North Las Vegas
Fire Code Amendments

Adapted to 2018 IFC including various NFPA Standards

Effective February 4, 2019

City of North Las Vegas

2250 Las Vegas Boulevard N.

North Las Vegas, NV 89030

702.633.2616

http://www.cityofnorthlasvegas.com/departments/ldcs/fire_prevention.php

Original copy of ordinance on-file with the City Clerk's Office

INTERNATIONAL FIRE CODE

101.2.1 Appendices

101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

The following appendices are hereby adopted and are a part of this code:

Appendix B – Fire-flow requirements for buildings, as amended

Appendix C – Fire hydrant locations and distribution, as amended

Appendix H – Hazardous materials management plan (HMMP) and hazardous materials inventory statement (HMIS) instructions

Appendix O – Proprietary (self) monitoring, as amended

Appendix P – Impairment Procedures, as amended

102.7.3 Local codes

102.7.3 Local codes. The revised locally adopted codes listed below shall replace the listed referenced documents. References contained herein shall refer to the locally adopted codes.

IMC-18 International Mechanical Code is replaced with 2018 Uniform Mechanical Code

IPC-18 International Plumbing Code is replaced with 2018 Uniform Plumbing Code

103.3.1 Division of Fire Prevention Personnel, Fire Department, and Police

103.3.1 Division of Fire Safety Personnel, Fire Department, and Police. The *fire chief*, the *fire code official*, and members of the Fire Safety Division, and members of the Fire Department shall have the powers of a police officer in performing their duties under this code.

104.3.2 Authority to Inspect

104.3.2 Authority to Inspect. The Fire Safety Division and/or the Fire Department shall inspect, as often as necessary, buildings and premises, including such other hazards or appliances designated by the chief for the purpose of ascertaining and causing to be corrected any conditions which would reasonably tend to cause fire or contribute to its spread, or any violation of the purpose or provisions of the Fire Code and of any other law or standard affecting fire safety.

104.12 Fire Protection Reports

104.12 Fire Protection Reports. All high-rise, covered mall, and atrium buildings, in addition to other complex or major facilities as determined by the *fire code official*, including but not limited to Group H and Group I occupancy buildings, shall have a Fire Protection Report submitted and approved prior to construction, demolition, or significant work stoppage. Fire protection reports shall be prepared by an architect or professional engineer working in their area of expertise.

104.12.1 Building Fire Protection Reports. Building fire protection reports shall describe the building uses, construction and life safety features of the entire building.

104.12.2 Tenant Improvement and Remodel Fire Protection Reports. A Fire Protection Report shall be submitted when any one of the following occurs within a building that would normally require or has a previously approved Fire Protection Report (FPR).

1. The area of remodel occurs over a floor area exceeding 20,000 square feet.
2. The area of remodel is an assembly occupancy with an occupant load that exceeds 1,000 persons.
3. The area of remodel occurs within spaces dedicated to or affecting emergency personnel response areas, such as exit enclosures, elevators, elevator lobbies, fire command centers, secondary response points, fire riser rooms, and fire pump rooms.
4. The tenant improvement space is not intended to install a sprinkler isolation control valve
5. The remodel area requires specific engineered fire suppression and/or alarm systems that will require an alternate means of system design that is not supported by adopted NFPA codes.
6. The remodel area includes clean agent suppression systems, new or existing.
7. The remodel includes kitchen exhaust systems that are used for smoke control or smoke removal and thereby requiring coordination of exhaust fan functioning.
8. The remodel area contains hazardous materials storage and/or use areas in any amount.
9. The remodel area includes high-piled storage.
10. The remodel area includes access controlled egress doors, delayed egress door hardware or other hardware systems that are interconnected with fire protection systems.
11. The remodel area modifies an existing smoke control system, smoke removal system, smoke control boundary or smoke removal boundary and the *fire code official* requires submittal of a remodel FPR.
12. Fire Safety tenant improvement and/or remodel reports are also required for all assembly, residential, high rise, covered mall, atrium and other complex or major facilities that have a previously approved FPR when required by the *fire code official.*

104.12.3 Alternate materials and methods report. An Alternate Materials and Methods Request shall be submitted when any of the following items are involved.

1. All instances where active fire protection features are offered as a mitigation in support of an alternative solution.
2. All requests relating to or referencing the International Fire Code or NFPA codes adopted within the International Fire Code.
3. All requests that involve alternate installation requirements of any active fire protection system governed by either the International Fire Code or Chapter 9 of the International Building Code, such as: *automatic sprinkler system*s, alternative automatic fire extinguishing systems, standpipe systems, fire alarm and detection systems, emergency alarm systems, fire department connections and smoke control graphic annunciator panels. Additionally, requests involving the modification of the following items shall be submitted to the *fire code official*: smoke and heat vents, fire command centers, thin combustible ceilings, hazardous materials, and alternate hardware when it may affect entry into a building by emergency responders.

104.12.4 Temporary Certificate of Occupancy (TCO) Fire Protection Report. When a temporary certificate of occupancy (TCO) is requested in a building that required a fire protection report prior to construction, the *fire code official* is authorized to require a fire protection report describing the uses to be occupied, the completed construction features, and the status of life safety systems, be submitted and approved prior to approval of the TCO request.

104.12.5 Hazardous materials, fog effects, and asphyxiants. Complex permits for hazardous materials, fog effects, and asphyxiants shall have fire protection reports submitted to address the hazards of the installation, as required by the *fire code official.*

105.1.7 Certificate of Insurance

105.1.7 Certificate of Insurance. A valid Certificate of Insurance shall be submitted to, or be on file with, the *fire code official* when applying for a permit to conduct specific operations.

Exception: The requirement for an insurance certificate may be waived by the fire code official's Risk Manager.

105.1.7.1 Certificate Information Required. The certificate shall be issued by an insurance company authorized to conduct business in the State of Nevada, or be named on the list of authorized insurers maintained by the Nevada Department of Business and Industry, Division of Insurance.

The following information shall be provided on the certificate:

1. The contractor shall be named as the insured. If the insurance is provided by an individual, company or partnership other than the contractor, the contractor shall be named as an additional insured.
2. "The City of North Las Vegas, it's agents, employees and volunteers" shall be named as both an additional insured and certificate holder
3. General liability limits, including contractual liability, in the minimum amounts specified below of the specific operation being conducted:
    a. To erect tents, temporary special event structures and other membrane structures. See Chapter 31: $2,000,000.
    b. To store or use explosive materials or pyrotechnic displays. See Chapter 56: $5,000,000

        Exception: The *fire code official* is authorized to reduce the liability limits to $1,000,000 for small private party blasting operations such as personal mining claims or agricultural uses and for stands for Safe and Sane fireworks. Under no circumstance will this include development related blasting activities, quarry blasting, construction blasting, or other similar large scale blasting operations.
    c. To operate a special amusement building. See Section 105.6.2. $2,000,000.

105.1.7.2 Additional Insurance. Greater liability insurance amounts may be required in certain cases (such as building implosions) as deemed necessary by the *fire code official*.

105.3.9 Fees

105.3.9 Fees. A permit shall not be issued until the fees have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

105.3.9.1 Schedule of permit fees

105.3.9.1 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

105.3.9.2 Work commencing before permit issuance

105.3.9.2 Work commencing before permit issuance. Any *person* who commences any work, activity or operation regulated by this code before obtaining the necessary permits shall be subject to an additional fee established by the applicable governing authority, which shall be in addition to the required permit fees.

105.3.9.3 Related fees

105.3.9.3 Related fees. The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

105.3.9.4 Refunds

105.3.9.4 Refunds. The applicable governing authority is authorized to establish a refund policy.

105.3.9.5 Penalty

105.3.9.5 Penalty. All fees due are a debt and obligation of the *person* or *persons* using the services of the City of North Las Vegas and shall constitute a lien against any personal or real property served. Such *person* or *persons* using these services or property owner whose property is furnished these services shall be liable and therefore in any action commenced by the City of North Las Vegas for the recovery of such fees in any court of competent jurisdiction.

105.6.4 Carnivals and fairs.

Section 105.6.4. Carnivals and fairs. Intentionally deleted.

105.6.51 thru 105.6.56 Required operational permits

105.6.51 Fire Protection Systems. An operational permit is required for any building or structure that contains one or more fire protection systems as defined in Chapter 9.

In developments with multi-family dwellings, one permit shall be required for each separate building that contains one or more fire protection systems.

In multi-tenant commercial properties, a separate permit shall be required for each separate suite or occupant space that has one or more fire protection systems that are separate from those fire protection systems that supply the entire building.

105.6.52 Monitoring facilities. An operation permit is required for any facility that remotely monitors electronic signals initiated by fire protection systems such as central or supervising facilities.

105.6.53 Proprietary /self-monitoring. An operational permit is required to operate an onsite proprietary (self) monitoring fire alarm system. See Appendix O.

105.6.54 Special Activity. An operational permit is required at locations that operate Christmas trees, pumpkin patch lots, and similar activities. See Section 321.

105.6.55 Tire storage. An operational permit is required to store tires in excess of 1,000 cubic feet (28.3 m^3). See Chapter 34.

105.6.56 Wood and plastic pallets. An operational permit is required for new and existing facilities which store more than 50 idle pallets on site, either inside or outside of a building.

105.7.4 Compressed gases

105.7.4 Compressed gases. Where the compressed gases in use or storage exceed the amounts listed in Table 105.6.8, a construction permit is required to install, repair damage to, abandon, remove, place temporarily out of service or close or substantially modify *a compressed gas system.*

Exceptions:

1. Routine maintenance.
2. For emergency repair work performed on an emergency basis, application for permit shall be made within two business days of commencement of work.
3. Category 3 compressed air and/or piped vacuum systems as defined by NFPA 99, *Standard for Health Care Facilities.*

105.7.5 Cryogenic fluids

105.7.5 Cryogenic fluids. A construction permit is required for installation of or alteration to stationary cryogenic fluid storage systems and for fog effect systems that utilize CO_2 or cryogenic fluids where the system capacity exceeds the amounts listed in Table 105.6.8 or Table 105.6.10. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

105.7.7 Fire alarm and detection systems, related equipment and dedicated function fire alarm systems (i.e., monitoring)

105.7.7 Fire alarm and detection systems, related equipment and dedicated function fire alarm systems (i.e., monitoring). A construction permit is required for the following:

1. Installation of or modification (including but not limited to: extending; reprogramming; upgrading field programmable EPROM, or altering) to fire alarm and detection systems, related equipment, and dedicated function fire alarm systems.
2. Replacement of recalled fire protection components.
3. Control equipment replacement.

Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

105.7.26 thru 105.7.30 Required construction permits

105.7.26 Fire Protection Report. A permit is required for the review and approval of a Fire Protection (Life Safety) Report. See Chapter 1.

105.7.27 Proprietary (self) monitoring facilities. The *Fire code official* is authorized to require a construction permit for the installation of or modification to an onsite proprietary (self) monitoring facility. See Appendix O.

105.7.28 Refrigeration systems. A construction permit is required for installation of a mechanical refrigeration system covered by Section 605.

105.7.29 Two-way communication. A construction permit is required for the installation of or modification to a two-way communication system. See Section 1009.8.

105.7.30 Water tanks. A construction permit is required for the installation of or modification to a water tank used for supply of a fire protection system. See Chapter 9 and NFPA 22.

Exception: Permits are not required for installation of tanks controlled by a water purveyor governed by the Nevada Public Service Commission, a State of Nevada charter, or other public franchise.

109 BOARD OF APPEALS

SECTION 109
BOARD OF APPEALS

109.1 Board of appeals, established. A board of appeals is established in NLVMC 15.72.130.

110.4 Violation penalties

110.4 Violation penalties. *Persons* who shall violate a provision of this code or shall fail to comply with any of the requirements thereof or who shall erect, install, alter, repair or do work in violation of the *approved construction documents* or directive of the *fire code official*, or of a permit or certificate used under the provisions of this code, shall be guilty of a misdemeanor, punishable by a fine of not more than one thousand dollars ($1,000.00) or by imprisonment not exceeding six (6) months, or both such fine and imprisonment. Each day that a violation continues after due notice has been served shall be deemed a separate offense.

110.4.2 Citations

110.4.2 Citations. The *fire code official* of the Fire Safety Division and his designees may prepare, sign and serve written citations on persons accused of violating any provision of this code. Any designated employee issuing a citation pursuant to this section shall comply with the provisions of NRS 171.1773.

112.4 Failure to comply

112.4 Failure to comply. Any *person* who shall continue any work after being served with a stop work order, except such work as that *person* is directed to perform to remove a violation or unsafe condition, shall be guilty of a misdemeanor, punishable by a fine of not more than one thousand dollars ($1,000.00) or by imprisonment not exceeding six (6) months, or both such fine and imprisonment.

202 GENERAL DEFINITIONS

SECTION 202
GENERAL DEFINITIONS

FIRE CODE OFFICIAL. The fire chief, fire marshal, or deputy fire marshal charged with the administration and enforcement of the code, or a duly authorized representative of the fire chief.

HIGH-RISE BUILDING. A building with an occupied floor located more than 55 feet (17 764 mm) above the lowest level of fire department vehicle access. This definition shall apply throughout this code and throughout all referenced codes and standards as stated in Section 102.7 and all applicable standards or requirements that are not set forth in this code as stated in Section 102.8.

Amendment to portions of the definition for OCCUPANCY CLASSIFICATION
[BG] Group E, day care facilities. This group includes buildings and structures or portions thereof occupied by more than five children older than 2 1/2 years of age who receive educational, supervision or personal care services for less than 24 hours per day.

> **[BG] Within places of worship.** Rooms and spaces within places of worship providing such care during religious functions shall be classified as part of the primary occupancy.
>
> **[BG] Five or fewer children.** A facility having five or fewer children receiving such care shall be classified as part of the primary occupancy.
>
> **[BG] Six or fewer children in a dwelling unit.** A facility such as the above within a dwelling unit and having six or fewer children receiving such care shall be classified as a Group R-3 occupancy or shall comply with the *International Residential Code.*

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

Adult day care

Child day care

[BG] Classification as Group E. A child day care facility that provides care for more than six-but no more than 100 children 2½ years or less of age, where the rooms in which the children are cared for are located on a level of exit discharge serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.

[BG] Six or fewer persons receiving care. A facility having six or fewer persons receiving custodial care shall be classified as part of the primary occupancy.

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

[BG] Six or fewer persons receiving care in a dwelling unit. A facility such as the above within a dwelling unit and having six or fewer persons receiving custodial care shall be classified as a Group R-3 occupancy or shall comply with the International Residential Code.

[BG] Residential Group R-2. Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

Apartment houses

Condominiums (nontransient)

Congregate living facilities (nontransient) with more than 16 occupants

Boarding houses (nontransient)

Convents

Dormitories

Fraternities and sororities

Monasteries

Hotels (nontransient)

Live/work units

Motels (nontransient)

Vacation timeshare properties

Residential Group R-3. Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Buildings that do not contain more than two *dwelling units*

Care facilities that provide accommodations for six or fewer persons receiving care

Congregate living facilities (nontransient) with 16 or fewer occupants

Boarding houses (nontransient)

Convents

Dormitories

Fraternities and sororities

Monasteries

Congregate living facilities (*transient*) with 10 or fewer occupants

Boarding houses (transient)

Lodging houses (transient) with five or fewer guestrooms and 10 or fewer occupants

[BG] Care facilities within a dwelling. Care facilities for six or fewer persons receiving care that are within a single-family dwelling are permitted to comply with the International Residential Code provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3 or with Section P2904 of the IRC.

SMOKE CONTROL, DEDICATED SYSTEMS. Dedicated smoke-control systems are intended for the purpose of smoke control only. They are separate systems of air moving and distribution equipment that do not function under

normal building operating conditions. Upon activation, these systems operate specifically to perform the smoke-control function.

SMOKE CONTROL, NON-DEDICATED SYSTEMS. Non-dedicated systems are those that share components with some other system(s) such as the building HVAC system. Activation causes the system to change its mode of operation to achieve the smoke-control objectives.

STANDPIPE SYSTEM, CLASSES OF, Standpipe system classes are as follows:

Class I system. A system providing 2 ½ -inch (64 mm) hose connections to supply water for use by fire departments and those trained in handling heavy fire streams. Any standpipe systems installed shall be a Class I system. All standpipe systems referred to in this code shall meaning of and meet all requirements for a Class I system.

307.2 Permit required

307.2 Permit required. A permit shall be obtained from the *fire code official* in accordance with Section 105.6 prior to kindling a fire for recognized silvicultural or range or wildlife management practices, or prevention or control of disease or pests. Application for such approval shall only be presented by and permits issued to the owner of the land upon which the fire is to be kindled.

307.4.1 Bonfires

307.4.1 Bonfires. Bonfires are prohibited.

319 MOBILE FOOD PREPARATION VEHICLES

Section 319. Intentionally Deleted in its entirety.

320 INDOOR TRADE SHOWS AND EXHIBITIONS

SECTION 320
INDOOR TRADE SHOWS AND EXHIBITIONS

320.1 General. Indoor Exposition and Trade Show Facilities are addressed in this section. These include, but are not limited to exhibition halls, convention general sessions, association meetings, product convention showrooms, trade shows with or without booths, and political conventions that constitute temporary assembly uses. An operational permit shall be obtained in accordance with Section 105.6.13.

320.2 Exhibit Booths. Booths shall comply with 320.2.1 through 320.2.5.

320.2.1 Automatic Sprinklers
320.2.1.1 Exhibit booths exceeding 1,500 square feet are not permitted in nonsprinklered buildings.

320.2.1.2 Single-level exhibit booths exceeding 1,000 sq. ft. (93 sq. m.) and covered with a ceiling shall be protected by automatic fire sprinklers installed within the booth.

> **Exception:** Where the booth is used in an event with duration less than 7 calendar days and does not contain vehicles, open flame or hot works, automatic fire sprinklers are not required.

320.2.1.3 Each level of multi-level exhibit booths shall be protected by an automatic fire sprinkler system installed within the booth where the accessible floor area of the upper walking level(s) is greater than 1000 sq ft. (93 sq. m).

> **Exception:** Where the booth is used in an event with duration less than 7 calendar days and does not contain vehicles, open flame or hot works, automatic fire sprinklers are not required.

320.2.1.4 The water supply and piping for the fire sprinkler protection for exhibit booths shall be an approved temporary means provided by an existing standpipe system or an existing fire sprinkler system.

320.2.1.5 Hydraulic calculations shall be provided to the Authority Having Jurisdiction when the sprinklers required by Section 320.2.1.2. They are to be supplied by the standpipe system or in a hydraulically most remote location as defined by the currently adopted edition of Standard for the Installation of Sprinklers, NFPA 13.

320.2.2 Horizontal Separation between Booths. A covered single exhibit (booth) or group of covered exhibits (booths) that do not require fire sprinklers shall be separated by a distance of not less than 8 ft. (2.4 m) from other covered exhibit booths where the aggregate ceiling exceeds 1000 sq. ft. (93 sq. m.).

320.2.3 Travel Distance within Booths. The travel distance within the exhibit booth or exhibit enclosure to an exit access aisle shall not exceed 50 ft. (15 m).

