CHAPTER 3
GENERAL REQUIREMENTS

SECTION 301
GENERAL

Section 301.2 Permits is retained and amended as follows:

301.2 Permits. Permits shall be required as set forth in Section 105.6 for the activities or uses regulated by Section 303–Asphalt Kettles; Section 304–Combustible Waste Material; Section 306–Motion Picture Projection Rooms and Film; Section 307–Open Burning, Recreational Fires and Portable Outdoor Fireplaces; Section 308–Open Flames; Section 309–Powered Industrial Trucks and Equipment; Section 311–Vacant Premises; Section 314–Indoor Displays; and 315–Miscellaneous Combustible Materials General Storage.

SECTION 302
DEFINITIONS

Section 302.1 Definitions is retained and amended as follows. The following terms are defined in Chapter 2.

ELECTROLYTE

POWERED INDUSTRIAL TRUCK

SECTION 304
COMBUSTIBLE WASTE MATERIAL

Section 304.2.1 Required storage conditions is retained as follows:

304.2.1 Required storage conditions. Combustible rubbish kept or accumulated within or adjacent to buildings, structures or residential dwelling units shall be in containers complying with this code, or in rooms or vaults constructed of non-combustible materials.

Exception: Storage, accumulation, use and handling of combustible rubbish and waste, newspapers, magazines, etc. not in excess of 10 cubic feet aggregate.

Section 304.3 Containers is retained as follows:

304.3 Containers. Combustible rubbish, and waste material kept within or near a structure shall be stored in accordance with Sections 304.3.1 through 304.3.6.

Sections 304.3.5 Removal, 304.3.6 Waste material handling operations and 304.3.6.1 Permits are retained as follows:

304.3.5 Removal. Combustible rubbish stored in containers outside of noncombustible vaults or rooms shall be removed from buildings at least once each working day.

304.3.6 Waste material handling operations. Occupancies exclusively performing commercial rubbish handling or recycling shall maintain rubbish or product to be processed or recycled as follows:
1. In approved vaults
2. In covered metal or metal-lined receptacles or bins, or
3. Completely baled and stacked in an orderly manner in an approved location.

304.3.6.1 Permits. A permit shall be required as set forth in Section 105.6 for a Waste Material Handling Plant.

304.3.7 Container location. A permit shall be required for the installation and maintenance of a waste receptacle with a capacity greater than 20 cubic feet. A site plan depicting the location of the waste receptacle must be submitted for approval prior to installation and anytime the waste receptacle is relocated. Toxic, explosive, flammable, chemical, infectious, radioactive materials and any other hazardous waste shall not be disposed of in the general waste dumpster(s). The waste receptacle(s) shall not be placed within fifteen (15) feet of combustible walls, openings, or combustible roof eave lines. The waste receptacle shall not obstruct emergency vehicular access or positioning for fire ground operations.

SECTION 308
OPEN FLAMES

Section 308.1.4 Open-flame devices is retained as follows:

308.1.4 Open-flame devices. No gas-fired grills, charcoal grills, or other similar devices used for cooking, heating, or any other purpose, shall be used or kindled on any balcony or under any overhanging portion or within 10 feet (3 m) of any structure.

Exceptions:

1. One- and two-family dwellings.
2. LP-gas burners having an LP-gas container with a water capacity not greater than 2.5 pounds [nominal 1 pound (0.454kg) LP-gas capacity]. Two extra 1 pound LP-gas containers may be stored on the balcony.
3. Listed natural gas appliances shall be permitted on balconies when installed in accordance with the International Fuel Gas Code and supplied by the building’s natural gas system.
4. Listed electric ranges, grills, or similar electrical apparatus shall be permitted.

SECTION 309
POWERED INDUSTRIAL TRUCKS

Section 309.2 Battery-charging operations is retained and subsections 309.2.2.2 through 309.2.2.6 are renumbered as follows:

309.2 Battery-charging operations. Battery-charging operations shall be located in areas designated for such purpose. Where on-board chargers are used, charging shall be accomplished at locations designated for such purpose.

309.2.1 Battery chargers. Battery chargers shall be of an approved type. Combustible storage shall be kept a minimum of 3 feet (915 mm) from battery chargers.

309.2.2 Battery-charging areas. Battery-charging areas shall be kept free of extraneous combustible materials. Battery charging shall not be conducted in areas accessible to the public.
309.2.2.1 Battery-charging area fire protection. Where aggregate electrolyte capacity exceeds 100 gallons, battery-charging areas shall be protected with an automatic sprinkler system per Section 903.3.1.1.

Exception: Automatic sprinklers shall not be required where the amount of electrolyte per battery-charging area is 100 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

309.2.2.2 Battery-charging area construction. Where aggregate electrolyte capacity exceeds 100 gallons, battery-charging areas shall be separated from the other portions of the building with a one-hour fire barrier constructed in accordance with International Building Code Chapter 7.

Exceptions:
1. One-hour fire barriers shall not be required where the amount of electrolyte per battery-charging area is 100 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

2. In buildings that are protected throughout with an automatic sprinkler system per Section 903.3.1.1, one-hour fire barriers shall not be required where the amount of electrolyte per battery-charging area is 200 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

309.2.2.4 Smoking prohibited. Smoking shall be prohibited in battery-charging areas. “No Smoking” signs shall be provided in the charging area in accordance with Section 310.3.

309.2.2.5 Neutralization. An approved method and materials capable of neutralizing a spill from the largest battery to a pH between 5.0 and 9.0 shall be provided.

309.2.2.6 Spill control. Each rack or tray of batteries shall be provided with a liquid-tight 4-inch minimum spill control barrier which extends at least one-inch beyond the battery rack in all directions. Alternative methods of spill control are subject to approval by the fire code official.

Exceptions:
1. Spill control shall not be required where the amount of electrolyte per battery-charging area is 100 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

2. In buildings that are protected throughout with an automatic sprinkler system per Section 903.3.1.1, spill control shall not be required where the amount of electrolyte per battery-charging area is 200 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

Section 309.3 Ventilation is retained as follows:

309.3 Ventilation. Where aggregate electrolyte capacity exceeds 100 gallons, continuous ventilation shall be provided at a rate of not less than 1 cu-ft/min/sq. ft. of designated battery-charging area.

Exceptions:
1. Ventilation systems shall not be required where the amount of electrolyte per area is 100 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

2. In buildings that are protected throughout with an automatic sprinkler system per Section 903.3.1.1, ventilation systems shall not be required where the amount of electrolyte per battery charging area is 200 gallons or less and the battery-charging areas are separated by a minimum of 75 feet.

Section 309.7 Signage is retained as follows:

309.7 Signage. Doors into battery-charging areas shall be provided with approved signs. The signs shall state that:
   1. The room contains energized battery systems.
   2. The room contains energized electrical circuits.
   3. The battery electrolyte solutions are corrosive liquids.

SECTION 315
GENERAL STORAGE

Section 315.3.3 Pile size, aisles and driveways is retained and renumbered as follows:

315.3.3 315.4.3 Pile size, aisles and driveways. Combustible material shall be piled with due regard to stability of piles and in no case higher than twenty (20) feet. When the area used for outside storage exceeds fifty (50) feet, but is less than one hundred fifty (150) feet, in any dimension, aisles of not less than eight (8) feet clear width shall be provided between piles. When the area used for outside storage exceeds one hundred fifty (150) feet in any dimension, a driveway between and around piles shall be at least fifteen (15) feet in width and maintained free of rubbish, equipment or other articles or materials. Driveways shall be so spaced that a maximum grid system unit of fifty (50) feet by one hundred fifty (150) feet is produced.

SECTION 316
HAZARDS TO FIRE FIGHTERS

Section 316.4.1 Fences, walls, retaining walls and similar barriers is retained, renumbered and amended as follows:

316.4.1-316.7 Fences, walls, retaining walls, and similar barriers. The use of barbed wire or any other sharp-pointed material, devices or features that deliver an electric shock, devices or features that deliver a physical or health hazard on, as, or on top of, fences, walls, retaining walls, or similar barriers, regardless of height, is prohibited except as provided in accordance with Section 316.7.1.

Exception: Barbed wire may be installed where approved by the fire code official and a permit is obtained in accordance with Section 105.6.

Section 316.7.1 Electrified fences is added as follows:

316.7.1 Electrified fences. Electrified fences may be permitted by specific approval of the fire code official. Requirements and submission for an electrified fence shall comply with DFD policy 316-1. All fences shall be designed in accordance with International Building Code Sections 1609 and 1807. Only fences powered by a 12 volt direct current (DC) power source shall be considered.
Section 316.6 Confined spaces is retained and renumbered as follows:

316.6 316.8 Confined spaces. Tanks that contain materials that would not contain enough oxygen to support life or contain a toxic atmosphere shall have at each entry point; a warning sign posted indicating the need for procedures for safe entry into confined spaces.
CHAPTER 4
EMERGENCY PLANNING AND PREPAREDNESS

SECTION 401
GENERAL

Section 401.1 Scope is retained by deleting the Exception.

Section 401.3 Emergency responder notification (including subsections 401.3.1 through 401.3.3) is retained as follows:

401.3 Emergency responder notification. In the event of an emergency, including but not limited to, unwanted fire, hazardous materials discharge, medical incident, or environmental calamity including utility malfunction, occurs on a property, the owner, occupant, or any other person in responsible charge of the property or portion thereof, including their tenants and employees, shall immediately report the emergency to 911. Building employees and tenants shall implement the appropriate emergency plans and procedures. No person shall, by any means, require or otherwise purposely cause any delay in the reporting of an emergency.

Section 401.3.1 Evidence of emergency is retained as follows:

401.3.1 Evidence of emergency. Upon discovery of evidence of an unwanted fire, hazardous materials discharge, medical incident, or environmental calamity, even though it appears to have been extinguished or otherwise stabilized, the owner, occupant, or any other person in responsible charge of the property or portion thereof, including their tenants and employees shall immediately notify the Fire Department of the evidence including what is known of the location and circumstances. Such evidence shall not be disturbed, thus preserving data for the Fire Department to conduct an investigation.

Section 401.5 Making false report is retained as follows:

401.5 False alarm. No person shall deliberately or maliciously report a fire or unauthorized discharge of hazardous materials when that person knows that no fire or discharge exists. The person responsible for the false alarm shall reimburse the City for the total cost of responding to the false alarm.

Section 401.10 Misleading information is retained and renumbered as follows:

401.109 Misleading information. It shall be unlawful for a person to willfully make any false, fraudulent, misleading, or unfounded report or statement or to willfully misrepresent any fact with the intention of misleading any Fire Department personnel or interfering with Fire Department operations.

SECTION 402
DEFINITIONS

Section 402.1 Definitions is retained and amended as follows. The following term is defined in Chapter 2.

PROPERTY
SECTION 403
EMERGENCY PREPAREDNESS REQUIREMENTS

Section 403.2.1 Contents is retained, renumbered and renamed as follows:

Section 403.12.2 Public safety plan for gatherings is retained and amended by adding the following to the list of items required to be addressed in the public safety plan.

- Fire hydrant locations
- Local fire protection (suppression and alarm)
- Public assembly areas
- Emergency procedures and employee training
- All other conditions possibly hazardous to life, property or public welfare in the occupancy

Section 403.4 Facility manager certification is retained and renumbered as follows:

403.4 403.13 Facility manager certification. All personnel responsible for facility maintenance, fire safety emergency procedures, evacuation plans, evacuation drills, employee training and response procedures, hazard communication, resident training, tenant identification, emergency response team formulation and training, hazardous materials management plans, hazardous materials inventory statement, etc. shall complete a Denver Fire Department training course and shall have a current certification by the Denver Fire Department.

SECTION 404
FIRE SAFETY EVACUATION AND LOCKDOWN PLANS

Section 404.3 Contents is retained and renumbered as follows:

404.3 404.2 Contents. Fire safety and evacuation plan contents shall be in accordance with Sections 404.2.1, 404.2.2, and Denver Fire Department policy on Emergency Procedures and Emergency Evacuation.

Section 404.3.2.2 404.2.2 Fire safety plans is retained, renumbered and amended by adding item 8 as follows:

8. Provide a description of the building’s life safety systems including fire alarm, fire sprinkler (including special suppression, standpipes, fire pumps, etc.), smoke control, elevator recall, areas of refuge, emergency power, etc.

SECTION 405
EMERGENCY EVACUATION DRILLS

Section 405.1 General is retained and amended by adding the following after the last sentence:

It shall be unlawful to refuse to participate or to interfere with Fire Department personnel conducting an emergency evacuation drill.
Table 405.2 FREQUENCY is retained as follows:
### TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION

<table>
<thead>
<tr>
<th>GROUP OR OCCUPANCY</th>
<th>FREQUENCY</th>
<th>PARTICIPATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covered Mall Building&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>Annually</td>
<td>Employees</td>
</tr>
<tr>
<td>High Rise&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Annually</td>
<td>All occupants</td>
</tr>
<tr>
<td>A&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Quarterly</td>
<td>Employees</td>
</tr>
<tr>
<td>B&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Annually</td>
<td>All occupants</td>
</tr>
<tr>
<td>E</td>
<td>Monthly&lt;sup&gt;a&lt;/sup&gt;</td>
<td>All occupants</td>
</tr>
<tr>
<td>F</td>
<td>Annually</td>
<td>All occupants</td>
</tr>
<tr>
<td>H</td>
<td>Annually on each shift</td>
<td>All occupants</td>
</tr>
<tr>
<td>I-1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Quarterly on each shift</td>
<td>All occupants</td>
</tr>
<tr>
<td>I-2, I-3, I-4</td>
<td>Quarterly on each shift</td>
<td>Employees</td>
</tr>
<tr>
<td>M&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Semiannually on each shift</td>
<td>Employees</td>
</tr>
<tr>
<td>R-1</td>
<td>Quarterly on each shift</td>
<td>Employees</td>
</tr>
<tr>
<td>R-2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Four annually</td>
<td>All occupants</td>
</tr>
<tr>
<td>R-4</td>
<td>Quarterly on each shift</td>
<td>Employees&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

- R-1, R-2, R-4, I-1, I-2, I-3, and I-4 use Frequency and Participation listed with those occupancies in Table 405.2; use High Rise Frequency and Participation for all other occupancies in High Rise buildings.
- As listed in Section 404.2, 403.3. Ambulatory health care - quarterly
- The frequency shall be allowed to be modified in accordance with Section 408.3.2, 403.5.
- Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 408.10.5, 403.8.1.6. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.

**Section 405.10 Extent of evacuation is retained as follows:**

**405.10 Extent of evacuation.** Fire and evacuation drills shall include the complete evacuation from the building of all persons required to participate. It shall be a violation of this code to refuse to participate or to interfere with the Fire Department personnel conducting a fire and evacuation drill.
CHAPTER 5
FIRE SERVICE FEATURES

SECTION 502
DEFINITIONS

Section 502.1 Definitions is retained and amended as follows. The following term is defined in chapter 2.

LOWEST LEVEL OF FIRE DEPARTMENT VEHICLE ACCESS

SECTION 503
FIRE APPARATUS ACCESS ROADS

Section 503.1.1 Buildings and facilities is retained and amended by adding the following to the end of the last sentence:

…and the interior of all courts (also see Section 504.5). The approved route shall be not less than a 3-foot wide access walkway leading from fire apparatus access roads to all portions of the exterior walls of the first floor.

Section 503.1.1 Buildings and facilities, Exception 1 is retained, renumbered and amended as follows:

1.1 Where a building is equipped throughout with an approved automatic sprinkler system installed in accordance with Sections 903.3.1.1 or 903.3.1.2, the 150 feet dimension may be increased to 250 feet.

1.4 A lesser width may be provided when approved by the fire code official.

Section 503.2.1 Dimensions is retained and amended as follows:

503.2.1 Dimensions. The fire apparatus access road shall have an unobstructed vertical clearance of not less than 13 feet, 6 inches. Fire apparatus access roads shall have an unobstructed width per Table 503.2.1, except for approved security gates in accordance with Section 503.6. See Fire Department policy.

Exception: Buildings containing Group R occupancies with attached S-2 parking garages where the building height does not exceed 5-stories. Fire apparatus access roads shall have an unobstructed width of not less than 20 feet when all of the following conditions are met:

1. The building is equipped throughout with an approved automatic sprinkler system installed in accordance with 903.3.1.1.

2. Construction Type of the building shall be I, II or III according to IBC Chapter 6. One exterior access door shall be provided from the address side of the building at the exit discharge level. This exterior door shall open into the first floor common areas where stairways provide access to all floors.
TABLE 503.2.1 
FIRE APPARATUS ACCESS ROADS

<table>
<thead>
<tr>
<th>Type of Right of Way</th>
<th>Minimum Clear Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private or public streets serving single-family detached buildings or townhomes with alleys</td>
<td>16 feet</td>
</tr>
<tr>
<td>Private or public streets serving single-family detached buildings or townhomes, without alleys but with driveways that reach the street</td>
<td>16 feet</td>
</tr>
<tr>
<td>Private or public streets serving single-family detached buildings or townhomes, without alleys OR driveways that reach the street</td>
<td>18 feet</td>
</tr>
<tr>
<td>Multi-family buildings, two stories or less, 15 units maximum per building</td>
<td>20 feet</td>
</tr>
<tr>
<td>Multi-family buildings, three or more stories, 16 or more units</td>
<td>25 feet</td>
</tr>
<tr>
<td>Non-residential</td>
<td>25 feet</td>
</tr>
<tr>
<td>Cul-de-sac</td>
<td>90 feet in diameter</td>
</tr>
<tr>
<td>Hammerhead turnaround</td>
<td>20 feet wide by 90 feet long</td>
</tr>
</tbody>
</table>

*Where a fire department access road serves two or more uses, the maximum width shall be used in both directions.*

Section 503.2.3 Surface is retained and amended by adding the following at the end of the paragraph:

503.2.3 Surface. Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be surfaced so as to provide all weather driving capabilities. All-weather permanent fire access surfaces shall be asphalt, concrete, or an approved surface. Temporary fire access surfaces during construction may consist of a gravel road base or asphalt or other approved surface. See IBCA Chapter 16 for Fire Department apparatus loading.

Section 503.2.3.1 Private fire apparatus access road surface design is added as follows:

503.2.3.1 Private fire apparatus access road surface design. Design of private fire apparatus access roads shall be in accordance with Appendix D Fire Department policy.

Section 503.2.4 Turning radius is retained as follows:

503.2.4 Turning radius. The required turning radii of a fire apparatus access road shall be a minimum of 25 feet inside and 50 feet outside.

Section 503.2.6.1 Grade-level structural deck is added as follows:

503.2.6.1 Grade-level structural deck. See IBCA Chapter 16 for structural loading.

Sections 503.6.1 Width and 503.6.2 Approved means of emergency operation are retained as follows:
503.6.1 **Width.** Security gates across a fire apparatus access road shall be a minimum 16 feet wide.

503.6.2 **Approved means of emergency operation.** Secured gates across a fire apparatus access road shall be provided with one or more of the following features:

1. Key box in accordance with Section 506.
2. An approved lock in accordance with Section 506.1.1.
3. Chains used to secure gates shall be ¼ inch maximum, non-case hardened steel.
4. Emergency operation approved by fire code official.

SECTION 504
ACCESS TO BUILDING OPENINGS AND ROOFS

Section 504.1 Required access is retained and amended by adding the following at the end of the paragraph:

504.1 **Exterior doors and openings.** Exterior doors and openings required by this code and the IBC shall be maintained readily accessible for emergency access by the Fire Department. An approved exterior key lock mechanism to open exterior doors and the exit stairs shall be provided.

A 5-foot wide (1524 mm) access walkway leading from fire apparatus access roads to required exterior openings shall be provided. The location and configuration shall be approved by the fire code official.

**Exception:** A lesser width may be provided when approved by the fire code official.

Section 504.4 Roof hatches is retained and amended as follows:

504.4 **Roof hatches.** All required interior stair enclosures that extend to the roof in any building four or more stories above grade plane shall have at the highest point of the enclosure, an approved roof hatch openable to the exterior. The hatch shall be a minimum of 16 square feet (1.5 m²) in area with a minimum dimension of 2 feet (610 mm). See Section 1011.12.2.1

**Exceptions:**

1. Roof hatches are not required on pressurized stair enclosures.
2. Roof hatches are not required on stair enclosures complying with IBCA Section 1009.13.1 1011.12.

Section 504.5 Courts is retained and amended as follows:

504.5 **Courts.** Access to grade level courts shall be provided from two remote locations. Access points shall be comprised of breezeways not less than 6 feet (1829 mm) wide and not less than the height of the first story of the building. Locations shall be approved by the fire code official (see also Sections 202, 1004.5, 1028.4 IBC Section 1206.3).

SECTION 505
PREMISES IDENTIFICATION

Section 505.1 Address identification is retained and amended by deleting “4 inches” in line 8 and replacing with “6 inches”. Line 9 is amended by deleting “½-inch stroke” and replacing with “¾-inch” stroke.

Section 505.1 Address identification Exception is retained as follows:
Exception: New and existing dwellings regulated by the *International Residential Code* (IRC).

**SECTION 507**
**FIRE PROTECTION WATER SUPPLIES**

**Section 507.2 Type of water supply is retained as follows:**

507.2 Type of water supply. A water supply shall be connected to a reliable public water works system.

**Section 507.2.1 Private fire service mains is deleted in its entirety.**

**Section 507.2.2 Water tanks is retained as follows:**

507.2.2 Water tanks. New water tanks for fire protection shall be prohibited.

Exceptions:

1. Water tanks for fire protection may be used for NFPA 13D per Section 903.3.1.3 or P-2904.
2. Existing water tanks for fire protection that were previously approved by the Fire Department. These tanks shall be inspected, tested and maintained in accordance with NFPA 25.

**Section 507.2.3 Water supply serving high-rise buildings is retained and amended as follows:**

507.2.3 Water supply serving high-rise buildings. High-rise buildings shall be supplied by connections to a minimum of two independent public water mains located in different streets. Separate supply piping shall be provided between each water main connection and the building. Required backflow prevention devices and flow switches shall be provided at each water main entry to the structure.

Exception:

Where approved by the fire code official, high-rise buildings without access to different water mains may have two fire main connections to the same public main. The public main shall have is valves such that an interruption of one water source can be isolated so that water supply will continue without interruption through at least one of the other connection. The two required fire mains shall have a minimum separation distance from each other of five (5) feet at all points from the public main to the building.

