2015 IBC Multifamily Dwellings

Presenter: Todd Snider

Tuesday, September 12, 2017

1:30 PM - 4:30 PM
Use Group R

- Residential Occupancies (IBC 420)
  - Walls separating units
    - Fire partitions
  - Floor assemblies separating units
    - Per Section 711
  - **Automatic Sprinkler System Required**
    - NFPA 13 or NFPA 13R
  - Fire and smoke alarms required

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Fire Alarms

- IBC 907.2: **When Required**
  - Groups R-1, R-2 & R-4, not required if...
    - ≤ 2 stories, attics and crawl spaces are separated by a continuous 1-hour fire partition, and each sleeping unit has an exit directly to a public way.

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Smoke Alarms

- Group R-2, R-3, and R-4
  - Outside each sleeping area
  - In each room used for sleeping
  - On each story

- Group R-1:
  - In Sleeping Areas
  - In every room from sleeping room to exit
  - On each story

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“Mom smokes in the car. Jesus is okay with it, but we can’t tell dad.” – Sheldon Cooper
Smoke Alarms

- Prohibited locations
  - Ionization alarms:
    - < 20 feet of cooking appliances
    - < 10 feet with silencing switch
  - Photoelectric alarms:
    - < 6 feet of cooking
    - < 3 feet from doors to bathrooms
- Alarms shall be interconnected
- Hardwired with battery backup

"And for gosh’s sake, watch your language!" – Tony Stark

Carbon Monoxide

- Required in buildings with:
  - Forced air furnace
  - Fuel burning appliances
  - Attached private garages
- Location:
  - Dwelling units:
    - In the vicinity outside of sleeping areas
    - Within bedrooms containing fuel burning appliances
  - Within sleeping units
- Hardwired with battery backup

"You have reached the life model decoy of Tony Stark, please leave a message" – Tony Stark

Horizontal Assemblies

- **IBC 711.2.2**: Continuity
  - Continuous w/out openings (except per IBC 712)
- **IBC 711.2.3**: Supporting Construction
  - Shall have same fire-resistance rating.
  - Exception:
    - In Type IIB, IIB or VB Construction, Horizontal Assemblies separating dwelling units not required to be supported on rated assemblies.
- **IBC 803.11.2.1**: Drop ceilings
  - Framing for drop ceiling below rated assemblies are required to be of non-combustible construction.
    - Exception: FRT allowed in Type III and V

"Just because everybody hates it doesn’t mean it’s not good." – Gru

Membrane Penetrations

- **IBC 714.4.2**: Exception 7:
  - 1-hr and 2-hr ceiling
  - Double top plate
  - Type X gypsum on wall
  - Penetrations of top plate protected per 714
  - Ceiling membrane tight to top plate

"I don’t have a skull… Or bones." – Olaf
Fire Partitions

IBC 708.3: Fire-Resistance Rating
- Not less than 1-hour
- Exceptions:
  - Corridor walls may be ½-hour per Table 1020.1
  - Dwelling and sleeping unit separations in Types IIB, IIIB and VB construction may be ½-hour if NFPA Sprinklered.

“Really, I’m guessing you don’t have much experience with heat.” – Kristoff

Fire Partitions

IBC 708.4: Continuity
- “…shall extend from the top of the foundation or floor-ceiling assembly below to the underside of the floor or roof sheathing, slab or deck or to the fire-resistance-rated floor/ceiling or roof/ceiling assembly above…”

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“That’s against my program to impersonate a deity.” – C3PO

Fire Partitions

IBC 708.4: Continuity
- Exceptions…
- 1-hr floor
- Extension not required in crawl space
- Room-side membrane to rated floor
- Corridor ceiling 1-hr
- Corridor ceiling constructed same as walls

“My weakness. Small knives. Anything but knives!” – Spiderman

Fire Partitions

IBC: Continuity
- If not continuous to the sheathing… fire blocking and draft stopping is required.
Draftstopping Floors

- **IBC 718.3.2: Use Group R**
  - Draftstopping at unit separation walls
  - Exceptions:
    - NFPA 13 or NFPA 13R with heads in concealed space

*Draftstopping at unit separation walls*

Concealed Spaces

- **Draftstopping Locations:**
  - “…shall be installed to subdivide attic spaces and concealed roof spaces”
  - Where...
    - Dwelling/sleeping units
    - Max. horizontal area of 3,000ft²