320.2.4 Means of Egress from Multi-level Booths. The upper deck of multi-level exhibit booths exceeding 300 sq. ft. (28 sq. m.) shall have not less than two remote means of egress.

320.2.5 Construction Materials. Exhibit booths shall be constructed using any of the following:

(1) Noncombustible or limited combustible materials

(2) Wood exceeding ¼ in. (6.3 mm) nominal thickness

(3) Wood that is pressure-treated, fire-retardant wood meeting the requirements of NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials.*

(4) Flame-retardant materials complying with one of the following:

a. They shall meet the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate of NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*.

b. They shall exhibit a heat release rate not exceeding 100 kW when tested in accordance with NFPA 289 using the 20 kW ignition source.

(5) Textile wall coverings, such as carpeting and similar products used in wall or ceiling finishes complying with Section 803.5 of the IFC.

(6) Plastics limited to a Class A flame spread index.

(7) Foamed plastics and materials containing foamed plastics complying with Section 807.5.1 of the IFC.

(8) Cardboard, honeycombed paper, and other combustible materials having a heat release rate for any single fuel package that does not exceed 150 kW where tested in accordance one of the following:

a. ANSI/UL 1975, *Standard for Fire Tests for Foamed Plastics Used for Decorative Purposes*

b. NFPA 289 using the 20 kW ignition source

(9) Alternate materials as approved by the *fire code official*.

320.3 Decorative Curtains, and Textiles

320.3.1 Curtains, drapes, and textiles used in temporary exhibitions and trade shows shall comply with Section 320, and shall not be required to comply with Section 807. Curtains, drapes and textiles shall comply with Standard Method of Fire Tests for Flame Propagation of Textiles and Films, NFPA 701, Test Method 2. Compliance shall be indicated by a tag affixed to each curtain, drape, or textile. The tag shall be affixed by the owner of the material after gaining assurance that the material is inherently flame retardant, provided with current flame retardant treatment, or otherwise is compliant with NFPA 701. The tag shall indicate the name of the owner of the material and a statement indicating compliance with the Fire Code. The *fire code official* is authorized to conduct

field test in accordance with the current edition of NFPA 705, *Recommended Practice for a Field Flame Test of Textiles and Films*, on any curtain, drape or textile installed.

320.3.2 Curtains, drapes and textiles shall comply with Standard Method of Fire Tests for Flame Propagation of Textiles and Films, NFPA 701, Test Method 2.

320.3.3 Curtains, drapes or textiles shall not be installed to cover exit signs, means of egress components, sprinklers, strobes, horn-strobes, standpipe outlets, hose cabinets, fire extinguishers, or any other fire protection equipment.

> **Exception:** Free-standing partitions situated in a manner to permit the minimum required egress width to one or both sides of the partition shall be permitted. The paths of egress provided around the partition shall be marked by exit signs complying with Chapter 10.

320.3.4 Ceiling suspended curtains drapes and textiles in exhibition spaces are to have a minimum of 18 inches of clear space between the top of the material and the sprinkler deflector.

> **Exception:** Clearance between the ceiling and the top of the curtain, drape or textile is not required when the curtain, drape, or textile is within 6 inches of a full-height wall.

320.3.5 The amount of temporary ceiling hung curtains, drapes or textiles in exhibition spaces equipped throughout with automatic sprinklers shall not be limited and shall comply with 320.3.1 through 320.3.3.

320.3.6 Artificial decorative vegetation used in exhibits and trade shows shall comply with IFC Section 807.4.

320.4 Demonstration cooking and food warming in exhibition spaces shall comply with the following:

1. All cooking appliances shall be listed or approved by a nationally recognized testing agency.
2. All cooking equipment is to be operated according to the manufacturers' recommendations and operating instructions. Equipment recommended for outdoor use shall not be used indoors.
3. All cooking equipment (deep fat fryers and woks) operations using combustible oils shall meet all of the following criteria:

   a. Metal lids sized to cover the horizontal cooking surface are to be provided.

   The cooking surface is limited to 288 sq in (two sq ft).

   b. The fryer is to be separated from all other equipment by a distance not less than 24 in.

   c. These cooking displays must be separated from all other combustibles by a distance not less than 10 ft.

   d. Deep fat fryers shall be electrically powered and have a shut-off switch.
4. Class-K fire extinguishers shall be provided within 30-ft of each cooking operation in accordance with 904.11.5.
5. Solid fuel cooking equipment shall be protected in accordance with the mechanical code.
6. LP-gas used for displays and demonstrations shall be in accordance with section 6103.2.1.5.

320.5 Plans. Plans for the exhibition or trade show shall be submitted to the authority having jurisdiction for approval, along with application for an operational permit, prior to setting up any exhibit. The plans shall show all pertinent details of the proposed exposition which shall include the following as applicable:

1. Overall floor plan (either drawn to scale or dimensioned properly).
2. Egress analysis showing conformance with Chapter 10 of the IFC.
3. Seating arrangements and/or table and chair configurations.

4. Locations of all exhibits (booths, aisles and exits).
5. Locations of temporary walls, partitions, or curtains.
6. Lobby and registration area usage.
7. Location of temporary platforms (along with any intended use beneath the platform).
8. Location of fire protection equipment (e.g. extinguishers, fire alarm devices, hose cabinets, etc.).
9. Temporary fire sprinkler and fire alarm system/devices to be installed (note: This requires a separate installation permit).
10. Copy of excerpt from show management information guide serving notice that all exhibits shall comply with applicable codes and shall have all necessary Fire Code permits.

321 SPECIAL ACTIVITY LOTS

SECTION 321
SPECIAL ACTIVITY LOTS

321.1 General. Special activity lots, including Christmas tree lots, pumpkin patches, hay ride lots, and other similar lots, shall comply with this section.

321.2 Permit required. An operational permit shall be obtained prior to commencing special activity lot operations. See Chapter 1.

321.3 Other required permits. Other activities that support the special activity lot, such as a tent, a fuel tank for generators, an amusement building, or any other associated activity, shall have separate permits prior to commencing those other activities. See Chapter 1.

321.4 Arrangement of combustibles. Combustibles, such as Christmas trees, hay bales, and other combustible materials associated with the special activity, shall be arranged on the lot in a manner to mitigate the impact of fire, and shall be arranged in accordance with this section

321.4.1 Access from fire apparatus access roads. Fire apparatus access roads shall be provided within 150 feet of all portions of the special activity lot, as measured along normal paths of travel.

321.4.2 Clearance from fire apparatus access roads. All combustible materials shall be a minimum of ten (10) feet away from fire apparatus access roads.

321.4.3 Clearance from property lines upon which buildings may be built. All combustible materials shall be a minimum of twenty (20) feet from property lines for property where buildings are or are permitted to be built.

321.4.4 Clearance from fuel dispensers. All combustible materials shall be a minimum of 50 feet away from any fuel dispenser.

321.4.5 Clearance from buildings, building exits, and building exit discharges to the public way. All combustible materials shall be a minimum of ten (10) feet from any building, building exit, and the path of discharge between the building exit and the public way.

321.4.6 Aisles between materials. Aisles having a minimum width of five (5) feet shall be provided between areas containing materials. Sufficient aisles shall be provided such that the area of material storage does not exceed 150 feet in length and 50 feet in width.

321.5 Wiring and lighting. All wiring and lighting shall be listed for outside use, be of proper size and type, and be protected against physical damage. Electrical extension cords with multiple electrical outlets cannot be used unless specifically listed for outdoor use.

321.6 Fire Protection. Fire protection features, such as fire extinguishers and water supply, shall be provided for special activity lots as required by this section.

321.6.1 Fire extinguisher. A minimum two 2 ½ gallon water-type fire extinguisher shall be provided at an approved location for protection against incipient fires.

321.6.2 Water supply. The special activity lot shall be located within 300 feet of a fire hydrant.

321.6.3 Smoking prohibited. Smoking is prohibited on special activity lots. "NO SMOKING" signs with 2-inch high letters on a contrasting background shall be posted at entrances to the special activity lot and to each aisle.

321.6.4 Open burning prohibited. Open burning, such as a campfire, is prohibited on special activity lots.

321.7 Egress. Egress shall be provided as required by this code.

503.1.2 Additional access

503.1.2 Additional access. The *fire code official* is authorized to require more than one fire apparatus access road based on the potential for impairment of a single road by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.
Approved secondary access for ingress shall be provided for 20 or more dwelling units, road(s) with dead ends or with a single point of access in excess of 600 feet (182 880 mm), and for all commercial and industrial developments.

503.2.1 Dimensions

503.2.1 Dimensions. Fire apparatus access roads shall have an unobstructed width of not less than 24 feet (7315 mm), exclusive of shoulders, except for approved access gates in accordance with Section 503.6, provided no parking is allowed, and not less than 40 feet if parallel parking is allowed on both sides, and an unobstructed vertical clearance of not less than 13 feet 6 inches (4115 mm).

503.2.1.1 Dimensions for Group R, Division 3 Residential Subdivisions

503.2.1.1 Dimensions for Group R, Division 3 Residential Subdivisions. For Group R, Division 3 Residential Subdivisions, the minimum width of fire apparatus access roads is 36 feet (10 973 mm), measured face of curb to face of curb.

> **Exception:** Fire apparatus access roads may be reduced to 24 feet (7315 mm) in width provided that all homes are provided with an *approved automatic sprinkler system* and on-street parking is prohibited.

503.2.3 Surface

503.2.3 Surface. Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus, with a minimum vehicle load of 33,000 pounds per axle, and shall be surfaced and paved so as to provide all-weather driving capabilities.

> **Exception:** Temporary access roads serving only buildings under construction shall not be required to be paved.

503.2.4 Turning radius

503.2.4 Turning radius. The required turning radius of a fire apparatus access road shall be no less than 28 feet inside turning radius and 52 feet outside turning radius.

503.2.7 Grade

503.2.7 Grade. The grade of the fire apparatus access road shall not exceed 12 percent.

503.2.8 Angles of approach and departure

503.2.8 Angles of approach and departure. The angles of approach and departure for fire apparatus access roads shall have a maximum grade change of 6 percent for 25 feet (7.6 m) before or after the grade change.

503.2.9 Fire Apparatus – Point Load

503.2.9 Fire Apparatus – Point Load. Fire apparatus access roads including elevated portions shall be designed with a ground bearing capacity not less than 75 psi (500 kPa) over the ground contact area.

503.3 Marking

503.3 Marking. Fire apparatus access roads shall be marked where required to prohibit parking and other obstructions. Marking shall consist of painting the curb, or the side of the street, where no curb is present, with a suitable coat of industrial red enamel along the entire length of road where parking is prohibited. Each section of curb that is painted red shall also be marked by signage stating "NO PARKING FIRE LANE" (Type A sign). Signs are to be installed no higher than 10 feet or less than 7 feet above the surface of the roadway. Signs shall be located at each end of painted curb, and additionally in between so that the maximum separation between signs is 100 feet, as measured along the centerline of the fire apparatus access road.

In lieu of providing multiple signs, where a minimum of one sign is provided at every entrance stating "ON-STREET PARKING IN MARKED FIRE LANES PROHIBITED" (Type B sign), fire lanes may be marked by painting the words "NO PARKING FIRE LANE", over the face of the red-painted curbs (Type C sign). The words on the curbs shall be painted in white letters not less than 4 inches in height with a brush stroke of not less than ¾ inch. The maximum separation between markings shall be 50 feet, as measured along the centerline of the fire apparatus access lane.

503.3.1 Sign and curb marking specifications. Where required by the *fire code official* signs shall be in accordance with the following:

Type A: Minimum dimension of 18 inches (457mm) high by 12 inches (305 mm) wide. Red letters on a reflective white background with 3/8 inch red trim around entire outer edge of sign. Lettering shall be:

"FIRE LANE"

Type B: Minimum dimension of 24 inches (610 mm) wide by 18 inches (457 mm) high. Red letters on reflective white background with 3/8 inch red trim strip around the entire outer edge of sign. Lettering on sign shall be:

"ON-STREET PARKING IN MARKED FIRE LANES PROHIBITED"

Type C: Minimum dimension of 36 inches (914 mm) wide by 4 inches (101 mm) high. White letters on red enamel background. Lettering on curb shall be:

"NO PARKING FIRE LANE"

Signs shall be installed not less than 7 feet (2134 mm) and not more than 10 feet (3048 mm) above the ground level. Posts for signs shall be metal and securely mounted, unless written permission for alternatives is obtained prior to installation from the *fire code official*.

TYPE A SIGN

TYPE B SIGN

TYPE C CURB MARKING

503.4.1 Traffic calming devices

503.4.1 Traffic calming devices. Traffic calming devices shall be prohibited unless *approved* by the *fire code official*.

> **Exception:** Speed humps are allowed on private fire apparatus access roads serving commercial and industrial buildings when *approved* by the *fire code official*. The location(s), the number permitted, and the design of the speed hump(s) shall meet the approval of the *fire code official*.

The *fire code official* is authorized to require the removal from any private property of any existing traffic management or calming device, including speed bumps that do not meet the applicable criteria, and has been determined by the *fire code official* to unnecessarily hinder emergency apparatus response.

503.6 Access Gates

503.6 Access Gates. The installation of access gates across a fire apparatus access road shall be approved by the *fire code official*. Where access gates are installed, they shall have an approved means of emergency operation. The access gates and the emergency operation shall be maintained operational at all times. The minimum clear opening width shall be 20 feet.

503.6.1 Permit. A construction permit is required to install a gate that obstructs a fire apparatus access road in accordance with Section 105.7.12. A separate permit is required for each gated entrance.

503.6.2 General. Fire apparatus access roads that are secured by gates shall comply with the specifications of the Fire Department.

503.6.3 Electronically controlled gates. Electronically controlled gates shall be provided with an approved vehicle detector/receiver system in accordance with the rules and regulations specified by the Fire Department. Access gates shall be maintained operational at all times. When electronically controlled gates are out of service, they shall be secured in the open position until repairs are complete. Repairs shall be in accordance with original specifications.

> **Exception:** When approved by the *fire code official*, electronically controlled gates that are manned on a 24-hour basis.

When required by the *fire code official*, the installing contractor or the owner of the property shall provide the Fire Department transmitter(s) or approved alternative without cost to the Fire Department.

The *fire code official* may provide transmitter(s), at no cost to the Fire Department, to local law enforcement agencies and/or an ambulance service for use in emergencies.

503.6.4 Existing facilities. All existing facilities with gates installed across access roads shall comply with Fire department guidelines. Non-complying gates shall be secured in the open position in a manner approved by the Fire Department and/or *fire code official*.

> **Exception:** Gates securing sensitive facilities operated by a public utility governed by the Nevada Public Service Commission, a State of Nevada charter, or other public franchise, shall not be required to be secured in the open position.

503.6.5 Plans and Specification. Three sets of plans and specifications for fire apparatus access road gates shall be submitted for review and approval prior to construction. Included in the submittal shall be the following information:

1. Site plan with north arrow, roadway and gate dimensions.
2. Location of underground roadway detector loop, and green marker, if applicable.
3. Manufacturers' specification sheets detailing the voltage, current, radio frequency, power cable and coding for the proposed system, if applicable.
4. Contractor's statement of compatibility with existing installations.
5. Detailed vicinity map.

503.6.6 Operational testing. An operational test shall be requested by the installing contractor and shall be conducted prior to placing the system into operation to establish that the final installation complies with this code, the specified design, and is functioning properly.

505.1 Address Identification

505.1 Address Identification. New and existing buildings shall have *approved* address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Where required by the *fire code official*, address identification shall be provided in additional *approved* locations to facilitate emergency response. Address

identification shall be in compliance with the requirements of the *fire code official* and the ordinances of the jurisdiction. Where access is by means of a private road and the building cannot be viewed from the *public way*, a monument, pole, or other sign or means shall be used to identify the structure. Address identification shall be maintained.

505.3 Directory required

505.3 Directory required. When multiple R-2 occupancy buildings are contained in a subdivision and where not all buildings have public street frontage, an approved permanent directory shall be provided at each entrance to the development from surrounding public streets.

507.1 Required water supply

507.1 Required water supply. An *approved* water supply capable of supplying the required fire flow for fire protection shall be provided to premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction. The design and installation of both public and private fire hydrants shall be in accordance with this section, Appendix B, Appendix C, NFPA 24 (for private systems) and the Uniform Design And Construction Standards for Potable Water Systems (UDACS)(for public systems). Unless otherwise approved by the *fire code official*, effluent reuse water is not an approved water supply.

507.5.7 Painting and Markings

507.5.7 Painting and Markings. Hydrants and curbs shall be painted, and hydrant locations shall be marked, in accordance with this section.

507.5.7.1 Hydrant Painting. On-site private fire hydrants shall be painted with a suitable prime coat and not less than 2 coats of exterior industrial grade enamel, safety red in color.

507.5.7.2 Curb and Roadside Painting. The curb, or roadside where no curb is present, adjacent to a fire hydrant shall be painted to restrict parked cars from obstructing access to the fire hydrants. A coat of exterior industrial grade enamel, safety red in color, shall be applied for a minimum of 30 feet, 15 feet to each side of the hydrant, unless the curb or roadside is interrupted by a driveway, at which point the paint shall end at the driveway.

507.5.7.3 Lane Marking. Hydrant locations shall be marked by means of a blue colored reflective marker in the fire access lane. The marker shall be located in the center of a drive lane where parking is not anticipated, nearest to the hydrant.

508.1 General

508.1 General. Where required by other sections of this code and in all buildings classified as high-rise buildings by the *International Building Code*, a *fire command center* for fire department operations shall be provided and shall comply with Sections 508.1.1 through 508.1.6. When required, a secondary response point shall comply with Section 508.2.

508.1.6 Required features

508.1.6 Required features. The *fire command* center shall comply with NFPA 72 and shall contain the following features:

1. The emergency voice/alarm communication control unit.
2. The fire department communication system.
3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.

5. Status indicator and controls for air distribution systems

6. The fire-fighter's control panel required by Section 909.16 for smoke control systems installed in the building.

7. Controls for unlocking interior exit stairway doors simultaneously.

8. Sprinkler valve and waterflow detector display panels.

9. Emergency and standby power status indicators.

10. A telephone for fire department use with controlled access to the public telephone system.

11. Fire pump status indicators.

12. Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, fire-fighting equipment and fire department access and the location of fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions.

13. An *approved* Building Information Card that contains, but is not limited to, the following information:

    13.1 General building information that includes: property name, address, the number of floors in the building above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor), and the estimated building population during the day, night and weekend;

    13.2 Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager, building engineer, and their respective work phone number, cell phone number, and e-mail address;

    13.3 Building construction information that includes: the type of building construction including but not limited to floors, walls, columns, and roof assembly;

    13.4 Exit access stairway and exit stairway information that includes: number of *exit access stairways and exit stairways* in the building; each exit access stairway and *exit stairway* designation and floors served; location where each exit access stairway and *exit stairway* discharges, interior *exit stairways* that are pressurized; *exit stairways* provided with emergency lighting, each *exit stairway* that allows reentry; *exit stairways* providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve, location of elevator machine rooms, control rooms and control spaces; location of sky lobby; and location of freight elevator banks;

    13.5 Building services and system information that includes: location of mechanical rooms, location of building management system, location and capacity of all fuel oil tanks, location of emergency generator, location of natural gas service;

    13.6 *Fire protection system* information that includes: locations of standpipes, location of fire pump room, location of fire department connections, floors protected by *automatic* sprinklers and location of different types of *automatic sprinkler systems* installed including but not limited to dry, wet and pre-action;

    13.7 Hazardous material information that includes: location and quantity of hazardous material.

14. A new work table with a minimum size of three (3) feet by seven (7) feet capable of holding plans in an open position.