**Section 507.3 Fire flow is retained as follows:**

507.3 Fire flow. Fire flow requirements shall be as determined in Appendix B. Each new or existing fire hydrant as required per Appendix C shall be capable of providing not less than 1500 GPM at 20 PSI residual pressure.

**Section 507.5.1 Where required is replaced as follows:**

507.5.1 Where required. See Section 507.3.

**Section 507.5.3 Private fire service mains and water tanks is retained as follows:**

507.5.3 Private fire service mains and water tanks. Private fire service mains and water tanks are not permitted except for existing systems previously approved by the Fire Department and as allowed
in Section 507.2.2. Existing private service mains and water tanks shall be periodically inspected, tested and maintained in accordance with NFPA 25 at the following intervals:

1. Private fire hydrants (all types): Inspection annually and after each operation; flow test and maintenance annually.
2. Fire service main piping: Inspection of exposed, annually; flow test every five years.
3. Fire service main piping strainers: Inspection and maintenance after each use.

SECTION 508
FIRE COMMAND CENTER

Section 508.1 General is retained as follows:

508.1 Fire command center (FCC). Where required by Section 907, buildings shall be provided with an FCC in accordance with this section. The FCC shall be used for no other purpose unless approved by the fire code official. Scale drawings of the FCC showing the location of all equipment and features, in plan and elevation views, shall be submitted for approval prior to installation.

Section 508.1.1 Location and access is retained and amended as follows:

508.1.1 Location and access. The FCC shall:

1. be on the ground floor, and
2. have a secured entrance directly accessible to and in immediate proximity of the main building entrance.
3. have direct access within the building to all fire service access elevators.

Exception: Unless otherwise approved by the fire code official.

Section 508.1.2 Separation is replaced as follows:

508.1.2 Separation. To meet the system survivability requirements of NFPA 72, the fire command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 707 or horizontal assembly in accordance with Section 711 of the International Building Code, or both.

Section 508.1.5 Required features is retained and renumbered as follows:

508.1.5-508.1.6 Required features. The FCC shall contain the following:

1. Emergency voice/alarm communication system unit per Section 907.6.2.2 907.5.2.2
2. Fire Department communication system per Section 907.2.13.2.
3. Fire detection and alarm control unit and annunciator per Sections 907.4.2.2 907.1.5 and 907.7.3.1 907.6.4.1.
4. Elevator status/Control panel per Section 907.2.13.7.1 907.2.13.6
5. Firefighter’s smoke control panel per Section 909.16 909.18
6. Manual controls for simultaneously unlocking stairway and refuge area doors per IBCA Appendix-LQ.
7. Emergency generator panel per Section 907.2.13.8 907.2.13.7.
8. Telephone with controlled access to a public telephone network.

9. Fire pump remote status panel per Section 907.2.13.9 907.2.13.8.

10. Building as-built construction plans indicating typical floor and roof plans, detailing the building core, means of egress, fire protection system drawings, fire fighting equipment, Fire Department access, interior generator and utility shut-off locations. These drawings shall be protected from damage and immediately accessible to the Fire Department, and a storage rack to support these drawing shall be provided.

11. Building site plan with “North” orientation, local street intersection, fire hydrants, Fire Department connections, building entries, exterior generator and fuel locations and exterior utility shut-off locations.

12. Work table 3’ x 5’ and chair.

13. Public address system equipment, where specifically required by other sections of this code.

14. A key vault approved by the Fire Department to house keys to access mechanical and electrical equipment.

15. Two-way communication required by: Section 4007.6.3 1009.6.5 1009.8 Appendix L-Q. Exception 3 to IBCA Appendix L 106.1.7 Q106.1.6 and IBC Section 3008.13 3008.6.6, two-way communication system required for elevator communication per ASME A17.1.

16. Multi-level lighting control. Separately switched lamps or dimming control is acceptable. Dimming of fluorescent fixtures shall be by EMI/RFI shielded devices.

17. Mass Notification System (MNS) equipment

SECTION 509
FIRE PROTECTION EQUIPMENT IDENTIFICATION AND ACCESS

Section 509.3 Access to fire pumps is retained and amended as follows:

509.3 Access to fire pumps. Access to fire pumps in new buildings constructed after adoption of the 2008 Fire Code Amendments shall be located at grade level with direct access to outside or located one level below grade. Pump rooms that are located one level below grade shall be placed such that there are no intervening rooms between the stairway door serving that level and the pump room. Door serving the pump room shall be within 25 ft of the stairway door. The stairway that serves the lower level shall exit directly to outside. Where a dedicated stairway is provided to access the pump room and mechanical rooms, stairway width shall not be less than 36 inches.

Section 510 Emergency Responder Radio Coverage is retained and amended as follows:

SECTION 510
EMERGENCY RESPONDER RADIO ENHANCEMENT COVERAGE SYSTEM (RES/BDA)

510.1 Emergency responder radio enhancement system coverage in buildings. Where required by Section 945–916, buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the Department of Safety communication system at the exterior of the building. Systems shall operate at the frequency of 800 MHz to 870 MHz, 806-816MHZ and 851-861MHz. This section shall not require improvement of the existing Department of Safety communication system. Active components (BDA, DAS controller, UPS), of the RES/BDA system shall be installed in a room constructed as a fire barrier in accordance with Section 707 of the International Building Code. The Emergency Responder Radio Enhancement Coverage system shall be a standalone system totally dedicated to public safety and no components of this system may be shared with any other
radio or cell phone systems. Modification, alteration, repair or removal of any RES/BDA system or component is specifically prohibited without the approval of the fire code official.

**Exception:** Where it is determined by the fire code official that current radio coverage within the building is adequate, system is not needed. Written documentation of the adequacy compliance of radio coverage shall be maintained on site. Degradation of radio coverage shall require testing of the building to the requirements of Section 510.1.1.3(1). Where the system can no longer meet the test requirements, a radio coverage system shall be installed. See Section 916 for subsequent testing requirements.

### 510.1.1 Coverage Requirement. The radio system control channel signal level shall exceed -100 dBm at 90% 95% or more of the locations measured within each grid area floor plate. Equivalently, the service area reliability shall be 90% 95% or greater on each floor of the structure and parking areas. All designated areas of refuge, such as Fire Command Centers, stairwells, main building lobbies and elevator lobbies shall have 100% signal coverage of -100dBm or stronger.

### 510.1.2 Definitions. The following terms are defined in Chapter 2:

**EMERGENCY RESPONDER RADIO ENHANCEMENT COMMUNICATION SYSTEM (RES/BDA)**

**RADIO FREQUENCY MAINTENANCE PLAN**

### 510.2 Radio systems. Where required, buildings shall be equipped throughout with an approved emergency responder Radio Enhancement System (RES/BDA system) for radio communications. The RES/BDA system shall meet the coverage requirements defined in this section and comprise one of the following: use bi-directional amplifiers with radiating (“leaky coax”) cable, a discrete distributed antenna system or other fire department approved equivalent technology. Radio communications systems shall only operate on the frequency range of 800 MHz to 870 MHz. 806-816MHz and 851-861MHz. Amplifiers: All active electronic components in the RES/BDA system shall be powered by a dedicated uninterruptible power source (UPS) with a minimum backup time of 24 hours with all amplifiers at rated output. The UPS input circuit shall be a dedicated circuit and any cord and plug connection(s) shall be secured in an approved cabinet to prevent inadvertent disconnection. The circuit shall also be connected to the emergency generator where one is provided. The circuit shall be provided with a “lock-on” device. The RES/BDA system shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective.

### 510.2.1 Requirements. The system shall effectively operate throughout the structure in accordance with this section. In addition to the areas identified in Section 907.2.13.2.1, Radio communication coverage is required throughout the parking garages and all areas below grade. Those areas which shield radio communication will be remedied through the use of currently acceptable technology, i.e. bi-directional amplifiers or (leaky coax) amplifier systems. Acceptance of the completed installed communication system shall be based upon Fire Department approval of the acceptance test as described below. All RES equipment shall be FCC compliant.

### 510.2.1.1 Acceptance test. Test procedures shall comply with DFD Policy 510-1. Measurement locations shall be uniformly distributed to the extent practical. There shall be at least 10 sampling measurements per 4,000 sq ft (one per every 20 foot X 20 foot square) of gross building area square footage. Adequate radio coverage shall be determined for the structure and parking areas separately. Elevators, stairways and enclosed areas within each grid must be included in the
testing. Where grid quadrants—points exhibit marginal RF signal levels, DFD personnel will perform a radio test to determine if intelligible transmissions can be made through the enhanced radio system to and from the quadrant individual grid point without the need for retransmission. If this test fails, communications will be considered inadequate and the quadrant at that grid location and coverage will be considered unacceptable that grid will have failed to meet the required signal level.

510.2.1.2 Periodic testing. RES shall be tested annually and at five-year intervals in accordance with DFD Policy 510-1. Additional testing may be required by the department where building modifications have the potential to degrade system performance.

510.2.1.3 Failure detection. RES equipment, including the RES/BDA amplifier and DAS controller if available, shall have failure detection circuitry which provides detection of mechanical, electrical and power failure of these components, as well as oscillation detection capability which will reduce the amplifier output to zero in the event of system oscillation. Detection of any failure output from an amplifier or main DAS controller, if provided, shall annunciate at the building fire alarm panel and result in a distinct local audible notification and transmission of a supervisory signal to the central monitoring station. RES/BDA system repairs shall be accomplished within 72 hours.

510.2.1.4 Permits. A #3A construction permit is required prior to installation repair, alteration or replacement of any RES/BDA system or component. Submittal and approval of shop drawings are required to obtain a permit for RES system work. Number 3A permits shall only be issued to companies possessing a current Denver Electrical Signal or Electrical Contractors license and a valid Fire Department issued certificate. An annual Denver Fire Department permit for the RES/BDA shall be secured obtained and maintained current by the building owner. Alterations, modifications, repairs and required testing of RES shall require an operational permit issued by the department to the DFD licensed contractor performing the work.

510.2.1.5 Information signs. A legible sign stating “THIS BUILDING IS EQUIPPED WITH A RADIO REPEATER SYSTEM” shall be conspicuously posted at the fire alarm panel. An additional sign stating “THIS BUILDING IS EQUIPPED WITH A RADIO REPEATER SYSTEM--DO NOT TAMPER WITH OR DISCONNECT,” at the RES/BDA location. Signs shall be constructed of plastic or metal and shall be approved by the fire code official at the time of inspection.

510.2.1.6 Shop drawings. Shop drawings, including RF grids, shall be submitted per Appendix KN and approved prior to installation of any RES. Drawings shall be a deferred submittal in accordance with IBCA Section 133.5. Three (3) sets of scaled, engineered hardcopy installation shop drawings shall be provided in addition to one set of all documents in electronic format (.pdf). Documents shall be of sufficient clarity and detail to fully describe the proposed installation and equipment. Handwritten notes or comments on drawings are not acceptable.

510.3 Wiring methods. Installation wiring for radio communications shall follow the manufacturer’s recommendations, NFPA 72 and NFPA 70 (NEC). All cable installations shall be UL listed. Radiating cables shall be FCC type approved and installed using manufacturer specified clips to secure cables to the support structure. Coax cable installed as risers and in plenums shall be listed for the application. All risers shall be installed in metallic conduit. All terminations shall be made with manufacturer approved devices. Cable cuts shall be made with manufacturer approved tools and methods. Limited-use cable is
not permitted. All penetrations through fire-rated construction shall be properly fire-stopped. All work is to be done in a neat and workmanlike matter.

510.3.1 RES/BDA riser cable. Installation of riser cable for distributed antenna systems shall be in a shaft constructed in accordance with Section 713 of the International Building Code. Wiring runs from a BDA unit to a riser shall be in minimum 1-hour rated construction in accordance with the International Building Code.

510.4 Maintenance. Maintenance of the RES shall be the responsibility of the building owner and requires an operational construction permit issued by the department for any maintenance, repair or modification work. The building owner shall maintain a service contract for emergency repair with response to the site within two (2) hours of notification.

510.4.1. Radio frequency maintenance plan. A radio frequency maintenance plan shall be developed which prohibits use of electrical/electronic equipment which cause degradation to the RES. The radio frequency maintenance plan shall comply with the following at a minimum:

   At a minimum, it shall:
   1. Prohibit the use of any electronic systems known to degrade the effectiveness of RES communications.
   2. Permit Department site access during reasonable business hours when necessary to assess the source of interference to RES communications.
   3. Be incorporated into the lease of every tenant.

510.5 Installer certification. No contractor shall install, modify, repair, alter or replace an RES without a valid Denver Fire Department license. All field installers shall be individually certified by the manufacturer for the equipment being installed. Each certified installer shall be permitted to supervise one apprentice/helper.

510.6 Records. Records of all system inspections, RES/BDA uplink and downlink gain settings, maintenance, annual tests and 5 year test results shall be maintained on the premises in the “RES/BDA System Maintenance and Test Results Log Book” which shall remain on the building premises and shall be available to the fire code official upon request.

Section 510.7 is relocated to Section 916.1.2 and amended.

510.7 Emergency responder radio coverage in existing buildings. For existing high-rise, underground buildings, I-1, I-2 and I-3 occupancies and airport buildings, when undergoing an upgrade to install a MNS or complete fire alarm head-end equipment replacement, the building shall be tested to Section 510 for public safety radio coverage and where deficient, RES/BDA coverage shall be provided. Buildings with currently acceptable signal strength shall be retested at five-year intervals per Section 510.1.1.3(3)(b) 2.1.2 to ensure continued compliant radio coverage.
CHAPTER 6
BUILDING SERVICES AND SYSTEMS

SECTION 603
FUEL-FIRED APPLIANCES

Section 603.4 Portable unvented heaters is retained and replaced in its entirety as follows:

603.4 Portable unvented heaters. Portable unvented fuel-fired heating equipment is prohibited within the City and County of Denver.

Section 603.8.1 Residential incinerators is retained and replaced in its entirety as follows:

603.8.1 Residential incinerators. Residential incinerators are prohibited within the City and County of Denver.

SECTION 604
EMERGENCY AND STANDBY POWER SYSTEMS

Section 604.1.1 Stationary generators is amended by adding the following to the last sentence:

... and operated by a diesel-fueled prime mover.

Section 604.1.1.1 Optional standby generators is added as follows:

604.1.1.1 Optional standby generators shall be permitted in accordance with NFPA 70 Article 702. Generators may be fueled by any approved liquid or gaseous fuel source. Gaseous fuels shall be provided by a public utility and piped to the unit. Gas fuel storage tanks are not permitted. Where liquid-fueled generators are located at other than grade level, individual fuel tank capacity shall not exceed 120 gallons, with a total capacity not to exceed 660 gallons on any building story or level.

Section 604.1.2 Installation is relocated from Section 604.1.1 and amended by adding the following after the last sentence:

All required generators shall be provided with a remote status panel in accordance with NFPA 110 and complying with 907.2.13.7. Panel location shall be in an area approved by the fire code official.

Section 604.1.4 Load duration is amended by adding the following after the last sentence:

If fuel pumping is required from a main fuel tank to a day tank, a duplex pumping system shall be provided. Fuel storage and handling shall comply with IFC Chap 57. Fuel supplies for emergency or required standby systems shall be located on-site.

Exception: Emergency generators supplying fire pumps shall have a fuel supply for 8 hours of operation.

Section 604.1.2 Stored energy emergency or standby power systems is retained, renumbered and amended as follows:

604.1.2 Stored energy emergency or standby power systems. Stored energy emergency and standby power systems required by this code shall be installed in accordance with Section 608 and NFPA 111 and shall have sufficient capacity to operate under full load for 90 minutes.
Section 604.1.9 Location is added as follows:

**604.1.9 Location.** All generators required by this code shall be located at grade level, or one level below grade with the filling connection located in accordance with IFC Chapter 57.

**Exception:**

Stationary emergency and legally required standby power generators in a stand-alone open parking garage less than 55' in height, shall be permitted to be located on the topmost atmospheric level.

Section 604.2.3 Emergency responder radio coverage systems is amended as follows:

Replace the word “standby” with “emergency” in the first and third lines.

Section 604.2.9 High-rise buildings is amended by deleting “standby power and” in the first line.

Section 604.2.13 Covered mall buildings is retained, renumbered and amended as follows:

**604.2.13 607.2.13 Covered mall buildings.** Covered mall buildings exceeding 50,000 square feet (4,645 m²) shall be provided with emergency power systems which are capable of operating the emergency voice/alarm communication system, the smoke control system per Section 909, for four adjacent zones per A. Section 909.21.6, the fire pump and one accessible elevator.

**SECTION 606**

**MECHANICAL REFRIGERATION**

Section 606.8 Refrigerant detector is retained as follows:

**606.8 Refrigerant detector.** Machinery rooms shall contain refrigerant leak detection and initiate an emergency alarm in accordance with this section and Section 908.8. The detectors or sampling tubes that draw air to the detectors shall be located in areas where refrigerant from a leak will concentrate. A leak detection alarm shall be actuated at a value not greater than the corresponding occupational exposure limit (OEL) values identified in the *International Mechanical Code* for the refrigerant classification. Accurate detector calibration shall be demonstrated during acceptance testing. Signage required by Section 908.8 shall state, “DO NOT ENTER WHEN LIGHT IS FLASHING – REFRIGERANT LEAK DETECTED."

**SECTION 607**

**ELEVATOR RECALL AND OPERATION, MAINTENANCE AND FIRE SERVICE KEYS**

Section 607.1 Emergency operation is retained and amended as follows:

**607.1 Emergency Operation.** New and altered elevators and conveying systems shall comply with Section 919 and Chapter 30 of the International Building Code. Elevators undergoing a controller replacement or alteration as defined in Colorado Code of Regulations 7CCR 1101-8 or ASME A17.1 (including hydraulic elevators undergoing a controller replacement as part of an alteration), shall be provided with Phase I emergency recall operation and Phase 2 emergency in-car operation. in accordance with Section 907.4.3 and ASME A17.1. Existing elevators with a travel distance of 25 feet (7620mm) or more shall comply with the requirements in IFC Chapter 11 as amended. All other alterations to existing elevators shall comply with State of Colorado requirements.
Sections 607.2 Standby power, 607.2.1 Manual transfer, 607.2.2 One elevator, 607.2.3 Two or more elevators and 607.2.4 Machine room ventilation are amended by replacing the term ”standby”, with the term “emergency or standby” throughout these Sections.

Section 607.2.2 One elevator is amended by replacing “60 seconds” with “10 seconds for an emergency and 60 seconds for a standby power source,”...

Section 607.2.3.1 Two or more elevators in high-rise buildings without fire service access elevators is added as follows:

607.2.3.1 Two or more elevators in high-rise buildings without fire service access elevators. In addition to the requirements of Section 607.2.3, in high-rise buildings without fire service access elevators, not less than two elevators shall remain simultaneously operable from the emergency power source and each elevator shall be capable of accessing all floors of the building. One of these elevators shall be the elevator required to accommodate an ambulance stretcher. All elevators shall be manually transferable to the emergency power source in accordance with Section 607.2.1.

Exception: Sufficient emergency power may be provided for only one elevator that only serves open parking levels of the high-rise building.

Section 607.2.3.2 Elevators in high-rise buildings with fire service access elevators, but without occupant evacuation elevators is added as follows:

607.2.3.2 Elevators in high-rise buildings with fire service access elevators, but without occupant evacuation elevators. In addition to the requirements of Section 607.2.3, in high-rise buildings with fire service access elevators, but without occupant evacuation elevators, no less than three elevators in each group shall remain simultaneously operable from the emergency power source and each elevator shall be capable of accessing all floors of the building. Where an elevator transfer floor is provided in order to provide access to all building floors, a minimum of five elevators shall be required for simultaneous operation on the emergency power source. Emergency power shall be provided to the required fire service access elevators in accordance with Section 3007.8 of the International Building Code. The designated non-fire service access elevator(s) shall be capable of having the emergency power manually transferrable to any other non-fire service access elevator(s) in accordance with Section 607.2.1.

Exception: Sufficient emergency power may be provided for only one elevator that only serves open parking levels of the high-rise building.

Section 607.3.1 Signage for existing elevators without a flashing hat indicator is added as follows:

607.3.1 Signage for existing elevators without a flashing hat indicator. Existing elevators with shunt trip capability that do not provide a flashing hat indication in accordance with 907.3.3.5 shall have an approved sign mounted in the cab stating; “CAUTION – When using elevator in PHASE I or PHASE 2 recall mode, elevator will lose power if heat detector in shaft or machine room activates.” Sign shall be black lettering on a yellow background and located on the operating panel adjacent to the firefighter operation keyswitch.

Section 607.8 Exception is replaced in its entirety with the following:
**Exception:** The owner shall place the building’s existing, approved non-standardized fire service elevator keys in a key box installed in accordance with Section 506.1.2.

Section 607.8.1 is amended by adding items 5 and 6 as follows:

5. Keys shall be Group 3 security per ASME A17.1 and comply with DFD policy 607-1.

6. All standardized fire service elevator keys located at the building shall be numbered sequentially by indelible marking and a key log shall be maintained on site that identifies the location and holder of each key. When a holder is no longer qualified to maintain possession of a key, the key shall be returned to the issuing authority for subsequent distribution in accordance with this code.

Section 607.8.1.1 New elevator installations is added as follows:

**607.8.1.1 New elevator installations.** Where a new elevator is installed as part of an existing group of elevators with a common controller, all elevators in the group shall be upgraded to the same firefighters’ emergency operation as required by this Code.

Section 607.8.1.2 Alterations to elevators is added as follows:

**607.8.1.2 Alterations to elevators.** Where an existing elevator is modified under any alteration encompassing a scope of work as described under Colorado Code of Regulations, 7 CCR 1101-8 or ASME A17.1 the altered elevator shall be provided with a standardized key. Where the altered elevator is part of an existing group of elevators with a common controller, all elevators in the group shall be retrofitted with a standardized key.