*Concealed Spaces*

Ventilation

- **IBC 1203.2: Attic Ventilation**
  - Enclosed attics and rafter spaces shall have cross ventilation for each separate space
    - Fire rated ceilings create enclosed rafter spaces
  - An air space of ≥1” between insulation and sheathing
  - Ventilating area shall ≥ 1/150 of the area of the space
    - 1/300 where 50-80% of vents 3 feet above the eaves, remainder of vents in eaves

*Ventilation*

Unvented Attics

- **IBC 1203.3: Unvented Attic or Rafter Spaces**
  - Space within thermal envelope
  - No Class I Vapor Retarder on ceiling side
  - ¼” Vented air space for wood shingles or shakes
  - Climate Zones 5-8:
    - Class II Vapor Retarder with air impermeable insulation
    - Choose one of the approved insulation methods
    - Unvented roofs not allowed for:
      - Special use structures such as swimming pools, data centers, hospitals, or art galleries
      - Climate Zones 5-8 with > 35% humidity for (3) coldest months

*Unvented Attics*
Unvented Attics (Cont)

- **Insulation for unvented attics**
  - Air impermeable insulation only
    - Apply insulation to underside of roof sheathing
  - Air permeable insulation only
    - Apply insulation to underside of roof sheathing
    - Rigid insulation above the roof per Table 1203.3
  - Combination of permeable and impermeable
    - Permeable insulation directly beneath impermeable
    - R-value for Impermeable insulation per Table 1203.3
  - Impermeable directly to underside of roof sheathing
  - Rigid insulation above the roof per Table 1203.3
- Above roof rigid insulation only
  - Sufficient insulation such that roof sheathing average 45°F

"They got enough armed personnel to occupy Paris! Okay, bad example." – Reuben

Exterior Walls

- **IBC 705.5: Fire-Resistance Ratings**
  - Per IBC Tables 601 and 602
  - FSD > 10-feet → “...rated for exposure to fire from the inside.”
  - FSD ≤ 10-feet → “...rated for exposure to fire from both sides.”
  - **Type III Construction**

"Listen to them, they’re dying R2! Curse my metal body. I wasn’t fast enough. It’s all my fault!” — C3PO

Exterior Walls

- **IBC 705.6: Ext. Walls – Structural Stability**
  - “Interior structural elements that brace the exterior wall but that are not located within the plane of the exterior wall shall per Table 601 for that element.”
  - Structural elements that brace the exterior wall but are located outside or within the plane of the exterior wall per Tables 601 and 602 for the exterior wall.

"Can I come into the out now?” – Oh
**Exterior Walls**

- IBC 704.10: Exterior Structural Members
  - “Load-bearing structural members ... outside of a building or structure” provided the highest rating of:
    - Table 601 for its type of building element
    - Table 601 for exterior walls
    - Table 602 based on FSD
    - Type III or V-A construction
  - Exterior posts must be fire rated per Exterior Walls

“Exterior Posts”

- IBC 704.10: Exterior Structural Members
  - “Load-bearing structural members ... outside of a building or structure” provided the highest rating of:
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    - Table 601 for exterior walls
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**Projections**

- IBC 705.2: Projections
  - “Cornices, eave overhangs, exterior balconies and similar projections...”
    - Projection = 1/3 FSD

“Combustible Projections”

- IBC 705.2.3: Combustible Projections
  - If w/ in 5-feet lot line...
    - 1-Hour construction, or...
    - Type IV construction, or...
    - Fire-retardant-treated wood
    - IBC 1406.3 (Exceptions): Pickets & rails or Fire sprinklers

“We seem to be made to suffer. It’s our lot in life.” – C3PO
Exterior Openings

<table>
<thead>
<tr>
<th>FIRE SEPARATION DISTANCE</th>
<th>DEGREE OF OPENING PROTECTION</th>
<th>ALLOWABLE AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Not Permitted</td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>Not Permitted</td>
<td></td>
</tr>
<tr>
<td>Group C</td>
<td>Permitted</td>
<td></td>
</tr>
<tr>
<td>Group D</td>
<td>Permitted</td>
<td></td>
</tr>
<tr>
<td>Group E</td>
<td>Permitted</td>
<td></td>
</tr>
<tr>
<td>Group F</td>
<td>Permitted</td>
<td></td>
</tr>
<tr>
<td>Group G</td>
<td>Permitted</td>
<td></td>
</tr>
<tr>
<td>Group H</td>
<td>Permitted</td>
<td></td>
</tr>
</tbody>
</table>