15. Generator supervision devices, manual start and transfer features.

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

17. Elevator fire recall switch in accordance with ASME A17.1/CSA B44.

18. Elevator emergency or standby power selector switch(es), where emergency or standby power is provided.

19. An approved white board with a minimum size of three (3) feet by four (4) feet capable of easy erasure, with a marking device and an eraser attached.

20. Separate shunt trip switches for normal and emergency power.

21. A printer connected to the fire alarm control panel to record all fire alarm, supervisory and trouble signals. The printer shall be connected either to a UPS battery system and/or an emergency power supply.

508.2 Secondary Response Point

508.2 Secondary Response Point. A Secondary Response Point (SRP) shall comply with Section 508.2.1 through 508.2.3.

508.2.1 Where required. When required by the *fire code official*, an SRP shall be provided in buildings/facilities that are required to be served by a *fire command center*.

508.2.2 Components required. The SRP shall have the following components:

1. A fire alarm LCD annunciator that provides a means to scroll through the list of devices that are activated and to acknowledge each alarm. The fire alarm annunciator shall not have the capability of silencing or resetting the building fire alarm system.
2. A microphone capable of providing all-call voice messaging over all notification appliance circuits of the alarm communication system.
3. A pull station capable of evacuating the entire building.
4. An elevator panel that allows the manual transfer of standby power to each elevator cab for all elevators located within the building.

   Exception: Where an elevator panel allowing manual transfer of standby power for all elevators is provided at the *fire command center*, an elevator panel is not required at the SRP.

508.2.3 Location. The SRP shall be located as follows, subject to the approval of the *fire code official*:

1. The SRP shall be located on the floor designated for primary elevator recall.
2. The exterior entrance leading to the SRP shall be adjacent to the fire department vehicle access lane.
3. The SRP shall be located in an area inaccessible to the public.
4. The SRP shall be located within a travel distance of 200 feet from the building entry.
5. The entrance to the SRP shall be separated from the *fire command center* a minimum distance equal to 25% of the building perimeter, or a minimum of 250 feet, as measured along the building perimeter.

510 EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

SECTION 510
EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

510.1.1 Emergency responder radio coverage system in new buildings. An emergency responder radio coverage system shall be provided throughout buildings when any of the following apply:

1. **High-rise buildings.**

2. **Underground and below grade buildings.** Buildings having a floor level below the finished floor of the lowest level of exit discharge of any level.

3. **Other buildings.** The fire code official is authorized to require a technical opinion and report, in accordance with Section 104.7.2, for buildings whose design, due to location, size, construction type, or other factors, could impede radio coverage as required by Section 510.4.1. The report shall make a recommendation regarding the need for an emergency responder radio coverage system.

510.2 Emergency responder radio coverage in existing buildings. Existing buildings shall be provided with *approved* radio coverage for emergency responders as required in Chapter 11. Existing buildings that do not have *approved* radio coverage, as determined by the Fire Chief, in accordance with Section 510.4.1 shall be equipped with such coverage in accordance with Section 510 within a time frame established by the *fire code official.*
Building owners shall submit to the *fire code official* a radio signal strength study, technical opinion and report prepared in accordance with Section 104.7.2. The report shall identify the area(s) requiring an emergency responder radio coverage system to comply with Section 510.4.1.

Exceptions:

1. Where *approved* by the *fire code official*, an existing *approved* wired communication system in accordance with Section 907.2.12.2 shall be permitted to be maintained in lieu of an approved radio coverage system.

2. Where it is determined by the *fire code official* that the radio coverage system is not needed.

510.3 Permit required.-A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment is required as specified in Sections 105.6 and 105.7.6. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

510.3.1 Construction documents. Construction documents for emergency responder radio coverage systems shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations as determined by the *fire code official*.

510.3.2 Plans. Plans shall be submitted to the *fire code official* for review and *approval* prior to installation. Coordination and compliance with *agency* radio system requirements is the responsibility of the owner and contractor.

510.3.2.1 Plan Submittals. Plan submittals shall include, but not be limited to all of the following:

a. A floor plan that indicates the use of all rooms, emergency responder radio coverage system equipment locations, power panel connections, raceway routing layout, conduit and conductor types and sizes, compliance with survivability criteria and locations of building access to the equipment.

b. A roof plan showing the location of antenna(s) including a line of site plan to agency transmitting and receiving antenna(s).

c. Schematic drawings of the electrical system, backup power, antenna system and other associated equipment.

d. Rack and equipment cabinet plans showing arrangement and configuration of emergency responder radio coverage system equipment.

e. System riser diagram(s).

510.3.2.2 Data sheets. Manufacturer's data sheets shall be provided for equipment to be installed. Manufacturers' data sheets shall indicate model numbers and listing information for equipment, devices and materials.

510.3.2.3 As-built documents. Any field changes that occur during construction shall be incorporated onto new as-built plans and data sheets. Plans shall be submitted to the *fire code official* and be *approval* prior to final inspections. Coordination and compliance with *agency* radio system as-built document requirements is the responsibility of the owner and contractor.

510.3.3 Licensing. All systems utilizing repeaters shall be FCC licensed under the *agency*'s system. A distributed antenna system (DAS) shall be FCC licensed under the *agency*'s system unless the DAS complies with 47 CFR Part 22.383.

510.3.4 Equipment. Systems and components shall be listed and approved for the purpose for which they are installed.

510.4 Technical requirements. The system shall be capable of transmitting all public safety radio frequencies assigned to the *agency's*, and be capable of using any modulating technology. Systems, components and equipment required to provide the emergency responder radio coverage system shall comply with Sections 510.4.1 through 510.4.2.9.

510.4.2 System design. The emergency responder radio coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.9, NFPA 70, NFPA 72 and NFPA 1221.

510.4.2.3 Standby power. Emergency responder radio coverage systems shall be provided with dedicated standby batteries or provided with 4 ~~2~~-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the emergency responder radio coverage system at 100-percent system capacity for a duration of not less than 24 hours.

510.4.2.5 System monitoring. The emergency responder radio enhancement system shall be monitored by a listed fire alarm control unit, or where *approved* by the *fire code official*, shall sound an audible signal at a constantly attended on-site location.

Automatic supervisory signals shall include the following:

Items 1 – 7 are u*nchanged.*

8. Supervisory signals required by NFPA 1221.

510.4.2.7 Pathway Survivability. The system shall be designed with a designated pathway survivability as described in NFPA 72 Section 24.3.13.8 and NFPA 1221 Section 9.6.2. The *fire code official* shall have the authority to require a fire and non-fire risk analysis be prepared to specify and document the pathway survivability design and installation requirements.

510.4.2.8 *Unchanged.*

Exceptions:

1. *Unchanged.*

2. *Unchanged.*

510.4.2.9 Cable.

510.4.2.5.2.6.1. Cable shall be contained in a non-combustible raceway, metal-clad, or fully enclosed cable tray system.

Exception: If *approved* by the *fire code official*, where leaky feeder cable is utilized as the antenna, it shall not be required to be installed in metal raceway.

510.4.2.5.2.6.2 Cable shall have a passband of 700-900 MHz.

510.5 Installation requirements. The installation of the public safety radio coverage system shall be in accordance with NFPA 70, NFPA 72, NFPA 1221 and Sections 510.5.1 through 510.5.4.

510.5.3 Acceptance test procedure. Where an emergency responder radio coverage system is required, annually and upon completion of installation, the building owner shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows:

Items 1 – 8 are u*nchanged.*

510.6 Maintenance. The emergency responder radio coverage system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.5.

510.6.1 Testing and proof of compliance. The owner of the building or owner's authorized agent shall have the emergency responder radio coverage system shall be inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

1. *Unchanged.*

2. *Unchanged.*

3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage.

If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined. Individual batteries shall be tested in accordance with NFPA 72, Chapter 14.

4. *Unchanged.*

5. At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.3, shall be submitted to the *fire code official*. A copy of this report shall also be maintained on-site for three years.

6 The *agency* shall be notified immediately of system impairments in accordance with Appendix P.

510.6.5 Operational Maintenance.

510.6.5.1 Maintenance contract. The owner is responsible for holding a maintenance contract with a company that can provide emergency response 24 hours a day, 7 days a week.

510.6.5.2 Maintenance records. Maintenance records shall be maintained on-site. Copies of all maintenance records shall be submitted to the agency's representatives and the *fire code official* when requested.

603.3.2.2 Restricted use and connection

603.3.2.2 Restricted use and connection. Tanks installed in accordance with Section 603.2.2 shall be used only to supply fuel oil to fuel-burning, fire pump, or generator equipment installed in accordance with Section 603.3.2.4. Connections between tanks and equipment supplied by such tanks shall be made using closed piping systems. Fuel connections and tank relief vents shall be located on the exterior of the building in approved locations.

605.5 Access

605.5 Access. Access to refrigeration systems having a refrigerant circuit containing more than the allowable quantity of refrigerant as stated in Table 1102.2 of the Uniform Mechanical Code shall be provided for the fire department at all times as required by the *fire code official*.

605.6 Testing of equipment

605.6 Testing of equipment. Refrigeration equipment and systems having a refrigerant circuit containing more than the allowable quantity of refrigerant as stated in Table 1102.2 of the Uniform Mechanical Code shall be subject to periodic testing in accordance with Section 605.6.1. Records of tests shall be maintained. Tests of emergency devices or systems required by this chapter shall be conducted by persons trained and qualified in refrigeration systems.

605.7 Emergency signs

605.7 Emergency signs. Refrigeration units or systems having a refrigerant circuit containing more than the allowable quantity of refrigerant as stated in Table 1102.2 of the Uniform Mechanical Code shall be provided with *approved* emergency signs, charts and labels in accordance with NFPA 704. Hazard signs shall be in accordance with the *International Mechanical Code* for the classification of refrigerants listed therein.

605.9 Remote controls

605.9 Remote controls. Where flammable refrigerants are used and compliance with Section 1107.0 of the *Uniform Mechanical Code* is required, remote control of the mechanical equipment and appliances located in the machinery room as required by Sections 605.9.1 and 605.9.2 shall be provided at an approved location immediately outside the machinery room and adjacent to its principal entrance.

605.11 Storage, use and handling

605.11 Storage, use and handling. Flammable and combustible materials shall not be stored in machinery rooms for refrigeration systems having a refrigerant circuit containing more than the allowable quantity of refrigerant as stated in Table 1102.2 of the Uniform Mechanical Code of any other group refrigerant. Storage, use or handling of extra refrigerant or refrigerant oils shall be as required by Chapters 50, 53, 55 and 57.

> **Exception:** This provision shall not apply to spare parts, tools and incidental materials necessary for the safe and proper operation and maintenance of the system.

605.16 Electrical equipment

605.16 Electrical equipment. Where *refrigerant* of Groups A2, A3, B2 and B3, as defined in the *International Mechanical Code*, are used, refrigeration machinery rooms shall conform to the Class I, Division 2 hazardous location classification requirements of NFPA 70.

Exceptions:

1. Ammonia machinery rooms that are provided with ventilation in accordance with Section 1106.2.5.1 of the *Uniform Mechanical Code*.
2. Machinery rooms for systems containing Group A2L *refrigerants* that are provided with ventilation in accordance with Section 605.17.

606.1 Emergency operation

606.1 Emergency operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more shall comply with the requirements in Chapter 11. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1. No building security, access control or similar system, shall disable or override any new or existing Phase II emergency operations, preventing access to all levels.

607.3.5 Access Panel Coordination

607.3.5 Access Panel Coordination. Ducts shall be provided with access panels to facilitate cleaning of automatic sprinklers installed within the duct. Access panels shall be in accordance with the *Uniform Mechanical Code*.

607.3.6 Automatic Sprinkler Location

607.3.6 Automatic Sprinkler Location. When automatic sprinkler protection is required, automatic sprinkler head locations shall be coordinated with access panels required by the *Uniform Mechanical Code* such that automatic sprinkler heads are within 3 feet of an access panel.

806.1.1 Restricted occupancies

806.1.1 Restricted occupancies. Natural cut trees shall be prohibited within ambulatory care facilities and Group A, B, E, F, H, I-1, I-2, I-3, I-4, M, R-1, R-2, R-4, and S occupancies.

Exception: Trees shall be allowed within dwelling units in Group R-2 occupancies.

807.1 General

807.1 General. The following requirements shall apply to all occupancies:

1. Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. Furnishings, draperies, hanging fabrics or other objects shall not be placed to obstruct *exits*, access thereto, egress therefrom or visibility thereof, and shall not obstruct fire protection and fire alarm devices and equipment, and shall not restrict the proper operation of such devices.
4. The permissible amount of noncombustible decorative materials shall not be limited.

901.2.2 Plans

901.2.2 Plans Complete plans and specification for fire protection systems shall be submitted to the *fire code official* for review and be approved prior to system installation. Approved plans shall be kept readily available on the job site.

The licensee (contractors Master or Qualified Employee) information shall be on submittals as per Nevada Administrative Code, Nevada Revised Statutes, and the Nevada Blue Book.

A designer of fire sprinkler, fire alarm, and special hazard systems shall hold a minimum Level II certification in their respective discipline from the National Institute for Certification in Engineering Technologies (NICET) or an equivalent certification (e.g., plans and calculations prepared by a Nevada Registered Professional Engineer working in their area of expertise). Submittals shall include the designer's printed name, certificate number, and signature.

901.4.6 – 901.4.8 Pump and riser rooms

Section 901.4.6 Pump room size. Where provided, fire pump rooms shall be designed with adequate space (see NFPA 20 for fire pump clearances and NFPA 70 for working space clearances) for all equipment necessary for the installation, as defined by the manufacturer, with sufficient working space around the stationary equipment. Clearances around equipment to elements of permanent construction, including other installed equipment and appliances, shall be sufficient to allow inspection, service, repair or replacement without removing such elements of permanent construction or disabling the function of a required fire-resistance-rated assembly. Fire pump rooms shall be provided with doors and unobstructed passageways large enough to allow removal of the largest piece of equipment.

901.4.6.1 Access. Fire pumps and controllers shall be provided with ready access. Where located in a pump room, the door shall be permitted to be locked provided that the key is available at all times.

901.4.6.2 Marking on access doors. Access doors for fire pump rooms shall be labeled "Fire Pump Room" or "Fire Pump House" with an approved sign. The lettering shall be in contrasting color to the background. Letters shall have a minimum height of 2 inches (51 mm) with a minimum stroke of 3/8 inch (10 mm).

901.4.6.3 Lighting. Permanently installed artificial illumination shall be provided in fire pump rooms.

901.4.7 *Automatic sprinkler system* riser rooms. A dedicated *automatic sprinkler system* riser room shall be required for each fire sprinkler system riser.

Exceptions:

1. Where approved by the *fire code official*, where systems are controlled by wall-mounted Post Indicator Valves (PIV), and where exterior access is provided to the monitoring panel that is located in a conditioned room, an *automatic sprinkler system* riser room is not required.
2. When approved, where a single system serves the building and the system is controlled by a PIV, a riser room is not required.
3. In multi-story facilities, floor control risers are permitted to be located on each floor level in an exit stair enclosure.
4. Systems designed in accordance with Section 903.3.1.3 (NFPA 13D) do not require an *automatic sprinkler system* riser room.
5. Systems designed in accordance with Section 903.3.1.2 (NFPA 13R) shall have an *automatic sprinkler system* riser room/closet that is large enough to facilitate access to all the necessary fire sprinkler and fire alarm valves and devices. This area shall be accessible from the outside with either a door or an access panel large enough to allow for testing and maintenance of system. The area shall also maintain a minimum temperature of 40° F and a maximum temperature of 100° F.
6. Fire pump rooms complying with Section 901.4.6.

901.4.7.1 Contents. The primary *automatic sprinkler system* riser room shall contain the fire riser into the building. The fire riser shall contain at a minimum, a flow switch, a check valve, and a control valve.

> **Exception:** Where there is a single system in the building and an exterior Post Indicator Valve (PIV) is provided, then the control valve is not required in the *automatic sprinkler system* riser room.

901.4.7.2 Exterior Access Door. *Automatic sprinkler system* riser rooms shall have an exterior access door with a minimum width of 36 inches (914 mm) and a minimum height of 80 inches (2032 mm).

> **Exception**: For high-rise, terminal, and covered mall buildings, secondary fire risers may be contained in *automatic sprinkler system* riser rooms that are located in dedicated rooms as *approved* by the *fire code official* in areas without direct access from the exterior.

901.4.7.3 Protection. *Automatic sprinkler system* riser rooms shall be separated from the rest of the building by 1-hour fire partitions.

901.4.7.4 Size. The riser room shall have a minimum area of 16 square feet (1.49 m^2), with a minimum dimension of 4 feet for the first sprinkler riser plus an additional 9 square feet for each additional riser contained.

901.4.7.5 Clearances for a fire alarm control unit. Where a fire alarm control unit is located in the *Automatic sprinkler system* riser room, the unit shall be located so that there is a minimum clearance in accordance with the electrical code.

901.4.7.6 Auxiliary control valves. *Automatic sprinkler system* riser rooms are not required for auxiliary control valves.

901.4.7.7 Signage. Weatherproof signage shall be provided on the exterior access door. Signage shall state “Fire Sprinkler Riser Room” in a contrasting color. Letters shall have a minimum height of 2 inches with a minimum stroke of 3/8 inch.

901.4.8 Environment. *Automatic sprinkler system* riser rooms and fire pump rooms shall be maintained at a temperature of not less than 40° F and a maximum temperature of 100° F. Heating and cooling units shall be permanently installed.

Exceptions:

1. Where the fire sprinkler riser room or fire pump room does not contain a Fire Alarm/Monitoring Panel or spare sprinklers heads, or when these devices are rated for higher ambient temperatures the room shall not be required to be conditioned for maximum temperature.

2. Heating and/or conditioning is not required if calculations are prepared and sealed by a design professional, on a case-by case address specific basis, proving that the temperature within the riser room does not fall or rise below the temperature range of 40° F to 100° F. To maintain 40° F, the temperature analysis must use a starting temperature of 50° F and use an outside temperature of 0° F for a period of 8 hours. To maintain 100° F, the temperature analysis must use a starting temperature of 90° F and use an outside temperature of 120° F for a period of 8 hours.

3. Where the fire sprinkler riser room or fire pump room contains equipment that has a higher manufacturer's temperature rating acceptable to the *fire code official*.