**Exception:** Elevators without existing Phase 1 and Phase 2 operation.

Section 607.8.1.3 Existing elevator installations is added as follows:

**607.8.1.3 Existing elevator installations.** Key switches required for Firefighters’ Emergency Operation and Emergency or Standby Power Systems selection on all elevators within a building shall be retrofitted with the approved standardized key by **July 1, 2018.**

Section 607.8.3 is replaced as follows:

**607.8.3 Duplication or distribution of keys.** No person may possess a standardized fire service elevator key unless in accordance with this code. Duplication of keys is not permitted. Unauthorized distribution/duplication of keys is subject to the penalties of Section 109.2.2.1.

Section 607.8.4 is replaced in as follows:

**607.8.4 Responsibility to provide keys.** A key shall be provided for each switch installed. Standardized fire service access keys shall be maintained in an approved lock box within a secured fire command center per Section 508 where provided, or an approved, listed key box in accordance with Section 506.

Section 607.9 Elevator recall for high-rise buildings with pressurized hoistways is added as follows:
607.9 Elevator recall for high-rise buildings with pressurized hoistways. In addition to the requirements of ASME A17.1, Fire Fighters’ service, elevator operation within high-rise buildings with pressurized hoistways shall be as follows:

The elevator doors shall automatically open when the car reaches the approved level. After a period of one minute, elevators shall automatically close their doors. The doors shall be responsive by pressing the designated return floor call button in the elevator lobby or by pressing the door open button in the interior of the elevator cab. Elevators shall remain at that level until manual overrides by the key-operated switch required by ASME A17.1.

Only the hall call buttons at the designated or alternate return level, the level the car(s) have returned to, shall function as door open buttons. All doors shall open simultaneously when operating under normal building power. When operating under emergency power, only the cars selected for emergency operation shall open their doors simultaneously.

During Phase 1 operation, the door recycle shall be 60 seconds.

Once the car is placed on Phase II, the fire department has control of the elevator; it shall operate per ASME A17.1, Section 2.27.3.3, Normal Phase II, Emergency In-Car Operation.

Section 607.10 Fire service access elevators is added:

607.10 Fire service access elevators. Installation of fire service access elevators shall comply with Section 919 and Section 3007 of the International Building Code as amended.

Section 607.11 Occupant evacuation elevators is added:

607.11 Occupant evacuation elevators. Installation of occupant evacuation elevators shall comply with Section 919 and Section 3008 of the International Building Code as amended.

SECTION 608
STATIONARY STORAGE BATTERY SYSTEMS

Section 608.5 Spill control and neutralization is retained as follows:

608.5 Spill control and neutralization. An approved method and materials for the control and neutralization of a spill of electrolyte shall be provided in areas containing lead-acid, nickel-cadmium or other types of batteries with free-flowing liquid electrolyte. Each rack of batteries or groups of racks shall be provided with a liquid-tight 4-inch (101.6mm) minimum spill-control barrier which extends at least 1-inch (25.4 mm) beyond the battery rack in all directions. For the purposes of this paragraph, a “spill” is defined as any unintentional release of electrolyte.

Exception: VRLA, lithium-ion or other types of sealed batteries with immobilized electrolyte shall not require spill control.
SECTION 806
DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

Section 806.6 Combustible natural vegetation is retained and amended as follows:

806.6 Combustible natural vegetation. Limited quantities of combustible natural vegetation shall be permitted in A, E, I3, R1, R2/Dormitory, and R-4 occupancies where the fire code official determines adequate safeguards are provided based on the quantity and nature of the vegetation. Flame resistance shall be demonstrated in an approved manner for each item of vegetation. The use of unlisted electrical wiring and lighting on combustible natural vegetation is prohibited.

SECTION 807
DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

Section 807.5.2.2 Artwork in corridors is replaced as follows:

807.5.2.2 Artwork in corridors. Artwork and teaching materials shall be limited on walls of corridors to not more than thirty (30) percent of the area of each wall to which they are attached.

Exception: Corridor walls may be used to attach artwork and teaching materials not to exceed and sixty (60) percent of the area of each wall when the building is protected throughout by an automatic fire sprinkler system in accordance with Section 903.3.1.1.

The height from the floor to the ceiling multiplied by the length of the wall excluding door and window openings is considered the area of each wall.

Exceptions:
1. These area limitations do not apply to artwork and teaching materials listed as non-combustible.
2. Artwork and teaching materials contained within fully enclosed, non-combustible or limited combustible containers or coverings such as metal and glass display cases are not required to be included in the area limitations.

Artwork and teaching materials shall not be attached to any wall within eighteen (18) inches of the exit access door. Doors and windows, including view panels of interior exit access doors, shall not be covered. The use of crepe paper that is not listed as flame resistant is prohibited.

Section 807.5.2.3 Artwork in classrooms is replaced as follows:

807.5.2.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than fifty (50) percent of the area of each wall to which they are attached.

Exception: Classroom walls may be used to attach artwork and teaching materials not to exceed and eighty (80) percent of the area of each wall when the building is protected throughout by an automatic fire sprinkler system in accordance with Section 903.3.1.1.
The height from the floor to the ceiling multiplied by the length of the wall excluding door and window openings is considered the area of each wall.

Exceptions:

1. These area limitations do not apply to artwork and teaching materials listed as non-combustible.
2. Artwork and teaching materials contained within fully enclosed, non-combustible or limited combustible containers or coverings such as metal and glass display cases are not required to be included in the area limitations.

Section 807.5.5.2 Artwork in corridors is replaced as follows:

807.5.2 Artwork in corridors. Artwork and teaching materials shall be limited on walls of corridors to not more than thirty (30) percent of the area of each wall to which they are attached.

Exception: Corridor walls may be used to attach artwork and teaching materials not to exceed and sixty (60) percent of the area of each wall when the building is protected throughout by an automatic fire sprinkler system in accordance with Section 903.3.1.1.

The height from the floor to the ceiling multiplied by the length of the wall excluding door and window openings is considered the area of each wall.

Exceptions:

1. These area limitations do not apply to artwork and teaching materials listed as non-combustible.
2. Artwork and teaching materials contained within fully enclosed, non-combustible or limited combustible containers or coverings such as metal and glass display cases are not required to be included in the area limitations.

Artwork and teaching materials shall not be attached to any wall within eighteen (18) inches of the exit access door. Doors and windows, including view panels of interior exit access doors, shall not be covered. The use of crepe paper that is not listed as flame resistant is prohibited.

Section 807.5.5.3 Artwork in classrooms is replaced as follows:

807.5.2.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than fifty (50) percent of the area of each wall to which they are attached.

Exception: Classroom walls may be used to attach artwork and teaching materials not to exceed and eighty (80) percent of the area of each wall when the building is protected throughout by an automatic fire sprinkler system in accordance with Section 903.3.1.1.

The height from the floor to the ceiling multiplied by the length of the wall excluding door and window openings is considered the area of each wall.

Exceptions:

1. These area limitations do not apply to artwork and teaching materials listed as non-combustible.
2. Artwork and teaching materials contained within fully enclosed, non-combustible or limited combustible containers or coverings such as metal and glass display cases are not required to be included in the area limitations.
Section 807.6 Ceiling artwork and teaching materials is added as follows:

807.6 Ceiling artwork and teaching materials. Artwork and teaching materials suspended from classroom and corridor ceilings shall be in accordance with the following:

1. Where permitted by Section 703.3, the ceiling structure must be capable of supporting the artwork and teaching materials.
2. The total area of materials suspended from ceilings plus the covered area of each adjacent wall shall not exceed the wall areas permitted to be covered in accordance with Sections 807.5.2.2, 807.5.2.3, 807.5.5.2 and 807.5.5.3.
3. Display of artwork and teaching materials shall not impair visibility or distract attention from any egress signage or alarm notification appliance.
4. No material shall be attached to electrified fixtures, electrical wiring, egress signage, plumbing, fire alarm components, fire sprinkler components, etc.
5. The display of artwork or teaching materials shall not obstruct or compromise in any manner the fire sprinkler or fire detection system.
6. Display of artwork and teaching materials on wires or cords strung across corridors from wall to wall shall not form a continuous combustible curtain. There shall be a minimum clearance of seven (7) feet from the floor to the lowest portion of the display.
7. Wires or cords used to suspend artwork and teaching materials from the ceiling cannot be strung from corner to corner of a room or space and cannot be strung parallel to any wall farther than six (6) inches from the wall.
CHAPTER 9

FIRE PROTECTION SYSTEMS

SECTION 901
GENERAL

Section 901.2 Construction documents is amended by adding the following after the last sentence: replaced as follows:

Shop drawings shall be provided in accordance with Appendix K-N.

Section 901.6.2 Records is replaced in its entirety with the following (subordinate section 901.6.2.1 remains):

901.6.2 Records. Records of all system installations, inspections, tests and maintenance required by Denver’s Fire Code and referenced standards shall be maintained on the premises, for a minimum of three years and shall be submitted to the Denver Fire Department’s Fire Prevention Division Office. The Records submitted shall be completed on National Fire Protection Association forms and/or forms provided by the Denver Fire Department. The name and Denver Fire Department license number(s) of the person(s) performing the work shall be legible on all forms.

SECTION 902
DEFINITIONS

Section 902.1 Definitions is retained and amended as follows. The following terms are defined in Chapter 2:

ALARM CONTROL UNIT
APPLIANCE
BATTERY BACKUP
BATTERY-POWERED
DEVICE
DUPELEX
FALSE FIRE ALARM
HARDWIRED
INSTALLED
NON-DEDICATED SMOKE CONTROL SYSTEM
SINGLE-FAMILY DWELLING
SINGLE STATION [CO] ALARM
SLEEPING ROOM
SECTION 903
AUTOMATIC SPRINKLER SYSTEMS

Section 903.2.8.1 Balconies is retained and renumbered as follows:

903.2.8.1 Balconies. Sprinkler protection shall be provided for all balconies and ground floor patios of dwelling units of all construction types. Sidewall sprinklers that are used to protect such areas shall be located such that their deflectors are within 1 inch (25 mm) to 6 inches (152 mm) below the structural members, at a maximum distance of 14 inches (356 mm) below the deck, or as listed by the sprinkler manufacturer.

Exception: Sprinklers are not required for noncombustible balconies where the balcony is not supplied by fuel gas and one of the following is met:

1. The roof or other overhead structure does not cover more than 50% of the entire balcony area.
2. The balcony has openings on two or more sides. The area of such openings must be at least 20 percent of the total perimeter wall area of the balcony. The aggregate length of the openings shall constitute a minimum of 40 percent of the perimeter of the balcony.

Section 903.2.8.2 Townhouses is retained and renumbered as follows:

903.2.8.2 Townhouses. When two or more contiguous residential dwelling units constructed as townhouses, including those permitted under the International Residential Code, are protected by a single, monitored sprinkler system, that system shall be configured so water flow is annunciated separately at the fire alarm control panel for each dwelling unit and each protected common area.

Section 903.2.9.1 is retained as follows:

5. Repair garages with a spray booth and/or a mixing area greater than 16 square feet utilizing flammable finishes.

Exception: It is not necessary to install sprinklers throughout the entire building when replacing a previously approved, booth, with an approved, packaged booth or one constructed per Section 4504.3.2, 2404.3.2

6. Repair garages using open flame or welding of any type where the garage floor area exceeds 3,000 square feet.

Section 903.2.9.2 Bulk storage of tires is retained and amended by replacing “20,000 cubic feet (566m3)” with “2,500 cubic feet (71m3)” in the third line.

Section 903.2.11.7 Shafts in high-rise building is added as follows:

903.2.11.7 Shafts in high-rise buildings. Where a reduction in shaft construction fire rating is permitted by Section 403 of the International Building Code, required sprinklers shall be located at the top of the shaft and at alternate floor levels. Sprinklers shall be provided with a dedicated
riser with an isolation valve and flow and tamper switch. Activation of the flow switch shall initiate a general alarm but not occupant notification or smoke control.

Section 903.3 Installation requirements is retained and amended by adding the following after the last sentence.

903.3 Installation requirements. Automatic sprinkler systems shall be designed and installed in accordance with Sections 903.3.1 through 903.3.7. All fire sprinkler systems and special extinguishing system design drawings, shall be submitted in accordance with Appendix K, including hydraulic calculations, shall bear the seal and signature of the engineer of record. Sprinkler systems and special extinguishing systems designed for a building with smoke control system(s) shall bear the seal and signature of the base building engineer of record.

Section 903.3.1.1 Exempt locations is retained and deletes (3), (4) and (5).

Section 903.3.1.2 NFPA 13R sprinkler systems is retained as follows:

903.3.1.2 NFPA 13R sprinkler systems. Automatic sprinkler systems in group R occupancies in buildings up to and including four stories in height measured above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R.

Section 903.3.1.2.1 Balconies and decks is retained and amended as follows:

903.3.1.2.1 Balconies and decks. Sprinkler protection for balconies and decks shall comply with Section 903.2.8.5.

Section 903.3.5 Water supplies is retained as follows:

903.3.5 Water supplies. The potable water supply shall be protected against backflow in accordance with Section 912.5. Hydraulic calculations shall be based on water supply information provided by Denver Water. Water supply information provided shall be obtained within the last 12 months. Hydraulic calculations shall be based on the water data provided with static and residual pressures reduced by 10% of the static value or 10 psi, whichever is smaller. Where water supply data is provided by a Denver Water system model, the high static pressure shall be used to verify that the fire pump churn pressure shall be maintained below the system design pressure. Shop drawings shall indicate the initial pressures and the reduced values as used in the hydraulic calculations.

Exception: Section 903.3.1.3 NFPA 13D sprinkler systems.

Section 903.3.5.1 Domestic service is retained as follows:

903.3.5.1 Domestic service. Use of domestic service for water supply to automatic fire sprinklers shall be prohibited.

Exceptions:

1. Water supply for new NFPA 13D or IRC P2904 sprinkler systems.
2. UL-300 listed fire suppression systems in buildings that are not provided with automatic sprinklers.
3. Medical gas rooms per Section 3006.2 and 5306.

Section 903.3.5.2 Residential combination services is deleted in its entirety.

Section 903.3.7 Fire department connections is retained as follows:

903.3.7 Fire department connections. Fire department connections shall be in accordance with Section 912.

Section 903.3.5.1 903.3.8 Limited area sprinkler systems and all subsections through 903.3.8.5 are deleted in their entirety.

Section 903.3.8 Elevator hoistways and machine rooms is retained, renumbered and amended as follows:

909.3.8 903.3.9 Elevator hoistways and machine rooms. In existing buildings protected with an automatic sprinkler system in accordance with NFPA 13 or NFPA 13R, elevator hoistways and machine rooms shall only be provided with automatic sprinklers as described in NFPA 13, 8.15.5. Where sprinkler protection is provided, installation shall comply with NFPA 13 except as noted in this section. Sprinkler protection for new or retrofit elevators shall comply with this section. Hoistways and machine rooms/spaces shall be protected by 286 degree F sprinklers, located in accordance with NFPA 13. Coverage shall be designed for Ordinary Hazard Group One. Sprinklers shall be supplied from a separate, independent branch line with a readily accessible indicating shut-off valve located outside the hoistway or room. Control valves shall carry identification signs. In fully sprinklered buildings, where machine room-less (MRL) elevator equipment is installed in an elevator hoistway, sprinkler protection shall be provided at the top of the shaft in all instances. Where sprinkler protection is not provided, automatic fire detectors shall be provided per Section 907.3.3.

Section 903.3.9 Sprinkler protection for electrical rooms is retained and renumbered as follows:

903.3.9.10 Sprinkler protection for electrical rooms. In buildings required to be fully sprinklered, electrical rooms containing electrical switchboards, panel boards, distribution boards, control equipment, generators and/or transformers shall be protected with automatic sprinklers. Sprinkler protection shall be designed with high-temperature sprinklers. Only sprinkler branch lines protecting the electrical room are permitted in the room.

Exceptions:

1. The room or space is under the control of a public utility.
2. The room is dedicated to electrical distribution equipment, has equipment operating at 600 volts or more and is provided with a smoke detection system connected to a monitored fire alarm system.

Section 903.4.2 Alarms is retained as follows:

903.4.2 Alarms. Approved audible/visible devices (24 VDC supervised) shall be connected to every automatic sprinkler system. These sprinkler water flow alarm devices shall be activated by main and/or zone water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Alarm devices shall be provided on the exterior of the building at least 10
feet above grade and within 25 feet of and visible from the fire department connections. Where a fire alarm system is installed, actuation of the automatic sprinkler system shall actuate the building fire alarm system.

Section 903.4.3 Floor control valves is retained as follows:

903.4.3 Floor control valves. Approved supervised indicating control valves and fire sprinkler water flow detection devices shall be provided at the point of connection of the sprinkler system to the standpipe riser on each floor in buildings with a standpipe system provided as required by IFC Section 905.

SECTION 904 ALTERNATIVE AUTOMATIC FIRE-EXTINGUISHING SYSTEMS

Section 904.3.4.1 Visible notification is retained and amended as follows:

904.3.4.1 Visible notification shall be provided by yellow amber strobes. Pending-discharge and discharge warning strobes shall be in conspicuous locations as approved by the fire code official and activated by the agent releasing panel. Subject to the approval of the fire code official, pending-discharge and discharge warning may be provided by combined audible/visible appliances. No more than two flash rates shall be possible in a single field of view per NFPA 72. Where pending-discharge and discharge warning strobes are provided in addition to visible fire alarm notification appliances, the warning strobes shall be synchronized, and fire alarm visible notification appliances shall be synchronized. A warning sign shall be provided that reads, “WARNING – Fire Extinguishing Agent Release in Progress.” Warning sign format, color and letter style shall comply with ANSI Z535 be as approved by the fire code official.

Section 904.3.5 Monitoring is retained and amended by adding the following at the end of the last sentence:

… “and Section 907”.

Section 904.3.5.1 Releasing panel is retained as follows:

904.3.5.1 Releasing panel. Pre-action and clean agent automatic fire-extinguishing systems shall be monitored and installed in accordance with this section and Section 907.7.6.

SECTION 905 STANDPIPE SYSTEMS

Section 905.1 General is retained as follows:

905.1 General. Standpipe systems shall be provided in new buildings and structures in accordance with this section. Fire hose threads used for connection to standpipe systems shall be approved and shall be compatible with Denver Fire Department hose threads – 2.5-inch hose thread is national standard; 1.5-inch hose thread is a special 11.5 threads per inch. The location of Fire Department hose connections shall be approved by the fire code official. Where standpipe valve outlets are installed in stair enclosures, outlets and ancillary equipment (PRVs, drains, etc.) shall not reduce the required width of the stairway or landing.
**905.1.1 Standpipe hose outlets.** Each outlet shall have a cap and chain. Outlets shall be at least 36 inches and not more than 52 inches above finished floor. The valves shall have no less than 3 inches clearance around control valve and outlet cabinet shall not impede attachment of hose.

**Section 905.2 Installation standard** is retained and amended as follows:

**905.2 Installation standard.** Standpipe systems shall be installed in accordance with this section and NFPA 14. When water pressure at a standpipe outlet exceeds 175 psi static or residual at 250 gpm flow, a pressure-reducing valve shall be provided. The required pressure-reducing valves shall be located at the hose valve outlet only. Only field-adjustable valves that have a nested spring design utilizing two custom springs allowing low torque field adjustment of the pressure-reducing functions shall be allowed. The valve shall have five (5) field-adjustable valve settings (A-E) on a color-coded indication label. Pin-in hex security screws shall be installed to secure the hand wheel and a high-impact plastic shield covering the pressure-reducing adjustment mechanism shall be provided. A pin-in hex bit shall be supplied with each valve. The pressure adjustment mechanism shall be actuated using an aluminum adjustment rod provided with each valve and actuated by rotating in either a clockwise or counter-clockwise direction. Pressure gauge taps shall be provided on inlet and discharge sides of each valve. A reflective decal shall be installed on the high-impact plastic shield valve with arrows and words indicating the direction to increase or decrease pressure. If special tools are required to make field adjustments, a minimum of four (4) such tools shall be provided at locations approved by the Fire Department.

**Section 905.3.1 Height is retained by replacing Exceptions as follows:**

**Exceptions:**
1. Class I standpipes are allowed in buildings equipped throughout with an automatic sprinkler system in accordance with Sections 903.3.1.1 or 903.3.1.2 subject to the provisions of Section 913.
2. Class I automatic dry standpipes are allowed in single use or mixed-use open parking garages in accordance with Section 913.6(2) where the highest floor is located not more than seventy-five (75) feet above the lowest level of Fire Department vehicle access. In a mixed-use parking garage, the standpipe system serving the open parking garage shall be integrated with the fire protection system serving the other occupancies, and not be a stand-alone system. Hose connections shall be located as required for Class II standpipes in accordance with Section 905.5.
3. Class I manual dry standpipes are allowed in single use open parking garages where the highest floor is less than 55 feet from the lowest level of Fire Department vehicle access. Hose connections shall be located as required for Class II standpipes in accordance with Section 905.5. This provision is applicable to open parking garages with one level of underground enclosed parking garage.
4. Class I standpipes are allowed in basements equipped throughout with an automatic sprinkler system.
5. Intentionally deleted.

**Section 905.3.4.1 Hose and cabinet is deleted in its entirety.**

**Section 905.4 Location of Class I standpipe hose connections** is retained and amended as follows: and Exception 7 is added:
Buildings four or more stories above the grade plane shall comply with 905.4 Exception 7.

5. Where buildings have 4 or more stories above the grade plane and standpipes are provided in buildings four or more stories above the grade plane, the roof slope is less than four units vertical to twelve units horizontal (33.3% slope), there shall be at least two 2-1/2" roof manifold outlet connections above the roof line. When the roof slope is less than four units vertical to twelve units horizontal (33.3% slope), outlets shall be located on the exterior perimeter of the stair enclosure within 20' of the roof access opening.

Section 905.4 Location of Class I standpipe hose connections is amended by adding the following at the end of subparagraph 1:

Where exterior stairways are provided as part of the required exit stairway, hose connections shall be located at the floor landing or as otherwise approved by the fire code official.

Section 905.5.3 Class II system 1-inch hose is deleted in its entirety.

SECTION 906
PORTABLE FIRE EXTINGUISHERS

Section 906.1 Where required subparagraph 1 Exception is amended by changing; 1-A:10-B:C, to; 2-A:10-B:C in the last sentence.