- Footnote J: Use Group U Private Garages and carports with F.S.D. of 5'-0" or more unlimited openings
- **NFPA 13R considered Nonsprinklered**
- Exception 2: Buildings with unrated exterior walls (Table 601 and 602) shall have unlimited openings:
  - Type III-A, III-B, V-A

Buildings on Same Lot

- Buildings on Same Lot (503.1.2)
  - Separate Buildings, or
  - Same building

Carport Example

- Table 602, Footnote h: FSD = 5'-0" no fire rating
- Table 705.8, Footnote J: FSD = 5'-0" unprotected openings
- **Table 705.2:** FSD = 5'-0" projections within 40"

Building Height

- IBC 504.2: No occupancy shall exceed the limits specified.
- IBC 504.3: The maximum height shall not exceed Table 504.3 (**NFPA 13R = NS**)
- IBC 504.4: The maximum number of stories per Table 504.4. (**NFPA 13R = NS**)
- Towers, spires, and steeples
  - No habitation or storage
  - Non-combustible – No Limit
  - Combustible – 20 feet higher than Table
**Table 504.4: # of Stories**

<table>
<thead>
<tr>
<th>OCCUPANCY CLASSIFICATION</th>
<th>TYPE I</th>
<th>TYPE II</th>
<th>TYPE III</th>
<th>TYPE IV</th>
<th>TYPE V</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>NS</td>
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<td>2</td>
<td>2</td>
</tr>
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<td></td>
<td>S</td>
<td>UL</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
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<td>UL</td>
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<td>3</td>
<td>3</td>
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<tr>
<td></td>
<td>S</td>
<td>UL</td>
<td>12</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

* Allowable area determined by:
  - **Construction Type**
  - **Use Group**
  - **Automatic Fire Sprinklers**
  - **Building Frontage**
  - **Single Basement**

- **Limited by allowable area per story**
- **Does not count toward total area**

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**IBC 506: Building Area**

- **Allowable Building Area per story**
  
  \[ A_a = A_t + [NS \times I] \quad (\text{Eq. 5-1}) \]

  - \( A_a \) = Allowable building area
  - \( A_t \) = Tabular Area (Table 506.2)
  - \( I \) = Frontage increase factor
  - \( NS \) = Tabular area for non-sprinklered building

  **Other Terms:**
  - **UL** – Unlimited
  - **NP** – Not Permitted
  - **NS** – Not Sprinklered
  - **S1 = 1 Story Sprinklered (NFPA 13)**
  - **SM = Multi-story Sprinklered (NFPA 13)**
  - **S13R = Sprinklered NFPA 13R**

*“It’s just some quantum mechanics, with a little string theory doodling around the edges.” – Sheldon Cooper*

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**Building Area**

- **Allowable area determined by:**
  - **Construction Type**
  - **Use Group**
  - **Automatic Fire Sprinklers**
  - **Building Frontage**
  - **Single Basement**

- **Limited by allowable area per story**
- **Does not count toward total area**

*“Wonderful girl. Either I’m going to kill her or I’m beginning to like her.” – Han Solo*

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**Table 506.2**

<table>
<thead>
<tr>
<th>OCCUPANCY CLASSIFICATION</th>
<th>TYPE I</th>
<th>TYPE II</th>
<th>TYPE III</th>
<th>TYPE IV</th>
<th>TYPE V</th>
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</thead>
<tbody>
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<td>2</td>
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<tr>
<td>A-3</td>
<td>NS</td>
<td>UL</td>
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<td>3</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>UL</td>
<td>12</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

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*“You usually don’t see that in bunnies.” – Gru*
**Mixed Use**

- General (508.1)
  - Use Group
    - Classify each area
    - Requirements of Code apply to each use
  - Each floor level is calculated independently
  - 4 Methods:
    - Accessory (508.2)
    - Non-separated (508.3)
    - Separated
    - Mix and Match

**IBC 508.2: Accessory**

- Accessory Areas (IBC 508.2)
  - Allowable height (508.2.2)
    - Per Main Occupancy
  - Allowable Building Area (508.2.3)
    - Per Main Occupancy
  - Accessory Occupancy shall (508.2.3):
    - Not exceed 10% of floor area
    - Not exceed NS Area of Table 506.2