903.1.1 Alternative protection

903.1.1 Alternative protection. Intentionally deleted.

903.2 Where required

903.2 Where required. Approved *automatic sprinkler system*s in new buildings and structures shall be provided throughout all buildings and structures, regardless of occupancy type and including buildings and structures in accordance with the International Residential Code, which meet one of the following requirements, and additionally in the locations described in Sections 903.2.1 through 903.2.12:

1. For buildings constructed in accordance with the International Building Code, approved automatic sprinklers systems are required where the building area exceeds 5,000 square feet (464 m^2).
2. For buildings constructed in accordance with the International Residential Code, approved *automatic sprinkler system*s are required where the building area exceeds 5,000 square feet (464 m^2).
3. For any buildings, not otherwise requiring fire sprinklers, where the available fire flow does not meet the fire flow requirements of this code, approved *automatic sprinkler system*s shall be provided as required by the *fire code official*.

   Exceptions:

   1. Open parking garages with no other occupancy above the open parking garage structure and with fire apparatus lanes immediately adjacent to two open sides of the garage equaling a minimum of 40% of the garage perimeter are not required to be protected with automatic sprinklers.
   2. Normally unoccupied Group U occupancies used for agricultural or livestock purposes.
   3. Buildings, structures, or service equipment and installations directly used in utility generation or distribution which are installed on properly recorded easements belonging to water, gas, power, telephone, or other utility companies that are preemptively regulated by the Nevada Public Service Committee, a State of Nevada charter, or other public franchise. This exception does not apply to non-exempted buildings or structures containing occupiable spaces such as offices, meeting rooms, service counters, public restrooms, or other normally occupied spaces.
   4. Playground shade structures, fuel dispensing canopies, and carports open to a minimum clear height of 10 feet on all sides around the entire perimeter, with non-combustible structural support and frame, with either non-combustible material, or fabric complying with NFPA 701 providing shade, located a minimum of 10 feet from the nearest building, property line or shade structure, and less than 10,000 square feet in projected area, do not require fire sprinklers.
   5. For new construction expanding existing unsprinklered Group R-3 buildings or one- and two-family dwellings built in accordance with the International Residential Code, sprinklers are not required to be

retrofitted into the building where the building is provided with fire flow in accordance with Appendix B and the newly added living space does not exceed 5,000 square feet.

If any fire area in a building or structure is provided with fire sprinklers, whether required or not, all fire areas in the building or structure shall be provided with fire sprinklers:

Exceptions:

1. Where a building is subdivided into separate buildings, each having a total building area of less than 5,000 sq ft (464 m^2), by fire walls with no openings constructed in accordance with the International Building Code.
2. Special hazard areas that required sprinklers for certain uses, such as medical gas rooms, may be fire sprinklered without requiring additional fire sprinklers throughout the building, when approved by the *fire code official*.

903.2.3 Group E

903.2.3 Group E. An *automatic sprinkler* system shall be provided for Group E occupancies where one of the following conditions exists:

1. Throughout all Group E *fire areas* greater than 5,000 square feet (64m^2) in area.
2. The Group E fire area is located on a floor other than a level of exit discharge serving such occupancies.

   Exception: In buildings where every classroom has not fewer than one exterior exit door at ground level, an automatic sprinkler system is not required in any area below the lowest level of exit discharge serving that area
3. The Group E Fire area has an occupant load of 300 or more.
4. Daycare facilities where there is occupancy from 12:00 AM - 6:00 AM and care for 7 or more children.

903.2.9 Group S-1

903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy.

Numbers 1-5 intentionally deleted.

903.2.9.1 Repair garages

903.2.9 Repair garages. An *automatic sprinkler system* shall be provided throughout all buildings used as repair garages in accordance with Section 406.8 of the *International Building Code*.

Numbers 1-4 intentionally deleted.

903.2.11.5 Commercial cooking operations

903.2.11.5 Commercial cooking operations. An *automatic sprinkler system* shall be installed in a commercial kitchen exhaust hood and duct system where an *automatic sprinkler system* is used to comply with Section 904, and for the entire length of duct when the duct length exceeds 75 feet.

903.2.11.7 Protection of available storage height

903.2.11.7. Protection of available storage height. In Group S-1 and all other storage areas the fire sprinkler system shall be designed to protect storage up to the maximum available storage height. The minimum sprinkler density shall be equivalent to that required for a Class IV commodity pursuant to NFPA 13.

903.3.1.1.1 Exempt locations

903.3.1.1.1 Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, or fire-resistance rated construction, or contains electrical equipment.

1. Any room where the application of water, or flame and water, constitutes a serious life or fire hazard.

2. Any room or space where sprinklers are considered undesirable because of the nature of the contents, when *approved* by the *fire code official.*

3. Fire service access elevator machine rooms and machinery spaces.

4. Machine rooms, machinery spaces, control rooms and control spaces associated with occupant evacuation elevators designed in accordance with Section 3008 of the *International Building Code*.

903.3.1.2 NFPA 13R sprinkler systems

903.3.1.2 NFPA 13R sprinkler systems. *Automatic sprinkler systems* in Group R Occupancies up to and including two stories in height in buildings not exceeding 60 feet (18 288 mm)in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R.

The number of stories in Group R occupancies constructed in accordance with Section 510.2 and 510.4 of the International Building Code shall be measured from the horizontal assembly creating separate buildings.

903.3.5.3 Cross connections and backflow, minimum types of protection

903.3.5.3 Cross connections and backflow, minimum types of protection. Sprinkler systems defined as Class 4, Class 5, and Class 6 fire sprinkler systems by NAC 445A, shall require approval from the water purveyor prior to system installation.

903.4 Sprinkler system supervision and alarms

903.4 Sprinkler system supervision and alarms. Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit.

Exceptions:

1. *Automatic sprinklers systems* protecting one- and two-family dwellings.
2. Limited area sprinkler systems in accordance with Section 903.3.8.
3. *Automatic sprinklers systems* installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.

903.4.1 Monitoring

903.4.1 Monitoring. Alarm, supervisory, and trouble signals shall be distinctly different and shall be automatically transmitted to an approved supervising station or, when approved by the *fire code official*, shall sound an audible signal at a constantly attended location.

Exceptions:

1. Underground key or hub valves are not required to be monitored.
2. Backflow prevention devices located at the municipal water supply connection are not required to be monitored when either locked in the open position, or are located within an underground vault or an approved insulated enclosure.

Multi-story facilities shall provide zone annunciation on a floor-by-floor basis.
In occupancies provided with a supervised sprinkler system, the following three distinctly different signals shall be transmitted to an approved supervising station:

1. Water Flow Alarm
2. Supervisory
3. System Trouble

The supervising station shall only retransmit Water Flow Alarm signals to the Fire Department.

903.4.2 Audible and Visual Notification appliances

903.4.2 Audible and Visual Notification appliances. *Approved* audible and visual notification appliances shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm notification appliances shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Exterior audible and visual notification appliances shall be provided on the exterior of the building above the wall-mounted Fire Department Connection. One interior audible and visual notification appliance shall be provided near the main entrance or in a normally occupied location. In multiple-tenant facilities, one interior audible and visual notification appliance shall be provided near the main entrance or in a normally occupied location for each tenant space. Where a fire alarm system is installed, actuation of the *automatic sprinkler system* shall actuate the building fire alarm system.

903.4.3 Floor control valves

903.4.3 Floor control valves. Approved supervised indicating control valves shall be provided at the point of connection to the riser on each floor in multi-story facilities.

903.4.4 Tenant isolation control valves

903.4.4 Tenant isolation control valves. *Approved* isolation control valves shall be provided for Group A and M tenant spaces having public access exclusively to an adjacent assembly space or mall. Immediately adjacent tenant spaces may be combined up to a gross area of 5,200 square feet. This isolation control valve shall not define a separate sprinkler system. It shall be required in new construction and in existing buildings with a change of occupancy or construction affecting 20 or more sprinklers.

903.6 Where required in additions, alterations, or changes of use or occupancy in existing buildings and structures

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903.6. Where required in additions, alterations, or change of use or occupancy to existing buildings. Additions, alterations, or change of use or occupancy to any existing building or structure shall comply with Section 903.2 for automatic sprinkler systems.

904.2 Where permitted

904.2 Where permitted. Automatic fire-extinguishing systems shall be approved by the *fire code official*.

905.3 Required installations

905.3 Required installations. Standpipe systems shall be installed where required by Sections 905.3.1 through 905.3.8. Standpipe systems are allowed to be combined with *automatic sprinkler system*s.

Exception: Standpipe systems are not required in Group R-3 occupancies.

The standpipe design shall be *approved* by the *fire code official*. Standpipes in buildings with fire pumps shall be automatic. Standpipes in buildings not subject to freezing shall be wet. Standpipes in areas subject to freezing shall be permitted to be manual dry when equipped with both KNOX locking caps and/or KNOX plugs for fire department connections (FDC) and hose valves that are acceptable to the *fire chief*.

905.3.1 Height

905.3.1 Height. Approved Class I standpipe systems shall be installed throughout buildings where any of the following conditions exist:

1. Four or more stories are above or below grade plane

2. The floor level of the highest story is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access.

3. The floor level of the lowest story is located more than 30 feet (9144 mm) below the highest level of the fire department vehicle access.

Exception: In determining the lowest level of fire department vehicle access, it shall not be required to consider:

1. Recessed loading docks for four vehicles or less, and

2. Conditions where topography makes access from the fire department vehicle to the building impractical or impossible.

905.3.3 Covered and open mall buildings

905.3.3 Covered and open mall buildings. Covered mall and open buildings shall be equipped throughout with a standpipe system where required by Section 905.3.1. Mall buildings not required to be equipped with a standpipe system by Section 905.3.1 shall be equipped with Class I hose connections connected to the *automatic sprinkler system* sized to deliver water at 250 gallons per minute (946.4 L/min) at the most hydraulically remote hose connection while concurrently supplying the *automatic sprinkler system* demand. The standpipe system shall be designed not to exceed a 50 pounds per square inch (psi) (345 kPa) residual pressure loss with a flow of 250 gallons per minute (946.4 L/min) from the fire department connection to the hydraulically most remote hose connection. Hose connections shall be provided at each of the following locations:

1. Within the mall at the entrance to each exit passageway or corridor.

2. At each floor-level landing within interior exit stairways opening directly on the mall.

3. At exterior public entrances to the mall of a covered mall building.

4. At public entrances at the perimeter line of an open mall building.

5. At other locations as necessary so that the distance to reach all portions of a tenant space does not exceed 100 feet (30 480 mm) of hose and 30-foot (9144 mm) of stream from a hose connection. The length of hose shall be measured along normal walking routes, and the stream shall not be expected to penetrate walls or windows.

905.3.9 Building area

905.3.9 Building area. When required by the *fire code official*, buildings in excess of 10,000 square feet (929 m^2) in area per level shall be equipped with a Class I standpipe system where any portion of the building's interior area

is more than 200 feet (60,960 mm) measured vertically and horizontally from the nearest point of fire department apparatus access.

905.4 Location of Class I standpipe hose connections

905.4 Location of Class I standpipe hose connections. Class I standpipe hose connection shall be provided in all of the following locations:

1. In every required interior exit stairway, a hose connection shall be provided for each story above and below grade plane. Hose connections shall be located at the main floor landing unless otherwise approved by the *fire code official*.

   Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open stairs that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the exit opening of a horizontal exit.

   Exception: Where floor areas adjacent to a horizontal exit are reachable from an interior exit stairway hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the horizontal exit.

3. In every exit passageway, at the entrance from the exit passageway to other areas of a building.

   Exception: Where floor areas adjacent to an exit passageway are reachable from an interior exit stairway hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the exit passageway to other areas of the building.

4. In covered mall buildings, adjacent to each exterior public entrance to the mall and adjacent to each entrance from an exit passageway or exit corridor to the mall. In open mall buildings, adjacent to each public entrance to the mall at the perimeter line and adjacent to each entrance from an exit passageway or exit corridor to the mall.

5. Where the roof has a slope less than four units vertical in 12 units horizontal (33.3-percent slope), a hose connection located to serve the roof or at the highest landing of an interior exit stairway with access to the roof provided in accordance with Section 1011.12.

6. Throughout the entire building so that all portions of each floor level are provided with hose valve coverage utilizing 100 feet (30 480 mm) of hose and 30-foot (9144 mm) stream from any hose connection located on that floor or intermediate landing. The length of hose shall be measured along normal walking routes, and the stream shall not be expected to penetrate walls or windows.

905.5.2 Protection

Section 905.5.2 Protection. Intentionally deleted.

905.5.3 Class II system 1-inch hose

Section 905.5.3 Class II system 1-inch hose. Intentionally deleted.

905.9 Valve supervision

905.9 Valve supervision. Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall also be transmitted to the control unit.

Exception: Valves to underground key or hub valves do not require supervision.

906.2 General requirements

906.2 General requirements. Portable fire extinguishers shall be selected, installed and maintained in accordance with this section and NFPA 10.

Exceptions:

1. The travel distance to reach an extinguisher shall not apply to spectator seating portions of Group A-5 occupancies.
2. Thirty-day inspections shall not be required and maintenance shall be performed annually for dry-chemical or halogenated agent portable fire extinguishers that are supervised by a listed and approved electronic monitoring device, provided that all of the following conditions are met:
    - 2.1 Electronic monitoring shall confirm that extinguishers are properly positioned, properly charged and unobstructed.
    - 2.2 Loss of power or circuit continuity to the electronic monitoring device shall initiate a trouble signal.
    - 2.3 The extinguishers shall be installed inside of a building or cabinet in a noncorrosive environment.
    - 2.4 Electronic monitoring devices and supervisory circuits shall be tested annually when extinguisher maintenance is performed.
    - 2.5 A written log of required hydrostatic test dates for extinguishers shall be maintained by the owner to ensure that hydrostatic tests are conducted at the frequency required by NFPA 10.
3. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations.

907.1 General

907.1 General. This section covers the application, installation, performance and maintenance of fire alarm systems and their components in new and existing buildings and structures. The requirements of Section 907.2 are applicable to new buildings and structures. The requirements of Section 907.9 are applicable to existing buildings and structures.
A separate fire alarm control unit is required for each separate building. A campus system shall not substitute the requirement for a separate fire alarm control unit for each separate building. Campus systems may be allowed subject to the approval of the *fire code official*. When approved by the *fire code official* campus systems circuits shall utilize Class X circuits with weatherproof raceways.

907.1.4 Signage

907.1.4 Signage. A “FIRE ALARM CONTROL PANEL” sign shall be provided in minimum 2” letters with a minimum ½” stroke. The color of the letters shall be contrasting with respect to the background. The sign shall be provided on the door leading to the fire alarm control panel(s), unless otherwise approved by the *fire code official*.

907.2

907.2 Where required-new buildings and structures. An *approved* fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

In separated mixed-use occupancy buildings the fire alarm/detection system shall be limited to the *fire area* that requires the system. In non-separated mixed-use occupancy buildings containing an occupancy with a fire alarm/detection system the system is required to be extended throughout the building or *fire area*.

A fire alarm system shall be installed throughout all buildings three or more stories in height.

Exception: Group R-3 occupancies and single-family dwellings built under the IRC.

Not fewer than one manual fire alarm box shall be provided in an *approved* location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes to sprinklers, a single fire alarm box shall be installed.

Exception: The manual fire alarm box shall not be installed for fire alarm systems dedicated to elevator recall control and supervisory service and fire sprinkler monitoring systems.

907.2.7.1 Occupant notification

907.2.7.1 Occupant notification. Intentionally deleted.

907.2.8.2 Automatic smoke detection system

907.2.8.2 Automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed throughout all interior *corridors* serving *sleeping units*. For the purposes of this section, interior means a conditioned space.

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

907.2.8.3 and 907.2.8.4 Smoke alarms and smoke detectors

907.2.8.3 Smoke alarms and smoke detectors. Single- and multiple-station smoke alarms or smoke detectors shall be installed in accordance with Section 907.2.10.

907.2.8.3.1 Smoke detectors. Smoke detectors shall operate in accordance with 907.2.10.7.

907.2.8.4 Smoke detection in sleeping areas. Smoke alarms or smoke detectors provided in sleeping areas within R-1 occupancies that are required to have a fire alarm system in accordance with this code shall be able of producing the 520 Hz low frequency audible alarm signal complying with the sleeping area requirements of NFPA 72.

907.2.9.1 Manual fire alarm system

907.2.9.1 Manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies where any of the following conditions apply:

1. Any *dwelling unit* or *sleeping unit* is located three or more stories above the lowest *level of exit discharge*;
2. Any *dwelling unit* or *sleeping unit* is located more than one story below the highest *level of exit discharge* of *exits* serving the *dwelling unit* or *sleeping unit*; or
3. The building contains 15 or more *dwelling units* or *sleeping units*.

Exceptions:

1. A fire alarm system is not required in buildings not more than two stories in height where all dwelling units or sleeping units and contiguous attic and crawl spaces are separated from each other and public or common areas by at least 1-hour fire partitions and each dwelling unit or sleeping unit has an exit directly to a public way, exit court or yard.

2. Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 and the occupant notification appliances will automatically activate throughout the notification zones upon a sprinkler water flow.

   2.1 At least one manual fire alarm box is installed at an approved location.

3. A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, provided that dwelling units either have a means or egress door opening directly to an exterior exit access that leads directly to exits or are served by open-ended corridors designed in accordance with Section 1027.6, Exception 3.

907.2.9.1.1 Automatic smoke detection system

907.2.9.1.1 Automatic smoke detection system. When a fire alarm system is required, an automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed throughout all interior corridors serving dwelling units. For the purposes of this section, interior means a conditioned space.

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

907.2.9.2 – 907.2.9.4 Smoke alarms and smoke detectors

907.2.9.2 Smoke alarms and smoke detectors. Single- and multiple-station smoke alarms or smoke detectors shall be installed in accordance with Section 907.2.10.

> **907.2.9.2.1 Smoke detectors.** Smoke detectors shall operate in accordance with 907.2.10.7.

907.2.9.3 Smoke detection in sleeping areas. Smoke alarms or smoke detectors provided in sleeping areas within R-2 occupancies that are required to have a fire alarm system in accordance with this code shall be able of producing the 520 Hz low frequency audible alarm signal complying with the sleeping area requirements in NFPA 72.

907.2.9.4 Group R-2 college and university buildings. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies operated by a college or university for student or staff housing in all of the following locations:

1. Common spaces outside of *dwelling units* and *sleeping units*.
2. Laundry rooms, mechanical equipment rooms and storage rooms.
3. All interior corridors serving *sleeping units* or *dwelling units*.

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

Required smoke alarms in *dwelling units* and *sleeping units* in Group R-2 occupancies operated by a college or university for student or staff housing shall be interconnected with the fire alarm system in accordance with NFPA 72.

907.2.12 High-rise buildings

907.2.12 High-rise buildings. High-rise buildings shall be provided with an automatic smoke detection system in accordance with Section 907.2.12.1, a fire department communication system in accordance with Section 907.2.12.2 and an emergency voice/alarm communication system in accordance with Section 907.5.2.2.

Exceptions:

1. Airport traffic control towers in accordance with Section 907.2.22 and Section 412 of the *International Building Code*.
2. Open parking garages in accordance with Section 406.5 of the *International Building Code*.
3. Unenclosed portions of buildings with an occupancy in Group A-5 in accordance with Section 303.1 of the *International Building Code*.
4. Low-hazard special occupancies in accordance with Section 503.1.1 of the *International Building Code*.