Section 906.1 Where required is amended by adding Item 7 as follows:

7. Where required by Section 106.2.13 for townhouses, condominiums and apartments.

Section 906.2.1 Verification of service collars is retained and amended as follows:

906.2.1 Verification of service collars. Every portable fire extinguisher, regardless of type, shall have a verification of service collar, in accordance with NFPA 10. Only collars obtained from the Denver Fire Department are allowed. Collars shall not be cut.

SECTION 907
FIRE ALARM AND DETECTION SYSTEMS

Section 907.1.1 Fire alarm shop drawings is retained as follows:

907.1.1–Fire alarm shop drawings. Shop drawings for fire alarm systems shall be submitted for permit application as a deferred submittal per IBCA Section 133.5. Plan review and approval are required prior to issuance of a permit for system installation. Two sets of scaled, engineered installation shop drawings shall be submitted. Documents shall be of sufficient clarity and detail to fully describe the scope of work. Handwritten notes and comments on reproduced drawings are not acceptable. Submittals shall comply with Appendix K N.

Section 907.1.2 Equipment is retained and renumbered as follows:

907.1.2 907.1.3 Equipment. Systems and their components shall be listed and approved for the purpose for which they are installed. Installation locations of all control panels and annunciators are
subject to field approval by the Fire Department. Keys for all equipment required to be accessible to the Fire Department shall be maintained in an approved location per Section 506. All components shall be compatible with the system in which installed.

Section 907.1.2.1 Connections to other systems is retained and renumbered as follows:

907.1.2.1 907.1.4 Connections to other systems. A fire alarm system shall not be used for any purpose other than fire warning or as specifically approved, e.g. pool alarm, access control release per IBCA, elevator recall and shunt trip, emergency alarms per Section 908, and mass notification systems as approved by the fire code official.

Section 907.1.2.2 Control units, annunciators and access keys is retained, renumbered and amended as follows:

907.1.2.2 907.1.5 Control units, annunciators and access keys. All fire alarm control units and annunciators panels shall be UL 864 listed or equivalent. Locations shall be within 10’ (3.048m) of the main building entrance, unless an alternate location is specifically approved for an alternate location, and Equipment locations are subject to field approval prior to installation. Installation shall comply with NFPA 72. Access keys to locked fire alarm equipment shall be maintained in an approved location. Fire alarm control units shall not be equipped with a key or special numeric code to access system reset and silence functions. Access to the reset and silence operator interface shall be secured behind a locked door. Field modification of control units or annunciators is not permitted. System zone and device disable functions shall not be accessible without a maintenance-level access code. Alarm signals shall be protected from unauthorized deactivation. This applies to disconnection of the panel alarm transmission to the monitoring station and the alarm output circuit(s) to notification appliances. Deactivation shall only be allowed by Fire Department personnel or authorized entities responsible for system testing and maintenance. Any system deactivation shall be reported to the monitoring station and the Fire Department. Facilities whose systems are estimated to be deactivated for 10 hours or more shall be provided with an approved fire watch.

Exceptions:

1. In existing buildings undergoing a panel replacement, remote annunciators with silence and reset functions may be provided when approved by the fire code official. These units shall not be equipped with “enable/disable” switches and shall be contained behind a transparent, lockable cover.

2. Low-power radio (wireless) systems shall comply with NFPA 72 and are permitted only for installations where the total system coverage does not exceed 1500 sf. Multiple low-power systems in a building are not permitted. Installation of low-power and wired systems is not permitted in the same building.

Section 907.1.3 Central alarm station connection is retained and renumbered and amended as follows:

907.1.3 907.1.6 Central alarm station connection. All fire alarm and sprinkler protection systems required by this code or by special agreement shall be monitored by an approved Class I supervising station complying with Section 917 and in accordance with the Denver Municipal Code. Multiple central alarm station connections from one building are not permitted. Alternatively, Fire Department radio boxes may be installed at locations approved by the Fire Department. These boxes shall
typically be installed at locations of high hazard, high occupancy or that require immediacy of response due to limitations in the occupants’ capabilities for self preservation. Under no circumstances shall a DFD radio box be removed from a protected premise without written approval of the fire code official.

**Section 907.1.4** Multiple fire alarm systems in a single building is retained, renumbered and amended as follows:

907.1.4 907.1.7 Multiple fire alarm systems in a single building. Only one fire alarm system shall be installed per building. Multiple points of silence and reset are prohibited on a single system.

**Exceptions:**

1. When permitted by the fire code official, portions of a building separated by fire walls without openings and identified with separate legitimate addresses are allowed to be considered separate buildings. When protected by an automatic sprinkler system, each portion of the building so considered shall be protected by a separate independent sprinkler system or a portion of a single sprinkler system dedicated to the separated portion of the building.

2. Multiple points of silence and reset as allowed by Section 907.1.2 Exception.

3. Multiple buildings constructed over a common structure where approved by the fire code official.

**Section 907.1.5** Problematic systems is retained, renumbered and amended as follows:

907.1.5 907.1.8 Problematic systems. Fire alarm systems that generate two (2) or more false or nuisance fire alarms within twenty-four (24) hours, three (3) or more within thirty (30) days, or ten (10) or more within one year shall be immediately repaired, mitigated or replaced as necessary. A fine will be imposed for any false or nuisance fire alarms exceeding ten (10) within one year. A permit shall be obtained for all remedial work. Fire protection, fire alarm and fire detection systems shall be properly maintained to provide at least the same level of reliability, performance and protection as designed and approved. The property owner shall be responsible for maintaining the system. If the system is found to be impaired two (2) or more times within a twelve (12) month period, legal action will be imposed until the system(s) is restored to a code complying condition. A permit shall be required for all remedial work.

**Section 907.1.6** Systems out of service is retained and renumbered as follows:

907.1.6-907.1.9 Systems out of service. Systems undergoing maintenance or modification shall not have any portion of the system out of service for more than ten (10) hours. During maintenance or modification, all manual pull stations and notification appliances shall remain operational. Fire watch must be provided in all areas of the building where maintenance or modification will place any portion of the system out of service.

**Exception:** Where practical difficulties are associated with replacement of fire alarm detection systems in existing high-rise buildings, phased replacement of an existing fire alarm system shall be permitted as follows:
1. An Administrative Modification (AM) request for the phased replacement of the fire alarm and detection system shall be submitted to the fire code official for evaluation and approval prior to submission of shop drawings.

2. Two fire alarm control panels shall be allowed during the phased system upgrade. Existing and new fire alarm control panels shall be co-located at a location approved by the fire code official. During this period, it shall be acceptable to have two points of system reset via the two fire alarm control panels. A wall map showing each floor with descriptions of which system is controlling devices in each area shall be posted adjacent to the fire alarm control panels during construction. Upon completion of the new front end equipment installation and after all compatible devices have been transferred, tested and approved by the fire code official, the contractor will remove the old panel and related equipment.

3. Installation within each floor shall be completed prior to commencement of work on any other floor unless the contractor can complete multiple floors simultaneously.

4. Project duration shall not exceed 24 months from the date the fire alarm permit is issued, nor shall the total duration, including project planning, design and installation, exceed 36 months. Subject to the approval of the fire code official, a single extension of up to a maximum of one year may be requested in writing. Extensions shall be granted only in cases of unforeseen difficulties. Building owners and contractors shall make every effort to minimize any delay to project completion.

5. The applicant shall present a planned schedule with phased replacement of the system and components, including scope of work and sequence of operation with coordination of the two fire alarm panels, to the fire code official for review and approval prior to preparation of shop drawings.

6. Fire alarm and detection system protection shall be maintained at all times and in all areas, except where system/component replacement is taking place while installers are present. Existing and new devices and appliances not affected and outside of the installation area shall be maintained fully operational at all times.

7. Phasing of fire alarm system replacement shall be in an organized, coherent and logical sequence to reduce system disruption and allow work while maintaining the life safety systems of the building.

8. Audible and visual notification appliance coverage shall comply with NFPA 72 and the IFCA.

9. Either point graphic annunciation or LED directory-type annunciation shall be provided. Where LED directory-type annunciation is provided, each device type per level in conjunction with progressive remote indicating lights for detected spaces shall be provided. Where multiple smoke control zones are provided within each level, each compartment shall be separately annunciated. For existing buildings with graphic annunciation, either the graphic annunciation shall be maintained or replaced with a new graphic annunciation panel. Annunciator panels shall include LED lights for automatic detection, manual pull, flow, tamper, special systems, supervisory and trouble.
10. Where the building has a smoke control system, detailed interface of the new fire alarm system with the existing or upgraded smoke control system shall be provided in the AM submission with details also shown on the shop drawings.

11. The building owner or owner's representative and the design professional shall sign the AM request.

12. The AM shall cite the practical difficulties of the proposed system replacement, the phased scope of replacement, the duration of each phase, as well as the total time from start to completion of the project. Failure to complete the project within the specified time frame shall subject the parties responsible to penalties specified in Section 109.2.2.1.

Section 907.2.1.1.4 Illumination of means of egress is retained and renumbered as follows:

907.2.1.1.4 907.2.1.3 Illumination of means of egress. Illumination levels shall comply with IFC Section 1008.2.1 and be interfaced to the fire alarm control unit as required.

Section 907.2.1.4 Smoke control is added:

907.2.1.4 Smoke control. Where required by IBC 1029.6.2 for assembly areas with smoke-protected seating. Smoke detection shall be provided as required for smoke control operation per Section 909.17. The smoke control system shall be activated automatically by an alarm initiated from a smoke detector, heat detector or dedicated sprinkler water flow alarm within the smoke zone. No detector zone shall exceed 22,500 sf or serve more than one smoke control zone. Where ceiling heights are 30 ft (7.62m) or greater, air sampling-type smoke detection systems or approved beam detection shall be provided in lieu of ceiling spot smoke detection.

Section 907.2.3 Group E is retained and amended as follows:

907.2.3 Group E. Group E occupancies shall be provided with an approved manual fire alarm and automatic detection system throughout the occupancy. Occupant notification shall be provided in accordance with Section 907.2.16-907.5.

Exceptions 1 and 2 to remain.

Section 907.2.3 Group E Exception 3 is retained and amended as follows:

3. In mixed occupancies where the E occupancy is accessory to an A occupancy, a manual fire alarm system is not required in the A occupancy except as identified in Section 907.2.1. Any exit paths for the E occupancy through the A occupancy shall be provided with automatic fire detection.

3. Manual fire alarm boxes and automatic detection are not required throughout Group E occupancies that are protected with automatic sprinklers throughout, where all the following conditions are met:

3.1 Interior corridors are protected by smoke detectors.
Manual fire alarm boxes are provided in the auditorium, cafeteria, gymnasium and staff locations.

Section 907.2.3 Group E Exception 4 is retained and amended and Exception 5 is added as follows:

4. Manual fire alarm boxes are not required throughout the building where all the following apply:
   a. Interior corridors are protected by smoke detectors.
   b. System central alarm station monitoring is provided.
   c. Manual boxes are provided in locations supervised by staff in accordance with Item 5 below.

4. Conversion of existing buildings to a small day care centers complying with IBCA Section 305.2.4 and E occupancies with less than 20 occupants excluding staff that are provided with smoke alarms complying with NFPA 72 located throughout. Smoke alarms shall be interconnected and provided with a power source complying with Section 907.2.11.6. Smoke alarms with an integral strobe shall be provided in staff offices and teachers’ lounge.

5. Where approved by the fire code official, existing buildings may be provided with battery-operated smoke alarms with 10-year tamper proof lithium batteries.

Exceptions:

1. If less than 50 occupants, the system is not required to be monitored by a central alarm station.

2. A manual fire alarm system is not required if 20 or less occupants and 120v AC single- or multiple-station residential smoke alarms with battery back-up, wired to an un-switched source are provided.

3. In mixed occupancies where the E occupancy is accessory to an A occupancy, a manual fire alarm system is not required in the A occupancy except as identified in Section 907.2.1. Any exit paths for the E occupancy through the A occupancy shall be provided with automatic fire detection.

4. Manual fire alarm boxes are not required throughout the building where all the following apply:
   a. Interior corridors are protected by smoke detectors.
   b. System central alarm station monitoring is provided.
   c. Manual boxes are provided in locations supervised by staff in accordance with Item 5 below.

5. Where an approved automatic sprinkler system is installed throughout a Group E occupancy, manual pull stations shall only be required in locations supervised by staff, (e.g. teachers’ lounge, custodial office, boiler room, administrative areas, auditorium and cafeteria). Notification appliances that activate on sprinkler waterflow and/or activation of a pull station shall be provided throughout.
6. Smoke detectors are not required in rooms or closets less than 24 sf.

Section 907.2.6 Group I is retained and amended by adding the following after the last sentence:

907.2.6 Group I. A manual fire alarm system shall be installed in Group I occupancies. Group I occupancies shall be provided with An emergency voice/alarm communication system per Section 907.5.2.2 shall be installed where partial evacuation is provided.

Exceptions 3 and 4 are retained and amended as follows:

3. A pre-signal system may be installed if approved by the fire code official. Twenty-four hour personnel supervision is required at approved locations. Chimes may be installed in lieu of audible notification appliances as approved by the fire code official. A Denver Fire Department permit is required for pre-signal application or alarm verification equipment.

4. Automatic fire detectors are not required in sprinklered areas less than 24 sq. ft. (2.23sq m.).

Section 907.2.6.1.1 Smoke alarms is retained and amended by adding an Exception as follows:

Exception: Where approved by the fire code official, existing buildings may be provided with battery-operated smoke alarms with 10-year tamper proof lithium batteries.

Section 907.2.6.2 Group I-2 is retained by inserting the following after the second sentence:

Corridors and areas open to corridors in hospitals shall be provided with automatic smoke detection. Additionally, hospitals shall be provided with smoke detection as required in Section 407.2 of the International Building Code, where not in conflict with this section.

Sections 907.2.6.3.4 Zoning and annunciation and 907.2.6.3.5 Monitoring are retained as follows:

907.2.6.3.4 Zoning and annunciation. Alarm, supervisory and trouble signals shall be displayed at the annunciation panel and be transmitted to the central alarm station. Alarm signals shall indicate the type of alarm and the zone of origin, in accordance with NFPA 72. Separate zones shall be provided for individual fire protection systems, buildings, building levels, cell complexes and sections of floors constructed as smoke compartments.

907.2.6.3.5 Monitoring. The fire alarm system shall be monitored by an approved central alarm station service or by transmission of a local alarm which will give audible and visible signals at an approved constantly attended location.

Section 907.2.6.4 Group I-4 day care facilities is retained and amended as follows:

907.2.6.4 Group I-4 day care facilities. Child Day care occupancies shall be provided with an approved manual fire alarm and automatic detection system throughout the occupancy.
Occupant notification shall be provided in accordance with Section 907.6. Conversion of existing buildings to small day care centers per IBCA 308.6 shall comply with this section.

Exceptions:

1. If less than 50 occupants, the system is not required to be monitored by a central alarm station.
2. A manual fire alarm system and automatic system smoke detection are not required if 20 or less occupants in and 120v AC residential smoke alarms with battery back-up, wired to an un-switched source are provided.
3. Manual fire alarm boxes are not required throughout the building where all the following apply:
   a. Interior corridors are protected by smoke detectors.
   b. System central alarm station monitoring is provided.
   c. Manual boxes are provided in locations supervised by staff in accordance with Item 4 below.
4. Where an approved automatic sprinkler system is installed throughout a Group I-4 child day care occupancy, manual pull stations shall only be required in locations supervised by staff, (e.g. teachers' or nurses' lounge, custodial office, boiler room, administrative areas, auditorium and cafeteria). Notification appliances that activate on sprinkler waterflow and/or activation of a pull station shall be provided throughout.

Section 907.2.8.3 Smoke alarms is amended by adding an Exception as follows:

**Exception:** Where approved by the fire code official, existing buildings may be provided with battery-operated smoke alarms with 10-year tamper proof lithium batteries.

Section 907.2.9.2 Smoke alarms is amended by adding an Exception as follows:

**Exception:** Where approved by the fire code official, existing buildings may be provided with battery-operated smoke alarms with 10-year tamper proof lithium batteries.

Section 907.2.10.3 Smoke alarms is retained and amended by adding an Exception as follows:

**Exception:** Where approved by the fire code official, existing buildings may be provided with battery-operated smoke alarms with 10-year tamper proof lithium batteries.

Section 907.2.11 Single- and multiple station-station smoke alarms is replaced as follows:

**907.2.11 Single- and multiple station-station smoke alarms.** Listed single- and multiple station-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.11.1 through 907.2.11.6 and NFPA 72, Chap 29. As approved by the fire code official, smoke alarms may be connected to a fire alarm system for supervision only. Smoke alarms within dwelling and sleeping units shall be inspected and tested in accordance with NFPA 72, Chap 14 and the manufacturer's instructions. A hard-copy log of all inspections, testing, maintenance and battery changes shall be kept at the property. This log shall include the dates of inspection, testing,
maintenance and battery change and the person performing such. Upon request, a copy of the log shall be provided to the fire code official. If this information is not current or available, an inspection shall be made to inspect and test all devices or the property owner or agent of the property owner shall be directed to retain a firm licensed by the Denver Fire Department to inspect and test all devices and submit a report of the inspection findings to the fire code official.

**Exception:** Detached one- and two-family dwellings and multiple single-family dwellings, or townhouses that comply with the *International Residential Code*.

**Section 907.2.13 High-rise buildings** is retained and amended as follows:

**907.2.13 High-rise buildings.** High-rise buildings with a floor used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall be provided with a fire command center in accordance with Section 508, a manual fire alarm boxes located in accordance with 907.4.2 and an automatic fire alarm and detection system in accordance with Section 907.2.13.1, a fire department communication system in accordance with Section 907.2.13.2, a smoke control system in accordance with Section 909.21.4 and an emergency voice/alarm communication system in accordance with Section 907.5.2.2 that provides occupant notification of alarm on the fire floor, floor above, floor below and at the level of the FCC.

**Exceptions to remain.**

**Section 907.2.13.1. Automatic smoke detection** is retained, renumbered and amended by adding items 3, 4, 5 and 6 as follows:

**907.2.13.1 Automatic Area smoke detection.** Smoke detectors shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shall operate the emergency voice/alarm communication system and shall place into operation all equipment necessary to prevent the re-circulation of smoke in accordance with Section 909. Smoke detectors shall be located as follows:

1.—In each mechanical equipment, electrical, transformer, telephone equipment or similar room, elevator machine rooms and in all elevator lobbies.

2.—In the main return air and exhaust air plenum of each air-handling system having a capacity greater than 2,000cfm (0.9m³/s) in accordance with the *International Mechanical Code* (IMC). Where multiple air-handling systems share common supply or return air ducts or plenums with a combined capacity greater than 2,000cfm (0.9cu m/s), smoke detectors shall be provided in accordance with the IMC. Such detectors shall be located in a serviceable area downstream of the last duct inlet. Duct type smoke detectors shall cause a supervisory signal, not an alarm signal, at the building annunciator panel. Detectors shall be listed for the air velocity in which they are installed.

**Exception:** Smoke detectors are not required for automatic shut-off of evaporative coolers or units that supply un-tempered 100% outside air.

3.—In the outlet of fans used for pressurization of stairways, hoistways and refuge areas. Activation of these smoke detectors shall cause a supervisory signal, not an alarm signal
Detectors shall be listed for the air velocity in which they are installed.

4. At each connection to a vertical duct or riser serving two or more stories from a return air duct or plenum on an air handling system. In Group R-1 and R-2 occupancies a listed smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cfm (2.4m³/s) and serving not more than 10 air inlet openings. These detectors are not required at return openings located in a corridor that is protected by full corridor or full floor area detection. Activation of these devices shall initiate an alarm signal at the fire alarm control unit.

3. In all interior corridors serving as a means of egress for Group R-1, R-2 and R-4 occupancies, with an occupant load of 10 or more.

4. Not less than one foot but no more than three feet on the occupied side of each door that enters a refuge area, elevator lobby and exit stairway which does not directly exit from a refuge area, for occupancies other than R-1, R-2 and R-4.

5. At the top of stairwells and in sprinklered elevator hoistways. These devices shall initiate an alarm condition and illuminate the respective indicator at the graphic annunciator. They shall not initiate occupant notification or the smoke control sequence.

6. Where unenclosed vertical openings are permitted by IBC Section 712, smoke detectors shall be located around the perimeter of the opening, on each level, not less than four feet from the edge of the opening. Unenclosed stairway and escalator openings shall comply with this Section and IBC 712.1.3. Openings in other than I-2 and I-3 occupancies shall comply with IBC Section 712.1.9. See Section 907.2.14 for atriums.

7. At unenclosed openings, where shaft enclosures are not required in accordance with Exception 2, 7 or 11 to Section 708.2 of the IBC or IBCA. Detectors shall be located at the perimeter of the opening, on each level, not less than 4ft. (1.219m) and not more than 8ft. (2.4384m) from the edge of the opening. Detectors at the highest level shall be installed to provide coverage 30ft. (9.144m) beyond the perimeter of the projected opening. For atriums as defined by this code, see Section 907.2.14.

8. At vertical openings for non-required stairwells/escalators in Group B and M occupancies. Smoke detectors shall be installed adjacent to the floor side of each opening where the area of the floor opening between stories does not exceed twice the horizontal projected area of the escalator or stairway and a smoke management system is provided in accordance with Section 909.

Section 907.2.13.2 Fire department communication system is retained and amended as follows:

907.2.13.2 Fire department communication system. Two-way telephone communication services shall be connected to a UL 864 listed fire alarm system. Design of the fire department communications system shall consist of both of the following:

1. Hardwired components, in accordance with Section 907.2.13.2.1, consisting of plug-in phone jack, permanent handsets, amplifiers and cable system for selective and “all-call” operation. Components shall be listed under UL product category code designation UOXX.
2. Radio communications using the emergency responder radio communications enhancement System (RES) in accordance with Section 510, designed and installed for full coverage in accordance with Section 510.1.1 coverage requirements.

Section 907.2.13.2.2 Hardwired systems is retained, renumbered and amended as follows:

907.2.13.2.2 Hardwired systems. An approved A two-way, Fire Department communication system shall be provided for Fire Department use. Each phone on the two-way Fire Department communication system shall have a separate control switch on the fire alarm control unit which distinctly identifies the location of the phone in use. The vertical riser and distribution wiring shall be installed in accordance with the National Electrical Code and shall be listed two-hour cable, Class A riser or run in a minimum two-hour rated enclosure. Comply with the pathway survivability requirements of NFPA 72, Chapter 24.

