	~~All other occupancies~~
~~Sealed absorption system~~				
~~In exit access~~	~~0~~	~~0~~	~~3.3~~	~~3.3~~
~~In adjacent outdoor locations~~	~~0~~	~~0~~	~~22~~	~~22~~
~~In other than exit access~~	~~0~~	~~6.6~~	~~6.6~~	~~6.6~~
~~Unit systems~~				
~~In other than exit access~~	~~0~~	~~0~~	~~6.6~~	~~6.6~~

~~For SI: 1 pound = 0.454 kg.~~

Reason Statement: These requirements are based on previous editions of ASHRAE 15. ASHRAE 15 has been updated numerous times resulting in the modification to the requirement similar to this proposal. High probability direct systems for human comfort must use either Group A1 or A2L refrigerant. Other refrigerants can be used provided the maximum charge does not exceed 6.6 pound for residential applications and 22 pounds for commercial units. Plus, these unit must be listed for use with these other refrigerants. The revision to Section 1104.3.1 becomes consistent with Section 7.5.2 of ASHRAE 15. Although, ASHRAE lists the refrigerants prohibited for this application, whereas this proposal lists the refrigerants required to be used.
Section 1104.3.2 text being stricken is addressed in the revised text to Section 1104.3.1. The remaining text is consistent with the requirements in Section 7.5.3 of ASHRAE 15.

Addendum i of ASHRAE 15-2019 deleted the table that is equivalent to Table 1104.3.2. This table is no longer necessary with the change to ammonia refrigerant requirements during the last two cycles and with the change adding the exceptions to Section 1104.3.1.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is a clarification of the current requirements that allow Group A1 and A2L for high probability system used for human comfort. There is no impact to the cost of construction.

M75-21

M76-21

IMC: 1104.3.3

Proponents: Greg Johnson, representing Codes & Standards International (gjohnsonconsulting@gmail.com); Jay Peters, representing Vertiv (peters.jay@me.com); Barry Greive, representing Target Corporation (barry.greive@target.com); David Collins, representing The Preview Group, Inc. (dcollins@preview-group.com)

2021 International Mechanical Code

Revise as follows:

1104.3.3 All occupancies. The total of all Group A2, B2, A3 and B3 refrigerants shall not exceed 1,100 pounds (499 kg) except where*approved*.

> **Exception:** The total of Group A2L refrigerants in industrial occupancies shall not be limited provided the quantity in a single independent circuit would not exceed 25 percent of the lower flammability limit (LFL) upon release to the space.

Reason Statement: The code currently does not clearly identify A2L refrigerants as being a separate classification from Group A2 refrigerants. For example, Section 1106.3 provides specific requirements for Groups A2, A3, B2 and B3 refrigerants but then creates an exception for A2L refrigerants leaving the user to infer that Group A2L must be a subset of Group A2.
This proposal clarifies that refrigerant limits applicable to Group A2 refrigerants are not applicable to Group A2L refrigerants used in industrial occupancies where a refrigerant release would not exceed 25 percent of the lower flammability limit.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
No actual changes in construction are associated with this change.

M77-21 Part I

IMC: 1106.3

Proponents: Julius Ballanco, representing Daikin US (JBENGINEER@aol.com)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Revise as follows:

1106.3 ~~Flammable~~ Class 2 and 3 refrigerants. Where refrigerants of Groups A2, A3, B2 and B3 are used, the *machinery room* shall conform to the Class I, Division 2, *hazardous location* classification requirements of NFPA 70.

~~Exception:~~ ~~*Machinery rooms* for systems containing Group A2L *refrigerants* that are provided with ventilation in accordance with Section 1106.4.~~

M77-21 Part II

IFC: [M] 608.17

Proponents: Julius Ballanco, representing Daikin US (jbengineer@aol.com)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Fire Code

Revise as follows:

[M] 608.17 Electrical equipment. Where refrigerant of Groups A2, A3, B2 and B3, as defined in the *International Mechanical Code*, are used, refrigeration machinery rooms shall conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70.

~~**Exceptions**~~ **Exception:**

1. Ammonia machinery rooms that are provided with ventilation in accordance with Section 1101.1.2, Exception 1 of the International Mechanical Code.
2. ~~Machinery rooms for systems containing Group A2L refrigerants that are provided with ventilation in accordance with Section 608.18.~~

Reason Statement: The second exception in the Fire Code and the exception in the Mechanical Code are no long necessary with the revision in the 2021 International Mechanical Code regarding refrigerant classification. A2L is a separate group of refrigerant. Both sections state that the requirements apply to A2, A3, B2, and B3. Hence, A2L is not included in the requirements so the two exceptions proposed for deletion no longer are needed.
ASHRAE 15 has been modified removing the term "flammable refrigerant" and replacing it with the specific Class of refrigerant. Section 1106.3 has thus been modified to indicate Class 2 and 3 refrigerants.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial in nature. As a result, there is no impact to the cost of construction.

M78-21 Part I

IMC: 1106.4, 1106.4.1 (New), 1106.4.2, TABLE 1106.4.2 (New), TABLE 1106.4.2, 1106.4.3

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

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

2021 International Mechanical Code

Delete and substitute as follows:

~~**1106.4 Special requirements for Group A2L refrigerant machinery rooms.** *Machinery rooms* with systems containing Group A2L *refrigerants* that do not conform to the Class I, Division 2, hazardous location electrical requirements of NFPA 70, as permitted by the exception to Section 1106.3, shall comply with Sections 1106.4.1 through 1106.4.3.~~

~~**Exception:** *Machinery rooms* conforming to the Class I, Division 2, hazardous location classification requirements of NFPA 70 are not required to comply with Sections 1106.4.1 and 1106.4.2.~~

1106.4 Group A2L and B2L Refrigerant. Machinery rooms for Group A2L and B2L refrigerant shall comply with Sections 1106.4.1 through Section 1106.4.3.

Add new text as follows:

1106.4.1 Elevated Temperatures. Open flame-producing devices or continuously operating hot surfaces over 1290 °F (700 °C) shall not be permanently installed in the room.

Delete and substitute as follows:

~~**1106.4.2 Emergency ventilation system.** An emergency ventilation system shall be provided at the minimum exhaust rate specified in ASHRAE 15 or Table 1106.4.2. Shutdown of the emergency ventilation system shall be by manual means.~~

1106.4.2 Refrigerant Detector. In addition to the requirements of Section 1105.3, refrigerant detectors shall signal an alarm and activate the ventilation system in accordance with the response time specified in Table 1106.4.2.

Add new text as follows:

TABLE 1106.4.2
GROUP A2L and B2L DETECTOR ACTIVATION

Activation Level	Maximum Response Time (seconds)	ASHRAE 15 Ventilation Level	Alarm Reset	Alarm Type
Less than or equal to the OEL in Table 1103.1	300	1	Automatic	Trouble
Less than or equal to the refrigerant concentration level in Table 1103.1	15	2	Manual	Emergency

Delete without substitution:

~~**TABLE 1106.4.2**~~
~~**MINIMUM EXHAUST RATES**~~

~~**REFRIGERANT**~~	~~**Q(m/sec)**~~	~~**Q(cfm)**~~
~~R32~~	~~15.4~~	~~32,600~~
~~R143~~	~~13.6~~	~~28,700~~
~~R444A~~	~~6.46~~	~~13,700~~
~~R444B~~	~~10.6~~	~~22,400~~
~~R445A~~	~~7.83~~	~~16,600~~
~~R446A~~	~~23.9~~	~~50,700~~
~~R447A~~	~~23.8~~	~~50,400~~
~~R451A~~	~~7.04~~	~~15,000~~
~~R451B~~	~~7.05~~	~~15,000~~
~~R1234yf~~	~~7.80~~	~~16,600~~
~~R1234ze(E)~~	~~5.92~~	~~12,600~~

Delete and substitute as follows:

~~**1106.4.3 Emergency ventilation system discharge.** The emergency ventilation system point of discharge to the atmosphere shall be located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, *ventilation* opening or *exit*.~~

1106.4.3 Mechanical Ventilation. The machinery room shall have a mechanical ventilation system complying with ASHRAE 15.

M78-21 Part I

M78-21 Part II

IMC: [F] 1106.4.1

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Mechanical Code

Delete without substitution:

~~**[F] 1106.4.1 Ventilation system activation.** Ventilation shall be activated by the refrigerant detection system in the *machinery room*. Refrigerant detection systems shall be in accordance with Section 605.8 of the International Fire Code and all of the following:~~

1. ~~The detectors shall activate at or below a refrigerant concentration of 25 percent of the LFL.~~
2. ~~Upon activation, the detection system shall activate the emergency ventilation system required by Section 1106.4.2.~~
3. ~~The detection, signaling and control circuits shall be supervised.~~

Reason Statement: The machinery room requirements in the 2019 edition of ASHRAE 15 have been completely revised for Group A2L and B2L refrigerants. The table in the current code was part of the original draft to ASHRAE 15 that was subsequently rejected as being inaccurate. This is proposed for deletion.
With Group A2L and B2L refrigerants, research has proven that open flames and hot surfaces can be at a higher temperature than Group A2, A3, B2, and B3 refrigerants. Section 1106.4.1 adds special provisions for Group A2L and B2L refrigerants regarding hot surfaces.
New ventilation requirements were added to ASHRAE 15 for machinery rooms using Group A2L and B2L refrigerants. There are two levels of ventilation that are required based on the response of the refrigerant detector. This proposal references ASHRAE 15 for the ventilation requirement (note that the latest standard can be viewed free of charge at https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards.) A table is included that identifies the two levels of annunciation in the event of a refrigerant leak in a machinery room. The first activation is a trouble alarm for a small leak. This requires a minimal amount of ventilation. The second level is an emergency alarm. This signals the activation of the full amount of ventilation for the room.