907.2.12.1.3 System smoke detection with sounder bases

907.2.12.1.3 System smoke detection with sounder bases. In a new structure classified as a high-rise building with residential occupancies, in lieu of installing stand-alone smoke alarms, system-type analog addressable smoke detectors with sounder-bases shall be installed in all locations required by Section 907.2.11. Activation of said devices shall send a supervisory alarm signal to the building fire alarm control panel. The smoke detector sounder shall only sound within the individual dwelling unit, suite of rooms, or similar area and shall not actuate the building fire alarm system, unless otherwise permitted by the *fire code official*.

907.2.12.2 Fire department communication system

907.2.12.2 Fire department communication system. Where a wired communication system is provided in addition to a radio coverage system in accordance with Section 510, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 using warden stations and shall operate between a *fire command center* complying with Section 508, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior *exit stairways* and other locations as required by the *fire code official*. The fire department communication device shall be provided at each floor level within the interior *exit stairway*.

907.2.12.3 Multi-channel voice evacuation

907.2.12.3 Multi-channel voice evacuation. Voice evacuation systems for high-rise buildings shall be multi-channel systems.

907.2.12.4 Reliability

907.2.12.4 Reliability. If a networked fire alarm system is installed, and if the fire alarm network nodes are interconnected utilizing physical conductors (e.g., metallic, optical fiber), the network nodes shall be interfaced with each other utilizing Class X wiring methods. The outgoing and return conductors shall not be run in the same cable assembly, enclosure, or raceway.

907.2.24 Child-care smoke detectors

907.2.24 Child-care smoke detectors. System smoke detectors shall be installed within sleeping areas of day care facilities.

Exception: Single-station smoke alarms may be permitted in facilities not otherwise required to be provided with a fire alarm system.

907.3.1 Duct smoke detectors

907.3.1 Duct smoke detectors. Smoke detectors installed in ducts shall be *listed* for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit when a fire alarm system is provided. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal on the building's fire alarm control unit when a fire alarm system is provided and shall perform the intended fire safety function in accordance with this code and the International *Mechanical Code*. In facilities that are required to be monitored by a supervising station, duct smoke detectors shall report only as a supervisory signal and not as a fire alarm. They shall not be used as a substitute for required open area detection.

Exceptions: Intentionally deleted.

907.4.1 Protection of fire alarm control unit

907.4.1 Protection of fire alarm control unit. In areas that are not continuously occupied, a single smoke detector shall be provided at the location of each fire alarm control unit, notification appliance circuit power extenders and supervising station transmitting equipment.

Exceptions:

1. Where ambient conditions prohibit installation of smoke detector, a heat detector shall be permitted.
2. Dedicated function sprinkler monitoring systems shall not be required to have smoke detectors installed above the dedicated function control unit.

907.4.2 Manual fire alarm boxes

907.4.2 Manual fire alarm boxes. Where a manual fire alarm system is required by another section of this code, it shall be activated by dual action fire alarm boxes installed in accordance with section 907.4.2.1 through 907.4.2.6.

907.5.2.1.1 Average sound pressure

907.5.2.1.1 Average sound pressure. The audible alarm notification appliances shall provide a sound pressure level of 15 decibels (15 dBA) above the average ambient sound level or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is greater, in every occupiable space within the building. The minimum sound pressure levels shall be: 90 dBA in mechanical equipment rooms; and 80 dBA in other occupancies. Audible notification appliances shall be installed in each occupiable space.

Exceptions:

1. Laundry rooms, walk-in closets, storage rooms and walk-in coolers/freezers equal to or less than 100 square feet (9.29 m^2) in floor area.
2. In lieu of showing an audible notification appliance within a specific occupiable space on the plans, calculations may be provided showing that the alarm signals from the adjacent audible appliances will achieve a minimum of 80 decibels inside and throughout that space, where doors or other barriers between the space and the adjacent audibility device(s) are closed. Sound pressure levels shall be measured during system acceptance testing to verify the calculated space achieves a minimum of 80 dBA.
3. In sleeping areas required to be protected with low-frequency alarms, the 80 dBA minimum sound pressure provision is not required where a listed fire alarm device is not available to simultaneously achieve both the low-frequency signal and the 80 dBA minimum sound pressure.

907.5.2.3.1 Public use areas and common use areas

907.5.2.3.1 Public use areas and common use areas. Visible alarm notification appliances shall be provided in public use areas and common use areas.

Exceptions:

1. Electrical and mechanical rooms that are not normally occupied or less than 400 square feet.
2. Janitor closets.
3. Storage rooms less than 400 square feet.
4. Exit enclosures.
5. Individual work areas or offices and private toilets serving individual work areas or offices.
6. Individual inmate sleeping areas and patient sleeping rooms.

907.5.2.2.6 Intelligibility

907.5.2.2.6 Intelligibility. Emergency voice/alarm communication system plan submittals to the *fire code official* shall indicate graphically and in tabular form each acoustically distinguishable space (ADS) as described in NFPA 72 Annex D. ADS where intelligibility is required shall be designated. ADS that require intelligibility testing shall be designated.

907.5.2.2.6.1 Intelligibility Acceptability Criteria. Where intelligibility testing is required, 90 percent of the measurement locations within each ADS shall have a measured Speech Transmission Index (STI) of not less than 0.50 (0.70 Common Intelligibility Scale (CIS)) and an average STI of not less than 0.55 (0.74 CIS). The relationship between STI, CIS and Intelligibility is shown on Table 907.5.2.2.6.1.

Table 907.5.2.2.6.1

STI Score	CIS Equivalent	Intelligibility
0.00	0.00	Bad
0.05	0.00	Bad
0.10	0.00	Bad
0.15	0.18	Bad
0.20	0.30	Bad
0.25	0.40	Bad
0.30	0.48	Bad
0.35	0.54	Poor
0.40	0.60	Poor
0.45	0.65	Poor
0.50	0.70	Fair
0.55	0.74	Fair
0.60	0.78	Fair
0.65	0.81	Good
0.70	0.85	Good
0.75	0.88	Good
0.80	0.90	Excellent
0.85	0.93	Excellent
0.90	0.95	Excellent
0.95	0.98	Excellent
1.00	1.00	Excellent

907.5.2.2.6.2 Intelligibility Testing. Where intelligibility testing is required, intelligibility shall be determined through

quantitative measurements.

907.5.2.2.6.3 Quantitative measurements within acoustically distinguishable space shall use pink noise or an approved signal source. Testing using any of the voice alarm emergency evacuation messages is prohibited.

907.6.4.1 Alarm Annunciator and Fire Alarm Control Unit

907.6.4.1 Alarm Annunciator and Fire Alarm Control Unit. Alarm annunciators and fire alarm control units shall comply with all of the following:

1. If a building has a main entrance/foyer and has more than one story, a read-only remote annunciator shall be provided inside the building at the main entrance/foyer.

   Exceptions:

   1. High-rise buildings provided with a fire command center.

   2. Alternate location as approved by the *fire code official*.

2. If a building has a fire riser room with an exterior door, the fire alarm control unit shall be provided within the fire riser room.

   Exceptions:

   1. High-rise buildings provided with a fire command center.

   2. Alternate location as approved by the *fire code official*.

3. The location of an operated initiating device shall be displayed by alphanumeric display at the annunciator.

4. The alphanumeric display shall state the device type, the floor level (if applicable), the device address and a descriptive location for the operated device(s).

5. The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.

907.6.6 Monitoring

907.6.6 Monitoring. Fire alarm systems required by this chapter or by the *International Building Code* shall be monitored by an *approved* supervising station in accordance with NFPA 72 and as *approved* by the *fire code official*. Home care facilities that are licensed by the State of Nevada are also required to be monitored per this section. Proprietary Supervising Station Systems (also called self-monitoring systems), when allowed by the *fire code official*, shall be in accordance with the IFC and NFPA 72.

Exception: Monitoring by a supervising station is not permitted unless specifically approved by the *fire code official* for:

1. Single- and multiple station smoke alarms required by Section 907.2.10.
2. *Automatic sprinkler systems* in one- and two-family dwellings.
3. Monitoring systems utilizing point-by-point monitoring.

In occupancies provided with a fire alarm system, the following four distinctly different alarm signals shall be transmitted to an approved supervising station:

1. Water Flow Alarm, if provided with a fire sprinkler system.
2. Fire Alarm.
3. System Trouble.
4. Supervisory, when applicable.

For new and existing facilities, the supervising station shall only retransmit Water Flow Alarm signals to the Fire Department.

> **Exception:** The supervising station shall also retransmit fire alarm signals for government buildings, (all facilities owned, leased and/or operated by any City, County, State, or Federal government agency) schools (including daycares, preschools, public and private schools etc.) and hospitals (including nursing homes, convalescent homes, adult care facilities, group homes, extended care facilities, etc.).

907.6.6.3 Control units

907.6.6.3 Control units. Unless otherwise approved, not more than one main or master fire alarm control unit shall be permitted per building, in an approved location. Unless otherwise approved, not more than one monitoring panel shall be permitted per building.

907.6.7 Connections to other systems

907.6.7 Connections to other systems. A fire alarm system shall not be used for any purpose other than fire warning unless approved by the *fire code official*. Interconnections to other systems shall be listed for compatibility or approved by the *fire code official*.

907.8 Inspection, testing and maintenance

907.8 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with Sections 907.8.1 through 907.8.5 and NFPA 72. Records of inspection, testing and maintenance shall be maintained.

All fire alarm systems shall be tested and inspected in accordance with nationally recognized standards and the State of Nevada Fire Marshals' Regulations. The alarm contractor shall also provide proof of a license to do business within the *fire code official's* area. A maintenance contract from an approved fire alarm company is required.

Inspection reports shall be kept on-site and shall be readily available to the inspection authority. A copy of inspection reports containing deficiencies shall be mailed to the *fire code official* within 48 hours, only when the owner or occupant has been notified of a discrepancy(s) and fails to correct the discrepancy(s) within 30 days whenever any deficiency of the system or violation of the Fire Code is noted.

Prior to service or testing of any equipment, the Fire Department's Dispatch Center shall be notified of the location of the test and the approximate time that the equipment will be inoperable. Upon the completion of the test and inspection, the Fire Department Dispatch Center shall be notified that the system is operable.

In the event a service/maintenance contract is canceled or not renewed, the *fire code official* shall be notified by the service company within 24 hours.

907.9 Where required in additions, alterations, or changes of use or occupancy in existing buildings and structures

907.9 Where required in additions, alterations, or changes of use or occupancy in existing buildings and structures. Additions, alterations, or change of use or occupancy to any existing building or structure shall comply with Section 907 for fire alarm and detection systems.

909.5.3 Opening protection

909.5.3 Opening protection. Openings in *smoke barriers* shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by *fire door assemblies* complying with Section 716 of the *International Building Code*.

Exceptions:

1. *Unchanged.*
2. *Unchanged.*

3. *Unchanged.*
4. *Unchanged.*
5. *Unchanged.*
6. *Unchanged.*
6. Door openings in s*moke barriers* shall be permitted to be protected by s*elf-closing* fire doors in the following locations:
    - 6.1 Guest rooms.
    - 6.2 Individual dwelling units.
    - 6.3 Mechanical rooms.
    - 6.4 Elevator machine rooms.
    - 6.5 Electrical rooms used exclusively for that purpose.
    - 6.6 Doors typically maintained in a closed position as approved by the *Building Official*.

909.16 Fire fighter's smoke control panel

909.16 Fire fighter's smoke control panel. An *approved* fire fighter's smoke control panel for fire department emergency response purposes only shall be provided and shall include manual control or override of automatic control for mechanical smoke control systems. The panel shall be located in a *fire command center* complying with Section 508 in high-rise buildings or buildings with smoke-protected assembly seating. In all other buildings, the fire fighter's smoke control panel shall be installed in an *approved* location adjacent to the fire alarm control panel. The fire fighter's smoke control panel shall comply with Sections 909.16.1 through 909.16.3 as required by the *fire code official.*

909.17 System response time

909.17 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. For purposes of smoke control, the fire-fighter's smoke control panel response time shall be the same for automatic or manual smoke control action initiated from any other building control point. The total response time, including that necessary for detection, shut-down of operating equipment and smoke control system startup, shall allow for full operational mode to be achieved before the conditions in the space exceed the design smoke condition. Upon receipt of an alarm condition at the fire alarm control panel, fans, dampers and automatic doors shall have achieved their proper operating state and final status shall be indicated at the smoke control panel within 90 seconds. Verification shall be reported in the required final report.

909.18.10 Alternative testing method

909.18.10 Alternative testing method. When required by the *Code official*, theatrical smoke or other approved tracer gases shall be used during final acceptance testing to visually verify air movement.

909.20 Maintenance

909.20 Maintenance. Smoke control systems shall be maintained in an operable condition at all times to ensure to a reasonable degree that the system is capable of controlling smoke for the duration required. Inspection and periodic testing of existing smoke control systems shall be performed in accordance with the Southern Nevada Fire Code Committee's Uniform Guideline for smoke control testing & recertification, the manufacturer's instructions and Sections 909.20.1 through 909.20.5.

909.20.4 Dedicated smoke control systems

909.20.4 Dedicated smoke control systems. Dedicated smoke control systems shall be operated for each control sequence semiannually. When required by the *fire code official*, the system shall also be tested under standby power conditions.

909.20.5 Non-dedicated smoke control systems

909.20.5 Non-dedicated smoke control systems. Non-dedicated smoke control systems shall be operated for each control sequence annually. When required by the *fire code official*, the system shall also be tested under standby power conditions.

910.3.2.1 Sprinklered buildings

910.3.2.1 Sprinklered buildings. Where installed in buildings provided with an approved *automatic sprinkler system*, smoke and heat vents shall be designed to operate automatically by actuation of a heat-responsive device rated at a minimum temperature of 360° F (182° C).

912.1.1 Required sizes

912.1.1 Required sizes. *Automatic sprinkler system*s with a demand of up to 500 gpm shall be installed with a siamese with two 2½-inch. (65 mm) inlets. *Automatic sprinkler system*s with a demand greater than 500 gpm and an inlet pressure requirement not exceeding 175 psi shall be installed with a single, thread-less coupling consisting of one 5-inch (130 mm) Storz brand locking connection with a 30-45 degree downward deflection. When the system demand exceeds 175 psi, the system shall include one 2½-inch (65 mm) inlet per every 250 gpm (956 L/min) demand. Modifications or alternate designs shall be *approved* by the *fire code official*.

Fire department connection piping shall be a minimum of 4-inch (100 mm) for three or fewer inlets, a minimum of 6 in (150 mm) for four or more inlets or a Storz inlet and shall have a diameter equal or greater to the largest supply main.

912.4.2 Clear space around connections

912.4.2 Clear space around connections. A working space of not less than 36 inches (762 mm) in width, 36 inches (914 mm) in depth and 78 inches (1981 mm) in height not including any doors or windows, shall be provided and maintained in front of and to the sides of wall-mounted fire department connections and around the circumference of free-standing fire department connections, except as otherwise required or *approved* by the *fire code official.*

> **Exception:** The FDC may be permitted within 36 inches of the fire riser room door opening as long as it is mounted on the opposite side of the hinges.

913.1.1 Redundant pumps in high-rise structures

913.1.1 Redundant pumps in high-rise structures. Where pumps are used in structures with an occupied floor or occupied roof greater than 250 feet (76 m) in height above the lowest level of fire department access, a redundant fire pump shall be provided for each required fire pump.

913.1.2 Redundant pumps in multiple structures

913.1.2 Redundant pumps in multiple structures. Where a fire pump is used for booster pressure supply to multiple structures, a redundant fire pump shall be provided for each required fire pump.

913.2.3 Drains

913.2.3 Drains. Floor drains having a minimum diameter of 3 inches shall be provided in the fire pump room.

914.3.1 Automatic sprinkler system

914.3.1 *Automatic sprinkler system*. Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 914.3.2.

Exception: An *automatic sprinkler system* shall not be required in *open parking garages* in accordance with Section 406.5 of the International Building Code.

914.3.2 *Secondary water supply*

914.3.2 Secondary water supply. An automatic dedicated secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream allowance required by NFPA 13, but not less than 15,000 usable gallons, shall be provided for high-rise buildings. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes.

Exception: Intentionally deleted.

914.3.2.1 Design options. Secondary water tanks that intercept the municipal water supply shall be designed to allow for continued fire protection when the secondary tank is taken out of service.

a. For secondary water tanks supplying horizontal split case fire pump(s), or other fire pump(s) that can take a piped water supply, a bypass shall be installed around the secondary water tank to allow for temporary supply to the fire protection system during the repair of the secondary water tank.

b. For secondary water tanks supplying vertical turbine pump(s), or other fire pump(s) that cannot accept piped supply, the secondary water supply shall be split into two separate tanks, each not less than ½ of the required water capacity, interconnected by pipe with sectional valves, with redundant pumping and automatic water filling capabilities. This tank arrangement shall be such as to permit one of the two tanks to be drained and have maintenance performed, while maintaining an operational fire protection system for the building served.

c. Alternate engineered solution that provides a water supply while the secondary tank is out of service approved by the *fire code official*.

914.4.1 Automatic sprinkler system

914.4.1 *Automatic sprinkler system*. An *approved automatic sprinkler system* shall be installed throughout the entire building.

Exceptions: Intentionally deleted.

914.6.1 Automatic sprinkler system

914.6.1 *Automatic sprinkler system*. Stages shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages.

Exceptions:

1. In buildings where an *automatic sprinkler system* is not otherwise required by other sections of this
code, sprinklers are not required for *stages* 1,000 square feet (93 m2) or less in area and 50 feet (15
240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable
vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single

backdrop.

2 Sprinklers are not required within portable orchestra enclosures on *stages.*

914.8.3 Fire suppression for aircraft hangars

914.8.3 Fire suppression for aircraft hangars. Aircraft hangars shall be provided with a fire suppression system designed in accordance with NFPA 409, based upon the classification for the hangar given in Table 914.8.3.

Exception: Intentionally deleted.

918 SMOKE REMOVAL

SECTION 918
SMOKE REMOVAL

918.1 General. Where required by this code or otherwise installed, smoke removal systems shall conform to the requirements of this section and the Building Code.

918.2 Where Required.

918.2.1 High rise buildings. Smoke removal systems shall be installed in accordance with Section 403.4.7 of the International Building Code.

918.3 Status Indicators and Controls. Status indicators and controls shall be designed in accordance with the *fire code official's* guidelines.

918.4 Maintenance. Smoke removal systems shall be maintained in an operable condition at all times to ensure to a reasonable degree that the system is capable of removing smoke when required.

Inspection and periodic testing of smoke removal systems shall be performed in accordance with the Southern Nevada Fire Code Committee's Uniform Guideline for smoke control testing & recertification using a Level I inspection firm, and the manufacturer's instructions.

Table 1006.2.1 SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCC.	MAX. OCC. LOAD OF SPACE	WITHOUT SPRINKLER SYSTEM (feet)		WITH SPRINKLER SYSTEM (feet)
		Occupant Load		
		≤ 30	>30	
R-1	20	NP	NP	125 [a]

All other portions of the Table and all Footnotes remain unchanged.

1010.1.8 Door arrangement

1010.1.8 Door arrangement. Space between two doors in a series shall be 48 inches (1219 mm) minimum plus the width of a door swinging into the space. Doors in a series shall swing either in the same direction or away from the space between the doors.