**Nonseparated Uses**

- Nonseparated
  - Use Groups not separated by fire rated construction
  - Most stringent requirement applies to whole building
  - Chapter 9 – Fire sprinklers or alarms
  - Chapter 5 – Height and area
  - Section 403 High rise buildings
  - Different Use Groups may control for different Sections

**Separated Use Groups**

- Separated Use Groups (Table 508.4)
  - Different Use Groups separated by:
    - Fire Barriers
    - Horizontal assemblies
    - NFPA 13R is *nonsprinklered*
  - Allowable Area
    - Determined for each Use
    - Sum of ratio actual/allowable < 1
  - Allowable height
    - Each use limited by Section 503
**Multiple Stories**

- **Single Occupancy (506.2.2)**
  - Total Allowable Area
    - \( A_f = \{A_i + (NS \times I_i)\} \times S_o \)
    - \( S_o = \) Actual number of stories
    - No more than 3
  - Each story
    - \(< A_f \) for \( S_o = 1.0 \)
- **Mixed Occupancy**
  - Each Story per 508
  - More than 3 Story
    - Sum of Ratio of Actual/Allowable per floor \(< 3.0 \)

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**Parking Below R (510.4)**

- **S-2 Parking**
  - Open or enclosed
  - 1 story above grade
  - Type I or IV
- **Group R**
  - Any construction type
  - Only count stories above
- **Floor between buildings**
  - Same construction type as garage
  - Minimum Fire Rating per IBC 508.4

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**Multistory Example**

- **V-A, 4-Story, NPFA 13R, No Frontage**
  - **A-2/A-3**: \( A_i = 11,500 \) ft\(^2\)
  - **B**: \( A_i = 18,000 \) ft\(^2\)
  - **M**: \( A_i = 14,000 \) ft\(^2\)
  - **R-2**: \( A_i = 12,000 \) ft\(^2\)
  - \( 0.98+1.0+2*(1.0)= 3.98 \)
  - OK, Exception 506.2.4

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**R-1 or R-2 of III-A (510.5)**

- **IBC 510.5: R1 or R2 of III-A**
  - 6 Stories Maximum
  - 75 feet max height
  - First floor above basement:
    - 3-hr fire rated
  - Floor area limited:
    - 3,000 ft\(^2\) per area
    - Separated by 2-hr Fire Wall

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"Flying makes me a better care provider." – Baymax

"You're making me beat up grass!“ – Rocket Raccoon

"O for 17“ – Scott Voss
R-1 or R-2 Type IIA

IBC 510.6: R-1 or R-2 of Type II-A
- 100 feet max height
- Max 9 stories
- 50 foot separation from
  o Lot Lines
  o Other buildings
- Exits separated by 2-hr rated Fire Walls
- First floor assembly is 1-1/2-hr rated

Open Parking Below R

IBC 510.7:
- Parking Garage
  o Open Parking Garage
  o Height and area per 406.5
- Building above
  o Per Section 503
  o Height and stories include parking
- Separation
  o Separated per 508.4
  o Separate construction types
    - Fire rating of structural elements
      supporting building above to be most restrictive
  o Means of egress from building above
    - Separated by 2-hr fire barrier from parking
    - Openings to be 2-hour rated (not 90 min.)

Energy Code

Commercial Provisions:
- Required:
  o All R-1 Use Groups
  o Other Group R with > 3 stories
- Dwelling or sleeping units
  o 75% high efficacy lights
  o Exempt from lighting requirements
- Thermal Envelope in podiums
  o Parking garage included:
    - Automatic closing garage doors required
    - Walls required to be insulated
  o Parking garage not included:
    - No heating/cooling permitted in garage
    - Insulation required between garage and units above

Shaft Enclosures

"...shall be constructed as fire barriers... or horizontal assemblies... or both."

IBC 713.4: Fire-Resistance Rating
- ≥ 4 stories ≥ 2-hour rating
- < 4 stories ≥ 1-hour rating
- Shall include basements
- Mezzanines not included
Shaft Enclosures

- IBC 713.12: Enclosure at Top
  - Must extend to underside of roof sheathing, or...
  - Must have the same rating as the top most floor penetration, but not less than shaft rating.