Bibliography: 1. ANSI/ASHRAE 15-2019, Safety Standard for Refrigeration Systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change clarifies the requirements for ventilation of a machinery room. The use of A2L refrigerant is optional.

M79-21

IMC: 1107.3, 1107.6, 1107.7, 1108.1, 1108.3.3, 1109.8.1, 1109.8.2, 1110.3, 1110.5.1

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Revise as follows:

1107.3 Materials rating. Materials, joints and connections shall be rated for the operating temperature and pressure of the refrigerant system. Materials shall be suitable for the type of refrigerant and type of lubricant in the ~~refrigerant~~ refrigeration system. Magnesium alloys shall not be used in contact with any halogenated refrigerants. Aluminum, zinc, magnesium and their alloys shall not be used in contact with R-40 (methyl chloride).

1107.6 Valves. Valves shall be of materials that are compatible with the type of piping material, refrigerants and oils in the system. Valves shall be *listed* and *labeled* and rated for the temperatures and pressures of the ~~refrigerant~~ refrigeration systems in which the valves are installed.

1107.7 Flexible connectors, expansion and vibration compensators. Flexible connectors and expansion and vibration control devices shall be *listed* and *labeled* for use in ~~refrigerant~~ refrigeration systems.

1108.1 Approval. Joints and connections shall be of an *approved* type. Joints and connections shall be tight for the pressure of the ~~refrigerant~~ refrigeration system when tested in accordance with Section 1110.

1108.3.3 Soldered joints. Joint surfaces to be soldered shall be cleaned and a flux conforming to ASTM B813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B32. Solder joints shall be limited to ~~refrigerant~~ refrigeration systems using Group A1 refrigerant and having a pressure of less than or equal to 200 psi (1378 kPa).

1109.8.1 ~~Refrigerating~~ Refrigeration systems containing more than 6.6 pounds (3.0 kg) of refrigerant. Stop valves shall be installed in the following locations on ~~refrigerating~~ refrigeration systems containing more than 6.6 pounds (3.0 kg) of refrigerant:

1. The suction inlet of each compressor, compressor unit or condensing unit.
2. The discharge outlet of each compressor, compressor unit or condensing unit.
3. The outlet of each liquid receiver.

1109.8.2 ~~Refrigerating~~ Refrigeration systems containing more than 100 pounds (45 kg) of refrigerant. In addition to stop valves required by Section 1109.8.1, systems containing more than 100 pounds (45 kg) of refrigerant shall have stop valves installed in the following locations:

1. Each inlet of each liquid receiver.
2. Each inlet and each outlet of each condenser where more than one condenser is used in parallel.

Exceptions:

1. Stop valves shall not be required at the inlet of a receiver in a condensing unit nor at the inlet of a receiver that is an integral part of the condenser.
2. Systems utilizing nonpositive displacement compressors.

1110.3 Test gases. The medium used for pressure testing the ~~refrigerant~~ refrigeration system shall be one of the following inert gases: oxygen-free nitrogen, helium or argon. For R-744 ~~refrigerant~~ refrigeration systems, carbon dioxide shall be allowed as the test medium. For R-718 ~~refrigerant~~ refrigeration systems, water shall be allowed as the test medium. Oxygen, air, combustible gases and mixtures containing such gases shall not be used as a test medium. Systems erected on the premises with tubing not exceeding $^{5}/_{8}$ inch (15.9 mm) outside diameter shall be allowed to use the refrigerant identified on the nameplate label or marking as the test medium.

1110.5.1 Joints and refrigerant-containing parts in air ducts. Joints and all refrigerant-containing parts of a ~~refrigerating~~ refrigeration system located in an air duct of an air-conditioning system that conveys conditioned air to and from human-occupied spaces shall be tested at a pressure of 150 percent of the higher of the design pressure or pressure relief device setting.

Reason Statement: This proposed change cleans up the language added during the last cycle. ASHRAE 15 has used refrigerant systems and refrigeration systems interchangeably for many years. ASHRAE SSPC 15 has voted to convert all of the text in the standard to “refrigeration systems.” This change will keep the Mechanical Code consistent with ASHRAE 15.

Bibliography: ASHRAE 15-2019, Safety Standard for Refrigeration Systems

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal is editorial text clarification only.

M80-21

IMC: SECTION 202, TABLE 1107.4, 1108.10 (New), 1109.4.1, ASTM Chapter 15 (New)

Proponents: Brad Campbell, Titeflex Corp., representing Gastite (brad.campbell@gastite.com)

2021 International Mechanical Code

Revise as follows:

PIPING. Where used in this code, "piping" refers to either pipe or tubing, or both.

Pipe.

A rigid conduit of iron, steel, copper, copper-alloy, or plastic , or multilayer composite aluminum and plastic.

Tubing.

Semirigid conduit of copper, copper-alloy, aluminum, plastic, or steel , or multilayer composite aluminum and plastic.

TABLE 1107.4
REFRIGERANT PIPE

PIPING MATERIAL	STANDARD
Aluminum tube	ASTM B210/ASTM B210M, ASTM B491/B491M
Brass (copper alloy) pipe	ASTM B43
Copper linesets	ASTM B280, ASTM B1003
Copper pipe	ASTM B42, ASTM B302
Copper tube[a]	ASTM B68, ASTM B75, ASTM B88, ASTM B280, ASTM B819
Steel pipe[b]	ASTM A53, ASTM A106
Steel tube	ASTM A254, ASTM A334
Polyethylene of raised temperature / aluminum / polyethylene of raised temperature (PERT/AL/PERT) linesets	ASTM FXXXX

a. Soft annealed copper tubing larger than $1^{3}/_{8}$ inch (35 mm) O.D. shall not be used for field-assembled refrigerant piping unless it is protected from mechanical damage.

b. ASTM A53, Type F steel pipe shall not be used for refrigerant lines having an operating temperature less than -20°F (-29°C).

Add new text as follows:

1108.10 PERT/AL/PERT pipe. Joints between PERT/AL/PERT pipe or fittings shall be mechanical or press-connect joints conforming to Section 1108.3.

Revise as follows:

1109.4.1 Piping material. Piping material for Group A2, A3, B2 or B3 refrigerant located inside the building, except for *machinery rooms*, shall be copper pipe, brass pipe or steel pipe. Multilayer composite PERT/AL/PERT pipe may be used for Group A2 refrigerant. Pipe joints located in areas other than the *machinery room* shall be welded. Self-contained *listed* and *labeled equipment* or *appliances* shall have piping material based on the listing requirements.

Exception: PERT/AL/PERT pipe joints located in areas other than the machinery room shall be mechanical or press-connect joints.

Add new text as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

ASTM FXXXX: Polyethylene of Raised Temperature/Aluminum/Polyethylene of Raised Temperature (PERT/AL/PERT) Composite Pressure Pipe based on Inner Diameter (ID) for use in Air Conditioning and Refrigeration Line Set Systems

Staff Analysis: A review of the standards proposed for inclusion in the code, ASTM FXXXX: Polyethylene of Raised Temperature/Aluminum/Polyethylene of Raised Temperature (PERT/AL/PERT) Composite Pressure Pipe based on Inner Diameter (ID) for use in Air Conditioning and Refrigeration Line Set Systems, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: PERT/AL/PERT pipe material is not listed in the IMC 1107 Refrigeration Piping Materials section. This type of composite pipe has primarily been used for water conveyance applications but if the pipe is designed and tested to the new ASTM FXXXX Standard for "Polyethylene of Raised Temperature / Aluminum / Polyethylene of Raised Temperature (PERT/AL/PERT) Composite Pressure Pipe based on Inner Diameter (ID) for use in Air Conditioning and Refrigeration Line Set Systems" it will be a comparable Line Set option. This new ASTM FXXXX standard will be finalized and published in the next 30 days.