907.2.13.2.2.1 Handsets. Both Permanently mounted and mobile telephone handsets shall be provided. Each permanently mounted handset shall initiate a signal from the handset to the FCC. Permanently mounted telephone handsets shall be provided in the locations listed below:

1. Building engineer’s office
2. Each mechanical room with fans used for smoke control
3. Emergency and standby power rooms
4. Each fire pump room
5. Rooms containing the primary means to disconnect electrical service
6. Each elevator equipment room

Section 907.2.13.3 Alarm notification is retained as follows:

907.2.13.3 Alarm notification. Alarm notification in high-rise buildings shall comply with Section 907.5 and notify occupants on the floor in alarm, the floor above, the floor below and at the level of the fire command center. Silence function shall be provided to independently silence notification appliances at the level of the FCC. This function shall be accomplished by an approved switch located in the FCC.

Section 907.2.13.4 Smoke control system activation is retained and amended as follows:

907.2.13.4 Smoke control system activation. Smoke control systems shall be automatically activated by alarm-initiating devices including return riser duct detectors, water flow switches, manual pull stations, special extinguishing systems activation and manual operation from the fire command center (FCC), in accordance with Sections 907.2.13.4.1 and 907.2.13.4.2. After the initial alarm activation, any subsequent automatic alarm activation on another floor shall initiate the floor exhaust sequence per Section 907.2.13.4.2.

Exception: Main sprinkler system water flow, heat or smoke detectors located in stair or hoistway enclosures, kitchen hood suppression activation and sprinkler system water flow in building service chutes or shafts. Where building shafts are protected with automatic sprinklers for reduction in shaft construction fire rating, a separate riser shall be provided.
907.2.13.4.1 Activation of pressurization. Activation of stair and elevator hoistway enclosure pressurization shall be initiated by the activation of any alarm-initiating device in accordance with Section 907.2.13.4 above.

2. Activation of any manual fire alarm box.

907.2.13.4.2 Smoke control exhaust. Exhaust in a smoke control zone shall be automatically activated by any automatic fire alarm or sprinkler initiating device within the respective smoke control zone. Unless otherwise approved by the fire code official, each floor of a high-rise building shall be considered a separate smoke control zone.

Exceptions:
1. Where floors are open to each other as permitted by IBC or IBC as amended, each floor shall be considered a separate smoke control zone.
2. Kitchen hood suppression system activation.

Section 907.2.13.6 Annunciation is retained, renumbered and amended as follows:

907.2.13.6 907.2.13.5 Annunciation. Graphic annunciation per shall be provided in accordance with Section 907.6.4.1.2 or computer graphic annunciation per 907.6.4.1.3 shall be provided.

Exception: Where approved by the fire code official, a computer graphic display shall be provided per Section 907.6.4.1.3.

Section 907.2.13.7.1 Elevator status/control panel is retained, renumbered and amended as follows:

907.2.13.7.1 907.2.13.6 Elevator status/control panel. An elevator status/control panel shall be provided. The elevator status/control panel shall comply with DFD policy and:

1. Identify each elevator cab numerically and the floors it serves. Identify corresponding cab number in elevator cab at the permanent handset.
2. Indicate which elevator(s) that are operating are on emergency power.
3. Have a placard at elevator status/control panel stating how many elevators can operate under emergency power simultaneously.
4. Indicate elevator car position.
5. Have key switches as required for selective activation of cars if all are not capable of simultaneous operation on secondary power provided with emergency power for simultaneous operation.

Section 907.2.13.6.1 Fire service and occupant evacuation elevator status panels is added as follows:

907.2.13.6.1 Fire service and occupant evacuation elevator status panels. Status of designated fire service and occupant evacuation elevators shall be displayed on an approved standard emergency services interface in accordance with NFPA 72, 21.5 and 21.6. These indications may be combined with the requirements of 907.2.13.6 as approved by the fire code official.
Section 907.2.13.8 Emergency generator status panel is retained, renumbered and amended as follows:

907.2.13.8 **Emergency status generator status panel.** An emergency generator status panel shall be provided. The emergency generator panel shall show:

1. Operating status (on-off) and malfunction indication panel as required by NFPA 110
2. Indication of transfer switch position (normal-emergency)
3. Indication that generator is in automatic mode
4. Main fuel oil storage tank low fuel level alarm.

Section 907.2.13.9 Fire pump status panel is retained, renumbered and amended as follows:

907.2.13.9 **Fire pump status panel.** A fire pump status panel shall be provided. The fire pump panel shall have:

1. Remote operating status indication panel as required by NFPA 20.
2. Motor/engine running/on or off. Pump running indication shall be transmitted to the fire alarm control panel as a supervisory signal and distinctly annunciated.
3. Low fuel level alarm for fire pump fuel tank.

Section 907.2.14 Atriums connecting more than two stories is retained and amended as follows:

907.2.14 **Atriums connecting more than two stories.** A fire smoke detection and smoke exhaust system shall be provided in atriums that connect more than two stories. The smoke exhaust system shall be activated designed in accordance with this section Section 909.14.

907.2.14.1 **Activation.** Activation of two smoke detectors in the atrium shall initiate the atrium exhaust sequence. In high-rise buildings, activation of a smoke detector located in areas separated from the atrium by a smoke barrier shall operate in accordance with Section 907.2.13.4.

907.2.14.1.2 **Detection.** Detection shall be as follows:

1. Area type smoke detectors, spaced in accordance with NFPA 72, shall be installed at the atrium ceiling where the ceiling is 30 feet (9.144 m) or less from the floor of the atrium. If the ceiling is greater than 30 feet (9.144 m) from the atrium floor, beam type detectors shall be installed. A detection system with alarm verification may be installed. The initial device in alarm shall initiate a supervisory condition at the fire alarm panel.

2. On the underside of projections into the atrium, spaced in accordance with NFPA 72.

3. Around the perimeter of the atrium opening on all floors open to the atrium. The detectors shall be spaced not more than 30 feet (9.144 m) on center and shall be located within 15 feet (4.572 m) of the atrium opening.
4. In high-rise buildings, where any part of the floor is open to an atrium, smoke detectors shall be located throughout the floor not included in the atrium area for every 2500 sq. ft. (232.258 sq m) of occupied floor space. No smoke detector shall serve more than one smoke zone.

5. All smoke detectors shall be accessible for maintenance and testing.

Sections 907.2.20.1 Smoke detection in covered malls is retained and amended as follows:

907.2.20.1 Smoke detection in covered malls. Per Section 907.2.14.1.2 smoke detection shall be provided in accordance with as follows:

Section 907.2.24 Airport buildings and structures is retained and renumbered as follows:

907.2.24 Airport buildings and structures. See NFPA 415 as amended per IBC Appendix NS, and Section 915.

Section 907.2.23 Battery rooms is retained and amended by adding an Exception as follows:

907.2.23 Battery rooms. An approved automatic smoke detection system shall be installed in areas containing stationary storage battery systems having a liquid capacity of more than 50 gallons (189 L). The detection system shall be supervised by an approved central, proprietary, or remote station service or a local alarm which will sound an audible signal at an approved location on the premises outside the battery room. Where a local alarm is installed, provide signage indicating “BATTERY ROOM ALARM – CALL 911.” In buildings with a monitored sprinkler or fire alarm/detection system, the battery room detectors shall be connected to the building fire alarm control panel.

Exception: A dedicated, detached on grade structure not to exceed 1,000 square feet.

Section 907.4.1 Duct smoke detectors is retained, renumbered and amended by replacing Exception 1 as follows:

1. Spot-type smoke detectors may be used for return air system connection to vertical risers serving two or more stories per NFPA 72. Detectors shall be listed for the maximum anticipated airflow velocity. Detectors concealed above the ceiling shall be provided with a remote indicating light mounted on the ceiling directly below the device. Remote indicating lights shall be installed in an accessible, visible area directly below or adjacent to the detector in accordance with Section 907.5.3.1.2.

Section 907.4.2 Delayed egress locks is retained, renumbered and amended by adding the following at the end of the last sentence:

907.3.2 Delayed egress locks. Where delayed egress locks are installed on means of egress doors in accordance with Section 1008.1.9.7, an automatic smoke or heat detection system shall be installed as required by that section …and in compliance with IBCA Appendix L-Q.

Section 907.4.3 Elevator emergency operation is retained, renumbered and amended as follows:
907.4.3 907.3.3 Elevator recall and shunt trip emergency operation. Automatic fire detectors installed for elevator emergency operation shall be installed in accordance with ASME A17.1 and NFPA 72. Elevator recall and shunt trip shall be provided for all new elevators. Where required, fixed temperature 190 degree F heat and smoke detectors shall be provided for shunt trip and recall operation, located in accordance with NFPA 72. Where sprinklers are not provided in elevator hoistways in accordance with NFPA 13, 8.15.5, 135 degree F heat detectors shall be installed at the top of the hoistway for recall operation. Where elevator machinery is installed in a non-sprinklered hoistway, 135 degree F heat detectors shall be installed at the top of the hoistway for recall operation. Smoke detectors shall be installed in all machine rooms, control rooms and machine and control spaces. Where the pit of the hydraulic elevators are not sprinklered in accordance with NFPA 13, 8.15.5.2, a 135 degree F heat detector shall be installed within 24” of the floor of the pit for the required recall operation. Where environmental or other conditions prohibit installation of smoke detectors for recall, 135 degree F fixed temperature heat detectors shall be permitted to substitute for the required recall smoke detectors. In buildings with a fire alarm system, these detectors shall be connected to the building fire alarm system.

Exception: For existing buildings undergoing an elevator alteration, replacement or new installation, an administrative modification shall be submitted for approval where an existing complying fire alarm control unit cannot be expanded within its listing to accommodate the additional required devices for recall and shunt trip. Upon approval by the fire code official, a dedicated “elevator recall and supervisory panel” shall be installed in accordance with the provisions for buildings without a fire alarm system. This panel shall report alarm and supervisory signals to the main FACP. The administrative modification shall state the practical difficulties involved in incorporating the recall/shunt trip devices into the existing fire alarm system.

Sections 907.3.3.1, 907.3.3.2, 907.3.3.3, 907.3.3.4 are retained, relocated from 907.4.3 and amended as follows:

907.4.3 907.3.3.1 In buildings without a fire alarm system, system smoke detectors and a dedicated fire alarm system control unit shall be provided that is designated as an “elevator recall control and supervisory panel.” The system shall be designed and installed in accordance with NFPA 72 and ASME A17.1.

907.4.3 907.3.3.2 In fully sprinklered buildings, Where sprinklers are provided in elevator shafts and machine rooms, spaces or control rooms or spaces, elevator power shunt trip shall be activated prior to sprinkler operation in accordance with NFPA 72. Where MRL elevator equipment is installed in a fully sprinklered building, smoke and heat detectors shall be provided at the top of the hoistway. Recall smoke detectors shall be installed in the control equipment space. Heat detectors for shunt trip shall be installed in the control equipment space if it is protected by sprinklers.

907.4.3 907.3.3.3 Shunt trip circuit breakers shall be located in either the main power distribution room or installed in the elevator machinery room/space in a NEMA 3R enclosure. Elevator power shunt trip shall be provided for elevator shut down prior to sprinkler operation in accordance with NFPA 72.

907.4.3 907.3.3.4 System smoke detectors shall be located in elevator lobbies, sprinklered hoistways and machine/control rooms/spaces. Activation of these smoke detectors shall return to grade level, nonstop, all elevators serving that alarm zone, lobby or with control equipment in the
affected machine/control room/space except for the smoke detector in the elevator lobby at grade level which shall return the elevators to an alternate level. Elevators without a landing at grade level shall be returned to the landing that is closest to grade level or other approved level. The alternate level shall be approved by the fire code official. Elevators shall remain at the level where they returned, with doors open, in accordance with IBC Section 3003, until being manually overridden by the operator key switch required by ASME A17.1 or the elevator control panel in the FCC. Use of detector relay bases for recall activation is specifically prohibited.

**Exception:** Upon recall, elevators in pressurized hoistways shall return to the designated or alternate level. Doors shall remain open for 60 seconds and then close.

**Exception:** For existing buildings undergoing an elevator upgrade, replacement or new installation, an administrative modification shall be submitted for approval where an existing complying fire alarm control unit cannot be expanded within its listing to accommodate the additional required devices for recall and shunt trip. Upon approval by the fire code official, a dedicated “elevator recall and supervisory panel” shall be installed in accordance with the provisions for buildings without a fire alarm system. This panel shall report alarm and supervisory signals to the main FACP. The administrative modification shall state the practical difficulties involved in incorporating the recall/shunt trip devices into the existing fire alarm system.

**Section 907.4.3.1 Elevator firefighter indicator is retained, renumbered and amended as follows:**

**907.4.3.1–907.3.3.5 Elevator firefighter indicator.** Section 2.27.3.2.6 of ASME A17.1/CSA B44-2007 is deleted as a reference.

**907.4.3.1.1 907.3.3.5.1 New elevators.** When elevator recall is initiated by detection devices located in the elevator lobby, the firefighter indicator shall illuminate steady. Independent of the initiating device, when a detection device located in the elevator hoistway, machine room or other elevator control space activates, the firefighter indicator shall illuminate intermittently (flashing).

**907.4.3.1.2 907.3.3.5.2 Alterations to existing elevators.** Where an existing elevator is modified under any alteration encompassing a scope of work described under 7CCR 1101-8, the elevator firefighter indicator shall function in accordance with Section 907.3.3.5.1. This requirement applies when any alterations are made to the firefighters emergency operation or any of the following conditions exist:

1. Substantial alteration of a conveyance as defined by state regulations Section 1-4(11)
2. An elevator presents a material risk as required by state regulations Section 2-7(1)
3. The use or occupancy of the building changes
4. Elevators undergoing controller replacement as part of an alteration, in accordance with IFCA Section 607.1

**Section 907.5.3.2 Remote indicating lights is retained and renumbered as follows:**
907.5.3.2 Remote indicating lights. A remote indicating light shall be installed for detector(s) within each room with an entry door. The indicating light shall be located on the wall or ceiling above the door and within 12 inches (30.48 cm), on the exit corridor side. This shall include each door leading through adjoining or intervening rooms from an exit corridor to that room (progressive type). Remote indicating lights shall be installed on the ceiling directly below detectors located above ceilings. Remote indicating lights shall latch "on" and remain lit (steady, not flashing) until the fire alarm system is reset.

Exception: Remote indicating lights may be deleted where a point-lit or computer graphic annunciator is provided.

Section 907.4.3.1 Automatic sprinkler system is renumbered to 907.4.3.2.

Section 907.6 907.5 Occupant notification systems is retained, renumbered and amended by replacing the Exception as follows: is amended by adding Exceptions 2 & 3:

2. Smoke alarms in dwelling units and rooms used for sleeping purposes in R-1 occupancies. Duct detectors shall initiate a supervisory signal only.

3. Occupant notification shall not activate upon operation of detectors at the top of stairwells or in elevator hoistways or main or service chute water flow devices.

Exception: Where notification systems are specified for operation in accordance with other provisions of Section 907.

Section 907.6.2 Alarm notification appliances is retained and renumbered as follows:

907.6.2 907.5.2 Alarm notification appliances. Audible and visible alarm notification shall be provided to alert occupants of the area having a fire alarm system as well as in the means of egress serving the occupancy. The fire alarm control panel shall incorporate an alarm silencing switch that shall only de-activate the audible notification appliances until the system is manually reset. Alarms shall be provided per Sections 907.5.2.1, 907.5.2.2 and 907.5.2.3, and as required by other sections of this code. Notification appliances shall be listed for the purpose.

Section 907.6.2.1 907.5.2.1 Audible alarms is, retained, renumbered and amended by adding the following after the last sentence:

In theaters, nightclubs, dance halls, ballrooms and similar areas, means shall be provided to reduce or eliminate background noise upon activation of the fire alarm system. The fire alarm system shall produce a sound level at least 15 dBA above the reduced average ambient sound level or 5 dBA above the maximum sound level having a duration of at least 60 seconds whichever is greater. The reduced sound level shall not require audible notification to exceed 110 dBA. Fire alarm audible notification shall comply with Sections 907.5.2.1.1 and 907.5.2.1.2.

Section 907.6.2.4 907.5.2.1 Audible alarms Exception 1 is retained and renumbered as follows:

1. Alternate alarm notification shall be permitted in critical care areas of Group I-2 occupancies as approved by the fire code official.

Section 907.5.2.1.3 Low frequency alarms is added as follows:
907.5.2.1.3 **Low frequency alarms.** Low frequency alarm signal appliances shall be provided for general alarm notification to all sleeping units in accordance with NFPA 72, 18.4.5.3.

Section 907.6.2.2.3 Alternate uses is retained and renumbered as follows:

907.6.2.2.3 **Alternate uses.** The emergency voice/alarm communication system may be used for other emergency communication announcements with the approval of the fire code official.

Section 907.5.2.2.6 Low frequency alarm signal is added as follows:

907.5.2.2.6 **Low frequency alarm signal.** A minimum of two cycles of an alert tone complying with NFPA 72, 18.4.5.3 shall precede and follow required voice evacuation messages.

Section 907.7.7 Survivability is retained, renumbered and amended as follows:

907.7—907.5.2.2.7 **Survivability.** Where occupant relocation or partial evacuation is part of the building life-safety plan, fire alarm system communication and other required emergency communication systems survivability shall be provided in accordance with NFPA 72 Chapter 24 and this Section. Audible and visible notification appliance circuits, area of refuge emergency communications and firefighter two-way communications, shall be designed and installed such that attack by fire within an evacuation zone shall not impair control and operation of the system outside the evacuation signaling zone.

907.7—907.5.2.2.7.1 **System design.** Where building occupant partial evacuation/relocation is provided, the emergency voice/alarm communication system, including visual appliances, area of refuge emergency communications and firefighters two-way communications shall utilize listed circuit integrity (CI) cable or a dedicated 2-hr fire-rated vertical shaft design requirements of NFPA 72 for pathway survivability Levels 2 and 3. Communication risers shall be installed in metallic conduit where required and shall comply with NFPA 70 and NFPA 72. Circuit classifications shall comply with NFPA 72, Chap 12.

**Exception:** Notification appliance circuits shall not be run in stairwells, except for the specific devices located in the stair enclosure.

907.7.2—907.5.2.2.7.2 **Communication systems in existing buildings.** Where occupant partial evacuation/relocation notification is provided and the existing communication systems comply with one of the performance design alternatives below, those systems shall be permitted to remain. The systems shall be maintained in accordance with the original design.

1. Separate "A" and "B" risers with alternating floor speakers, designed such that no more than ½ the speakers on a floor shall be affected by loss of any one amplifier, pre-amplifier or cable within the floor or communication zone.

2. Class A wiring configuration for risers and floor distribution provided system survivability is maintained in the event of a failure of any distributed or banked amplifier to limit the failure to no more than ½ the notification appliances on the floor plate in the notification zone. Internally backed-up amplifier modules are acceptable.
3. Class A wiring configuration for risers and class B floor distribution wiring with alternating speakers such that system survivability is maintained in the event of a failure of any distributed or banked amplifier to limit the failure to no more than ½ the notification appliances on the floor plate in the notification zone. Internally backed-up amplifier modules are acceptable.

Section 907.6.2.2.4 Background noise reduction is retained, renumbered and amended as follows:

907.6.2.2.4 907.5.2.2.7 Background noise reduction. In very high noise areas, such as theaters, nightclubs, ballrooms and dance halls, the system shall be designed to reduce or eliminate the background noise upon alarm initiation activation.

Section 907.6.2.3.3 Visible notification appliances in Groups I-1 and R-1 occupancies is retained, renumbered and amended as follows:

907.6.2.3.2 907.5.2.3.2 Visible notification appliances in Groups R-1, R-2 and I-1 occupancies. Group R-1, R-2 and I-1 sleeping and dwelling units shall be provided with visible notification activated by an integral in-room smoke alarm required by IFC 907.2.11. Visible notification appliances shall also be provided which are activated by the building fire alarm and/or automatic sprinkler system. The minimum number of sleeping units per building to be provided with visible notification appliances shall be in accordance with IFC Table 907.5.2.3.2. All accessible units required by IBC Table 1107.6.1.1 shall be provided with visible notification appliances as part of this requirement.

Section 907.5.2.3.3 Group R-2 is deleted.

Section 907.6.2.3.5 Visible notification appliances in R-3 and R-4 occupancies is retained, renumbered and amended as follows:

907.6.2.3.5 907.5.2.3.3 Visible notification appliances in R-3 and R-4 occupancies. Sleeping rooms shall be provided with visible notification activated by an integral in-room smoke alarm. Visible notification appliances shall also be provided which shall be activated by the building fire alarm and/or sprinkler system, where provided.

Exception: Buildings that do not contain more than two dwelling units.

Section 907.6 Installation and monitoring is replaced as follows:

907.6  Installation and monitoring. A fire alarm system shall be installed and monitored in accordance with this section and NFPA 72.

Section 907.7.1 Wiring is retained and renumbered as follows:

907.7.1 907.6.1 Wiring. Fire alarm system and communications wiring shall comply with provisions of NFPA 72 and NFPA 70 (NEC) Article 760. Wiring color code shall be consistent throughout the entire system and permanently posted inside the fire alarm control panel. Separate colors shall be used for each type of initiating circuit, indicating circuit and control circuit. Color coding shall be by continuous colored insulation or by application of 6-inch (15.24 cm) long colored heat-shrink tubing at the end of each conductor at all splices, taps and terminations. Wiring shall not
be painted. Wireless protection systems utilizing radio-frequency transmitting devices shall comply with the special requirements for supervision of low-power wireless systems in NFPA 72.

**Section 907.7.1.1 Monitoring integrity is retained, renumbered and amended as follows:**

**907.7.1.1 Monitoring Integrity.** Conductors and connections that interconnect equipment, devices and appliances shall be monitored for integrity, as set forth in accordance with NFPA 72, Chapter 12. Power supplies shall be monitored for integrity per NFPA 72, Chapter 10.