- IBC 713.13: Waste/Linen Chutes & Incinerator
  - Must comply with NFPA 82, Chapter 5
  - Shall not be used for any other purpose
  - Openings shall be protected (3/4-hour rating)
  - Openings shall not be located in corridors
  - Doors shall be self-closing
  - Access rooms → enclosed by 1-hour fire barriers
  - Discharge rooms → enclosed by fire barriers of same rating as shaft enclosure
  - Incinerator rooms → per IBC Table 509

Shaft Enclosures

- IBC 713.13: Waste/Linen Chutes & Incinerator
  - Sprinklered per IBC 903.2.11.2.

Duct and Air Transfer

- Ducts/Air Transfer Openings
  - HVAC duct
  - Bathroom exhaust ducts
  - Dryer exhaust ducts
    - Dampers not permitted
  - Kitchen exhaust ducts
  - Combustion air

- Smoke and Fire Dampers Required
  - Fire Walls (no exceptions)
  - Shaft Enclosures
  - Corridors
  - Horizontal Assemblies

"Wait, you got engaged to someone you just met that day?" – Kristoff

"We have been without an interpreter since our master got angry with our last protocol droid and disintegrated him." – EV-9D9

"Well somebody has to save our skins. Into the garbage fly-boy." – Princess Leia

"You're afraid of insects and women. Ladybugs must render you catatonic." – Sheldon
Shaft Penetrations

- IBC 717.5.3: Duct Penetration of Shafts
  - Fire and Smoke Damper Required
  - Exceptions:
    - Fire dampers not required:
      - 22" Vertical in shaft
      - Kitchen and clothes dryers per IMC 504.8
    - Smoke dampers not required:
      - Kitchen, clothes dryer, bathroom if:
        - 26 gage, 22" Vertical, and Exhaust fan w/ Emergency power
    - Fire and smoke dampers not required:
      - In parking garage separated by 2hr rating from building
      - Smoke control system

Ducts in Fire Partitions

- IBC 717.5.4: Duct penetration of unit separation walls
  - Fire Damper Required
  - Exceptions:
    - Corridor walls with NFPA 13 or 13R
    - Duct meets following:
      - < 100 in², 0.0217" steel, not open to corridor, above ceiling, no register in rated wall, 12" long 0.06" thick sleeve at penetration.
      - Part of HVAC system with following:
        - Wall rating is 1 hour or less, NFPA 13 or 13R, 26 gage, continuous from air handler to outlet.

Ducts in Corridors

- IBC 717.5.4.1: Duct penetrations in corridors
  - Corridor dampers required at rated ceiling through penetrations
  - Ceiling radiation dampers for membrane penetration
  - Smoke dampers in rated or smoke barrier corridors
  - Exceptions:
    - Smoke control system
    - 0.019" duct, no opening into corridor

Horizontal Assemblies

- IBC 717.6.1: Duct through penetrations of rated floors.
  - Fire damper required, except:
    - Connects only 2 stories
    - Penetrate 3 floors (4 stories) if:
      - Within a wall
      - 26 gage steel
      - Open into only (1) dwelling
      - Continuous to exterior
      - 4" diameter, less than 100in² in 100ft²
      - Annular space protected
      - Grille openings have ceiling radiation damper
Membrane Penetration

- IBC 717.6.2: Membrane penetrations of ducts
  - Protected by one of the following:
    - Shaft enclosure
    - A listed ceiling radiation damper
  - Damper not required for any of the following:
    - Assembly tested per ASTM E 119 with penetration
    - Exhaust ducts with following:
      - Penetration protected per 714.4.2 (Fire-Stop)
      - Located in wall cavity
      - Don’t pass through another unit
    - Duct outlet protection system tested per ASTM E 119

 Concealed Spaces

- Fireblocking Locations:
  1) Concealed wall spaces
     - Vertically at the ceiling and floor levels
     - Horizontally ≤ 10-feet

Fire Extinguishers

- Size & Distribution:
  - Class ‘A’ → Table 906.3(1)
  - Class ‘B’ → Table 906.3(2)
  - Maximum Travel Distance of 75-feet
    - This includes to all areas within each unit.