Bibliography: ASTM FXXX approved PERT/AL/PERT lineset pipes have been tested and proven to be an excellent refrigeration piping material option. This standard was designed with dimensional tables that are ID controlled to match that of ACR Copper lineset tube so that the flowrate and volume of the pipe remains the same. This specification also has high pressure performance tables so that the pipe satisfies the wide range of refrigerant pressures. The new ASTM standard covers the following test evaluations:

- Dimensional evaluation to allowed standard (ASTM D2122)
- Adhesion testing (visual and peel) to verify the bonding between the various layers
- Ring pull testing to ensure a strong and effective weld seam
- Elongation and tensile testing of the aluminum alloy used in the pipe construction to ensure that only top performing alloys are used for this

application (ASTM E8/E8M)

- Burst pressure testing to verify the listed design pressure (ASTM D1599)
- Sustained pressure testing to ensure the pipe will handle continuous high pressure values at elevated temperatures (ASTM1598)
- Vibration testing after specified refrigerant exposure to pipe and fitting assembly (UL1963 Sec. 58.10)
- Pull testing after specified refrigerant exposure to pipe and fitting assembly (UL1963 Sec.58.11)
- Burst or Fatigue testing after specified refrigerant exposure to pipe and fitting assembly (Fatigue Method UL207 Sec. 14)
- Hydrostatic burst testing to evaluate the fitting connection to the pipe (ASTM 1599)
- Hydrostatic sustained pressure testing to evaluate the fitting connection to the pipe (ASTM1598)
- Thermocycling testing to evaluate the fitting connection to the pipe

This product has also been tested and evaluated for refrigerant and oil exposure to ASHRAE G38 "Guideline for Using Metal Pressure Vessels to Test Materials Used in Refrigeration Systems" where the physical properties of the inner PERT wall were evaluated both before and after exposure testing.

Cost Impact: The code change proposal will decrease the cost of construction
The use of an ASTM FXXXX approved PERT/AL/PERT lineset pipe will provide a decrease in the cost of construction due to cost effective raw materials that are used to make up the multilayer pipe. Most importantly the PERT, adhesive, and aluminum layer construction maintains better price stability than that of the commonly used refrigeration piping materials today which are very volatile and can not be held for any period of time. The product is light weight and can be sold in larger easily handled coils that can be straightened and formed for quicker installation in the field saving time and money. The overall structure of the pipe provides a lower risk of kinking than that of traditional lineset pipes which helps prevent unnecessary installation scrap and rework. Also this type of pipe is less likely to be stolen at job sights due to nature of the material.

M80-21

M81-21

IMC: 1108.5

Proponents: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com)

2021 International Mechanical Code

Delete without substitution:

~~**1108.5 Brass (copper alloy) pipe.** Joints between brass pipe or fittings shall be brazed, mechanical, press-connect, threaded or welded joints conforming to Section 1108.3.~~

Reason Statement: Because brass is a copper alloy, this section is not needed and is covered in Section 1108.6.

Bibliography: 1108.6 Copper pipe. Joints between copper or copper-alloy pipe or fittings shall be brazed, mechanical, press-connect, soldered, threaded or welded joints conforming to Section 1108.3.

Cost Impact: The code change proposal will increase the cost of construction
This is simply an elimination of duplication of requirements in code. It is a clarification of the code that does not affect materials or labor.

M82-21

IMC: 1109.4.1

Proponents: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com)

2021 International Mechanical Code

Revise as follows:

1109.4.1 Piping material. Piping material for Group A2, A3, B2 or B3 refrigerant located inside the building, except for *machinery rooms*, shall be copper pipe, ~~brass~~ copper alloy pipe or steel pipe. Pipe joints located in areas other than the *machinery room* shall be welded. Self-contained *listed* and *labeled equipment* or *appliances* shall have piping material based on the listing requirements.

Reason Statement: Brass and Bronze are Copper Alloys. Copper Alloy is the correct term.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is editorial to update the use of terms in the code. Editorial changes do not affect material or labor costs.

M83-21

IMC: TABLE 1107.4, TABLE 1107.5, 1107.7, 1109.2.2, 1109.2.3, 1109.2.6, 1109.2.7, 1109.3, 1109.3.1, 1109.3.2, 1109.4, 1109.4.1, 1109.4.2, 1109.7, 1110.3, 1110.3.1 (New), 1110.5, 1110.5.2, 1110.5.1, 1110.6, 1110.7, ASTM Chapter 15 (New)

Proponents: Emily Toto, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Revise as follows:

TABLE 1107.4
REFRIGERANT PIPE

PIPING MATERIAL	STANDARD
Aluminum tube	ASTM B210/ASTM B210M, ASTM B491/B491M
Brass (copper alloy) pipe	ASTM B43
Copper linesets	ASTM B280, ASTM B1003
Copper pipe	ASTM B42, ASTM B302
Copper tube[a]	ASTM B68, ASTM B75, ASTM B88, ASTM B280, ASTM B819
Steel pipe[b]	ASTM A53, ASTM A106, ASTM A333
Steel tube	ASTM A254, ASTM A334

a. Soft annealed copper tubing larger than $1^{3}/_{8}$ inch (35 mm) O.D. shall not be used for field-assembled refrigerant piping unless it is protected from mechanical damage.

b. ASTM A53, Type F steel pipe shall ~~not be used for refrigerant lines having an operating temperature less than -20°F (-29°C).~~ only be permitted for discharge lines in pressure relief systems.

TABLE 1107.5
REFRIGERANT PIPE FITTINGS

FITTING MATERIAL	STANDARD
Aluminum	ASTM B361
~~Brass (copper alloy)~~	~~ASME B16.15, ASME B16.24~~
Copper and Copper Alloy (Brass)	ASME B16.15, ASME B16.18, ASME B16.22, ASME B16.24, ASME B16.26, ASME B16.50
Steel	ASTM A105, ASTM A181, ASTM A193, ASTM A234, ASTM A420, ASTM A707

1107.7 Flexible connectors, expansion and vibration compensators. Flexible connectors and expansion and vibration control devices shall be *listed* and *labeled* for use in refrigerant systems , and pressures for which the components are installed.

1109.2.2 Refrigerant pipe enclosure. Refrigerant piping shall be protected by locating it within the building elements or within protective enclosures.
Exception: Piping protection within the building elements or protective enclosure shall not be required in any of the following locations:

1. Where installed without ready access or located more than 7 feet 3 inches (2210 mm) above the finished floor.
2. Where located within 6 feet (1829 mm) of the refrigerant unit or *appliance*.
3. Where located in a *machinery room* complying with Section 1105.
4. Outside the building:
   4.1. Protected from damage from the weather, including, but not limited to, hail, ice, and snow loads, and
   4.2. Protected from damage within the expected foot or traffic path
   4.3. Outside underground installed not less than 8 inches (200 mm) below finished grade and protected against corrosion.

1109.2.3 Prohibited locations. Refrigerant piping shall not be installed in any of the following locations:
1. Exposed within a fire-resistance-rated exit access corridor.
2. Exposed w~~W~~ithin an interior exit stairway.
3. Within an interior exit ramp.
4. Within an exit passageway.
5. Within an elevator, dumbwaiter or other shaft containing a moving object.

1109.2.6 Exposed piping surface temperature. Exposed piping with ready access to nonauthorized personnel having surface temperatures greater than 120°F (49°C) or less than 5°F (-15°C) shall be protected from contact or shall have thermal insulation that limits the exposed insulation surface temperature to a range of 5°F (-15°C) to 120°F (49°C).

1109.2.7 Pipe identification. Refrigerant pipe located in areas other than the room or space where the refrigerating *equipment* is located shall be identified. The pipe identification shall be located at intervals not exceeding 20 feet (6096 mm) on the refrigerant piping or pipe insulation. The minimum height of lettering of the identification label shall be $^1/_2$ inch (12.7 mm). The identification shall indicate the refrigerant designation and safety group classification of refrigerant used in the piping system. For Group A2L and B2L refrigerants the identification shall also include the following statement: “WARNING – Risk of Fire. Flammable Refrigerant.” For Group A2, A3, B2 and B3 refrigerants, the identification shall also include the following statement: "DANGER—Risk of Fire or Explosion. Flammable Refrigerant." For any Group B refrigerant, the identification shall also include the following statement: "DANGER—Toxic Refrigerant."

1109.3 Installation requirements for Group A2L, A2, A3, ~~or~~ B2L , B2, or B3 refrigerant. Piping systems using Group A2L , A2, A3, ~~or~~ B2L , B2, or B3 refrigerant shall comply with the requirements of Sections 1109.3.1 and 1109.3.2.

1109.3.1 Pipe protection. In addition to the requirements of Section 305.5, aluminum, copper and steel tube used for Group ~~A2L~~ A2, A3, ~~and~~ B2L , B2, and B3 refrigerants and located in concealed locations where tubing is installed in studs, joists, rafters or similar member spaces, and located less than $1^1/_2$ inches (38 mm) from the nearest edge of the member, shall be continuously protected by shield plates. Protective steel shield plates having a minimum thickness of 0.0575 inch (1.46 mm) (No. 16 gage) shall cover the area of the tube plus the area extending not less than 2 inches (51 mm) beyond both sides of the tube.

1109.3.2 Shaft ventilation. Refrigerant pipe shafts with systems using Group A2L or B2L refrigerant shall be naturally or mechanically ventilated. Refrigerant pipe shafts with one or more systems using any Group A2, A3, B2, or B3 refrigerant shall be continuously mechanically ventilated and shall include a refrigerant detector. The shaft ventilation exhaust outlet shall comply with Section 501.3.1. Naturally ventilated shafts shall have a pipe, duct or conduit not less than 4 inches (102 mm) in diameter that connects to the lowest point of the shaft and extends to the outdoors. The

pipe, duct or conduit shall be level or pitched downward to the outdoors. Mechanically ventilated shafts shall have a minimum airflow velocity in accordance with Table 1109.3.2. The mechanical ventilation shall be continuously operated or activated by a refrigerant detector. Systems utilizing a refrigerant detector shall activate the mechanical ventilation at a maximum refrigerant concentration of 25 percent of the lower flammable limit of the refrigerant. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The shaft shall not be required to be ventilated for double-wall refrigerant pipe where the interstitial space of the double-wall pipe is vented to the outdoors.