**Section 907.7.3 Zones is retained, renumbered and amended as follows:**

**907.7.3–907.6.4 Zones.** All fire alarm systems shall be divided into alarm zones. When two or more alarm zones are provided, visible **annunciation zone indication** shall be provided at an approved location. Zones shall comply with this section unless otherwise approved by the Fire Department fire code official. Trouble and supervisory signals shall be **annunciated** indicated in accordance with this section and NFPA 72. Annunciator panels shall comply with Section 907.6.4.1. Annunciation zones shall comply with the following.

Each building level shall be annunciated separately as follows:

1. All manual devices.
2. All automatic devices.
3. Where standpipes are required per IFC Section 905, at each fire sprinkler water flow detection device. Sprinkler zones shall comply with NFPA 13.

Separate visible indication shall be provided for:

1. Main fire sprinkler flow. Individual risers per Section 903.
2. Each special extinguishing system
3. Each non-required system
4. Each special detection system
5. Each stairway (where detection is provided)
6. Each emergency alarm system per Section 908
7. Each elevator hoistway and machine room (separate zone indication for smoke and heat detectors as provided)
8. System trouble
9. Sprinkler control valves (supervisory only). Maximum 20 devices per zone
10. Duct detectors (supervisory only). Maximum 20 devices per zone
11. Fire pump running supervisory indication
12. Elevator shunt trip power supervisory indication
13. Radio enhancement system power supervisory indication
14. Refuge area two-way communication supervisory indication
15. Radio enhancement system malfunction supervisory indication
16. Radio communicator trouble

**Section 907.7.3.1 Annunciator panels is retained, renumbered and amended as follows:**

**907.7.3.1–907.6.4.1 Annunciator panels.** Annunciator panels shall be point-lit graphic or computer graphic or a directory LED point display type as approved by the fire code official. Upon initiation of an alarm, supervisory or trouble condition the panel shall record the status.
Alarms shall “lock-in” until the fire alarm system is reset with a dedicated reset switch located at the main fire alarm control panel. Annunciation lights shall be red for “Alarm” and yellow for “Trouble” and “Supervisory” signals. Each signal type shall be distinctly identified.

**Exception:** Where a monitored building fire alarm control unit is not provided, annunciator panels are not required for a dedicated function elevator recall control and supervisory control unit or sprinkler waterflow and supervisory control unit.

**907.7.3.1.1 907.6.4.1.1 Directory annunciator.** A directory annunciator shall be provided as required. Location shall be field approved. The annunciator shall be provided with individual alarm indications per Section 907.7.3 for each zone. Indicators shall be of sufficient size and intensity to be visible in normal lighting.

**907.7.3.1.1 907.6.4.1.1.1 Building plans.** Scaled floor plans shall be permanently mounted adjacent to directory type annunciator panels. Plans shall be of durable construction, easily readable in normal lighting, protected by a smooth, transparent, plastic surface and shall include every building level including mezzanines and roofs. Plan content shall comply with Appendix KN.

**907.7.3.1.2 907.6.4.1.2 Point-lit graphic annunciator.** A graphic annunciator shall be provided as required in Sections 907.7.3.1.2.1 through 907.7.3.1.2.3.

**907.7.3.1.2.1 907.6.4.1.2.1 When required.** A point-lit graphic annunciator is required for the following: underground buildings, high-rise buildings, buildings with a smoke control system per Section 909 and where required for a pre-action fire sprinkler or clean agent extinguishing system per Section 907.7.6.

**907.7.3.1.2.2 907.6.4.1.2.2 Location in building.** Location of annunciators shall be field approved. Locations depicted on reviewed drawings are not permitted until field verification is secured.

**907.7.3.1.2.3 907.6.4.1.2.3 Graphics.** The annunciator shall consist of building plans per Appendix KN, with the addition of discrete LED indications for each alarm and supervisory initiating device. The annunciator shall be provided with a momentary push-button “Lamp Test.” Separate indications for “Trouble” and “Supervisory” conditions shall be provided.

**Section 907.7.3.1.3 Computer graphic display is retained and renumbered as follows:**

**907.7.3.1.3 907.6.4.1.3 Computer graphic display.** Computer graphic displays shall be permitted for individual system designs only with the approval of the fire code official. Systems shall be fully compliant with UL 864. Systems shall contain a full color primary and secondary display. Demonstration of the specific equipment to be installed with the actual operating software for the proposed system shall be presented to the fire code official. Operator interface to the graphic shall be based on:

1. Ease of use. Primary operator interface shall be standard 2-button mouse driven. Optional secondary interfaces may be provided.
2. Adequacy of display for operational purposes. Displays shall be capable of presenting the entire floor plate with all devices and device status shown on an initial alarm screen. On any alarm indication, the floor plate in alarm shall come up on the screen with all devices shown and the device in alarm highlighted. Display segmentation from this initial view shall be possible for expanding the view of the area of alarm incidence. Displays shall be contrasting black lines and lettering on a white background.

3. Flexibility of system for upgrade.


5. Plain English report generation of events, histories, maintenance schedules, device status and settings and user access.

6. UL-864 listed event-driven primary display. Secondary display(s) as approved by the fire code official. All displays shall be specified for 24-hour, 7-day continuous operation. A 3-year warranty is recommended.

7. Secure access.

8. Fire alarm device icons shall be per NFPA 170 or graphic icons as approved by the fire code official.

Building plans per Section 907.7.3.1.1 907.6.4.1.1 shall be provided and shall be located as approved by the fire code official.

Section 907.7.6 Pre-action and clean agent extinguishing systems is retained and renumbered as follows:

907.7.6. Pre-action and clean agent extinguishing systems. Pre-action and clean agent extinguishing systems shall have a dedicated releasing panel and annunciator connected to the building fire alarm system where provided. Pre-action systems shall be installed per NFPA 13. Clean agent systems shall comply with Section 904.10. Control panels shall be listed for releasing service. Control panel and annunciator shall be located outside the protected area in a location approved by the fire code official. Areas protected by a single releasing panel shall be contiguous. Shop drawings for system installations shall be submitted per Appendix KN, NFPA 13 and NFPA 2001. Cross-zoned detection systems shall transmit a building alarm on activation of the first initiating device. Fire protection piping and initiating device, control and annunciation drawings shall be submitted together. Clean agent systems are supplemental and not permitted to substitute for required automatic sprinkler systems unless specifically approved by the fire code official.

907.7.6.1. Annunciation. Pre-action and clean agent systems shall be provided with a local directory annunciator zoned for manual, smoke detector, flow alarm and tamper supervisory indications per Section 907.6.4.2. Systems with under floor and/or above ceiling detection devices shall be provided with a point-lit graphic annunciator in accordance with Section 7/3/1/2 643. Systems shall annunciate alarm and supervisory conditions at the main building fire alarm panel.

Section 907.7.6.2 Application of pre-action systems is retained, renumbered and amended as follows:
907.6.2 907.6.3.2 Application of pre-action systems. The types of pre-action systems that are approved for use per NFPA 13 are: single interlock, non-interlock and double-interlock systems. The installation of double-interlock pre-action systems shall be approved only for freezing facilities subject to approval by the fire code official.

Section 907.7.8 Non-required full or partial systems is retained and renumbered as follows:

907.7.8–907.10 Non-required full or partial systems. Fire alarm systems and fire detection systems not required in this Code or by special agreement are not required to be connected to a central station. Where non-required fire alarm and/or fire detection systems are connected to a central station, the central station shall be an approved Class I central station. Multiple central station connections from one building are not permitted unless approved by the fire code official. Installation of non-required full or partial fire alarm or fire detection systems shall comply with NFPA 72, Chapter 23. Zone annunciation shall be provided in accordance with Section 907.6.4.1. Annunciation and control panels for non-required or partial systems shall be of an approved type and have permanent signage indicating “Non-required System” or “Partial System.” Partial and non-required systems shall be maintained operational. System removal shall be permitted only with the approval of the fire code official.

Exception: New and existing dwellings regulated by the International Residential Code (IRC).

907.7.8.1–907.10.1 907.76.8.1 General system design and installation requirements. Shop drawings must be submitted for approval. Documents shall be stamped and signed by a professional engineer licensed by the State of Colorado and shall comply with Section 907.1.2. Non-required systems installed in a building with a required fire alarm system shall have the non-required system connected to the required fire alarm control panel. Each non-required system shall annunciate as a separate zone at the required fire alarm control panel. Multiple fire alarm control panels are not allowed where a required system is installed.

907.7.8.2–907.10.2 Design criteria. Design of non-required fire alarm systems shall comply with the following:

1. A minimum of one audible/visible alarm appliance per floor in an approved location.
2. One initiating device zone per floor.
3. Existing duct detectors are not required to be connected to a non-required system.
4. Secondary power is required for the FACP per NFPA 72.
5. Multiple non-required, non-monitored systems in a building are not required to be interconnected.

SECTION 908
EMERGENCY ALARM SYSTEMS

Section 908.8 Emergency alarms is retained and amended as follows:

908.8 Emergency alarm systems. Emergency alarm systems shall be monitored by the building fire or sprinkler alarm control panel, where provided. An emergency alarm system shall be annunciated as a separate zone on the building annunciator and transmitted to the supervising station. Where multiple emergency alarm systems are installed, each shall be monitored and annunciuated separately. Where the
Fire or sprinkler alarm control panel is not monitored by a supervising station, annunciation shall be provided in an approved location.

Separate emergency alarm control panels monitored by the building fire or sprinkler alarm control panel, or emergency alarm panels installed in buildings permitted without a fire or sprinkler alarm system shall be approved. Separate emergency alarm control panels shall be installed in approved locations outside of the potentially contaminated areas. Areas protected by a single separate emergency alarm control panel shall be contiguous. Multiple separate emergency alarm control panels are permitted.

Floor plans of the area protected by an emergency alarm system shall be provided per the requirements of Section 907.7.3.1.1.1 907.6.4.1.1.1. If two or more zones are provided on an emergency alarm system, directory-style LED annunciation shall be provided at the emergency alarm control panel. Systems with under-floor or above-ceiling initiating devices shall be provided with a point-lit graphic annunciator in accordance with Section 907.7.3.1.2 907.6.4.1.2 at the emergency alarm control panel. Supervisory and trouble signals shall be annunciated separately with yellow LEDs and alarm signals shall be annunciated with red LEDs.

Manual emergency alarm initiating devices shall be annunciated on separate zones from automatic emergency alarm initiating devices. Automatic emergency alarm initiating devices required for different hazards shall be annunciated on separate zones for each hazard. Automatic emergency alarm initiating devices for the same hazard located in separate rooms or areas, or separated by 100 feet or more in the same room or area shall be annunciated as separate zones.

Manual emergency alarm initiation shall be designed per this section and the manual fire alarm requirements of NFPA 72. Manual emergency alarm-initiating devices shall be yellow or amber, comply with the mounting requirements of IFC Section 907.5.2 907.4.2 and be installed outside of each interior exit and exit access door, and inside of each exterior exit and exit discharge directly serving the potentially contaminated area identified in IFC Sections 908.1 through 908.7.

Audible and visible emergency alarm notification appliances shall be installed on the interior of the areas identified in IFC Sections 908.1 through 908.6 908.7 per the notification requirements of NFPA 72. Audible and visible notification appliances along with clearly legible signage shall be installed inside and outside of these occupancies in approved locations to alert all occupants possibly entering the potentially contaminated area.

Audible emergency alarm notification shall have tone and pattern distinctly different from fire alarm notification. Visible notification appliances shall be amber strobes or beacons. Subject to the approval of the fire code official, complete notification per NFPA 72 throughout a building or facility beyond the potentially contaminated area is not required provided the potential for migration of the hazard to other occupied areas is small. Signage shall be placed adjacent to the amber strobes/horns. The sign shall have a minimum 2-inch block lettering with a minimum ½-inch stroke. The sign shall be on a contrasting surface of red and white and shall be of durable construction. Language shall be as approved by the fire code official.

Section 908.8.1 Emergency alarm systems shop drawings is added as follows:

**908.8.1 Emergency alarm systems shop drawings.** Shop drawings for emergency alarm systems shall be submitted for permit application as a deferred submittal per IBCA Section 133.5. Plan review and approval are required prior to issuance of a permit for system installation. Two sets of scaled, engineered installation shop drawings shall be submitted. Documents shall be of sufficient clarity and detail to fully describe the scope of work. Handwritten notes and comments on reproduced drawings are not acceptable.

Section 909 Smoke Control Systems is retained and amended as follows:
SECTION 909
SMOKE CONTROL SYSTEMS

909.1 Scope and purpose. This section applies to mechanical smoke control systems when they are required by other provisions of this code. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-venting provisions found in Section 910. Mechanical smoke control systems shall not be considered exhaust systems under Chapter 5 of the International Mechanical Code.

909.2 General design requirements. Buildings, structures or parts thereof required by this code to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions.

909.2.2 Specific requirements—Smoke exhaust control systems. As required by other sections of this code, smoke exhaust control system(s) shall be provided for all high-rise buildings, atriums, covered malls, underground buildings, assembly occupancies with smoke-protected seating, stages and areas per IBC Section 410, airport buildings in accordance with IBCA Appendix S, and assembly occupancies with an aggregate of 1,000 or more occupants in high-rise buildings. The smoke exhaust system(s) shall be configured and controlled to exhaust the fire floor or fire zone. This requirement shall be applicable to the Occupancy Groups as follows: A; B; E; M; R-1; R-2, and I-1 and I-3.

909.2.3 Specific requirements—Construction document submittals. Construction documents for smoke control systems shall be submitted for permit application with the construction drawings for the project per IBCA Section 154, including the seal and signature of the design professional responsible for the coordination of the smoke control design package. Included within this submittal shall be the following:

1. Code reference used as a basis of design, including any administrative modifications or Board of Appeals decisions.
2. Plans identifying each smoke control zone including a listing of smoke control equipment (fans) associated with each respective zone. A combination of vertical (section), horizontal (plan) and/or schematic views may be necessary to clearly depict each zone.
3. Plans shall identify location of smoke control duct inlet/discharge locations and all fire/smoke damper locations.
4. Detailed description of the systems interface to the emergency power system and plans detailing locations of panels (with schedules) and associated circuits and disconnects.
5. Plans shall identify HVAC systems—operating status (i.e., on/off) during a smoke control scenario, e.g., toilet exhaust, general HVAC, etc.
6. Written narrative sequence of operation for the complete smoke control system.
7. Basic fire alarm drawings shall be developed with sufficient detail to demonstrate system control/sequence.
8. Fans sizing calculations for each zone including stairways and hoistways.

9. Preliminary acceptance testing plan and procedure.

909.2.4 909.5 Specific requirements-- Shop drawing submittals (deferred submittal). The deferred submittal shall be consistent with the approved construction document submittal and reviewed by the engineer of record prior to submission to the Denver Fire Department in accordance with Appendix K.N.

909.5 909.6 Smoke barrier construction. Smoke barriers shall comply with IBC Section 710, and shall be constructed and sealed to limit leakage areas exclusive of protected openings. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

1. Walls: $A/A_w = 0.00100$
2. Exit enclosures: $A/A_w = 0.00035$
3. All other shafts: $A/A_w = 0.00150$
4. Floors and roofs: $A/A_F = 0.00050$

where:

- $A =$ Total leakage area, square feet ($m^2$)
- $A_F =$ Unit floor or roof area of barrier, square feet ($m^2$)
- $A_w =$ Unit wall area of barrier, square feet ($m^2$)

909.11 909.7 Power systems. The smoke control system shall be supplied with two sources of power. Primary power shall be from the normal building power system. Secondary power shall be from an approved emergency or standby source complying with the National Electrical Code NFPA 70. The secondary power source and its transfer switches shall be in a separate room from the normal power transformers and switchgear and shall be enclosed in a room constructed of not less than 1-hour fire barriers ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes. Transfer to secondary power shall be automatic and in compliance with the National Electrical Code NFPA 70.

909.11.1 909.7.1 Power sources and power surges. Elements of the smoke management system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span a 15-minute primary power interruption. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other approved means.

909.12.1 909.7.2 Wiring. In addition to meeting requirements of NFPA 70, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways in mechanical rooms, electrical rooms, elevator equipment rooms and vertical risers. Wiring shall not be painted.

909.16 909.8 Firefighter’s smoke control panel. A firefighter’s smoke control panel meeting the requirements of UL 864 and listed for smoke control under UL product category guide designation UUKL shall be provided and shall include manual control or override of automatic control for mechanical smoke control systems. Upon an alarm, the fire alarm system shall take direct control of all smoke control system components such as fans, dampers, activation of dedicated pressure control systems and status indication. The fire alarm system shall provide a signal to any temperature control or building automation systems for HVAC system enable/disable control and status. Where HVAC systems are utilized for smoke control the fire alarm system shall take direct control of those HVAC system components utilized for smoke control. Hard-wired interlock is acceptable. The fire alarm system shall provide automatic and manual override control and status. Terminal air distribution units may remain under their own normal building automation control. The panel shall be located in a fire command center complying with Section 509 in high rise buildings or buildings with smoke-protected assembly seating. In all other buildings, the
The firefighter’s smoke control panel shall be installed in an approved location adjacent to the fire alarm control panel. The firefighter’s smoke control panel shall comply with Appendix K.

909.16.1—909.8.1 Smoke control systems. The firefighter’s control panel shall be provided for manual or override of automatic control of mechanical smoke control systems. This panel shall graphically depict the individual smoke control system fan and damper controls, their relative location within the building, stairwells, hoistways, building pressurization and exhaust airflow, refuge area pressurization and all other smoke control zones that apply. This panel shall clearly show the building arrangement and smoke control zones served by the systems. The graphic panel shall be oriented to the building and include a North reference compass point. A combination of vertical (section) and/or horizontal (plan) graphic arrangement may be necessary. The operating control and status indicators on the FSCP shall have a maximum height from the floor of 6 feet, 6 inches and a minimum of 2 feet, 0 inches, and may require more than one section to accommodate height limitations. Layout, labeling and location of the fire fighters control panel shall be reviewed and approved by the Fire Department prior to fabrication.

909.17 909.9 System response time. Smoke control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as dampers and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts and other equipment. The total response time for individual smoke control systems to achieve their desired operating mode shall not exceed the following time periods:

- Fan operating at desired state – 75 seconds
- Damper position travel – 60 seconds

909.18 909.10 Testing of smoke control systems. Before the Fire Department accepts the smoke control systems and prior to initial occupancy, the smoke control systems shall be tested in their presence to confirm that the systems operate in compliance with this Section. In addition, all smoke control systems shall be tested annually and shall be maintained to perform its intended purpose under the code version with which it was built.

909.18.1 909.10.1 Acceptance testing. The requirements of acceptance testing defined hereinafter shall be the minimum requirements. All acceptance tests shall be witnessed by a Fire Department representative.

1. Furnish a testing procedure, reviewed by the smoke control system design professional engineer, to the Fire Department 72 hrs in advance of the acceptance tests being performed. The procedure shall define how compliance with the code will be demonstrated. The procedure shall also identify what instrumentation including artificial smoke generating equipment, will be used during the testing.

2. Smoke control systems testing shall include the following subsystems to the extent that they affect the operation of the smoke-control system:

   a. Fire alarm system (See NFPA 72, National Fire Alarm Code)
   b. Building Automation & Temperature Control System
   c. HVAC equipment
   d. Electrical equipment
   e. Power sources including Emergency or Standby power
   f. Automatic suppression systems
g. Automatic operating doors and closers  
h. Dedicated and Non-dedicated smoke-control systems  
i. Emergency elevator operation  

3. Prior to witnessed acceptance testing of the smoke control systems, the design professional engineer shall confirm and advise the Fire Department in writing that the entire smoke control system has been installed, air balanced and tested in accordance with its design, plans, specifications and this code.  

4. The following shall be notified so that they may witness the acceptance testing:  
   a. Design professional Engineer-of-Record  
   b. Building contractor  
   c. Owner’s representative  
   d. Denver Fire Department  
   e. Denver Building Department  

5. Unless otherwise approved by the Fire Department, sufficient smoke shall be generated to produce at least the volume of the smoke zone being tested within approximately five (5) minutes. All smoke-generating devices shall be supplied by the owner or his representative and shall meet with the approval of the fire code official.  

6. Acceptance testing shall demonstrate that the correct outputs are produced for a given input for each control sequence specified. The following control sequences shall demonstrate complete smoke-control sequence.  
   a. Normal mode  
   b. Automatic smoke-control mode for first alarm  
   c. Manual override of normal and automatic smoke-control modes  
   d. Return to normal  

7. After the smoke control system is activated, smoke shall not continue to migrate to other smoke zones of the building.  

8. Smoke control systems shall demonstrate the ability to inhibit smoke from migrating across smoke zone boundaries to other areas and containment within the active smoke zone. Smoke control system shall also demonstrate the continual reduction of smoke concentration from within the active smoke zone.  

909.11.2  909.10.2 Testing requirements. Tests shall be performed in full automatic mode with the building operating under both normal power and emergency power. Test equipment shall include manometer (calibrated within last 12 months), spring scale and other equipment as necessary to adequately measure and record system performance. Communications shall be provided between the test locations and the fire command center.  

1. For a building that is not a high rise, multiple tests on more than one floor or smoke zone shall be required to demonstrate proper operation.  

2. For high rise buildings, tests shall be conducted at a minimum of five (5) locations.
a. A floor in the lower third, a floor in the middle third and a floor in the upper third of the building.

b. With a floor in alarm, an additional automatic alarm shall be initiated on a floor immediately above or below the initial floor in alarm. All floors in alarm shall go to exhaust mode.

c. With a floor in alarm, a manual pull station on another floor shall be activated. Smoke control operation shall not be affected.

d. For atriums, more than one test may be required depending upon the atrium configuration, its relationship to adjacent spaces and if the atrium is located in a high-rise.

e. Activation of one smoke detector in each smoke control zone on each floor being tested.

f. Activation of at least one sprinkler flow switch.

g. Activation of at least one manual pull station.

3. For high rise buildings, pressure differentials shall be measured across stairway doors, across elevator/lobby/refuge corridor area doors and adjoining spaces, between atriums and areas immediately adjacent to atriums where atriums are part of a high rise building. Door opening force into stair enclosures or refuge areas shall not exceed 30 lbs. under any conditions.

4. Upon activation of the fire alarm system for each test, confirm that the smoke control system fans and dampers have assumed the correct operating condition for the type of alarm initiating device and the location of the initiating device. This shall be confirmed also at the smoke control panel in the fire command center.