Exceptions:

1. The minimum distance between horizontal sliding power-operated doors in a series shall be 48 inches (1219 mm).
2. Storm and screen doors serving individual *dwelling units* in Groups R-2 and R-3 need not be spaced 48 inches (1219 mm) from the other door.
3. Doors within individual *dwelling units* in Groups R-2 and R-3 other than within *Type A* dwelling units.
4. The space between doors serving access vestibules of smokeproof enclosures shall be permitted to be in accordance with Section 909.20.1 of the International Building Code.

1029.6.2.3 Automatic sprinklers

1029.6.2.3 Automatic sprinklers. Enclosed areas with walls and ceilings in buildings or structures containing *smoke-protected assembly seating* shall be protected with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1.

Exception: Outdoor seating facilities where seating and the *means of egress* in the seating area are essentially open to the outside.

Chapter 11 CONSTRUCTION REQUIREMENTS FOR EXISTING BUILDINGS

Chapter 11 is deleted in its entirety. All references to Chapter 11 throughout this code are also deleted. The City of North Las Vegas adheres to the Nevada State Fire Marshal's Regulations regarding construction requirements for existing buildings.

2304.2.4.1 Alternatives to obstructions to view

2304.2.4.1 Alternatives to obstructions to view. Video monitoring systems or other acceptable alternatives may be utilized when approved by the *fire code official*. Plans documenting camera and video monitor locations or other alternatives utilized shall be submitted to the *fire code official* for review and approval.

2404.2 Location of spray-finishing operations

2404.2 Location of spray-finishing operations. Spray finishing operations conducted in building areas used for Group A, E, I or R occupancies shall be located in a spray room protected with an approved *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and separated vertically and horizontally from any other areas in accordance with the International Building Code. In other occupancies, spray-finishing operations shall be conducted in a spray room, spray booth, or spraying space approved for such use.

Exceptions:

1. Automobile undercoating spray operations and spray-on automotive lining operations conducted in areas with approved natural or mechanical ventilation shall be exempt from the provisions of Section 2404 when approved and where utilizing Class IIIA or IIIB combustible liquids.
2. In buildings other than Group A, E, I or R occupancies, approved limited spraying space in accordance with Section 2404.9.
3. Resin application areas used for manufacturing of reinforced plastics complying with Section 2409 shall not be required to be located in a spray room, spray booth or spraying space.

3103.8.4 Membrane structures on buildings

3103.8.4 Membrane structures on buildings. Membrane structures that are attached to or erected on buildings, balconies, decks or other structures shall be regulated as permanent membrane structures in accordance with Section 3102 of the *International Building Code.*

3104.2 Flames propagation treatment

3104.2 Flames propagation treatment. Before a permit is granted, the owner or agent shall file with the *fire code official* a certificate executed by and *approved* testing laboratory. The certificate shall indicate that the floor coverings tents, membrane structures and their appurtenances, which include, sidewalls, drops and tarpaulins, are composed of materials meeting the flame propagation performance of Test Method 2 of NFPA 701 or California Title 19 Office of the State Fire Marshal. Additionally, it shall indicate that the bunting and combustible decorative materials and effects are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2 of NFPA 701 or California Title 19 Office of the State Fire Marshal as applicable. The flame performance criteria shall be effective for the period specified by the permit. Alternatively, the material shall be treated with a flame retardant in an *approved* manner and meet the flame propagation performance criteria of the applicable test method of NFPA 701 or California Title 19 Office of the State Fire Marshal. The flame propagation criteria shall be effective for the period specified by the permit.

Floor coverings are not evaluated per the same type of flame propagation tests required for fabrics, textiles, membrane materials and the like and should not be included in this code section that addresses flame propagation testing. Floor coverings are therefore proposed to be deleted without replacement in other sections and they are not a major factor in the evaluation of tents, canopies and membrane structures.

3201.3 Construction documents

3201.3 Construction documents. At the time of building permit application for new structures designed to accommodate high-piled storage or for requesting a change of occupancy/use, and at the time of application for a storage permit, plans and specifications shall be submitted for review and approval. In addition to the information required by the International Building Code, the storage permit submittal shall include the information specified in this section. Following approval of the plans, a copy of the approved plans shall be maintained on the premises in an approved location. The plans shall include the following:

1. Floor plan of the building showing locations and dimensions of high-piled storage areas.
2. Usable storage height for each storage area
3. Number of tiers within each rack, if applicable.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between storage array.
6. Maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 3203.
8. Location of commodities which are banded or encapsulated.
9. Location of required fire department access doors.
10. Type of fire suppression and fire detection systems.
    a. For density/area fire sprinklers protecting the high-piled storage area, indicate the sprinkler identification number (SIN), the sprinkler k factor, square footage of the remote area, and the system design density. If the SIN is not available, a copy of the manufacturer specification sheet for the sprinkler head is required.
    b. For specific application sprinklers, such as large-drop and ESFR sprinklers, protecting the high-piled storage area, indicate the sprinkler identification number (SIN), the sprinkler k factor, the number of sprinkler heads in the remote area, and the minimum residual pressure provided at the

most hydraulically demanding sprinkler head. If the SIN is not available, a copy of the manufacturer specification sheet for the sprinkler head is required.

11. Location of valves controlling the water supply of ceiling and in-rack sprinklers.
12. Type, location, and specifications of smoke removal and curtain board systems.
13. Dimension and location of transverse and longitudinal flue spaces.
14. Additional information regarding design features, commodities, storage arrangement and fire protection features within the high-piled storage area shall be provided at the time of permit, when required by the *fire code official*.
15. Type of shelving material used, whether it is solid, slatted, or wire mesh.
16. Verification of sufficient fire flow provided for the building, when required by the *fire code official*.

3310.3 Site identification sign

3310.3 Site identification sign. The street address of the construction site shall be posted on the street side of the site. Signage shall have approved address numbers, buildings numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Signage shall have nominal 12" high, 1" stroke numbering and lettering.

3312 WATER SUPPLY FOR FIRE PROTECTION

SECTION 3312
WATER SUPPLY FOR FIRE PROTECTION

3312.1 When required. An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on the site. Additional fire flow shall be provided upon commencement of vertical construction in accordance with Section 3312.

3312.2 Volume required. The required volume of fire flow shall be based on the fire flow required for the building/facility when constructed, with reductions permitted as set forth in this section. In all cases, a minimum fire flow of 1,500 gpm shall be required.

> **Exception:** Where approved by the *fire code official* for rural areas or other areas with decreased fire flow capacity, the minimum required fire flow may be reduced below 1,500 gpm.

3312.3 Combustible material protection. Where combustibles are delivered to a construction site, a minimum fire flow in accordance with Section 3312.2 shall be provided. The fire hydrant(s) shall be within 300 feet of combustible materials.

3312.4 Vertical construction, combustible construction Types III, IV, and V. Required fire flow shall be provided at the commencement of vertical construction in accordance with the separation distance as specified in this section.

3312.4.1 Separation up to 20 feet (6.1m). Where the structure is separated 20 feet (6.1m) or less from property lines against property that has an existing structure or otherwise can be constructed upon, a fire flow of no less than 100% of the required fire flow, including all required hydrant locations, shall be provided.

3312.4.2 Separation greater than 20 feet (6.1m) up to 60 feet (18.3m). Where the structure is separated greater than 20 feet (6.1m) and up to 60 feet (18.3m) from property lines against property that has an existing structure or otherwise can be constructed upon, a fire flow of no less than 50% of the required fire flow shall be provided. Sufficient hydrants to accommodate the required flow shall be provided, subject to approval by the *fire code official*.

3312.4.3 Separation greater than 60 feet (18.3m). Where the structure is separated greater than 60 feet (18.3m) from property lines against property that has an existing structure or otherwise can be constructed upon, fire flow shall be provided in accordance with Section 3312.2. The fire hydrant(s) shall be within 300 feet of the structure protected.

3312.5 Vertical construction, non-combustible construction Types I and II. Fire flow is not required prior to commencing vertical construction of non-combustible construction buildings. Where combustible materials are delivered to the construction site, fire flow in accordance with Section 3312.3 shall be provided. When a standpipe per Section 3313 is provided, fire flow shall be provided in accordance with Section 3312.2.

3312.6 Combustible loading (stocking). Where combustible loading (stocking) of the building has been approved by the *fire code official*, the fire flow provided shall be equal to 100% of the fire flow required at the time of building occupancy.

3312.7 Occupancy of Building. Prior to occupancy of the completed building, the required fire flow shall be provided and flow tested to verify the water system's capability to supply the required fire flow. All acceptance testing shall be witnessed by the *fire code official*.

3312.8 Access. Access in accordance with Section 3310 shall be provided between all hydrants required by this section and the construction being protected.

3903.3 Location

3903.3 Location. The extraction equipment and extraction processes utilizing hydrocarbon solvents shall be located in a room or area dedicated to extraction. A listed spray booth conforming to the requirements of section 2404.3 may be used for this purpose.

3905.1.3 Operation

3905.1.3 Operation. Activation of the gas detection system shall result in all the following:

1. Initiation of distinct audible and visual alarm signals in the extraction room.

2. Deactivation of all heating systems located in the extraction room.

3. Activation of the mechanical ventilation system, where the system is interlocked with gas detection.

4. Mechanical ventilation rate shall be such that the air velocity over the cross-section of the extraction room in the direction of air flow is not less than 100 linear feet/minute.

5003.2.2.1 Design and construction

5003.2.2.1 Design and construction. Piping, tubing, valves, fittings and related components used for hazardous materials shall be in accordance with the following:

1. Piping, tubing, valves, fittings and related components shall be designed and fabricated from materials that are compatible with the material to be contained and shall be of adequate strength and durability to withstand the pressure, structural and seismic stress and exposure to which they are subject.
2. Piping and tubing shall be identified in accordance with ASME A13.1 to indicate the material conveyed.
3. Readily accessible manual valves or automatic remotely activated fail-safe emergency shutoff valves shall be installed on supply piping and tubing at the following locations:

   3.1 The point of use.

   3.2 The tank, cylinder or bulk source

4. Manual emergency shutoff valves and controls for remotely activated emergency shutoff valves shall be identified and the location shall be clearly visible, accessible and indicated by means of a sign.
5. Backflow prevention or check valves shall be provided when the backflow of hazardous materials could create a hazardous condition or cause the unauthorized discharge of hazardous materials.

   Exceptions:

   1. Piping for inlet connections designed to prevent backflow.

2. Piping for pressure relief devices.

6. New and existing remote tank filling connections shall be in accordance with this subsection 6.

6.1 Permanent signs clearly indicating the tank contents associated with each connection port shall be displayed at the remote filling station. Signage shall be in English as a primary language or in symbols allowed by this code, shall be durable, and the size color and lettering shall be *approved*.

6.2 The transfer hose connection for liquids that have a pH of 6.0 or less (acidic) shall be equipped with female "Cam-lock" type fittings or other mechanical connection means *approved* by the *fire code official*, sized appropriately.

6.3 The transfer hose connection for liquids that have a pH of 8.0 or greater (basic) shall be equipped with male "Cam-lock" type fittings or other mechanical connection means *approved* by the *fire code official*, sized appropriately.

5003.11.1.1

5003.11.1.1. Table 5003.11.1 shall not be applicable to mixed occupancies which include either an A, E, I, or R occupancy.

Exception: Single-story buildings.

5305.11 Temporary Indoor Carbon Dioxide Fog Effects

5305.11 Temporary Indoor Carbon Dioxide Fog Effects. Maximum Allowable Quantity of Carbon Dioxide (CO2) shall be calculated as follows:

1) Calculate Stage Volume: Build an imaginary 'box' over stage that is 10' high and calculate the volume of the 'box'.

2) Calculate Allowable Cubic feet of CO2 within 'box': OSHA allowable short-term exposure limit for CO2 is 30,000 ppm or 3 %.

3) Convert volume of CO2 to pounds by dividing by 8.74 lbs/ft3 CO2.

4) If the desired amount of CO2 is less than the allowable calculated amount, then the desired quantity is acceptable.

5) If more CO2 is desired, calculate air change rate of venue and determine number of air changes per show.

6) Calculate Venue Air Change Rate: Air change rate = venue volume / exhaust rate.

7) Calculate number of Air Changes: Show length / air change rate.

8) Calculate the Total Allowable CO2: Step 3 above, then multiply by the number of air changes.

5306.6 Medical gas system plan submittal

5306.6 Medical gas system plan submittal. Plans and specifications shall be submitted for review and approval. Following approval of the plans, a copy of the approved plans and permit shall be maintained on the premises in an approved location. As required by the *fire code official*, the plans shall include the following:

1. Project name, street address and owners' name.
2. Contractor name, address, phone number, license numbers (City, State Contractor and State Fire Marshal).
3. Signature of the licensee (contractors Master or Qualified Employee) or seal and signature of a Professional Engineer licensed in the state of Nevada.

4. Code edition of standards used in the design.
5. System classification.
6. When used - gas type, container size and quantity.
7. Symbol legend with equipment description (manufacture's name and model number) and mounting description (surface, semi-flush, flush, and exterior).
8. Site plan.
9. Floor plan drawn to an indicated scale (1/8" minimum) on sheets of a uniform size showing:
    a. Point of compass (north arrow).
    b. Walls, doors, windows, openings, stairs, elevators, passageways, high-piled storage racks, etc., as applicable to depict the facility.
    c. Room use identification labels.
    d. Gas, air and vacuum piping distribution systems, manifolds, sizes and material types. Piping hangers and slopes.
    e. Valves and valve boxes, outlets, gages and other components.
    f. Electrical warning systems (local and master alarm panels), conductor/conduit routing and size, power panel and circuit connection.
    g. Key plan.
    h. Compressor inlet location and vacuum exhaust outlet location.
    i. For interior gas supply rooms provide construction fire ratings, ventilation and fire sprinkler information.
10. Product data submittal including a cover index sheet listing products used by make and model number, manufacturer data sheets (highlighted or marked) and listing information for all equipment, devices, and materials.
11. Design number and detail of penetration fire stop system when required.
12. Verification & inspection requirements.
13. Name of independent medical gas testing agency to certify the system.
14. Any additional information determined necessary.

5306.7 Medical gas systems, testing

5306.7 Medical gas systems, testing. Hyperbaric systems and medical gas systems required by NFPA 99 to be verified by person other than the installing contractor shall be certified by an independent medical gas testing agency prior to use of the system. The independent medical gas inspector shall hold a current NITC certification and Nevada State Fire Marshal certification as a medical gas inspector. The *fire code official* may witness any or all testing. Copies of the system certification shall be provided to the *fire code official*.

5307.3.2 Gas detection system

5307.3.2 Gas detection system. Where ventilation is not provided in accordance with Section 5307.3.1, a gas detection system shall be provided in rooms or indoor areas and in below-grade outdoor locations with insulated carbon dioxide systems. Carbon dioxide sensors shall be provided within 12 inches (305 mm) of the floor in the area where the gas is expected to accumulate or other approved locations. The system shall be designed as follows:

1. Activates an audible and visible supervisory alarm at a normally attended location upon detection of a carbon dioxide concentration of 5,000 ppm (9000 mg/m^3).

2. Activates an audible and visible alarm within the room or immediate area where the system is installed and stops the flow of carbon dioxide into the piping system upon detection of a carbon dioxide concentration of 30,000 ppm (54 000 mg/m^3).

5601.1.3 Fireworks

5601.1.3 Fireworks. The possession, manufacture, storage, sale, handling, and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 5604.
2. Manufacturer, assembly and testing of fireworks as allowed in Section 5605.
3. The use of fireworks for fireworks displays as allowed in Section 5608.
4. The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided such fireworks comply with NFPA 1124, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR, Parts 100-185, as applicable for consumer fireworks.
5. The possession, storage, use, handling, and sale of consumer safe and sane fireworks in accordance with the current "Fire Prevention Association of Nevada Guidelines for Fireworks".

5601.2.2 Sale and retail display

5601.2.2 Sale and retail display. All sales and retail displays of fireworks and explosives are prohibited.

Exception: Consumer fireworks 1.4G (safe and sane) offered for sale at portable retail fireworks stands that are in accordance with the current "Fire Prevention Association of Nevada Guidelines for Fireworks".

5601.2.4 Financial Responsibility

5601.2.4 Financial Responsibility. Before a permit is issued, as required by Section 5601.2, the applicant shall file with the jurisdiction a valid certificate of insurance complying with Section 105.1.7.1 in the amount of $5,000,000.00, for the purpose of the payment of all damages to persons or property that arise from, or are caused by, the conduct of any act authorized by the permit upon which any judicial judgment results. The *fire code official* is authorized to specify a greater amount when, in his or her opinion, conditions at the location of use indicate a greater amount is required. Government entities shall be exempt from this bond requirement.

5601.2.4.1 Blasting

5601.2.4.1 Blasting. Before approval to do blasting is issued, the applicant for approval shall submit a certificate of insurance as specified in Chapter 1 in such form, amount and coverage as determined by the legal department of the jurisdiction to be adequate in each case to indemnify the jurisdiction against any and all damages arising from permitted blasting.

5601.2.4.2 Fireworks Display

5601.2.4.2 Fireworks Display. The permit holder shall furnish a certificate of insurance as specified in Chapter 1 for the payment of all potential damages to a person or persons or to property by reason of the permitted display, and arising from any acts of the permit holder, the agent, employees or subcontractors.

5603.8 Shot reports

5603.8 Shot reports. Shot reports shall be maintained for every blast. These reports shall be available to the *fire code official* upon request within 48 hours. The report shall at a minimum contain the following information:

1. Date and time of the blast.
2. Company name and contact information.
3. Location of the blast.
4. Weather conditions including temperature and wind speed.
5. Quantity and description of all materials used.
6. A list of any un-spent or misfired products.
7. A list of all personnel present.
8. The license type and card number of the blaster.
9. The signature of the blaster or shooter in charge.
10. For blasting operations the report shall include the seismic data.

5604.1 General

5604.1 General. Storage of explosives and explosives materials, small arms ammunition, small arms primers, propellant-actuated cartridges, and smokeless propellants in magazines shall comply with the provisions of this section. Explosive materials shall be stored only in areas with appropriate zoning and use permits as required by the planning or zoning authority, and shall be subject to the approval of the *fire code official*.

5604.6.5 Signs and placards

5604.6.5 Signs and placards. Property upon which Type 1 magazines and outdoor magazines of Types 2, 4 and 5 are located shall be posted with signs stating: NO SMOKING and EXPLOSIVES—KEEP OFF. These signs shall be of contrasting colors with a minimum letter height of 3 inches (76 mm) with a minimum brush stroke of ½ inch (12.7 mm). The signs shall be located to minimize the possibility of a bullet shot at the sign hitting the magazine.

5604.6.5.2 Placards

5604.6.5.2 Placards. Type 5 magazines containing Division 1.5 blasting agents shall be prominently placarded during storage as required during transportation by DOTn 49CFR, Part 172 and DOTy 27 CFR, Part 55. All other magazines shall be labeled with the hazard classification only.