Two Means of Egress

- 1006.2 – 2 means of egress required for any of the following:
  - Occupant Load
  - Travel Distance
    - Special uses:
      - Boiler rooms
      - Cold rooms
      - Refrigeration rooms
      - Day cares

"I'm too small for Twister. And roller coasters. And sitting with my feet on the floor." - Bernadette

"Homo habilis discovering his opposable thumbs says what?" – Leonard Hofstadter

"My hands are equipped with defibrillators." – Baymax

"You take the blue pill – the story ends. You take the red pill you stay in wonderland" – Morpheus
# Means of Egress

**Means of Egress/Story**
- Occupied Roofs same as stories
- Number of Exits per Table 1006.3.1
- Egress Access through only (1) adjacent story
- Above 2 story at least (1) Exit Stair
- Stories with Single Exit per 1006.3.2

**Means of Egress Configuration**
- ½ or 1/3 longest diagonal between exit or exit access doorways

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"Why don't you make like a tree and get out of here" - Biff

"No! Listen, the only thing I want to do with your hair is to get out of it, literally!" – Flynn Rider

"Escape is not his plan. I must face him alone. – Darth Vader"

"Looks like you've managed to cut off our only escape route." – Princess Leia
Access Stairs

- 1019.3: Other than I-2 or I-3, Unenclosed:
  - Open to only 2 floors
  - Within Group R dwelling unit
  - Within R-3 or R-4
  - Draft Curtain W/NFPA 13
    - Other than B and M limited to 4 stories
  - Within Atriums
  - Open Parking garages
  - Open air seating areas
  - Serving balconies or galleries in theaters or auditoriums

Corridor Openings

- 716.5.3: Corridor doors
  - Smoke and draft control
    - S rating required
  - 20 minute rating
  - Self closing
- 3002.6: Elevator Doors
  - Doors must be:
    - Readily openable from car
    - No key or special knowledge

IBC 1020: Corridors

- Corridors (IBC 1020)
  - Air movement restricted

Egress Balconies

- IBC 1021: Balconies used for egress
  - Wall Separation (1021.2):
    - Separated from interior per corridors
    - Exception: 2 stairs w/out deadend
  - Openness (1021.3):
    - "Long side" shall be 50% open
  - Location (1021.4):
    - 10 feet from lot lines, other buildings, or the same building

"To the windy stairs . . . Up, up, up the stairs we go and then we come to the tunnel" – Smeagol

"If you want to know who killed Mr. Body, I did. In the hall. With the revolver." – Mr Green

"I may be as pretty as an angel, but I sure as hell ain't one." – Yondu Udonta

"Can I come into the out now?" – Oh
**Interior Exit Stairs**

- IBC 1023: Interior exit stairs
  - Enclosed and lead directly to exterior
    - 1-hr rating < 4 stories
    - 2-hr rating 4 or more stories
  - Penetrations limited for items for stairs only
  - Exterior walls not required to be rated
    - Exterior walls <180° within 10 feet
      - 1-hour rated
      - ¾-hr openings

**Exterior Exit Stairs**

- IBC 1027: Exterior Exit Stairs
  - Prohibited for:
    - > 6 stories
    - High rise buildings
    - Use Group I-2
  - Open side
    - At least one side open
    - 35 ft² aggregate open/level
    - Opening located > 42"
  - Located 10ft from:
    - Adjacent lot lines
    - Other buildings

**Stair Signage**

- IBC 1023.9: Stairs connecting >3 stories
  - Sign at each floor landing
    - 5 ft above landing
    - Visible when door open
  - Include the following:
    - Terminus at top and bottom
    - Stairway designation
    - Level of exit discharge
    - Availability of roof top access
  - Floor-level sign
    - Raised letters and braille
    - Located adjacent door on each level

**Ext. Stair Separation**

- IBC 1027.6: Separated from interior
  - Separation per 1023.2
  - Exterior walls per 1023.7
Exterior Stair Examples
- Open Ended Corridor
  - Not required to be separated from exit stairs:
    - 1. NFPA 13 or 13R
    - 2. Ext. Stair at each end
    - 3. 35ft² open at >45° bend in corridor

Exit Discharge
- To Public Way (1028.1)
  - (3) exceptions
    - 50% may reenter building
- Egress Court (1028.4)
  - >44" wide
  - < 10 feet 1hr fire separation

Stairways
- IBC 1011 – General Stair Requirements
  - 44” Wide (1011.2)
  - 6’8” Headroom (1011.3)
  - 7:11 Rise:Run (1011.5.2)
    - 7 ¾ “:10” within unit
  - Solid Risers (1011.5.3)
  - 48” Landings (1011.6)
  - Fire rate enclosures below
  - 12 foot vertical w/out landing
  - Handrails each side (1011.11)
    - One side within unit

Window Openings
- Applies to R-2 or R-3 Occupancies
- Required when operable windows are located:
  - Sill height > 72” above adjacent grade (one side)
  - Bottom of opening < 36” above adjacent grade (other side)
- Window opening is limited to 4” sphere