5. Manually override the operation of a sampling of fans and dampers during each test, taking care not to damage system components. Return all override switches to their “auto” position after each test.

909.11.3 909.10.3 Annual tests. Annual tests shall be performed in accordance with Sections 909.11.3.1, 909.10.3.1 and 909.11.3.2-909.10.3.2, on all smoke control systems including those installed prior to adoption of this code. It is recognized that smoke control systems installed prior to adoption of this Code could have parameters that are different than those described in this section. In those cases, smoke control tests shall be adjusted accordingly to meet the intent of this section.

For high-rise buildings, every fifth year the annual test shall be performed in the presence of a representative of the Denver Fire Department Fire Prevention or Operations Division. DFD shall be notified five (5) days in advance of this test to determine a mutually-agreed upon date and time for performance of this test. An operational permit is required for this testing per IFCA 105.6.46.3.

909.11.3.1 909.10.3.1 Equipment operating tests. The following equipment operating tests shall be conducted annually on the smoke control system components:

1. Verify the proper control and status indication of smoke control dampers (i.e., "OPEN/CLOSED") and fans (i.e., "ON/OFF") by visual observation at each damper and fan location and at the smoke control status/control panel in the fire command center.
2. Verify that all smoke control dampers and fans assume the correct operating position under both normal and fire modes and when the manual override switches at the smoke control status/control panel are placed in the "auto" position.

3. Verify that the manual override switches function properly for smoke control dampers and fans.

4. Items 1, 2 and 3 above may be performed by qualified service technicians who are familiar with the proper operation of the smoke control systems and equipment. The engineer responsible for conducting the smoke control system performance tests shall develop the test procedures to be used and review the results obtained by the service technicians, including an actual sampling to confirm the accuracy of the test. A statement summarizing this review shall be included in the performance test report described in Section 909.18.4 that is required to be submitted by the engineer to the Fire Department.

5. A copy of the written test procedure and an accurate log of tests shall be maintained in the fire command center and at either the building management office or the maintenance office. A copy of the previous test report shall be submitted to the engineer responsible for the smoke control performance tests for the engineer's review and approval prior to the smoke control test. Any defects, system modifications and repairs shall be recorded in the log. Necessary corrections shall be made prior to the smoke control performance test.

909.18.3.2 Performance tests. Within 30 days after completion of annual equipment operating tests defined above, conduct the following smoke control system performance tests. The annual smoke control systems tests shall be conducted under the direct supervision of a professional engineer qualified in the testing of such smoke control systems.

1. Activate the smoke control systems manually for tests used to confirm minimum pressure differentials defined in this section.

2. Activate the smoke control systems automatically through the fire alarm system for tests used to confirm proper sequencing of the system components. Measure actual relative pressure differentials between areas in alarm and adjacent areas and actual door opening forces.

3. For high rise buildings, conduct smoke control tests, observations and measurements of all aspects of the smoke control system at a minimum of three (3) locations: a floor in the lower third, a floor in the middle third and a floor in the upper third of the building. Smoke control tests in subsequent years shall be conducted on previously untested floors, as may be practical so that all floors ultimately are tested.

4. For all other buildings, conduct smoke control tests, observations and measurements of all aspects of the smoke control system at a minimum number of locations to demonstrate proper performance as approved by the Fire Department. Each test shall attempt to involve as many different fan systems as practical. Smoke control tests in subsequent years shall be conducted on previously untested locations, as may be practical so that all locations ultimately are tested over a three year period.

5. Tests of the smoke control system shall be conducted by activation of at least one smoke detector in each smoke control zone on each floor being tested. One test of at least one of the smoke control zones shall include activation of one sprinkler flow switch. In addition, the smoke control tests shall include activation of at least one manual fire alarm box. For high rise buildings, pressure differentials shall be measured across stairway doors, between floors in alarm and floors immediately above and below floors in alarm, across elevator/lobby/refuge corridor area doors and adjoining spaces in Group R-1, R-2 or I-1.
occupancies, and between atriums and areas immediately adjacent to atriums where atriums are part of high rise buildings.

6. Upon activation of the fire alarm system for each test, confirm that the smoke control system fans and dampers have assumed the correct operating condition for the type of alarm initiating device and the location of the initiating device. This shall be confirmed also at the smoke control panel in the fire command center.

7. Manually override the operation of a sampling of fans and dampers during each test, taking care not to damage system components. Return all override switches to their “auto” position after each test.

909.18.4 909.10.4 Test reports. Within 30 days of completing any smoke control test, submit a test report to the Fire Department. A copy of the previous and current test reports shall be kept in the fire command center. The test report shall be written by the professional engineer who conducted the testing. The test report shall bear the seal and signature of the professional engineer. Any defects, modifications and repairs shall be recorded in a log kept in the fire command center and at either the building management office or the maintenance office. The test report shall include, but is not limited to the following:

1. Provide a brief description of the smoke control system installed in the building being tested, and state the year the building received its construction permit for the smoke control system. Provide a sequence of operation for the smoke control system.

2. Describe in general terms the equipment operating test procedures. Include a list of the equipment operating and smoke control test deficiencies along with a schedule of the proposed corrective action.

3. Describe detailed procedures followed during the equipment operating tests. Describe detailed procedures followed during the smoke control tests.

4. List test equipment used and outside air temperature and wind conditions at the time the smoke control tests were conducted.

5. State sequences and timing of the system operations during all smoke control tests (e.g., smoke detector activation time, fan start times, time for dampers to assume the correct position, etc.).

6. List the location of test measurements and the measured values for pressure differentials and door-opening forces for each test location.

7. Record any operational defects and performance deficiencies with respect to the requirements of this section, and state recommendations for corrective action. Include a schedule to re-test each deficiency. Submit results of any subsequent tests performed after completion of the corrective action.

8. Engineer’s assessment indicating that the smoke control system, as installed and tested, conforms to the requirements of Section 909.

909.18.5 909.10.5 Functional test requirements for smoke control system equipment. Testing of smoke control equipment shall be performed in accordance with this section to determine that the installed systems continue to operate in accordance with the approved design. Operational testing of the smoke control system shall include all equipment such as fans, dampers, controls, and doors. Testing shall include positive confirmation of actuation. System equipment and components shall be exercised for sufficient time to provide positive confirmation of proper operation or fault condition.
909.18.5.1 909.10.5.1 Written record. Results of the tests shall be documented in the building’s life safety systems testing and maintenance log and printed reports generated during the automated testing. Testing documents must be maintained on-site in the fire command center or in a location approved by the fire code official.

909.18.5.2 909.10.5.2 Dedicated systems.

909.18.5.2.1 909.10.5.2.1 Dedicated systems shall be tested quarterly, semiannually.

909.18.5.2.2 909.10.5.2.2 The smoke-control system shall be operationally tested as prescribed in Section 909.18.15. Dedicated smoke control systems shall be operated for each control sequence.

909.18.5.2.3 909.10.5.2.3 Operation of the correct outputs for each given input shall be verified and recorded.

909.18.5.3 909.10.5.3 Non-dedicated systems.

909.18.5.3.1 909.10.5.3.1 Non-dedicated systems shall be tested semiannually, annually.

909.18.5.3.2 909.10.5.3.2 The smoke-control system shall be operationally tested as prescribed in Section 909.11.5–909.10.5. Nondedicated smoke control systems shall be operated on a representative sample of each type of equipment sufficient to verify proper operation for each control sequence. For high rise buildings, tests shall be conducted at a minimum of three (3) locations: a floor in the lower third, a floor in the middle third and a floor in the upper third of the building. Tests in subsequent years shall be conducted on previously untested floors, as may be practical so that all floors ultimately are tested. For all other buildings, tests shall be conducted at a minimum number of locations to demonstrate proper performance as approved by the Fire Department. Tests in subsequent years shall be conducted on previously untested locations, as may be practical, so that all locations ultimately are tested over a three year period.

909.18.5.3.3 909.10.5.3.3 Operation of the correct outputs for each given input shall be verified and recorded.

909.18.6 909.10.6 System repairs and maintenance. All deficiencies noted in the annual report will be corrected within 30 days and, if required by the engineer, the smoke control system shall be re-tested. All smoke control systems will be maintained to perform its intended purpose under the code version with which it was built. As stated in Section 107.5, correction and abatement of violations of this code shall be the responsibility of the owner. With approval of the Denver Building Department and the Denver Fire Department smoke control systems may be remodeled to comply with current code.

909.19 909.11 System acceptance. Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the fire code official determines that the provisions of this section have been fully complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system.

Exception: In buildings of phased construction, a temporary certificate of occupancy, as approved by the fire code official, shall be allowed provided that those portions of the building to be occupied meet the requirements of this section and that the remainder does not pose a significant hazard to the safety of the proposed occupants or adjacent buildings.
909.20 909.12 Smokeproof enclosures. For buildings required to comply with Sections 403 or 405 of the International Building Code, a smokeproof enclosure shall consist of an enclosed, pressurized stairway conforming to IBC A Section 909.20 as amended and this Section.

909.20.3.1 909.12.1 Ventilation systems. Smokeproof enclosure ventilation systems shall be independent of other building ventilation systems. The equipment and ductwork shall comply with one of the following:

1. Equipment and ductwork shall be located exterior to the building and directly connected to the smokeproof enclosure or connected to the smokeproof enclosure by ductwork enclosed by two-hour fire barriers.

2. Equipment and ductwork shall be located within the smokeproof enclosure with intake or exhaust directly from and to the outside or through ductwork enclosed by two-hour fire barriers.

3. Equipment and ductwork shall be located within the building if separated from the remainder of the building, including other mechanical equipment, by two-hour fire barriers.

909.21.2 909.13 Design criteria. All smoke control systems shall comply with the requirements of Sections 909.14.1 through 909.14.5.

909.21.2.1 909.13.1 Minimum pressure differential. The minimum pressure differential across stairway and hoistway fire and smoke-proof enclosures, and adjacent smoke zones on non-fire floors, shall be 0.05 inch water gauge (0.0124 kPa), positive from the stairway or hoistway enclosure or adjacent smoke zone to the fire floor smoke zone in alarm.

909.21.2.2 909.13.2 Maximum door opening force. The maximum pressure difference across a fire smoke barrier or smoke zone and an opening into a stair enclosure shall be determined by the required door-opening or door-closing forces. Door opening force shall not exceed 30 pounds applied horizontally at the latch side of the door on the door-opening device under any operating condition. Maximum door opening force shall not exceed 15 pounds at stairway entry doors during a non-fire mode of operation.

909.21.2.3 909.13.3 Resistance to smoke recirculation. Locate outdoor air intakes for pressurization systems remote from points of discharge for smoke exhaust systems in order to minimize the potential for recirculation of smoke to the outdoor air intakes. The minimum separation distance shall be 10 ft. in any direction.

909.21.2.4 909.13.4 Determination of the volume of a space. Certain prescriptive criteria contained within this alternative design approach are associated with the sizing of smoke control systems. The volume of a given building element shall be defined as the space that is contained between the finished floor slab(s) of one level and the underside of the floor or roof element above, and the walls or partitions that form the boundaries of the space.

909.21.3.1 909.13.5 Fire/Smoke damper temperature rating. The temperature rating for the fusible link in fire and combination fire/smoke dampers, where they are applied in smoke exhaust systems, shall be no less than 250° F. For systems where the probable temperature rise to which the damper will be exposed may be higher than 250° F the temperature shall be computed as in Section 909.10.1 by an approved method.
Smoke control systems for atriums (where required by IBC Section 404).

Requirements. The prescriptive approach described hereinafter may be used when approved by the Denver Fire Department. The operation of the smoke control systems shall be controlled through the fire alarm system and shall comply with the requirements of this Section. The atrium volume shall include all spaces not separated from the atrium by the provisions of IBC Section 404.6.

Operation. Upon activation of initiating devices in accordance with Section 907, the following sequence shall occur:

1. Open atrium exhaust dampers.
2. Start exhaust fans.
3. Close exhaust dampers on all adjacent smoke zones.
4. Open supply dampers to atrium.

Atrium exhaust in excess of 55 feet in height. The system shall exhaust a minimum of four six air changes per hour. A minimum of 50 percent of the volume of supply air shall be sized and introduced via gravity supply or fan powered inlets within 10 feet of the lowest level of the atrium. The total volume of supply air shall be 75 percent of the required volume of exhaust air. A maximum velocity of 200 feet per minute shall be maintained across the net free area of the supply air openings.

Exhaust openings. Atrium exhaust openings shall be located in the ceiling or in a smoke trap area immediately adjacent to the ceiling at the top of the atrium. The lowest level of the exhaust openings shall be above the top of the highest elevation of door openings into the atrium.

Smoke control systems for high-rise buildings.

Stairway pressurization systems.

Requirements. Each interior enclosed exit stairway with a total rise of 75' or more, and associated exit passageway shall be mechanically pressurized with outdoor air, via a separate, dedicated pressurization system. The operation of each stairway pressurization system shall be controlled through the fire alarm system, as described in subsequent Articles of this Section. Stairway pressurization system ductwork shall not include fire or smoke dampers; however, isolation dampers may be included in the outdoor air intake ductwork systems, where such dampers are controlled via hard-wired interlock, and are configured to be “fail” open from a control standpoint.

Operation. Each stairway pressurization system shall be enclosed in an approved two-hour fire-resistive enclosure in accordance with ASTM E 119 as part of the fire-resistance rated assembly, from the outdoor air intake to the stairway enclosure penetration. Each fan discharge shall be provided with a duct smoke detector that shall be annunciated as a supervisory signal at the fire command center (graphic panel annunciator) and illuminate a lamp adjacent to the fan status indicator on the firefighters smoke control panel. The capability to manually override the operation of each fan shall be provided to Fire
Department personnel in the fire command center. Fans shall not shut off until manually overridden by Fire Department personnel or until the fire alarm system is reset.

**909.21.4.2**  **909.15.2** Hoistway pressurization systems

**909.21.4.2.1**  **909.15.2.1** Requirements. Each elevator hoistway with a total rise of 75' or more shall be mechanically pressurized with outside air, via a separate, dedicated pressurization system per 909.16.1.1 909.15.1.1. The operation of each hoistway pressurization system shall be controlled through the fire alarm system. Elevator hoistway pressurization system ductwork shall not include fire or smoke dampers; however, isolation dampers may be included, in the outdoor air intake ductwork systems, where such dampers are controlled via hardwired interlock, and are configured to be “fail” open from a control standpoint.

**909.21.4.2.2**  **909.15.2.2** Operation. System operation shall comply with 909.15.1.2. Each pressurization system shall be enclosed in a two-hour fire resistive enclosure in accordance with ASTM E 119 as part of the fire resistance rated assembly, from outside air intake to the hoistway penetration. Each fan discharge shall be provided with a duct smoke detector that shall be annunciated as a supervisory signal at the fire command center graphic panel and illuminate a lamp adjacent to the fan status indicator on the firefighters smoke control panel. Fans shall not shut off until manually overridden by Fire Department personnel or until the fire alarm system is reset.

**909.21.4.2.3**  **909.15.2.3** Design. Elevator hoistway pressurization systems shall be sized for a minimum of 15,000 CFM per bank (shaft) of elevators, plus 300 CFM per door opening per floor, with 1.0 inch water gauge static pressure minimum, at the duct penetration into hoistway. Static pressure control shall be provided for hoistway pressurization fan systems. Variable frequency drives may be utilized for this purpose. Hoistway pressurization system performance shall not interfere with the opening and closing of elevator doors. Refer to Chapter 30 for door activation.

**909.21.4.2.4**  **909.15.2.3.2** Smoke venting to exterior. Smoke venting of pressurized elevator hoistways to the exterior of the building shall not be required.

**909.21.4.2.5**  **909.15.2.3.3** Elevator machine rooms. Elevator machine rooms may be pressurized indirectly via the elevator hoistway pressurization system through the cable slots in the machine room floor.

**909.21.4.2.2**  **909.15.2.3.4** Lobby/Refuge areas. Elevator lobbies designated as refuge areas may have the elevator lobby/refuge area pressurized using the elevator hoistway pressurization system by transferring air to the elevator lobby/refuge area from the
hoistway. Use of transfer openings protected with fire/smoke dampers between the hoistway and the lobby/refuge area is acceptable.

909.21.4.3 909.15.3 General building Smoke exhaust systems.

909.21.4.3.1 909.15.3.1 Requirements. A general Smoke exhaust system(s) shall be provided in high-rise buildings with a high-rise classification, for the occupancies indicated. This system shall be controlled via the fire alarm system, to operate in conjunction with the other applicable smoke control systems for the building, in order to achieve the objectives as follows:

1. To maintain a zone of negative pressure in the fire floor (or smoke zone) relative to the other floors or adjacent smoke zones, means of egress stair enclosures and elevator lobby/refuge areas; and

2. To maintain a maximum stairway enclosure or smoke barrier door opening force on the fire floor or smoke zone in alarm. The prescriptive approach described hereinafter is not intended to preclude the use of a performance-based smoke control approach, such as that defined by NFPA 92A or 92B or IFC Section 909, for smoke control; However, The values listed hereinafter represent the minimum level of performance that must be achieved.

909.21.4.3.2 909.15.3.2 Configuration. The general Smoke exhaust systems shall include motorized combination fire/smoke dampers or a motorized smoke and a fire damper on each floor of a multi-level building served by the system(s). The exhaust damper(s) in the fire floor smoke zone in alarm shall be commanded open, in order to exhaust that floor zone, and the smoke exhaust fan commanded to “ON” the operating mode. The exhaust dampers in the non-fire floors other adjacent smoke zones shall be driven to, or shall remain in, the closed position. The use of smoke dampers shall not preclude the provision of fire dampers, where required by other sections of this code.

909.21.4.3.3 909.15.3.3 Design criteria. The general building smoke exhaust system(s) for each floor/smoke zone shall be sized in accordance with the following:

1. The assumption that make-up air will be available on the fire floor to the smoke zone in alarm.

2. The smoke exhaust system shall be sized to remove a minimum of five air changes per hour on the fire floor in Occupancy Groups A, B, E and M.

3. The smoke exhaust system shall be sized to remove a minimum of fifteen air changes per hour in the typical floor corridors, the typical floor corridors/elevator lobbies, or the typical floor elevator lobbies in Occupancy Groups R-1, R-2, I-1 and I-3.

4. That appropriate consideration be made for damper leakage on non-fire floors connected to a central riser system, when selecting the smoke exhaust fan(s).

909.21.4.3.4 15.3.4 Operation. Upon activation of an automatic alarm initiating device as described in Section 907, the following smoke control sequence shall occur:

1. Open exhaust dampers on the zone in alarm.
2. Start exhaust fans.
3. Close exhaust dampers to all adjacent smoke zones.
4. Turn off all supply and make-up air fans.
5. Close all smoke zone supply air dampers.
6. Initiate stairway and elevator hoistway pressurization sequence per Sections 909.15.1 and 909.15.2.

909.15.4 909.15.4 Street level retail tenant exception. General building pressurization and Smoke exhaust systems will not be required to serve individual retail tenant areas located on the level of egress and that have at least one exit directly to the exterior.

909.21.4.4 909.16 Smoke control systems for parking garages within high rise structures.

909.21.4.4.1 909.16.1 Requirements. Elevator lobbies designated as refuge areas on all floors within an enclosed parking structure shall have the elevator lobby/refuge area pressurized using the elevator hoistway pressurization system by transferring air to the elevator lobby/refuge area. Use of transfer openings protected with fire/smoke dampers between the hoistway and the lobby/refuge area is acceptable.

909.21.4.4.2 909.16.2 Open parking garages. A general building smoke control system shall not be required for elevator lobbies that are enclosed and that serve an open parking garage, if direct access without stairs or obstructions is available for people with special needs to exit from the elevator lobby to the open parking garage level or directly to a public way.

909.21.4.4.3 909.16.3 Enclosed garages. Exhaust fans associated with an enclosed parking structure shall be capable of manual operation from the fire command center smoke control panel. Such exhaust fans will not require a redundant source of electrical power, and this shall be indicated at the fire command center smoke control panel with the words, "Not on Emergency Power."

909.21.5 909.17 Smoke exhaust for assembly occupancies with 1,000 occupants or more in high-rise buildings, assembly occupancies with smoke protected seating, stages and areas per IBC 410, and underground buildings.

909.21.5.1 909.17.1 Requirements. Each area shall be a compartment and separated into smoke control zones not to exceed 52,000 square feet on a single floor. Smoke control zones shall be separated from each other by a wall that shall extend from the floor to the underside of the floor or roof above, except for the following:

1. Openings into atriums
2. Pedestrian bridges between two buildings
3. Non-required stair enclosures between floors
4. Open escalators between multiple floors

909.21.5.2 909.17.2 Design criteria. Building construction shall be configured in order to support the performance of the general building smoke exhaust system, in accordance with the following:
1. Where wall separation is not provided between smoke zones, draft stops shall be provided between smoke control zones without wall separation, in order to prevent migration of smoke throughout the building, whereby. The configuration of the draft stops shall be as approved by the Building and Fire Departments.

2. A smoke control zone in alarm shall actuate the respective general building smoke exhaust system, while the smoke exhaust systems in the adjacent smoke control zones shall remains inactive.

3. Where smoke control zones have wall separations. The minimum positive static pressure differential shall be maintained in the between adjacent non-fire alarm zones, with respect to relative to the smoke control zone in alarm, where smoke control zones have wall separations.

4. Sprinkler and smoke detection zones shall coincide with smoke zones.

5. Products of combustion must be demonstrated to be contained within the zone of origin, for smoke zones without wall separations. and the Failure to restrict products of combustion to the floor or area of origin will shall be considered non-compliant with the performance requirements for the smoke control exhaust system.

**909.17.3** 909.17.2.1 Assembly area smoke zones shall be separated from adjacent zones by draft stops located immediately adjacent to each smoke zone. The draft stops shall be at least 18 inches deep. The draft stops shall be of non combustible or limited combustible material that will stay in place before and during sprinkler operation.

**Exception.** Assembly areas smoke zone separation from adjacent smoke zones is not required for ceiling heights 18 feet and greater.

**909.17.3** Design criteria. The smoke control exhaust system shall exhaust a minimum of six (6) air changes per hour or 20,000 cfm from each smoke control zone, whichever is greater.