Delete without substitution:

~~**1109.4 Installation requirements for Group A2, A3, B2 or B3 refrigerant.** Piping systems using Group A2, A3, B2 or B3 refrigerant shall comply with the requirements of Sections 1109.4.1 and 1109.4.2.~~

~~**1109.4.1 Piping material.** Piping material for Group A2, A3, B2 or B3 refrigerant located inside the building, except for *machinery rooms*, shall be copper pipe, brass pipe or steel pipe. Pipe joints located in areas other than the *machinery room* shall be welded. Self-contained *listed* and *labeled equipment* or *appliances* shall have piping material based on the listing requirements.~~

~~**1109.4.2 Shaft ventilation.** Refrigerant pipe shafts with systems using Group A2, A3, B2 or B3 refrigerant shall be continuously mechanically ventilated. The shaft ventilation exhaust outlet shall comply with Section 501.3.1. Mechanically ventilated shafts shall have a minimum airflow velocity as specified in Table 1109.3.2. The shaft shall not be required to be ventilated for double-wall refrigerant pipe where the interstitial space of the double-wall pipe is vented to the outdoors.~~

~~**1109.7 Condensate control.** Refrigerating piping and fittings that, during normal operation, will reach a surface temperature below the dew point of the surrounding air, and are located in spaces or areas where condensation has the potential to cause a safety hazard to the building occupants, structure, electrical *equipment* or any other *equipment* or *appliances*, shall be insulated or protected in an *approved* manner to prevent damage from condensation.~~

Revise as follows:

1110.3 Test gases. The medium used for pressure testing the refrigerant system shall be one of the following inert gases: oxygen-free nitrogen, helium, ~~or~~ argon or premixed nonflammable oxygen-free nitrogen with a tracer gas of hydrogen or helium. For R-744 refrigerant systems, carbon dioxide shall be allowed as the test medium. For R-718 refrigerant systems, water shall be allowed as the test medium. ~~Oxygen, air, combustible gases and mixtures containing such gases shall not be used as a test medium. Systems erected on the premises with tubing not exceeding $^{5}/_{8}$ inch (15.9 mm) outside diameter shall be allowed to use the refrigerant identified on the nameplate label or marking as the test medium.~~

Add new text as follows:

1110.3.1 Test Gases Not Permitted. Oxygen, air, refrigerants other than those identified in Section 1110.3, combustible gases and mixtures containing such gases shall not be used as the pressure test medium.

Revise as follows:

1110.5 Piping system strength test ~~pressure test and leak test~~. Refrigerating system components and refrigerant piping shall be tested in accordance with ASME B31.5 or this section. Separate tests for isolated portions of the system are permitted provided that all required portions are tested at least once. Pressurize with test gas for a minimum of 10 minutes to not less than the lower of (a) the lowest design pressure for any system component, or (b) the lowest value of set pressure for any pressure relief devices in the system. The design pressures for determination of test pressure shall be the pressure identified on the label nameplate of the condensing unit, compressor, compressor unit, pressure vessel, or other system component with a nameplate. A passing test result shall have no rupture or structural failure of any system component or refrigerant piping.

Refrigerant piping and tubing greater than 3/4 inches in diameter shall be tested in accordance with ASHRAE 15.

~~The refrigerant piping system shall be tested as a whole or separate tests shall be conducted for the low-pressure side and high-pressure side of the piping system. The refrigerant piping system shall be tested in accordance with both of the following methods:~~

1. ~~The system shall be pressurized for a period of not less than 60 minutes to not less than the lower of the design pressures or the setting of the pressure relief device(s). The design pressures for testing shall be the pressure listed on the label nameplate of the condensing unit, compressor, compressor unit, pressure vessel or other system component with a nameplate. Additional test gas shall not be added to the system after the start of the pressure test. The system shall not show loss of pressure on the test pressure measuring device during the pressure test. Where using refrigerant as a test medium in accordance with Section 1110.3, the test pressure shall be not less than the saturation dew point pressure at 77°F (25°C).~~
2. ~~A vacuum of 500 microns shall be achieved. After achieving a vacuum, the system shall be isolated from the vacuum pump. The system pressure shall not rise above 1,500 microns for a period of not less than 10 minutes.~~

Delete without substitution:

~~**1110.5.2 Limited charge systems.** Limited charge systems with a pressure relief device, erected on the premises, shall be tested at a pressure not less than one and one-half times the pressure setting of the relief device. *Listed* and *labeled* limited charge systems shall be tested at the~~

~~*equipment* or *appliance* design pressure.~~

~~**1110.5.1 Joints and refrigerant-containing parts in air ducts.** Joints and all refrigerant-containing parts of a refrigerating system located in an air duct of an air-conditioning system that conveys conditioned air to and from human-occupied spaces shall be tested at a pressure of 150 percent of the higher of the design pressure or pressure relief device setting.~~

~~**1110.6 Booster compressor.** Where a compressor protected by a pressure relief device is used as a booster to obtain an intermediate pressure, and such compressor discharges into the suction side of another compressor, the booster compressor shall be considered to be a part of the low-pressure side of the system.~~

~~**1110.7 Centrifugal/nonpositive displacement compressors.** Where testing systems using centrifugal or other nonpositive displacement compressors, the entire system shall be considered to be the low-pressure side for test purposes.~~

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

A333-18: Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and other Applications with required Notch Toughness

Staff Analysis: A review of the standards proposed for inclusion in the code, ASTM A333-18: Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: For Table 1107.4, ASHRAE 15 modified the piping requirements by adding ASTM A333, which is a steel pipe used in refrigerant piping systems. The other change is to modification of Note b. ASHRAE 15 added restrictions to the use of Type F pipe. For many years, Type F pipe ceased to be manufactured in the United States. Hence, the requirements were basically ignored. With the influx of foreign made steel pipe, Type F pipe has reemerged in the United States. That is why it is important to add the limitation since Type F pipe does not have strength and longevity of ERW pipe. Note: ASTM will provide the documentation required to add ASTM A333 to the Chapter 15 references.
For Table 1107.5 , the change is editorial. ASHRAE SSPC 15 Refrigerant Piping Working Group combined brass and copper fittings since the fittings can be used for either piping material. The fitting standard shown being removed are already located under the current heading of copper.

For Section 1107.7, we propose to add a reference to UL 207, which has been modified to add requirements for flexible connectors and expansion and vibration compensators. The other change is a mandate that the components be rated for the pressure of the refrigerant piping system. While this is already implied, it is better to include the wording to avoid improper interpretation of the requirement.

For Sections 1109.2-1109.4, There are two changes made by the ASHRAE 15 Committee regarding piping installation requirements. New requirements were added for piping protection when installed on the outside of the building. This includes buried pipe. The other change relates to interior exit stairways. These spaces are often heated and cooled by individual heat pumps. Thus, there is refrigerant piping within the exit stairs, however, the piping is not exposed creating a hazard. Furthermore, the quantity of refrigerant in the piping must be below the RCL (refrigerant concentration limit). The installation requirements for flammable refrigerants were also simplified by combining the sections of A2L and B2L with A2, A3, B2, and B3. The changes that resulted from the combining of the sections was the allowance of steel, stainless steel, and copper tubing for A2, A3, B2, and B3. ASHRAE 15 Committee found no reason for the continued requirement of limiting A2, A3, B2, and B3 refrigerants to pipe while not allowing tube. Both materials can handle the refrigerants and pressures. Furthermore, there are protection requirements for the tubing. In the tubing protection section, Group A2L was removed. This is based on testing showing that continuous protection is unnecessary for Group A2L refrigerants. The protection of stud and joist penetrations remain. The other changes include a statement on nonauthorized personnel for protection of the piping. This would allow exposed piping in machinery rooms. The last change is a marking requirement for A2L and B2L piping. This added marking of the piping is consistent with the labeling required by UL/CSA 60335-2-40.

For Section 1109.7, The ASHRAE 15 Committee was of the opinion that this section would be very difficult for a code official to enforce. To eliminate unintended consequences of the uncertainty associated with dew point will in a given space, this section was deleted during the updating of the piping requirements.

For Section 1110, The proposed Test Gas requirements adds an allowance for the use of premixed nitrogen with a tracer gas or either hydrogen or helium. The tracer gas makes it easier to detect a leak in larger refrigeration piping systems. The use of tracer gases for testing piping systems is common practice in larger refrigeration systems. The changes to the testing section reflect modifications made in ASHRAE 15 to expand the requirements for large piping systems in which a greater duration is appropriate. Note that the latest standard can be viewed free of charge at https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards.

Bibliography: 1. ASTM A333-18, Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness.
2. ANSI/ASHRAE Standard 15-2019, Safety Standard for Refrigeration Systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
While some times for testing are increased, technicians can normally be completing other tasks associated with the refrigeration system during these times.