"Would it help if I got out and pushed?" – Princess Leia
"You never left that tower. And you’re still gonna go back?" – Flynn Rider
"If the height of a single step is off as little as 2 millimeters, most people will trip." – Sheldon Cooper
"We jumped out a window" – Baymax

Fire Barrier per 1022.2
- 10 ft - 1hr rated wall
- ¾ hr rated openings

Option:
Safe Dispersal Area
"If we jumped out a window, we'd die. But if we don't, we're dead anyway." – Baymax
Escape and Rescue

- Similar to requirements in IRC
  - R-2 and R-3 occupancies only
    - R-2 not required in stories w/ (2) means of egress.
  - Windows located in basement and below 4th story
  - Opening size:
    - > 5.7 ft² net opening
    - > 24 inches tall
    - > 20 inches wide
  - 44 inch maximum sill height

Dwelling Units (IBC)

- Types of Units (1107.2)
  - Accessible Units
    - Required in Group R-1, R-2, R-4
  - Type A Units
    - Only in R-2 (Apartments)
  - Type B Units
    - > 4 units all others (except...)

Accessible Route (IBC)

- Accessible Route (1107.4)
  - From entrance of “Covered” units
    - To accessible building entrance
    - To interior spaces serving units
    - To exterior spaces serving units

Exceptions:
1. A vehicular route may be provided to exterior features where one of the following prevent an accessible route:
   - Slope > 1:12 , physical barriers, or legal restrictions
2. In R-2, R-3, R-4, and within individual units of R-1, no route to mezzanines and stories, where:
   - “Covered” units and public areas are on an accessible route

Dwelling Units (IBC)

- Accessible Spaces (1107.3)
  - Available to general public
  - Serving: Accessible, Type A, or Type B Units
    - “Covered” Units
  - Includes following:
    - Toilet and Bathing rooms
    - Kitchen, living, and dining areas
    - Exterior areas
    - Patios, terraces, and balconies

Accessible Route (IBC)

- Accessible Route (1107.4)
  - From entrance of “Covered” units
    - To accessible building entrance
    - To interior spaces serving units
    - To exterior spaces serving units

Exceptions:
1. A vehicular route may be provided to exterior features where one of the following prevent an accessible route:
   - Slope > 1:12 , physical barriers, or legal restrictions
2. In R-2, R-3, R-4, and within individual units of R-1, no route to mezzanines and stories, where:
   - “Covered” units and public areas are on an accessible route

"Esc-a-pay! That’s funny, it’s spelled just like the word escape" - Dory

"Phenomenal cosmic powers! Itty bitty living space!" – Genie

"Go up to the roof, hop over to the next building, there’s a small gap, don’t look down if you’re subject to vetigo, and use their stairwell." – Sheldon
**Accessible Site**

- At least one route within site to the accessible entrance from all of the following:
  - Public transit
  - Access. parking
  - Loading zone
  - Public Streets
  - Sidewalks

“Looks like you’ve managed to cut off our only escape route.” – Princess Leia

**Accessible Parking**

- Location of Parking (1106.6)
  - Along shortest route to entrance
    - Where no building closest to accessible route
  - Multiple Entrances
    - Disperse parking near all entrances

- Exceptions:
  - Multilevel Parking
  - Van parking on one level
    - Located in different facility, if:
      - Substantially equivalent; distance, fee, and convenience
  - Not (1) of each class
    - > 50 units in a building
      - Treat buildings independent

“Everybody remember where we parked.” – James T. Kirk

**Group R-1 (IBC)**

- Group R-1 (1107.6.1)
  - Accessible Units
    - Table 1107.6.1
    - Dispersed class
      - Not (1) of each class
        - > 50 units in a building
          - Treat buildings independent
  - Type B Units
    - All dwelling/sleeping units
    - Except:
      - Not intended as residence
      - < 4 residences
      - Section 1107.7

“I remembered somebody saying last week that her fantasy was to live in a chocolate house.” – George Stacy
Group R-2 (IBC)

- Group R-2 (Dormitories 1107.6.2.3)
  - Accessible Units
    - Table 1107.6.1.1 (R-1)
  - Type B Units
    - All dwelling/sleeping units
    - Except:
      - Not intended as residence
      - < 4 residences
      - Section 1107.7