5604.7.1 Security

5604.7.1 Security. Magazines shall be kept locked in the manner prescribed in NFPA 495 at all times except during placement or removal of *explosives*, inventory, or inspection. In addition to the locking requirements, the following security measures shall be required at all explosives storage locations:

1. The entire magazine site shall be fenced. The fence shall be a minimum of 8 feet in height and constructed of non-combustible materials.

   Exception: Indoor storage locations shall be secured in a manner consistent with NFPA 495.

2 All explosives magazines and storage sites shall submit a security and site access control plan to the *fire code official*.

5604.7.1.1 Security and site access control plan. Security and site access control plans shall include at a minimum:

1. Site management. The plan shall include details of how access to the site is restricted, tracked, and monitored.

2. Security. The plan shall include details on the method of site security. Security alarm system, video or motion activated cameras, manned security guards, or other approved method.
3. Record keeping. The plan shall include the procedures for how the inventory of explosives materials and blasting agents are tracked and maintained.
4. Emergency contact. A primary and secondary emergency contact person and phone number shall be provided.

5605.1 General

5605.1 General. The manufacture, assembly and testing of explosives, ammunition, blasting agents and fireworks is prohibited.

Exceptions:

1. The hand loading of small arms ammunition prepared for personal use and not offered for resale.
2. The mixing and loading of blasting agents at blasting sites in accordance with NFPA 495.
3. The use of binary explosives or plosophoric materials in blasting or pyrotechnic special effects applications in accordance with NFPA 495 or NFPA 1126.
4. Subject to approval of the *fire code official* and obtaining proper approvals from the planning and zoning authority, the manufacture, assembly and testing of explosives, ammunition, blasting agents and fireworks shall comply with the requirements of this section and NFPA 495 or NFAP 1124.

5607.3 Blasting

5607.3 Blasting. Where blasting is done in close proximity to a structure, railway or highway, development, quarry, or any other installation, precautions shall be taken to minimize earth vibrations and air blast effects. Blasting mats or other protective means shall be used to prevent fragments from being thrown.

5607.3.1 Blasting activities. The blasting contractor shall comply with the following requirements in connection with all blasting activities:

1. All blasts shall be monitored at the nearest structure by a third-party engineering firm. Utilities or other critical infrastructure within 300 feet of the blast area shall be monitored by a third-party engineering firm. Such monitoring shall be done by a seismologist using a certified, annually calibrated, seismic monitor that shall be capable of measuring blast-induced vibration and blast-induced sound levels.
2. A minimum of two seismographs shall be used to obtain data from each blast or as required by the *fire code official*.
3. The maximum ground-borne vibrations shall not exceed a single component peak particle velocity (vector sum) of 0.5 inches per second at the nearest structure.
4. For utilities and other critical infrastructure within 300 feet of the blast-area, the maximum ground-borne vibrations shall not exceed the limits as set forth by the specific utility purveyors or critical infrastructures engineering department. A written approval from the utility purveyor or critical infrastructure detailing these limits shall be provided to the *fire code official* prior to any blasting activities.

   Exception: If the utility or critical infrastructure purveyor does not provide written approval within a reasonable period of time, as determined by the *fire code official,* the applicant may request permission to submit a blast plan designed so that the maximum ground-borne vibrations shall not exceed a single component peak particle velocity (vector sum) of 0.5 inches per second at the nearest utility or other critical infrastructure.
5. The maximum air blast shall not exceed 120 dB at the nearest structure.

6. Monitoring results shall be reported to the *fire code official* within 48 hours via e-mail.
7. The blasting contractor shall provide a minimum of 72 hours prior written notice of blasting activities and project duration to all residences, property owners, businesses, and public uses within 2500 feet of the blasting area. The manner, form, and content of any such notice shall be subject to the approval of the *fire code official*.
8. For utility notification, see 5607.5.
9. The blasting contractor shall notify the *fire code official* and fire department dispatch by telephone a minimum of two (2) hours prior to each blast, and immediately following each blast.
10. The blasting contractor shall provide for pre-blast and post-blast surveys of all structures, utilities, and other critical infrastructures within 300 feet of the blast area, or when otherwise required by condition of the *fire code official*. These surveys must be completed by a third-party engineering firm at no cost to the owner.
11. A traffic and access control plan shall be provided when blasting activities are conducted within 100 feet of any public roadway, or when required by the *fire code official*. The plan shall include warning signage, flagging, temporary road closure, and detour routes. This plan may be subject to the approval of the local law enforcement agency.
12. The blasting contractor shall be responsible for removing and cleaning up any debris from the blast site and adjacent properties.

Exception: These requirements may be modified by the *fire code official*.

5607.3.2 Permit Requirements. A permit is required for the storage and or use of explosives, and for any proposed excavation or development activity that will involve blasting. The permit must be obtained by the blasting contractor prior to the beginning of any drilling or blasting activities. The application shall be made to the fire department in such a form and detail as described by the *fire code official*. Applications for permits shall be accompanied by plans detailing the proposed blasting activities as required by the *fire code official*.

5607.4 Restricted hours

5607.4 Restricted hours. Blasting operations shall be limited to the hours of 8 a.m. to 4 p.m., Monday through Friday, excluding state-recognized holidays unless otherwise approved by the *fire code official*.

5607.5 Utility Notification

5607.5 Utility Notification. The blasting contractor shall contact “Call Before You Dig” to obtain a utility notification dig-ticket number a minimum of 48 hours prior to commencing any drilling or blasting activities. A copy of the dig ticket shall be provided to the *fire code official* upon request.

Exception: In an emergency situation, the time limit shall not apply when *approved*.

5607.6 Electric or electronic detonator precautions

5607.6 Electric or electronic detonator precautions. Precautions shall be taken to prevent accidental discharge of electric or electronic detonators from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous energy.

5607.13 Pre-blast procedures

5607.13 Pre-blast procedures. A blast shall not be fired until:

1. The blaster has made certain that all surplus explosives materials are in a safe place in accordance with Section 5607.10 and;

2. All construction workers and equipment are at a safe distance and;
3. Seismic monitor(s) are set up and;
4. All access to the blast site has been shut down and secured and;
5. Communication has been set up between the blaster in charge and those persons securing the blast site and;
6. That adequate warning signals have been given.

5607.13.1 Warning Signals

5607.13.1 Warning Signals. Warning signals shall be given to alert construction workers on or near a blast site that a blast is going to occur.

1. A warning signal shall be given five minutes prior to the blast and;
2. A warning signal shall be given one minute prior to the blast and;
3. A warning signal shall be given following the blast in accordance with 5607.14 (4).

5607.14 Post-blast procedures

5607.14 Post-blast procedures. After the blast, the following procedures shall be observed.

1. Persons shall not return to the blast area until allowed to do so by the blaster in charge.
2. The blaster shall allow sufficient time for smoke and fumes to dissipate and for dust to settle before returning to or approaching the blast area.
3. The blaster shall inspect the entire blast site for misfires before allowing other personnel to return to the blast area.
4. The blaster shall sound an all clear warning signal in accordance with 5607.13.1

5608.1 General

5608.1 General. Outdoor fireworks displays, use of pyrotechnics before a proximate audience displays and pyrotechnic special effects in motion picture, television, theatrical, and group entertainment productions, shall comply with the *fire code official's* guidelines, Sections 5608.2 through 5608.10, and NFPA 1123, NFPA 1126, or NFPA 160.

5704.2.9.2.5 Fire flow

5704.2.9.2.5 Fire flow. Fire flow shall be based on flash point of the most hazardous liquid stored and the estimated foam requirement for the largest tank, in accordance with Table 5704.2.9.2.5(a) and Table 5704.2.9.2.5(b). The minimum fire flow provided shall be equal to the sum of flows required by these tables. Minimum fire flow duration shall be 4 hours.

Table 5704.2.9.2.5(a)
Hose Stream Demand for Tanks Storing Flammable and Combustible Liquids [1]

Flash Point of Liquid	Largest Tank	Largest Exposed Tank
<140° F	1000 gpm [2]	500 gpm [2]
≥140° F	750 gpm	250 gpm

[1] Required flows may be reduced by half for horizontal tanks
[2] Add 250 gpm for each 100 ft. increase in tank diameter above 100 ft.

Table 5704.2.9.2.5(b)

Estimated Water Demand for Fixed Foam Protection for a full Surface Fire

Tank Diameter (ft)	Water Demand (gpm)
50	200
100	800
150	2000
200	3200
250	5000
300	7100

5704.2.13.1.3 Out of service for one year

5704.2.13.1.3 Out of service for one year. Underground tanks that have been out of service for a period of one year shall be removed from the ground in accordance with Section 5704.2.14. Coordination and compliance with Environmental Health Division of Southern Nevada Health District for tank removal is the responsibility of the owner and contractor.

5704.2.13.1.4 Tanks abandoned in place

5704.2.13.1.4 Tanks abandoned in place. Intentionally deleted.

5704.5 Generator and Fire Pump Diesel Fuel Tanks

5704.5 Generator and Fire Pump Diesel Fuel Tanks.

5704.5.1 Exterior Installations. Exterior installations shall be in accordance with this section.

5704.5.1.1 Secondary containment. Tanks shall be listed and labeled as a secondary containment tank in accordance with UL 142 or shall be a UL 2085 tank.

5704.5.1.2 Separation distances. Aboveground tanks shall be separated from property lines, important buildings, public ways, and other tanks in accordance with NFPA 30.

5704.5.2 Interior Installations. Interior installations of aboveground fuel tanks shall comply with Chapters 6, 50 and 57.

5706.2.4.4 Locations where above-ground tanks are prohibited

5706.2.4.4 Locations where above-ground tanks are prohibited. The storage of class I, II, and III liquids in above-ground tanks outside of buildings is prohibited.

> **Exception**: When approved by the planning or zoning authority (in jurisdictions requiring this specific approval) and when *approved* by the *fire code official*.

5706.5.1.6 Fire Protection

5706.5.1.6 Fire Protection. Fire Protection shall be in accordance with Section 5703.2. Where operations involve vehicle loading of Class I and/or Class II liquids, the loading areas shall be protected with approved automatic fire protection systems.

5706.5.4.5 Commercial, industrial, governmental or manufacturing

5706.5.4.5 Commercial, industrial, governmental or manufacturing. Dispensing of motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where permitted, provided such dispensing operations are conducted in accordance with the following:

1. Dispensing shall occur only out of mobile fueling vehicles that have been issued a permit to conduct mobile fueling by the jurisdiction where the business license address is located.

2 – 25 remain unchanged.

5806.2 Limitations

5806.2 Limitations. Storage of flammable *cryogenic fluids* in stationary containers outside of buildings is prohibited.

> **Exception**: When *approved* by the planning or zoning authority (in jurisdictions requiring this specific approval) and when *approved* by the *fire code official*.

6104.2 Liquefied petroleum gas storage containers. Maximum capacity within established limits

6104.2 Liquefied petroleum gas storage containers. Maximum capacity within established limits. Within the limits established by law restricting ~~t~~the storage of liquefied petroleum gas for the protection of heavily populated or congested areas the aggregate capacity of any one installation shall not exceed a water capacity of 2,000 gallons (7570 L).

> **Exception**: When *approved* by the planning or zoning authority (in jurisdictions requiring this specific approval) and/or when *approved* by the *fire code official*.

80 REFERENCED STANDARDS, NFPA

Chapter 80 REFERENCED STANDARDS, NFPA,

54-18	National Fuel Gas Code
140-18	Motion Picture and Television Production Studio Soundstages, Approved Production Facilities, and Production Locations... 322

Appendix B FIRE-FLOW REQUIREMENTS FOR BUILDINGS

Table B105.1(1) REQUIRED FIRE FLOW FOR ONE- AND TWO- FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

TABLE B105.1(1)
REQUIRED FIRE FLOW FOR ONE- AND TWO- FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE FLOW CALCULATION AREA (square feet)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
0-3,600	1,000	1
3,601 and greater	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required fire-flow rate
3,601 and greater with automatic sprinkler system	1/2 Value in Table B105.1(2) but not less than 1,000	Duration in Table B105.1(2) at the required fire-flow rate

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

Table B105.2 REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

Table B105.2

REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
No *automatic sprinkler system*	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the International Fire Code	High-rise Buildings: 75% All Other Buildings: 50% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the International Fire Code	High-rise Buildings: 75% All Other Buildings: 50% of the value in Table B105.1(2)[ab]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m

a. The reduced fire flow shall be not less than 1,500 gallons per minute

Appendix C FIRE HYDRANT LOCATIONS AND DISTRIBUTION

Delete Existing Appendix C Text and Replace with the Following:

Section C101
General

C101.1 Scope. Fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, as required by Section 507. Design shall comply with the Clark County Uniform Design and Construction Standards (UDACS) for public installations or NFPA 24 for private installations, as applicable.

Section C102
Location

C102.1 Fire hydrant locations. Fire hydrants shall be provided along required fire apparatus access roads.

C102.2 Intersections. The spacing of fire hydrants shall start by placing fire hydrants at all intersections.

C102.3 R-3 Occupancies and single-family dwellings built under the IRC. In all residential areas (R-3 occupancies and single-family dwellings built under the IRC only), hydrants shall be spaced not to exceed 500 feet, or 600 feet if all homes are protected by approved automatic fire sprinkler systems.

C102.4 Distance from Hydrant to R-3 Occupancy and single-family dwelling built under the IRC. The maximum distance from a one- or two-family dwelling to a fire hydrant shall not exceed 300 feet, as measured from an approved point on a street or road frontage to a fire hydrant. An approved point is defined as the property line furthest from the hydrant, at a right angle to the street.

C102.5 Commercial and Residential Occupancies other than R-3 and single-family dwelling built under the IRC. In all commercial and industrial areas, including multi-family R-1 and R-2 occupancies, hydrants shall be spaced not to exceed 300 feet, or 400 feet if all buildings are protected by approved *automatic sprinkler system*s.

C102.6 Distance to Dead-End Street. The maximum distance from a hydrant to the end of a dead-end street shall not exceed 200 feet.

C102.7 Distance to a Fire Department Connection (FDC). The maximum distance from a fire hydrant to a fire department connection (FDC) supplying fire sprinklers and/or standpipes shall not exceed 100 feet, as measured by an approved route. An approved route is defined as an unobstructed path of travel on which hose can easily be laid.

C102.8 Spacing Along Major Streets. Where streets are provided with median dividers, or have four or more travel lanes and a traffic count of more than 30,000 vehicles per day, hydrants shall be spaced at a maximum of 1,000 feet along both sides of the street; arranged on an alternating basis at 500–foot intervals.

C102.9 Hydrants Provided with New Water Mains. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide water for transportation hazards.

C102.10 Hydrant Clearances from Structures. No fire hydrant shall be located within 6 feet of a driveway, power pole, light standard, or any other obstruction. For wall, fence and planter locations, a perimeter around the hydrant measuring a minimum of 3 feet from its exterior shall be maintained clear of all obstructions at all times.

C102.11 Hydrant set-back from curbs. Fire hydrants shall be located 4 feet to 7 feet from the back of curb. Where it is not possible to locate the hydrant a minimum of 4 feet from the back of the curb, the hydrant shall be protected against vehicular impact in accordance with Section 312.

C102.12 Hydrant Pad. A concrete pad, with minimum dimensions of 3 feet by 3 feet, with a minimum depth of 10 inches, shall be provided at each fire hydrant.

Section C103
Approved Fire Hydrants

C103.1 Scope. Hydrants that are proposed for installation in public water systems shall be in accordance with approved fire hydrants as allowed by the water purveyor. Hydrants proposed for installation on private water systems shall be in accordance with approved fire hydrants as allowed by the Fire Department.

Section C104
Supply and Underground Mains

C104.1 Supply points. Two sources of water supply are required whenever 4 or more fire hydrants and/or sprinkler (per Section 903.3.1.1 and/or 903.3.1.2) lead-ins are installed on a single system. Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated.

C104.2 Sectional Control Valve. For systems required to have two sources of water supply per C104.1, sectional control valves shall be installed so that no more than 2 fire hydrants and/or fire sprinkler (per Section 903.1.1 and/or 903.3.1.2 only) lead-ins can be out of service due to a service interruption.

C104.3 Minimum Size of Line. Supply lines feeding multiple fire hydrants shall have a minimum diameter of 8 inches, with a dead-end maximum length of 150 feet of 6-inch underground pipe supplying only one hydrant.

C104.4 Pressure Rating. Underground piping shall have a minimum working pressure of 150 psi (Class 235). Underground piping connected to a fire pump or a Fire Department Connection (FDC) shall have a minimum working pressure of 200 psi (Class 305).

C104.5 Restraint. All underground water lines shall be restrained in accordance with applicable codes and standards.

C104.6 Listings. All on-site underground water mains and materials shall be U.L. listed, A.W.W.A. compliant , and shall be rated for the appropriate working pressure.

Section C105
Satisfying Fire Flow Requirements
(in Accordance with Appendix B)

C105.1 Minimum number of hydrants. The minimum number of fire hydrants required to meet the fire flow shall be based on a maximum flow of 1,000 gallons per minute per hydrant. All hydrants utilized in providing the fire flow shall be within 750 feet of the structure being protected as measured along the street or approved fire apparatus access road.

C105.2 Hydrants on adjacent properties. Fire hydrants on adjacent properties shall not be considered unless fire apparatus access roads extend between properties and recorded easements are established.

Section C106
Construction Operations

C106.1 Construction Hydrants. Hydrants shall be provided for construction in accordance with Section 3312.

C106.2 Placing hydrant out of service. If during construction it becomes necessary to close any control valve or place a hydrant out of service, approval shall be obtained from the Fire Department prior to placing the hydrant out of service.

Section C107

Hydrant Markings

C107.1 Hydrant Markings. Hydrants shall be painted safety yellow for public and safety red for private, shall have their location marked in the adjacent fire access lane by a blue reflective pavement marker and shall have red painted curbs 15 feet in each direction. Hydrant markings shall be in accordance with Section 507.

C107.2 Hydrant Marking Maintenance. Hydrant marking shall be maintained in accordance with Section 507.

Appendix O
PROPRIETARY SUPERVISING STATION FACILITIES

Section O101
General

O101.1 Scope. Proprietary supervising station facilities (self-monitoring facilities) shall meet all of the requirements of this appendix.

O101.2 Permit Required. The proprietary supervising station facility shall maintain an annual operational permit.

Section O102
Site Requirements

O102.1 Location. The proprietary supervising station shall be located in a property's Fire Command Center, or other approved location.

O102.1.1 Equipment. The approved location shall have at a minimum the following items:

1. A fire alarm annunciator that has appropriate control capabilities.
2. An all-call microphone and all-call evacuation switch.
3. Switches that activate the evacuation message, the investigation message (if applicable), and the all-clear message for the active alarm zones.
4. A printer that is provided with a secondary power source such as an uninterruptible power supply or other approved means.
5. Copy of the approved SOP as required by Section O104.

O102.2 Retransmission Means. Two means of retransmission shall be provided. The primary means of retransmission shall be a land-line telephone. The secondary means of retransmission shall be a dedicated cellular telephone.

Section O103
Personnel

O103.1 Qualifications. Proprietary supervising stations shall be operated by trained personnel in constant attendance who are responsible to the owner of the protected property.