M83-21

M84-21

IMC: 1110.3

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Mechanical Code

Delete and substitute as follows:

~~**1110.3 Test gases.** The medium used for pressure testing the refrigerant system shall be one of the following inert gases: oxygen-free nitrogen, helium or argon. For R-744 refrigerant systems, carbon dioxide shall be allowed as the test medium. For R-718 refrigerant systems, water shall be allowed as the test medium. Oxygen, air, combustible gases and mixtures containing such gases shall not be used as a test medium. Systems erected on the premises with tubing not exceeding $^{5}/_{8}$ inch (15.9 mm) outside diameter shall be allowed to use the refrigerant identified on the nameplate label or marking as the test medium.~~

1110.3 Test gases.
Tests shall be performed with dry nitrogen or other nonflammable, nonreactive, dried gas. Oxygen, air, or mixtures containing them shall not be used. The means used to build up the test pressure shall have either a pressure limiting device or a pressure-reducing device and a gauge on the outlet side. The pressure-relief device shall be set above the test pressure but low enough to prevent permanent deformation of the system's components.

Exceptions:

1. Mixtures of dry nitrogen, inert gases, or a combination of them with Class 1 refrigerant in concentrations of a refrigerant weight fraction (mass fraction) not exceeding 5 percent shall be permitted for tests.
2. Mixtures of dry nitrogen, inert gases, or a combination of them with Class 2L, Class 2 and Class 3 refrigerants in concentrations not exceeding the lower of a refrigerant weight fraction (mass fraction) of 5 percent or 25 percent of the LFL shall be permitted for tests.
3. Compressed air without added refrigerants shall be permitted for tests, provided the system is subsequently evacuated to less than 1000 microns (0.1333 kPa) before charging with refrigerant. The required evacuation level is atmospheric pressure for systems using R-718 (water) or R-744 (carbon dioxide) as the refrigerant.
4. Systems erected on the premises using Group A1 refrigerant and with copper tubing not exceeding 0.62 of an inch (15.7 mm) outside diameter shall be tested by means of the refrigerant charged into the system at the saturated vapor pressure of the refrigerant at not less than 68°F (20°C).

Reason Statement: This proposal aligns the IMC with ASHRAE 15, 2019 edition requirements for test gases, and specifies how to appropriately use refrigerants as tracer gases to minimize the use of and ensure only de minimis release of these products during testing. The proposed language is an extraction from ASHRAE 15-2019, Section 10.1.2

Bibliography: ASHRAE 15-2019, Safety Standard for Refrigeration Systems

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal provides clarity on test gas requirements.

M84-21

M85-21

IMC: 1201.1

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Revise as follows:

1201.1 Scope. The provisions of this chapter shall govern the construction, installation,*alteration* and repair of hydronic piping systems. This chapter shall apply to hydronic piping systems that are part of heating, ventilation and air-conditioning systems. Such piping systems shall include steam, hot water, radiant heating, radiant cooling, chilled water, steam condensate , ~~and~~ ground source heat pump loop systems and snow- and ice-melting. Potable cold and hot water distribution systems shall be installed in accordance with the *International Plumbing Code* .

Reason Statement: The hydronic applications known as radiant heating & cooling and snow & ice melting are currently listed within Ch. 12 in Section 1209 Embedded Piping, but are missing from the Scope. Therefore, these types of hydronic systems should be listed within the Scope. Subsequent proposals, if accepted, will add new requirements for radiant heating & cooling and snow & ice melting tubing systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The hydronic applications known as radiant heating & cooling and snow & ice melting are currently listed within Ch. 12 in Section 1209 Embedded Piping, but are missing from the Scope.

M86-21

IMC: TABLE 1202.4

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Revise as follows:

TABLE 1202.4
HYDRONIC PIPE

MATERIAL	STANDARD (see Chapter 15)
Acrylonitrile butadiene styrene (ABS) plastic pipe	~~ASTM D1527;~~ ASTM F2806
Chlorinated polyvinyl chloride (CPVC) plastic pipe	ASTM D2846; ASTM F441; ASTM F442
Chlorinated polyvinyl chloride/aluminum/chlorinated polyvinyl chloride (CPVC/AL/CPVC)	ASTM F2855
Copper or copper-alloy pipe	ASTM B42; ASTM B43; ASTM B302
Copper or copper-alloy tube (Type K, L or M)	ASTM B75; ASTM B88; ASTM B135; ASTM B251
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe	ASTM F1281; CSA CAN/CSA-B-137.10
Cross-linked polyethylene (PEX) tubing	ASTM F876; ASTM F3253; CSA B137.5
Ductile iron pipe	AWWA C115/A21.15; AWWA C151/A21.51
~~Lead pipe~~	~~FS WW-P-325B~~
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
Polypropylene (PP) plastic pipe	ASTM F2389
Polyvinyl chloride (PVC) plastic pipe	ASTM D1785; ASTM D2241
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769; CSA B137.18
Steel pipe	ASTM A53; ASTM A106
Steel tubing	ASTM A254

Reason Statement: The referenced ABS specification ASTM D1527 was withdrawn by ASTM in 2013, so it should be removed from Table 1202.4. Lead pipe should not be used for hydronic systems due to health and safety reasons, and should be removed from this table. The referenced Federal Specification (FS) WW-P-325B has been cancelled. Searchable here https://fedspecs.gsa.gov/FedSpecsSearchPage

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There is no cost impact because the two reference standards which are proposed for deletion from Table 1202.4 are no longer published.

M86-21

M87-21

IMC: TABLE 1202.4, ASTM Chapter 15 (New)

Proponents: Lisa Reiheld, representing Viega LLC (lisa.reiheld@viega.us)

2021 International Mechanical Code

Revise as follows:

TABLE 1202.4
HYDRONIC PIPE

MATERIAL	STANDARD (see Chapter 15)
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D1527; ASTM F2806
Chlorinated polyvinyl chloride (CPVC) plastic pipe	ASTM D2846; ASTM F441; ASTM F442
Chlorinated polyvinyl chloride/aluminum/chlorinated polyvinyl chloride (CPVC/AL/CPVC)	ASTM F2855
Copper or copper-alloy pipe	ASTM B42; ASTM B43; ASTM B302
Copper or copper-alloy tube (Type K, L or M)	ASTM B75; ASTM B88; ASTM B135; ASTM B251
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe	ASTM F1281; CSA CAN/CSA-B-137.10
Cross-linked polyethylene (PEX) tubing	ASTM F876; ASTM F3253; CSA B137.5
Ductile iron pipe	AWWA C115/A21.15; AWWA C151/A21.51
Lead pipe	FS WW-P-325B
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
Polypropylene (PP) plastic pipe	ASTM F2389
Polyvinyl chloride (PVC) plastic pipe	ASTM D1785; ASTM D2241
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769; CSA B137.18
Steel pipe	ASTM A53; ASTM A106;
Steel tubing	ASTM A254
Stainless Steel pipe	ASTM A269; ASTM A312; ASTM A554; ASTM A778
Stainless Steel tubing	ASTM A269; ASTM A312; ASTM A554; ASTM A778

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

ASTM A554-16: Standard Specification for Welded Stainless Steel Mechanical Tubing

Add new text as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

ASTM A778/A778M-16: Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

Staff Analysis: A review of the standards proposed for inclusion in the code, ASTM A554-16 and A778-16: Standard Specification for Welded Stainless Steel Mechanical Tubing and ASTM A778/A778M-16: Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: Stainless steel material is proposed to be added for hydronic applications where stainless steel pipe, tubing and fittings are necessary for corrosion resistance. The proposed stainless steel standards are also referenced in other nationally recognized codes and are commonly used for potable water distribution and hydronic applications.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal of including stainless steel as another recognized material for the use in hydronic systems will not increase the cost of construction due to the fact that stainless steel piping and tubing would be only one of multiple material options the user of the code could specify.

M87-21

M88-21

IMC: TABLE 1202.5, ASTM Chapter 15 (New)

Proponents: Lisa Reiheld, Viega LLC, representing Viega LLC (lisa.reiheld@viega.us)

2021 International Mechanical Code

Revise as follows:

TABLE 1202.5
HYDRONIC PIPE FITTINGS

MATERIAL	STANDARD (see Chapter 15)
Copper and copper alloys	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.24; ASME B16.26; ASME B16.51; ASSE 1061; ASTM F1974; ASTM F3226
CPVC	ASSE 1061; ASTM D2846; ASTM F438; ASTM F439
Ductile iron and gray iron	ANSI/AWWA C110/A21.10; ASTM A395; ASTM A536; ASTM F1476; ASTM F1548; AWWA C153/A21.53
Ductile iron	ANSI/AWWA C153/A21.53
Gray iron	ASTM A126
Malleable iron	ASME B16.3
PE-RT fittings	ASSE 1061; ASTM D3261; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; CSA B137.1; CSA B137.18
PEX fittings	ASSE 1061; ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F3253
Plastic	ASTM D2466; ASTM D2467; ASTM D2846; ASTM F877; ASTM F2389; ASTM F2735
Steel	ASME B16.5; ASME B16.9; ASME B16.11; ASME B16.28; ASTM A53; ASTM A106; ASTM A234; ASTM A395; ASTM A420; ASTM A536; ASTM F1476; ASTM F1548; ASTM F3226
Stainless Steel	ASTM A269; ASTM A312; ASTM A554; ASTM A778; ASTM F3226

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

A554-16: Standard Specification for Welded Stainless Steel Mechanical Tubing

A778/A778M-16: Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

Staff Analysis: A review of the standards proposed for inclusion in the code, ASTM A554: Standard Specification for Welded Stainless Steel Mechanical Tubing; and ASTM A778: Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: ASTM F3226 Standard Specification for Metallic Press-Connect Fittings for Piping and Tubing Systems is now published and includes Carbon Steel, Stainless Steel, Copper and Copper-Alloy materials. By including this standard will provide a reference standard for press-connect technology for each of the alloys.
Stainless steel material is proposed to be added for applications where stainless steel pipe, tubing and fittings are necessary for corrosion resistance. The proposed stainless steel standards are also referenced in other nationally recognized codes and are commonly used for potable water distribution and hydronic applications.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This standard is not the only standard that the pipe fittings can meet in accordance with the Pipe Fittings Table, this is just an alternative standard that some manufacturer's have tested their products to and would like to see recognized as an acceptable standard for pipe fittings. Testing to this standard is optional and no existing standards have been removed or replaced by the proposed addition of this standard.