- Group R-2 (Apartments 1107.6.2.2)
  - Type A Units
    - Only > 20 units
    - 2% (at least 1)
    - Dispersed class
      - Not (1) of each class
    - Reduced per 1107.7
  - Type B Units
    - All dwelling/sleeping units
    - Except:
      - Not intended as residence
      - < 4 residences
      - Section 1107.7

Group R-3 and R-4

- Group R-3 (1107.6.3)
  - Type B Units
    - All dwelling/sleeping units
    - Except:
      - Not intended as residence
      - < 4 residences
      - Section 1107.7

- Group R-4 (1107.6.4)
  - Accessible
    - Condition 1 at least 1
    - Condition 2 at least 2
  - Type B
    - Same as above

Exceptions (IBC)

- Reduction for Type A or B Units
  - NO ELEVATOR (1107.7.1)
    - At least one story accessible
    - Levels which have entrances:
      - 50 ft of arrival point
      - < 10% slope
    - Minimum number per 1107.7.4
**Exceptions (IBC)**

- **Reduction for Type A or B Units**
  - Site Impracticality (1107.7.4)
    - No elevator provided
    - % of units = % site < 1:10 slope
      - Prior to development
      - Minimum 20%
      - Units w/ 1:12 slope to arrival point
      - Levels with elevated walkway from arrival point
      - Units served by elevator

**Site Impracticality**

- **Step A**
  - < 10% slope
    - = 75%
- **Step B**
  - 26 ground floor units
    - 75% of 26 = 20 Type B
- **Step C**
  - All units on accessible floors are Type B
    - 22 Total Type B

**IBC 1107.7: Exceptions**

- **Reduction for Type A or B Units**
  - Multi-story Units (1107.7.2)
    - Elevator access
    - Level with elevator Type B
      - Provide bathroom
      - Provide Kitchen
      - Provide livingspace
  - Elevator Service (1107.7.3)
    - Elevator to lowest level
    - Units w/ elevator access
      - Type B

**Exceptions (IBC)**

- **Reduction for Type A or B Units**
  - Flood Elevation
    - Lowest level at or above flood:
      - 30' above site access w/ in 50ft
      - > 10% slope to site access
Recreational Facilities

- Groups R-2, R-3, and R-4
  - Accessible Type units
    - All facilities accessible
  - Serves Type A or Type B
    - 25% of all facilities
    - At least one of each Type
    - Includes all features serving all buildings on site

IBC 1110.4

- “Recreational facilities to be accessible and shall be on an accessible route to the extent specified in this Section.”
  - Area of Activity
  - Court Sports
  - Exercise Rooms
  - Swimming Pools
  - Hot Tubs/Spas

Recreational Facilities

- Sports Activity (1110.4.1)
  - Accessible route to field
  - Field not required to be accessible
- Court Sports (1110.4.4)
  - Both sides of court
- Team/Player seating
  - One wheelchair space
- Not Required to be Accessible
  - Raised boxing/wrestling rings
  - Raised refereeing/scoring areas

Section 1104 – A117.1

- Exercise Equipment
  - Clear Floor (1104.1)
    - Positioned for transfer/use
    - Clear spaces may overlap
  - Section 1101.2.4
    - Operable parts not required to comply

“Do you really think I’d break up a couple just to win a bowling game?” – Wil Wheaton

“You hit a guy, with glasses. That’s... that’s well-played.” – King Candy

“The physics is theoretical but the fun is real” – Sheldon Cooper

“Physical fitness is very important to Shannon.” – Shannon
Swimming Pools

IBC 1110.4.13:

- Swimming Pools, Wading Pools, Hot tubs and spas
- All are required to be accessible

Exceptions
- Catch pools for water slides
  - Portion of pool edge must be on accessible route
- Clusters of Hot Tubs or Spas
  - 5% per cluster
- Swimming Pools serving Type A or B units
  - Accessible entry into water is not required.

Exhaust (IMC)

- Exhausts for kitchens and common garages
  - Footnote ‘b’ – Exhaust to exterior
    - IMC 403.2.1 recirculation allowed when restricted to kitchen
  - Footnote ‘f’:
    - 25 CFM continuous
    - 100 CFM intermittent
  - Refer to IMC 505 for Kitchen hood requirements

Questions?

- “Okay, that’s a shark. Quit befriending it!” – Trawler Captain, Walter Mitty
- “I can’t breathe in this thing!” – Dark Helmet
- “These are not the droids you’re looking for.” – Obi Wan Kenobi