**909.17.3.4** Operation. Upon activation of a fire alarm initiating device in accordance with Section 907, smoke control operation shall comply with the following:

1. Open exhaust dampers for smoke zone in alarm
2. Start smoke zone exhaust fans
3. Close supply dampers to smoke zone in alarm
4. Adjacent zones go to 100% outside air
5. All other systems maintain normal operation

**909.21.8 909.19** Smoke control systems for covered mall buildings (where required by IBC Section 402) shall comply with Section 909.15–909.14.

**909.20** Retrofit Alteration of smoke control systems in existing high rise buildings. **909.10.1 Requirements.** Smoke control systems shall be maintained in operational condition as required by the code under which the system was installed. Construction drawings and system sequence of operation shall be submitted for approval in accordance with Appendix KN. The upgraded system alteration may be considered for application under this code with approval by the fire code official, provided that; the building is fully protected by automatic sprinklers complying with current NFPA
13 provisions for high rise buildings, the building has complying standpipes, and smoke detection is provided in accordance with Section 907.2.13.1.1. Upon approval, the altered configuration shall be considered the new requirement and documented as approved by the Denver Building Department and the Denver Fire Department. Future work shall not be allowed to adversely affect the performance of the system.

SECTION 912
FIRE DEPARTMENT CONNECTIONS

Section 912.2 Location is retained and amended by replacing the last sentence with the following:

The location of fire department connections shall be field approved by the fire code official prior to installation. Fire department connections shall be a minimum of one 2½ x 2½ x 4-inch siamese or single 2½-inch, as approved by the fire code official. In buildings with standpipes, an FDC shall be located within 100 ft of a fire hydrant.

Section 912.3.4 Orientation is retained and renumbered as follows:

912.3.4

**Orientation.** Fire department connections shall be oriented so inlets are in a horizontal line.

Exception: Two inlets may be stacked with written approval from the fire code official.

SECTION 913
FIRE PUMPS

Section 913.1 General is retained and amended by adding the following after the last sentence:

Limited service controllers are not permitted. Access to fire pumps shall comply with Section 509.3.

Section 913.2 Protection against interruption of service is amended by adding the following after the last sentence:

Except as permitted by NFPA 20, rooms containing fire pumps shall be free of storage, equipment, and penetrations not essential to the operation of the pump and related components.

Section 913.2.2 Circuits supplying fire pumps is replaced as follows:

913.2.2 Circuits supplying fire pumps. Installation of cables used for survivability of fire pump circuits shall comply with NFPA 70, Article 695. Cables shall be listed to UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

Section 913.4 Valve supervision is replaced as follows:

913.4 Valve supervision. Fire pump suction, discharge and bypass valves and isolation valves on the backflow prevention device or assembly shall be supervised by an approved central station complying with Section 917.
Section 913.4.1 Test outlet valve supervision is replaced in its entirety with the following:

913.4.1 Test outlet valve. The hose control valves for the fire pump test outlet(s) shall be located on the exterior of the building. The main supply valve controlling the fire pump test outlet(s) shall be supervised in the closed position.

Section 913.6 is retained and amended as follows:

913.6 Fire pump requirement for non-high-rise structures buildings. Where building standpipes are required by other provisions of this code, a fire pump shall be provided. Installation of a fire pump is not required subject to the following exceptions. A written request for approval of omission of the fire pump, substantiating compliance with this provision, shall be submitted to the fire department. Where required, Fire pumps shall have a minimum output rating of 500 gpm or the sprinkler system flow demand, whichever is greater results in a larger fire pump. The fire pump shall be capable of delivering the required sprinkler system pressure at the required system flow.

Exceptions:

1. The requirement of a fire pump may be waived in all occupancies except H and I occupancies where all of the following are met:
   a. Buildings shall be equipped throughout by an automatic sprinkler system in accordance with Sections 903.3.1.1 or 903.3.1.2 with quick response or residential sprinkler heads.
   b. City water pressure, as tested at the site, as provided by Denver Water model or flow test, reduced by 10%, must be capable of hydraulically supporting the sprinkler system without a fire pump or augmentation by the Fire Department.
   c. Standpipes shall be installed or be existing and, when a fire pump is not provided, shall be capable of providing water flow as follows:
      For Class I standpipe systems, the minimum flow rate for the hydraulically most remote standpipe shall be 500 gpm, and the calculation procedure shall be in accordance with NFPA 14. The minimum flow rate for additional standpipes shall be 250 gpm per standpipe, with the total not to exceed 1,000 gpm for buildings that are sprinklered throughout per NFPA 13 or NFPA 13R. Minimum pressure for system design shall be as required by NFPA 14 with Fire Department pumpers augmenting the system with a maximum flow rate of 1,000 gpm and a maximum pressure of 135 psi at each the fire department connection (FDC).
   d. Projects must have Approved Fire Department access for fire-fighting apparatus access to the building FDC or connections located on the exterior face of the building. The distance from the centerline of Fire Department access to the primary FDC shall not exceed 50ft. The FDC shall be located within 100ft of a fire hydrant.
   e. If the building floor plate exceeds 12,500 sq. ft., two separate and remote FDCs shall be provided. One FDC shall be within 100 ft of a fire hydrant. The distance from the centerline of Fire Department access to each FDC shall not exceed 50 feet.
   f. An graphic or a directory type approved annunciation panel shall be provided. Each building level shall be provided with a flow switch and shall be annunciated as a separate zone. The main flow switch shall also be annunciated as a separate zone. Tamper
switches may be annunciated on one zone. Valve monitoring and water flow alarm and trouble signals shall be distinctly annunciated.

2. The requirement of a fire pump may be waived in mixed-use or single-use open parking garages with standpipes, including those with enclosed parking levels under the open garage. This exception is applicable where the elevation of the highest tier/floor does not exceed 75 ft above the lowest level of Fire Department vehicle access and the following provisions are met:

   a. The building is constructed in accordance with IBC Section 406.3.

   b. Standpipes shall be installed or be existing and, when a fire pump is not provided, shall be capable of providing water flow as follows:

   For Class I automatic dry standpipe systems, the minimum flow rate for the hydraulically most remote standpipe shall be 500 gpm, and the calculation procedure shall be in accordance with NFPA 14. The minimum flow rate for additional standpipes shall be 250 gpm per standpipe, with the total not to exceed 1000 gpm. Minimum pressure for system design shall be as required by NFPA 14 with Fire Department pumers augmenting the system with a maximum flow rate of 1,000 gpm and a maximum pressure of 135 psi at each fire department connection (FDC).

   c. Standpipes are installed in accordance with Section 905 and NFPA 14.

   d. Projects must have Approved Fire Department access for firefighting apparatus access to the building FDC located on the exterior face of the building. The distance from the centerline of fire department access to the primary FDC shall not exceed 50 feet.

Section 913.7 Remote status panel is retained and amended as follows:

913.7 Remote status panel. Where the fire pump room is not constantly attended, a fire pump remote operating status panel shall be provided per NFPA 20 for all fire pump installations. The fire pump remote operating status panel shall be located adjacent to the fire alarm control panel or as determined by the fire code official.

Section 913.8 Diesel engine pump drivers is retained as follows:

913.8 Diesel engine pump drivers. Diesel drivers for fire pumps shall comply with NFPA 20. A dedicated fuel supply shall be provided sufficient for eight (8) hours of operation. Fill openings shall be located on the exterior of the building with an approved fill port. If fuel pumping is required from a main fuel tank to a diesel engine pump driver, a duplex pumping system shall be provided.

SECTION 915
CARBON MONOXIDE DETECTION

Section 915.1.3 Forced-air furnaces is amended by deleting the Exception.

Section 915.1.5 Private garages is amended by adding the following after the last sentence:

Exceptions below do not apply to R-2 occupancies.
Section 915.2.2 Sleeping units is amended by adding the following to the end of the last sentence:

“... and within 15 feet of the entrance to each sleeping unit. This requirement supersedes the locations specified in NFPA 720.”

Section 915.3 Detection equipment is replaced and 915.3.1 Location is added as follows:

915.3 Detection equipment. Carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide alarms complying with Section 915.4. Carbon monoxide detection required in dwelling units and sleeping units by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide alarms complying with 915.4.

915.3.1 Location. In locations outside of sleeping units and dwelling units in buildings that are not equipped with either a fire alarm system or a sprinkler monitoring system, carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide alarms complying with 915.4 or carbon monoxide detection systems complying with Section 915.5. In locations outside of sleeping units and dwelling units in buildings that are equipped with a fire alarm system or a sprinkler monitoring system, carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide detection systems complying with Section 915.5 electrically supervised by the fire alarm control unit.

**Exception:** One- and two-family dwellings constructed under the *International Residential Code* as amended.

Section 915.5 Carbon monoxide detection systems is replaced as follows:

915.5 Carbon monoxide detection systems shall be provided for buildings containing a central fuel-burning appliance. The carbon monoxide detection system shall be monitored by the building fire alarm system, where provided. This requirement applies to any new equipment installation for which a permit is required by the Building Department.

**Exception:** Carbon monoxide detectors are not required for listed fuel-burning cooking appliances.

Section 915.5.2 Locations is replaced as follows:

915.5.2 Locations. System detectors are required for each room containing a central fuel-burning appliance and shall be located within 25 feet of any fuel-burning appliance. This requirement supersedes the locations specified in NFPA 720.

Section 916 Emergency Responder Radio Enhancement System (RES) is retained, renumbered and amended as follows:

**SECTION 915 916**

**EMERGENCY RESPONDER RADIO ENHANCEMENT SYSTEM (RES)**

915.1 916.1 Where required. Buildings shall have approved radio coverage in accordance with Section 510 for emergency responders as follows:

1. High-rise buildings
2. Underground buildings (per constructed in accordance with IBC Section 405)
3. Airport buildings and structures
4. Buildings of 50,000 gsf or more

915.1.1 916.1.1 Compliance testing. New buildings of 50,000 gsf or more and all Group E and I occupancies over 10,000 gsf on any story shall be tested upon substantial construction completion and, where lacking required coverage, shall be provided with an RES. Buildings having compliant initial radio coverage shall be tested every five years thereafter in accordance with Section 510.2.1.1 for continued adequacy of emergency responder radio communications coverage. Buildings failing to meet the minimum coverage requirements after testing shall be provided with an RES per Section 510.1.2.1. Exception: Where it is determined by the fire code official the radio coverage system is not needed, written documentation of the adequacy of existing radio coverage shall be maintained on site. Degradation of radio coverage shall require testing of the building to the requirements of Section 510.2.1.1. Where the system can no longer meet the test requirements, a radio coverage system shall be installed.

Section 916.1.2 Emergency responder radio coverage in existing buildings was relocated from 510.7, retained and amended as follows:

510.7 916.1.2 Emergency responder radio coverage in existing buildings. For existing high-rise, underground buildings, I-1, I-2 and I-3 occupancies and airport buildings, when undergoing an upgrade to install a MNS or complete fire alarm head-end equipment replacement, the building shall be tested to Section 510 for public safety radio coverage and where deficient, RES/BDA coverage shall be provided. Buildings with currently acceptable signal strength shall be retested at five-year intervals per Section 510.1.1.3(3) (b) 2.1.2 to ensure continued compliant radio coverage. Where it is determined by the fire code official that the radio coverage system is not needed, written documentation of the adequacy of existing radio coverage shall be maintained on site.

Section 916 Central Alarm Stations is renumbered, retained and amended as follows:

SECTION 916 917
CENTRAL ALARM STATIONS

916.1-917.1 General. Where required by Section 907.1.3–907.1.6, monitored protected premises systems shall be connected to an approved central alarm station. A Class I central alarm station shall comply with the Denver Municipal Code and this section. Signals shall be transmitted, received and managed in accordance with NFPA 72. Approved central alarm stations shall be a listed central station, a proprietary central alarm station, a remote supervising station, or a subsidiary station or a repeater station to UL 827 and as approved by the fire code official. All central alarm/subsidiary stations shall obtain an annual operating license from the Fire Department and meet the facility construction and operational requirements of NFPA 72. Central alarm stations shall be subject to Fire Department inspection during normal business hours. Subsidiary stations shall be inspected by central station personnel monthly and shall be provided with a written restoration plan per NFPA 72, to be maintained on site. Installations found not to maintain facility requirements and/or operating procedures in accordance with NFPA 72 or the certificated listing, shall be subject to license revocation by the Fire Department.

Exception: Approved protected premises connected directly to Denver Fire Department facilities

916.2-917.2 Communication methods. Communication from a protected premises to a central alarm or subsidiary station shall be by digital alarm communicator transmitter (DACT), two-way RF multiplex
system or one-way private radio alarm system in accordance with NFPA 72. Alternative performance-based communication technologies may be presented for consideration by the fire code official for application in the jurisdiction. Performance-based systems shall be submitted for approval under Section 104.8.1. Provisions of Section 104.7.2 for technical assistance, may be required at the discretion of the fire code official, for determination of the adequacy of the proposed technology to the requirements of NFPA 72 and this code. Fees for department evaluation of performance-based systems shall apply in accordance with the Denver Building Department fee schedule for “Application for consideration of Alternate Materials, Methods, or Equipment.

916.3 917.3 Transmission channels. Transmission channels between a protected premises and central alarm or subsidiary stations shall consist of one of the methods of Sections 917.3.1, 917.3.2, 917.3.3 or as approved in accordance with Section 917.2 for performance-based technologies. Where multiple communications technologies are used, provision shall be made to monitor the integrity of each communication path and failure of any communication path shall be annunciated at the central alarm station and at the protected premises within 24 hours. Re-transmission of signals from a subsidiary station shall be provided with primary and backup communication paths. Transmission channels shall be monitored for integrity in accordance with NFPA 72.

916.3.1 917.3.1 DACT transmission shall consist of a minimum of one dedicated loop start seizable public phone line and one seizable telephone line or a dedicated loop start public phone line plus an approved NFPA 72 Type 4 or Type 5 two-way RF multiplex system, with a network connectivity (Net/Con) of 6 or less, or a minimum one-way private radio alarm system complying with Section 917.3.3 or an approved alternative communication technology in accordance with Section 917.2.

916.3.2 917.3.2 RF multiplex systems shall consist of sufficient UL-listed fire system transmitter/receivers to establish and maintain a minimum Net/Con of 5 or less as measured by manufacturer-approved test equipment. Primary RF multiplex systems shall meet NFPA 72 requirements for a Type 4 network. RF systems that cannot achieve this required level of reliability shall only be permitted as a secondary communication means in accordance with Section 917.3.1. have a dedicated loop start public phone line installed as the primary signal transmission means. RF communications of fire alarm signals shall only be permitted over a network dedicated to and listed for transmission and receipt of fire alarm signals. Upon application for a system installation permit for any subscriber unit, the central station licensee shall provide documentation verifying that their network complies with the requirements for a listed, dedicated fire alarm signal network for the protected premises.

916.3.3 917.3.3 One-way private radio alarm systems shall consist of a network of radio alarm supervising station receivers, radio alarm repeating station receivers and radio alarm transmitters. The system shall be configured for Type 6 or Type 7 operation per NFPA 72. Radio communications of fire alarm signals shall only be permitted over a network dedicated to and listed for transmission and receipt of fire alarm signals. Upon application for a system installation permit for any subscriber unit, the central station licensee shall provide documentation verifying that their network complies with the requirements for a listed, dedicated fire alarm signal network for the protected premises. Signal quality shall be supervised and maintained in accordance with NFPA 72.

Section 917 Transmission of City Microwave Signals is retained and renumbered as follows:

SECTION 917 918 TRANSMISSION OF CITY MICROWAVE SIGNALS

Construction permits or Certificates of Occupancy shall not be issued for any building or structure exceeding 60 feet (18.3m) in height which interferes or may interfere with the transmission or
reception of City microwave communication signals unless the owner of the building or structure provides for installation of equipment to retransmit or redirect the signal as necessary to eliminate any interference. Such equipment shall be approved by and installed at the direction of the Department of Safety. A service agreement must also be approved by the Department of Safety where transmission is affected by the proposed building or structure prior to the issuance of any permit or Certificate of Occupancy. Such agreements shall include provisions for easements and access for maintenance, electricity for operation, and replacement of equipment.

Section 919 Elevators and Conveying Systems is added as follows:

SECTION 919
ELEVATORS AND CONVEYING SYSTEMS

919.1 General. Elevators and other conveyances shall comply with this code, ASME A17.1, ASME 18.1, ANSI 10.4, Colorado State Regulation 7CCR 1101-8 and the applicable equipment installation and maintenance standards.

919.2 New installations. Installation shop drawings shall be submitted for approval prior to installation of any conveyance. Conveyances shall be registered with the State of Colorado Division of Oil and Public Safety before issuance of any installation permit. Shop drawing submittal shall comply with this section and Appx N. Colorado State registration is not required for residential conveyances and temporary construction elevators.

919.3 Alterations to existing conveyances. Alterations to existing conveyances as defined in Colorado Code of Regulations 7CCR1101-8 shall require submittal of shop drawings for approval as per section 919.2. Conveyances shall have a valid Colorado State registration number prior to approval of any alterations. Colorado State registration is not required for residential conveyances and temporary construction elevators.

919.4 Removal from service. Permits shall be obtained from the fire department prior to any conveyance being removed from service, made dormant or otherwise rendered inoperable.

919.5 Annual operating permit. All conveyances shall obtain an annual conveyance operating permit in accordance with Fire Department policy 105-2 prior to issuance of a Certificate of Operation. No conveyance shall be operated without a valid Certificate of Operation.

Exceptions:

1. Conveyances issued a Temporary Certificate of Operation when operating under the terms of that Certificate.
2. Residential elevators complying with Section 919.21

919.6 Standardized keyswitches. All elevators shall be provided with standardized keyswitches for emergency operation in accordance with Section 607.8.1.

919.7 Venting of hydraulic tanks located in hoistways. New and existing elevators permitted to have a hydraulic tank located in the hoistway per ASME A17.1 shall be provided with tank venting in accordance with fire department policy 105-5.

919.8 Emergency and standby power. Where emergency or standby power is provided to elevators as required by this code, the International Building Code, other applicable standards or voluntarily, installation and operation shall comply with Sections 604 and 607.
**919.8.1. Auxiliary power lowering operation** provided in accordance with ASME A17.1 shall be permitted and shall not be considered as an emergency or standby power source.

**919.9 Fire service access elevators.** Where required by the International Building Code, fire service access elevators shall be provided. Elevator system monitoring, electrical power, sprinkler protection, protection of wiring or cables and standpipe hose connection access shall comply with IBC Section 3007. Elevator monitoring panels shall be submitted for approval prior to installation and shall monitor and display the conditions per NFPA 72, 21.5.1. Notification of occupants in the elevator shall be by CCTV or other means approved by the fire code official. Shunt trip operation shall not be permitted for fire service access elevators.

**919.10 Occupant evacuation elevators.** Where required by the International Building Code, occupant evacuation elevators shall be provided. Elevator system monitoring, elevator recall, electrical power, sprinkler protection, two-way communication, protection of wiring or cables, emergency voice/alarm communication and notification appliances shall comply with IBC Section 3008. Elevator monitoring panels shall be submitted for approval prior to installation and shall monitor and display the conditions per NFPA 72, 21.6.1. Notification of occupants in the elevator shall be by CCTV or other means approved by the fire code official. Shunt trip operation shall not be permitted for occupant evacuation elevators.

**919.11 Elevators with destination dispatch.** Where elevators with destination dispatch are provided, all elevators in a group shall be visible from the dispatch console and shall be provided with a common Phase I recall keyswitch located in the lobby within sight of the elevator or all elevators in that group and shall be readily accessible.

**919.12 “TWIN” type elevators.** Installation of “TWIN” elevators shall be as approved by the State of Colorado Division of Oil and Public Safety and the fire code official.

**919.13 Elevator firefighter indicator.** The operation of the elevator firefighter indicator (firefighter hat symbol) shall comply with Section 907.3.3.5.

**919.14 Elevator in-car communications.** Where required by ASME A17.1, two-way in-car communications shall be provided from the car to an approved location. Authorized personnel at the receiving station shall notify the Denver Fire Department within five (5) minutes of any indication of a trapped party, medical emergency or non-responsive occupant.

**919.15 Elevator building communications for elevator rise of 60 feet (18.5m) or more.** Where required by ASME A17.1, two-way communications shall be provided for emergency personnel to communicate directly with occupants of the elevator car. Communications equipment for emergency responder use shall be located in the Fire Command Center, where provided, or a location approved by the fire code official. Where only some of the elevators within a building are required to comply with this section, these elevators shall be identified at the emergency responder communication means.

**919.16 Inspections.** Elevator and conveyance annual and periodic inspections shall comply with 7CCR 1101-8, manufacturer’s instructions, the Maintenance Control Plan and this code.

**919.17 Alterations to elevator car and hoistway openings.** Alterations to clear opening dimensions of existing elevator cars and hoistways is subject to approval by the fire code official. Alterations to clear open dimensions of car and hoistway doors of required ambulance stretcher, fire service access and occupant evacuation elevators shall not be permitted.
919.18 Conveying systems. Escalators, moving walks, conveyors, platform lifts, dumbwaiters, stairway chair lifts, personnel hoists, material lifts and material hoists shall comply with the provisions of this code and Chapter 30 of the International Building Code.

919.19 Automated Guideway Transportation Systems (AGTS). AGTS shall comply with Sections 919.2, 919.3 and ASCE 21 as adopted by the State of Colorado.

919.20 Conveyances used during construction. Elevators and personnel hoists used during construction shall comply with ASME A17.1 Section 5.10, ANSI A10.4 and Fire Department policy 105-4. Upon installation or modification, certification shall be provided to the department that the required acceptance test was performed in accordance with the approved plans, ANSI A10.4 and the manufacturer’s installation instructions. Such certification shall also be provided for each periodic inspection required at intervals not to exceed 90 days. Certifications shall bear the signature and license number of a Denver licensed inspector.

919.21 Residential elevators. All elevators used in private residences shall comply with ANSI A17.1 and Fire Department policy. Installation or alteration of an elevator in a private residence shall be submitted for approval in accordance with Section 919.2 or Section 919.3.

919.21.1 Certificate of Operation. Elevators are required to have a current Certificate of Operation issued by the Department. Certificates shall be valid for a period of three years and shall require submission to the Department of an inspection affidavit signed by a Denver licensed inspector prior to issuance or renewal.