M88-21

M89-21

IMC: 1203.3.4

Proponents: Forest Hampton, representing Lubrizol, Inc. (forest.hampton@lubrizol.com)

2021 International Mechanical Code

Revise as follows:

1203.3.4 Solvent-cemented joints. Joint surfaces shall be clean and free from moisture. An *approved* primer shall be applied to CPVC and PVC pipe-joint surfaces. Joints shall be made while the cement is wet. Solvent cement conforming to the following standards shall be applied to all joint surfaces:

1. ASTM D2235 for ABS joints.
2. ASTM F493 for CPVC joints.
3. ASTM D2564 for PVC joints.

CPVC joints shall be made in accordance with ASTM D2846.

Exception: For CPVC pipe joint connections, a primer is not required where all of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM F493.
2. The solvent cement is yellow or green in color.
3. The solvent cement is used only for joining $^{1}/_{2}$-inch (12.7 mm) through 2-inch (51 mm) diameter CPVC pipe and fittings.
4. The CPVC pipe or fittings are manufactured in accordance with ASTM D2846.

Reason Statement: Currently, it can be difficult to see the yellow solvent cement ring on a tan CTS CPVC joint during inspection. A high contrast cement has been asked for from the field to aid in the inspection of CPVC joints. The color green was chosen because of its high contrast against the tan pipe and fittings and green is not currently used to identify any other type of cement.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The addition of another one-step solvent cement color will not change the cost of construction.

M90-21

IMC: 1203.9, 1203.9.1

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Delete without substitution:

~~**1203.9 Polybutylene plastic pipe and tubing.** Joints between polybutylene plastic pipe and tubing or fittings shall be mechanical joints conforming to Section 1203.3 or heat-fusion joints conforming to Section 1203.9.1.~~

~~**1203.9.1 Heat-fusion joints.** Joints shall be of the socket-fusion or butt-fusion type. Joint surfaces shall be clean and free from moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM D3309.~~

Reason Statement: Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s. PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015. The referenced product standard, ASTM D3309 “Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems” was withdrawn in 2010.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s, and PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015.

M91-21

IMC: 1203.14 (New), 1203.15 (New)

Proponents: Lisa Reiheld, Viega LLC, representing Viega LLC (lisa.reiheld@viega.us)

International Mechanical Code

2021 International Mechanical Code

Add new text as follows:

1203.14 Stainless Steel Pipe. Joints between stainless steel pipe or fittings shall be mechanical joints that are made with an approved elastomeric seal, or shall be threaded or welded joints conforming to Section 1203.3.

1203.15 Stainless Steel Tubing. Joints between stainless steel tubing or fittings shall be mechanical or welded joints conforming to Section 1203.3.

Reason Statement: Stainless steel pipe and tubing are not currently recognized in the IMC as materials for use in hydronic applications. However, these materials are often specified for use in hydronic applications and are selected due to the corrosion resistance provided by stainless steel. The inclusion of stainless steel pipe and tubing in the body of this code for hydronic applications will allow the specifier and/or installer the option to use a much more corrosive resistant material for applications where this is important to the integrity of the hydronic installation. IMC Section 1203 Joints and Connections, specifies particular materials that can be joined in hydronic applications and currently includes steel but not stainless steel. Stainless steel pipe and tubing joints are being added to replicate their use as equivalent to Sections 1203.12 Steel pipe and 1203.13 Steel tubing for joints as well as state the suitable equivalent methods of joining as stated for Steel pipe and tubing.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposal of including stainless steel as another recognized material for the use in hydronic systems will not increase the cost of construction due to the fact that stainless steel piping and tubing would be only one of multiple material options the user of the code could specify.

M92-21

IMC: 1205.1

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Mechanical Code

Revise as follows:

1205.1 Where required. Shutoff valves shall be installed in hydronic piping systems in the locations indicated in Sections 1205.1.1 through 1205.1.6. Access shall be provided to all full open valves and shutoff valves.

Reason Statement: Although Section 306.1 alludes to access for devices if you want to call a valve a device, it doesn't just come out and include valves. This change will make it clear that valves will be required to have access.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial in nature is done for consistency purposes only.

M93-21

IMC: 1210.4, TABLE 1210.4

Proponents: Michael Cudahy, representing PPFA (mikec@cmservices.com)

2021 International Mechanical Code

1210.4 Piping and tubing materials standards. Ground-source heat pump ground-loop pipe and tubing shall conform to the standards listed in Table 1210.4.

Revise as follows:

TABLE 1210.4
GROUND-SOURCE LOOP PIPE

MATERIAL	STANDARD (see Chapter 15)
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F441; ASTM F442
Cross-linked polyethylene (PEX)	ASTM F876; ASTM F3253; CSA B137.5; CSA C448; NSF 358-3
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
High-density polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D1785; ASTM D2241
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769; CSA B137.18; CSA C448; NSF 358-4

Reason Statement: ASTM F3253 is titled, "Standard Specification for *Crosslinked Polyethylene (PEX) Tubing* with Oxygen Barrier for Hot- and Cold-Water Hydronic Distribution Systems" and contains information for PEX systems for hydronic applications where an oxygen barrier is used. This standard for PEX tubing and fittings is already included in the hydronics fittings table and is missing in the piping table, so we are correcting its absence.

Bibliography: ASTM F3253 is already included in the code.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction. The proposal simply adds an additional ASTM standard for inclusion of approved PEX piping. There is not expected to be an increase or decrease in construction costs by the inclusion of another approved piping material defined by the ASTM product standard for tubing to this section of the code. This standard is for PEX tubing and fittings and is already included in the hydronics fittings table and is only missing in the piping table.

M93-21

M94-21

IMC: 1206.12 (New)

Proponents: paul gradeway, representing self

2021 International Mechanical Code

Add new text as follows:

1206.12 Circulation Pump Attachment. All circulation pumps for radiant heating systems shall be securely attached to the building structure with approved fastening devices.

Reason Statement: Circulation pumps have traditionally been supported on the heating system piping which creates stress points in the system as pipe flexes and shrinks due to heat expansion and contraction.
It is structurally beneficial to have a circulation pump securely fastened to a solid surface to allow the piping system to expand and contract within it's supports as necessary.

With more systems moving to Pex type tubing and away from traditional copper or iron pipe, this allows for a seamless transition.

Cost Impact: The code change proposal will increase the cost of construction
Costs should be negligible. $10 - $25 in fasteners.

M95-21

IMC: 1209.1

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Revise as follows:

1209.1 Materials. Piping for heating panels shall be standard-weight steel pipe, Type L copper tubing, ~~polybutylene~~ or ~~other~~ *approved* plastic pipe or tubing rated at 100 psi (689 kPa) at 180°F (82°C).

Reason Statement: Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s. PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s. PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015.

M96-21

IMC: 1209.3.3

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Delete without substitution:

~~**1209.3.3 Polybutylene joints.** Polybutylene pipe and tubing shall be installed in continuous lengths or shall be joined by heat fusion in accordance with Section 1203.9.1.~~

Reason Statement: Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s. PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Polybutylene (PB) tubing has not been manufactured for sale in the US since the late 1990s. PB was previously removed from Table 1202.4 “Hydronic Pipe” at some time before 2015.

M97-21

IMC: 1209.6 (New), 1209.6.1 (New), TABLE 1209.6.1 (New), 1209.6.2 (New), 1209.6.3 (New)

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Add new text as follows:

1209.6 Radiant tubing placement. Hydronic tubing to be embedded for the purpose of radiant heating or cooling shall be installed in accordance with the manufacturer's instructions and with the tube layout and spacing in accordance with the system design. Individual tubing circuit lengths shall be installed with a variance of not more than ±10 percent from the design.

1209.6.1 Radiant tubing circuit length. The maximum circuit length of radiant tubing from a supply-and-return manifold shall not exceed the lengths specified by the system design or, in the absence of manufacturer's specifications, the lengths specified in Table 1209.6.1.

TABLE 1209.6.1
MAXIMUM CIRCUIT LENGTH OF RADIANT TUBING FROM A SUPPLY-AND-RETURN MANIFOLD ARRANGEMENT

NOMINAL TUBE SIZE	MAXIMUM CIRCUIT LENGTH (FEET)
1/4	125
5/16	200
3/8	250
1/2	300
5/8	400
3/4	500
1	750

For SI units: 1 foot = 304.8 mm

1209.6.2 Radiant tubing circuit tags. Each individual radiant tubing circuit shall have a tag or label securely affixed to each manifold outlet to indicate the length of each circuit and the areas served.

1209.6.3 Radiant tubing drawings. The radiant tubing drawings and design report shall be provided to the building owner or the designated representative of the building owner.

Reason Statement: Manufacturers of radiant heating and cooling tubing recognize that the proper installation of radiant heating and cooling tubing is critical to the successful operation of these systems. One of the most fundamental aspects of installation is the length of each tubing circuit, because if installed lengths are too short or too long, or not labelled, it may be impossible to balance the radiant system correctly for proper operation, comfort and efficiency. For tubing that is to be embedded, this topic is critical, yet is very inspectable and enforceable.
The circuit lengths in the proposed Table 1209.1 are based on existing industry practices, and take into account the allowable temperature gain or loss from the hydronic fluid, and the typical pressure loss in radiant circuits of those diameters. These values match those found in other codes.

The proposed language makes it clear that tubing circuit lengths are to be installed according to system design or the default Table 1209.1 and are to be inspected for such compliance.

Also, it is important for radiant tubing circuits to be tagged or labelled, and for the final drawings/design to be given to the building owner, in case the tubing routing and locations need to be identified at a later date.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposed code sections are based on existing industry practices used by trained experienced professionals, and do not alter the design or construction of radiant systems.

M97-21

M98-21

IMC: 1209.7 (New), 1209.7.1 (New), TABLE 1209.7.1 (New), 1209.7.2 (New)

Proponents: Lance MacNevin, Plastics Pipe Institute, representing Plastics Pipe Institute (lmacnevin@plasticpipe.org)

2021 International Mechanical Code

Add new text as follows:

1209.7 Snow & ice melt tubing placement. Hydronic tubing to be embedded for the purpose of snow & ice melt systems shall be installed in accordance with the manufacturer's installation instructions and with the tube layout and spacing in accordance with the system design.

1209.7.1 Snow-and ice-melt tubing circuit length. The maximum circuit length of snow- and ice- melt tubing from a supply-and-return manifold shall not exceed the lengths specified by the system design or, in the absence of manufacturer's specifications, the lengths specified in Table 1209.7.1. Individual tubing circuit lengths shall be installed with a variance of not more than ±10 percent from the design.

TABLE 1209.7.1
MAXIMUM CIRCUIT LENGTH OF SNOW- AND ICE-MELT TUBING FROM A SUPPLY-AND-RETURN MANIFOLD ARRANGEMENT

NOMINAL TUBE SIZE	MAXIMUM CIRCUIT LENGTH (FEET)
1/2	140
5/8	250
3/4	325
1	475

For SI units: 1 foot = 304.8 mm

1209.7.2 Snow- and ice-melt tubing drawings. The snow- and ice-melt tubing drawings and design report shall be provided to the building owner or the designated representive of the building owner.

Reason Statement: Manufacturers of snow & ice melt (SIM) system tubing recognize that the proper installation of this tubing is critical to the successful operation of these systems. One of the most fundamental aspects of installation is the length of each tubing circuit, because if installed lengths are too short or too long, it may be impossible to balance the system correctly for proper operation, efficiency and safety. For tubing that is to be embedded, this topic is critical, yet is very inspectable and enforceable.
The circuit lengths in the proposed Table 1209.2 are based on existing industry practices, and take into account the allowable temperature loss from the hydronic fluid and the typical pressure loss in snow & ice melt circuits of those diameters. The actual lengths are based on the typical on-center spacing of tubing in a SIM system and the typical heat energy required per square foot of outdoor area. These values match those found in other codes.

The proposed language makes it clear that tubing circuit lengths are to be installed according to system design or the default Table 1209.2 and are to be inspected for such compliance.Also, it is important that the final drawings/design be provided to the building owner in case the tubing routing and locations need to be identified at a later date.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The proposed requirements are based on existing industry practices, and match those found in other codes.

M98-21

M99-21 Part I

IMC: TABLE 1210.5, TABLE 1202.5, ASTM Chapter 15 (New)

Proponents: Michael Cudahy, representing PPFA (mikec@cmservices.com)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART II WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

2021 International Mechanical Code

Revise as follows:

TABLE 1210.5
GROUND-SOURCE LOOP PIPE FITTINGS

PIPE MATERIAL	STANDARD (see Chapter 15)
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; ASTM F3347; CSA B137.5; CSA C448; NSF 358-3
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F1282; ASTM F2434; CSA B137.9
High-density polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D3261; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; ASTM F3347; CSA B137.1; CSA B137.18; CSA C448; NSF 358-4

TABLE 1202.5
HYDRONIC PIPE FITTINGS

MATERIAL	STANDARD (see Chapter 15)
Copper and copper alloys	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.24; ASME B16.26; ASME B16.51; ASSE 1061; ASTM F1974
CPVC	ASSE 1061; ASTM D2846; ASTM F438; ASTM F439
Ductile iron and gray iron	ANSI/AWWA C110/A21.10; ASTM A395; ASTM A536; ASTM F1476; ASTM F1548; AWWA C153/A21.53
Ductile iron	ANSI/AWWA C153/A21.53
Gray iron	ASTM A126
Malleable iron	ASME B16.3
PE-RT fittings	ASSE 1061; ASTM D3261; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; ASTM F3347; CSA B137.1; CSA B137.18
PEX fittings	ASSE 1061; ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F3253; ASTM F3347
Plastic	ASTM D2466; ASTM D2467; ASTM D2846; ASTM F877; ASTM F2389; ASTM F2735
Steel	ASME B16.5; ASME B16.9; ASME B16.11; ASME B16.28; ASTM A53; ASTM A106; ASTM A234; ASTM A395; ASTM A420; ASTM A536; ASTM F1476; ASTM F1548

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

F3347-20a: Standard Specification for Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing

Staff Analysis: A review of the standards proposed for inclusion in the code, ASTM F3347: Standard Specification for Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

M99-21 Part I

M99-21 Part II

IRC: TABLE P2906.6, TABLE M2101.1, ASTM Chapter 44 (New)

Proponents: Michael Cudahy, representing PPFA (mikec@cmservices.com)

2021 International Residential Code

Revise as follows:

TABLE P2906.6
PIPE FITTINGS

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic	ASTM D2468
Cast iron	ASME B16.4
Chlorinated polyvinyl chloride (CPVC) plastic	ASSE 1061; ASTM D2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6
Copper or copper alloy	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.26; ASME B16.51; ASSE 1061; ASTM F3226
Cross-linked polyethylene/aluminum/high-density polyethylene (PEX-AL-HDPE)	ASTM F1986
Fittings for cross-linked polyethylene (PEX) plastic tubing	ASSE 1061; ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2098; ASTM F2159; ASTM F2434; ASTM F2735; ASTM F3347; CSA B137.5
Gray iron and ductile iron	AWWA C110/A21.10; AWWA C153/A21.53
Malleable iron	ASME B16.3
Insert fittings for Polyethylene/aluminum/polyethylene (PE-AL-PE) and cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX)	ASTM F1281; ASTM F1282; ASTM F1974; CSA B137.9; CSA B137.10
Polyethylene (PE) plastic	ASTM D2609; CSA B137.1
Fittings for polyethylene of raised temperature (PE-RT) plastic tubing	ASSE 1061; ASTM D2683; ASTM D3261; ASTM F1055; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; ASTM F3347; CSA B137.18
Polypropylene (PP) plastic pipe or tubing	ASTM F2389; CSA B137.11
Polyvinyl chloride (PVC) plastic	ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3
Stainless steel (Type 304/304L) pipe	ASTM A312; ASTM A778
Stainless steel (Type 316/316L) pipe	ASTM A312; ASTM A778
Steel	ASME B16.9; ASME B16.11; ASME B16.28

TABLE M2101.1
HYDRONIC PIPING AND FITTING MATERIALS

MATERIAL	USE CODE[a]	STANDARD[b]	JOINTS	NOTES
Acrylonitrile butadiene styrene (ABS) plastic pipe	1, 5	ASTM D1527, ASTM F2806, ASTM F2969	Solvent cement joints	—
Chlorinated poly (vinyl chloride) (CPVC) pipe and tubing	1, 2, 3	ASTM D2846	Solvent cement joints, compression joints and threaded adapters	—
Copper and copper-alloy pipe	1	ASTM B42, ASTM B43, ASTM B302	Brazed, soldered and mechanical fittings threaded, welded and flanged	—
Copper and copper-alloy tubing (Type K, L or M)	1, 2	ASME B16.51, ASTM B75, ASTM B88, ASTM B135, ASTM B251, ASTM B306	Brazed, soldered, press-connected and flared mechanical fittings	Joints embedded in concrete shall be brazed
Cross-linked polyethylene (PEX)	1, 2, 3	ASTM F876; ASTM F3253	(See PEX fittings)	Install in accordance with manufacturer's instructions
Cross-linked polyethylene/ aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe	1, 2	ASTM F1281 or CAN/CSA B137.10	Mechanical, crimp/insert	Install in accordance with manufacturer's instructions
PEX fittings	—	ASTM F877, ASTM F1807, ASTM F1960, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F3253; ASTM F3347	Copper crimp/insert fittings, cold expansion fittings, stainless steel clamp, insert fittings	Install in accordance with manufacturer's instructions
Polybutylene (PB) pipe and tubing	1, 2, 3	ASTM D3309	Heat-fusion, crimp/insert and compression	Joints in concrete shall be heat-fused
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	1, 2, 3	ASTM F1282, CSA B137.9	Mechanical, crimp/insert	—
Polypropylene (PP)	1, 2, 3	ISO 15874, ASTM F2389	Heat-fusion joints, mechanical fittings, threaded adapters, compression joints	—
Raised temperature polyethylene (PE-RT)	1, 2, 3	ASTM F2623, ASTM F2769, CSA B137.18	Copper crimp/insert fitting, stainless steel clamp, insert fittings	—
Raised temperature polyethylene (PE-RT) fittings	1, 2, 3	ASTM D3261, ASTM F1807, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F2769, ASTM F3347; CSA B137.18	Copper crimp/insert fitting, stainless steel clamp, insert fittings	—
Steel pipe	1, 2	ASTM A53, ASTM A106	Brazed, welded, threaded, flanged and mechanical fittings	Joints in concrete shall be welded. Galvanized pipe shall not be welded or brazed.
Steel tubing	1	ASTM A254	Mechanical fittings, welded	—

For SI: °C = [(°F) – 32]/1.8.

a. Use code:

1. Above ground.
2. Embedded in radiant systems.
3. Temperatures below 180°F only.
4. Low temperature (below 130°F) applications only.
5. Temperatures below 160°F only.

b. Standards as listed in Chapter 44.

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

ASTM F3347: Standard Specification for Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing

Reason Statement: ASTM F3347 is titled, "Standard Specification for Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing" and contains information for metallic fittings for both PEX and PERT systems intended for use in residential and commercial, hot and cold, potable water distribution systems as well as sealed central heating, including under-floor heating/cooling systems, and residential fire sprinkler systems.

Bibliography: ASTM F3347 Standard Specification for Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction. The proposal simply adds an additional ASTM standard for inclusion of approved PEX and PERT fitting products and is therefore not expected to either raise or lower the cost of construction by offering another potential product to the application, it only increases additional options.

M99-21 Part II

M100-21 Part I

IMC: TABLE 1210.5, TABLE 1202.5, ASTM Chapter 15 (New)

Proponents: Michael Cudahy, representing PPFA (mikec@cmservices.com)

THIS IS A TWO PART CODE CHANGE. PART 1 WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. PART 2 WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL MECHANICAL/PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2021 International Mechanical Code

Revise as follows:

TABLE 1210.5
GROUND-SOURCE LOOP PIPE FITTINGS

PIPE MATERIAL	STANDARD (see Chapter 15)
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; ASTM F3348; CSA B137.5; CSA C448; NSF 358-3
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F1282; ASTM F2434; CSA B137.9
High-density polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D3261; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; ASTM F3348; CSA B137.1; CSA B137.18; CSA C448; NSF 358-4

TABLE 1202.5
HYDRONIC PIPE FITTINGS

MATERIAL	STANDARD (see Chapter 15)
Copper and copper alloys	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.24; ASME B16.26; ASME B16.51; ASSE 1061; ASTM F1974
CPVC	ASSE 1061; ASTM D2846; ASTM F438; ASTM F439
Ductile iron and gray iron	ANSI/AWWA C110/A21.10; ASTM A395; ASTM A536; ASTM F1476; ASTM F1548; AWWA C153/A21.53
Ductile iron	ANSI/AWWA C153/A21.53
Gray iron	ASTM A126
Malleable iron	ASME B16.3
PE-RT fittings	ASSE 1061; ASTM D3261; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; ASTM F3348; CSA B137.1; CSA B137.18
PEX fittings	ASSE 1061; ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F3253; ASTM F3348
Plastic	ASTM D2466; ASTM D2467; ASTM D2846; ASTM F877; ASTM F2389; ASTM F2735
Steel	ASME B16.5; ASME B16.9; ASME B16.11; ASME B16.28; ASTM A53; ASTM A106; ASTM A234; ASTM A395; ASTM A420; ASTM A536; ASTM F1476; ASTM F1548

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

ASTM F3348-20b: Standard Specification for Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing

Staff Analysis: A review of the standards proposed for inclusion in the code, ASTM F3348-20b: Standard Specification for Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing, with regard to some of the key ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

M100-21 Part I

M100-21 Part II

IRC: TABLE M2101.1, ASTM Chapter 44 (New)

Proponents: Michael Cudahy, representing PPFA (mikec@cmservices.com)

2021 International Residential Code

Revise as follows:

TABLE M2101.1
HYDRONIC PIPING AND FITTING MATERIALS

MATERIAL	USE CODE[a]	STANDARD[b]	JOINTS	NOTES
Acrylonitrile butadiene styrene (ABS) plastic pipe	1, 5	ASTM D1527, ASTM F2806, ASTM F2969	Solvent cement joints	—
Chlorinated poly (vinyl chloride) (CPVC) pipe and tubing	1, 2, 3	ASTM D2846	Solvent cement joints, compression joints and threaded adapters	—
Copper and copper-alloy pipe	1	ASTM B42, ASTM B43, ASTM B302	Brazed, soldered and mechanical fittings threaded, welded and flanged	—
Copper and copper-alloy tubing (Type K, L or M)	1, 2	ASME B16.51, ASTM B75, ASTM B88, ASTM B135, ASTM B251, ASTM B306	Brazed, soldered, press-connected and flared mechanical fittings	Joints embedded in concrete shall be brazed
Cross-linked polyethylene (PEX)	1, 2, 3	ASTM F876; ASTM F3253	(See PEX fittings)	Install in accordance with manufacturer's instructions
Cross-linked polyethylene/ aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe	1, 2	ASTM F1281 or CAN/CSA B137.10	Mechanical, crimp/insert	Install in accordance with manufacturer's instructions
PEX fittings	—	ASTM F877, ASTM F1807, ASTM F1960, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F3253; ASTM F3348	Copper crimp/insert fittings, cold expansion fittings, stainless steel clamp, insert fittings	Install in accordance with manufacturer's instructions
Polybutylene (PB) pipe and tubing	1, 2, 3	ASTM D3309	Heat-fusion, crimp/insert and compression	Joints in concrete shall be heat-fused
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	1, 2, 3	ASTM F1282, CSA B137.9	Mechanical, crimp/insert	—
Polypropylene (PP)	1, 2, 3	ISO 15874, ASTM F2389	Heat-fusion joints, mechanical fittings, threaded adapters, compression joints	—
Raised temperature polyethylene (PE-RT)	1, 2, 3	ASTM F2623, ASTM F2769, CSA B137.18	Copper crimp/insert fitting, stainless steel clamp, insert fittings	—
Raised temperature polyethylene (PE-RT) fittings	1, 2, 3	ASTM D3261, ASTM F1807, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F2769, ASTM F3348; CSA B137.18	Copper crimp/insert fitting, stainless steel clamp, insert fittings	—
Steel pipe	1, 2	ASTM A53, ASTM A106	Brazed, welded, threaded, flanged and mechanical fittings	Joints in concrete shall be welded. Galvanized pipe shall not be welded or brazed.
Steel tubing	1	ASTM A254	Mechanical fittings, welded	—

For SI: °C = [(°F) – 32]/1.8.

a. Use code:

1. Above ground.
2. Embedded in radiant systems.
3. Temperatures below 180°F only.
4. Low temperature (below 130°F) applications only.
5. Temperatures below 160°F only.

b. Standards as listed in Chapter 44.

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428

F3348-18: Standard Specification for Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing

Reason Statement: ASTM F3348 is titled, "Standard Specification for Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing" and contains information on plastic fittings for PEX and PERT systems and should be included in the fittings table. The fittings are intended for use in residential and commercial, hot and cold, potable water distribution systems as well as sealed central heating, including under-floor heating/cooling systems, and residential fire sprinkler systems.

Bibliography: ASTM F3348 Standard Specification for Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction. The proposal simply adds an additional ASTM standard for inclusion of approved PEX and PERT fitting products and is therefore not expected to either raise or lower the cost of construction by offering another potential product to the application, it only increases additional options.

M100-21 Part II

M101-21

IMC: 1210.6

Proponents: Lisa Reiheld, representing Viega LLC (lisa.reiheld@viega.us)

2021 International Mechanical Code

Revise as follows:

1210.6 Joints. Joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the ground-source loop system. Joints used underground shall be of an approved type for buried applications.

Reason Statement: The use of the word "approved" by itself by definition in the IMC indicates being approved the Authority Having Jurisdiction. Modifying this language to indicate that it is of an "approved type" indicates that it is listed to a standard that has been approved for this type of product rather than at the discretion of the AHJ.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This does not increase or decrease the cost but merely clarifies the type of approval necessary for underground installation.