O103.1.1 Evidence of training. Annually the applicant shall certify in writing to the *fire code official* that all authorized personnel have received training in the recognition and proper handling of alarm signals. Evidence of annual training for each authorized personnel shall be provided when requested by the *fire code official*.

O103.2 Training. Operators shall be trained on a yearly basis either by the installing fire alarm contractor, by the fire alarm maintenance contractor, or by the manufacturer's representative of installed fire alarm system. Documentation of annual training shall be kept on site and available upon request of the *fire code official*.

Operators shall be trained on the following:

1. How to differentiate between a water flow alarm signal, a fire alarm signal, a fire supervisory signal, and a fire trouble signal.
2. The basic operations of the panel, including but not limited, to the following: signal acknowledgment, resetting of the fire alarm system, selection of evacuation zones, and activating of the evacuation, investigation (if applicable), and all-clear evacuation messaging.
3. The Standard Operating Procedures (SOP's) required by Section O104 for the facility.

0103.3 Number of personnel. At least two operators shall be on duty at all times. One of the two operators shall be permitted to be a runner.

0103.4 Coverage. Adequate staffing shall be provided for runners to survey the entire facility within three minutes when responding to either a water flow alarm signal or a fire alarm signal.

Section 0104
Standard Operating Procedures

0104.1 General. A Standard Operating Procedure (SOP) shall be submitted to the *fire code official* when applying for the required annual permit for proprietary supervising station facilities. The SOP shall outline procedures with regards to emergency procedures and the disposition of the alarm, supervisory, and trouble signals. The SOP shall include at a minimum the following items:

1. The number of operators that will be on duty at all times.
2. The location and the equipment found within the proprietary supervising station facility.
3. The facilities' procedures in handling alarm, supervisory, and trouble signals.

Section 0105
Disposition of Signals

0105.1 Alarm signals. Upon receipt of a fire alarm signal, the proprietary supervising station operator shall immediately dispatch a runner to the alarm location identified on the fire alarm control unit.

a. If the fire is verified, immediately activate the evacuation message on the fire alarm system and initiate notification procedures. See 0103.4 for coverage requirements.

b. If the alarm is false, the fire alarm system shall be reset. If either an investigation message or an evacuation message has been activated, then sound an all-clear message.

0105.2 Supervisory signals. Upon receipt of a supervisory signal, the proprietary supervising station operator shall immediately dispatch a runner to the location identified on the fire alarm control unit, unless the supervisory conditions are promptly restored.

0105.3 Trouble signals. Upon receipt of trouble signals or other signals pertaining solely to matters of equipment maintenance of the fire alarm system, the proprietary supervising station operator shall immediately dispatch runner to the location identified on the fire alarm control unit, unless the trouble conditions are promptly restored.

Section 0106
Record-Keeping

0106.1 Alarms. A written log of all fire alarm signals shall be maintained in the Fire Command Center including:

1. The investigating person's name.
2. The device address.
3. The type of alarm.
4. The date and time of receipt of the fire alarm signals.
5. The cause and disposition of the fire alarm signals.

Appendix P
FIRE PROTECTION SYSTEMS – IMPAIRMENTS AND SYSTEMS OUT OF SERVICE

Section P101
IMPAIRMENT PROCEDURES

P101.1 General. In addition to the requirements of Section 901.7 alternative protection measures shall be provided in accordance with this Appendix. Tables P102.1 (a) and P102.1 (b) shall be used by the impairment coordinator to determine the alternative protection measurers required.

P101.2 Impairment Coordinator Procedures. For all impairments, both planned and emergency (unplanned), an impairment coordinator shall be designated per Section 901.7.1. An impairment coordinator is the person responsible for maintenance of a particular fire protection system. When an *impairment coordinator* is not designated the *owner* shall be considered the impairment coordinator.

The impairment coordinator is responsible for informing the Fire Department as to the nature of the impairment and its status, coordinating necessary repairs, tagging systems per Section 901.7.2 & 901.7.3 and implementing required alternative protection measures.

For all planned impairments, the impairment coordinator shall engage licensed contractors to conduct work needed on the fire protection systems. For all emergency impairments, the impairment coordinator shall contact the appropriate fire sprinkler, fire alarm or other fire protection system maintenance contractor to initiate emergency service response.

P101.3 Maintenance Contractor Procedures. The maintenance contractor shall assess the impairment and provide a time estimate for the repair (impairment duration). The impairment coordinator shall use this time estimate and Tables P102.1(a) and P102.1(b) to determine the appropriate actions to take. Where the impairment is discovered during maintenance activities, the maintenance contractor shall contact ownership to request an impairment coordinator. The maintenance contractor shall estimate the time required for repair, and report the impairment in accordance with this section.

P101.4 Impairment Procedure Tables. The impairment coordinator shall comply with impairment tables Tables P102.1 (a) and P102.1 (b). Alternative protection measures are categorized as:

1. Notifying fire dispatch
2. Instituting a fire watch within the building area where fire protection is impaired
3. Providing other alternative protection measures as determined by the *Fire Code Official* on a case by case basis.

P101.4.1 Notify Dispatch. When required by Tables P102.1 (a) and P102.1 (b) the impairment coordinator shall notify the Fire Department dispatch center and *fire code official*.

P101.4.2 Fire watch. When required by Tables P102.1 (a) and P102.1 (b) the impairment coordinator shall institute a fire watch, approved by the *fire code official*, within the building area where fire protection is impaired for the duration of the impairment. Fire watch personnel shall be provided at a rate of 1 person per 100,000 square feet of building area, over the entire area of the building affected by the impairment. Fire watch personnel shall meet the following characteristics:

1) Be capable of walking the building continuously during the shift. The fire watch shall walk over all assigned floor areas, including all exits from the floor areas assigned. Where the fire watch needs to take a break, another fire watch person shall cover the area during the break.
2) Be equipped with a bullhorn, flashlight, and cellular phone.
3) Be capable of assisting employees and building occupants to evacuate the building in an emergency situation while utilizing the flashlight to illuminate the means of egress. This activity may be required

within the assigned fire watch area, or in assistance to other fire watch personnel in other fire watch areas in the building.

4) Be capable of calling emergency services by dialing 911 in case of fire. Upon discovery of fire, fire watch personnel shall first call 911, and then advise all other fire watch personnel of the emergency in order to obtain their assistance in notifying and evacuating employees and building occupants.

P101.4.3 Other Measures. When determined necessary by the f*ire code official*, on a case-by-case basis, the impairment coordinator may be required to implement additional protection measures. The measure(s) available to the *fire code official* include, but are not limited to, the following:

1) Fire Department oversight of Fire Watch.
2) Manning of equipment, such as manual release buttons for deluge systems.
3) Discontinuance of hazardous activities, such as cooking, welding, and pyrotechnic displays.
4) Removing hazard from building, i.e. as removing an airplane from a hangar.
5) Have all fire doors and shutters closed.
6) Manually activate smoke control.
7) Shut down an elevator.
8) Unlock stair door locks.
9) Engine stand-by for supply to fire sprinkler/standpipe system.
10) Partial evacuation of building.
11) Full evacuation of building.

Any costs associated with providing alternative protection measures shall be borne by the building owner.

P102
Impairment Tables – Use Groups A, E, H, I and R

P102.1 Use Groups A, E, H, I and R. Groups A, E, H, I and R occupancies are deemed a high risk due to the characteristics of these occupancies. As such, alternative protection measurers are tailored on a case-by-case basis in order to manage the risk in these occupancies. The impairment coordinator shall use the following tables P102.1 (a) and P102.1 (b) to address impairments to fire protection systems. When alternative protection measures are required by tables P102.1 (a) and P102.1 (b) the *Fire Code Official* shall be contacted.

TABLE P102.1(a)
SUPPRESSION-BASED SYSTEMS – USE GROUPS A, E, H, I, R

Impairment Description	Building/ Location Height – Stories Above Grade	Impairment Duration	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
Fire Pump (standalone)	1	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	2-5	≤ 2 hours	Y	N
		> 2 hours	Y	Y
	6 or more	≤ 1 hour	Y	N
		> 1 hour	Y	Y
Fire Pump with back-up fire pump	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 6 hours	N	N
		> 6 hours	N	Y
	6 or more	≤ 3 hour	N	N
		> 3 hour	N	Y
Feed Main/ Standpipe Out of Service (does not affect sprinkler system supplies)	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 10 hours	N	N
		> 10 hours	N	Y
	6 or more	≤ 6 hours	N	N
		> 6 hours	N	Y
Feed Main/ Standpipe Out of Service (interrupts supply to more than one sprinkler system)	1	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	2-5	≤ 2 hours	Y	N
		> 2 hours	Y	Y
	6 or more	≤ 1 hour	Y	N
		> 1 hour	Y	Y
Underground fire service main out of service – redundant main and tank	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 10 hours	N	N
		> 10 hours	N	Y
	6 or more	≤ 6 hour	N	N
		> 6 hour	N	Y
Underground Supply Out of Service (No secondary water supply)	1	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	2-5	≤ 2 hours	Y	N
		> 2 hours	Y	Y
	6 or more	≤ 1 hour	Y	N
		> 1 hour	Y	Y
Underground Supply Out of Service (built-in secondary water supply)	1	≤ 6 hours	N	N
		> 6 hours	N	Y
	2-5	≤ 4 hours	N	N

Impairment Description	Building/ Location Height – Stories Above Grade	Impairment Duration	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
		> 4 hours	N	Y
	6 or more	≤ 2 hours	N	N
		> 2 hours	N	Y
Waterflow switch not functional (system still operational)	1	≤ 6 hours	N	N
		> 6 hours	Y	N
	2-5	≤ 4 hours	N	N
		> 4 hours	Y	N
	6 or more	≤ 2 hours	N	N
		> 2 hours	Y	N
Sprinkler System Repair/Sprinkler System out of Service	1	≤ 6 hours	Y	N
		> 6 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 2 hours	Y	N
		> 2 hours	Y	Y
Water Spray Fixed Systems (NFPA 15)	NA	≤ 8 hours	N	N
		> 8 hours	Y	Y
Foam-water system	1	≤ 4 hours	N	N
		> 4 hours	Y	Y
	2-5	≤ 4 hours	N	N
		> 4 hours	Y	Y
	6 or more	≤ 4 hours	N	N
		> 4 hours	Y	Y
Kitchen exhaust hood and duct extinguishing system	NA	≤ 2 hours	N	N
		> 2 hours	Y	Y
Clean-agent (with sprinkler system inside the space)	1	≤ 10 hours	N	N
		> 10 hours	N	N
	2-5	≤ 10 hours	N	N
		> 10 hours	N	N
	6 or more	≤ 6 hours	N	N
		> 6 hours	Y	N
Clean-agent (without sprinkler system inside the space)	1	≤ 6 hours	Y	N
		> 6 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 2 hours	Y	N
		> 2 hours	Y	Y
Water storage tank (including pools used as tanks) - with redundant water mains	1	≤ 10 hours	N	N
		> 10 hours	N	N
	2-5	≤ 10 hours	N	N

Impairment Description	Building/ Location Height – Stories Above Grade	Impairment Duration	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
		> 10 hours	N	N
	6 or more	≤ 6 hours	N	N
		> 6 hours	N	Y
Water storage tank (including pools used as tanks) - without redundant water mains and tank acts as secondary supply only	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 6 hours	N	N
		> 6 hours	N	Y
	6 or more	≤ 3 hours	N	N
		> 3 hours	N	Y
Water storage tank (including pools used as tanks) - without redundant water mains and tank acts as break tank for primary supply	1	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	2-5	≤ 2 hours	Y	N
		> 2 hours	Y	Y
	6 or more	≤ 1 hours	Y	N
		> 1 hours	Y	Y
Obstructions in water supply – Lack of Flushing/MIC	1	≤ 8 hours	N	N
		> 8 hours	Y	Y
	2-5	≤ 6 hours	N	N
		> 6 hours	Y	Y
	6 or more	≤ 4 hours	N	N
		> 4 hours	Y	Y
Fire department access (fire hydrant, fire command center, fire pump and FDC access)	1	≤ 4 hours	N	N
		> 4 hours	Y	Y
	2-5	≤ 4 hours	N	N
		> 4 hours	Y	Y
	6 or more	≤ 4 hours	N	N
		> 4 hours	Y	Y

TABLE P102.1(b)
FIRE-ALARM SYSTEMS – USE GROUPS A, E, H, I, R

Impairment (Fire Alarms Systems, Groups A, E, H, I, R)	Building Height - Stories	Estimated Repair Time [1]	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
Main FACU Not Operational (No Stand-alone Nodes)	1	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	2-5	≤ 2 hours	Y	N
		> 2 hours	Y	Y
	6 or more	≤ 1 hour	Y	N
		> 1 hour	Y	Y
Main FACU Not Operational (Stand-alone Nodes are available)	1	≤ 5 hours	Y	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	N
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Node FACU panel is down	1	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	2-5	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	6 or more	≤ 2 hours	Y	N
		> 2 hours	Y	Y
Strobe power supply is down	1	≤ 5 hours	N	N
		> 5 hours	N	Y
	2-5	≤ 5 hours	N	N
		> 5 hours	N	Y
	6 or more	≤ 3 hours	N	N
		> 3 hours	N	Y
Audio Panel is down	1	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Single detection circuit is down	1	≤ 5 hours	N	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	N	N
		> 5 hours	Y	N
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Single notification circuit is down	1	≤ 5 hours	N	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	N	N
		> 5 hours	Y	N

Impairment (Fire Alarms Systems, Groups A, E, H, I, R)	Building Height - Stories	Estimated Repair Time [1]	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Single detection device not operational	1	≤ 10 hours	N	N
		> 10 hours	Y	N
	2-5	≤ 10 hours	N	N
		> 10 hours	Y	N
	6 or more	≤ 10 hours	N	N
		> 10 hours	Y	N
Single Notification Device not operational	1	≤ 10 hours	N	N
		> 10 hours	Y	N
	2-5	≤ 10 hours	N	N
		> 10 hours	Y	N
	6 or more	≤ 10 hours	N	N
		> 10 hours	Y	N
Monitoring Panel not operational (fire sprinkler and fire alarm systems still operational)	1	≤ 12 hours	N	N
		> 12 hours	Y	Y
	2-5	≤ 12 hours	N	N
		> 12 hours	Y	Y
	6 or more	≤ 12 hours	N	N
		> 12 hours	Y	Y
Ground Fault	1	≤ 5 hours	N	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	N	N
		> 5 hours	Y	N
	6 or more	≤ 5 hours	N	N
		> 5 hours	Y	N
Single Notification Card in Panel	1	≤ 5 hours	Y	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Single Detection Card in Panel	1	≤ 5 hours	Y	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Recall	1	NA	NA	NA
	2-5	≤ 5 hours	N	N
		> 5 hours	N	Y
	6 or more	≤ 5 hours	N	N
		> 5 hours	N	Y

Impairment (Fire Alarms Systems, Groups A, E, H, I, R)	Building Height - Stories	Estimated Repair Time [1]	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
Automatic Doors not Releasing Automatically	1	≤ 2 hours	N	N
		> 2 hours	N	Y
	2-5	≤ 2 hours	N	N
		> 2 hours	N	Y
	6 or more	≤ 2 hours	N	N
		> 2 hours	N	Y
Smoke Control Panel (automatic mode works)	1	≤ 4 hours	N	N
		> 4 hours	N	Y
	2-5	≤ 3 hours	N	N
		> 3 hours	N	Y
	6 or more	≤ 2 hours	N	N
		> 2 hours	N	Y
Smoke Control Panel (automatic mode does not works)	NA	NA	N	Y
Fire fighter communication systems (fire phones and radio systems)	NA	NA	N	Y

[1] If the building is protected with a fire sprinkler system, the "Estimated Repair Time" hours shown in this column may be doubled.

P103
Impairment Tables – Use Groups B, F, M, S

P103.1 Use Groups B, F, M, S. Groups B, F, M and S Occupancies are considered lower hazard occupancies. As such, the impairment guideline is tailored to manage the risks associated with those occupancies. Mitigation shall be in accordance with Table P103.1(a) and Table P103.1(b).

TABLE P103.1(a)
SUPPRESSION-BASED SYSTEMS – USE GROUPS B, F, M, S

Impairment (Water-Based Systems, Groups B, F, M and S)	Building/ Location Height – Stories Above Grade	Estimated Repair Time	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
Fire Pump	1	≤ 10 hours	Y	N
		> 10 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 2 hour	Y	N
		> 2 hour	Y	Y
Fire Pump with back-up fire pump	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 10 hours	N	N
		> 10 hours	N	Y
	6 or more	≤ 10 hours	N	N
		> 10 hours	N	Y
Feed Main/ Standpipe Out of Service (does not affect sprinkler system supplies)	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 10 hours	N	N
		> 10 hours	N	Y
	6 or more	≤ 8 hours	N	N
		> 8 hours	N	Y
Feed Main/ Standpipe Out of Service (interrupts supply to more than one sprinkler system)	1	≤ 10 hours	Y	N
		> 10 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 2 hour	Y	N
		> 2 hour	Y	Y
Underground fire service main out of service – redundant main and tank	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 10 hours	N	N
		> 10 hours	N	Y
	6 or more	≤ 8 hours	N	N
		> 8 hours	N	Y
Underground Supply Out of Service (No secondary water supply)	1	≤ 10 hours	Y	N
		> 10 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 1 hour	Y	N
		> 1 hour	Y	Y
Underground Supply Out of Service (built-in secondary water supply)	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 10 hours	N	N
		> 10 hours	N	Y
	6 or more	≤ 2 hours	N	N
		> 2 hours	N	Y
Waterflow switch not functional	1	≤ 10 hours	N	N

Impairment (Water-Based Systems, Groups B, F, M and S)	Building/ Location Height – Stories Above Grade	Estimated Repair Time	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
(system still operational)		> 10 hours	Y	N
	2-5	≤ 6 hours	N	N
		> 6 hours	Y	N
	6 or more	≤ 3 hours	N	N
		> 3 hours	Y	N
Sprinkler System Repair/Sprinkler System out of Service	1	≤ 10 hours	Y	N
		> 10 hours	Y	Y
	2-5	≤ 6 hours	Y	N
		> 6 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Water Spray Fixed Systems (NFPA 15)	NA	≤ 8 hours	N	N
		> 8 hours	Y	Y
Foam-water system	1	≤ 4 hours	N	N
		> 4 hours	Y	Y
	2-5	≤ 4 hours	N	N
		> 4 hours	Y	Y
	6 or more	≤ 4 hours	N	N
		> 4 hours	Y	Y
Kitchen exhaust hood and duct extinguishing system	NA	≤ 2 hours	N	N
		> 2 hours	Y	Y
Clean-agent (with sprinkler system inside the space)	1	≤ 10 hours	N	N
		> 10 hours	N	N
	2-5	≤ 10 hours	N	N
		> 10 hours	N	N
	6 or more	≤ 8 hours	N	N
		> 8 hours	Y	N
Clean-agent (without sprinkler system inside the space)	1	≤ 8 hours	Y	N
		> 8 hours	Y	Y
	2-5	≤ 6 hours	Y	N
		> 6 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Water storage tank (including pools used as tanks) - with redundant water mains	1	≤ 10 hours	N	N
		> 10 hours	N	N
	2-5	≤ 10 hours	N	N
		> 10 hours	N	N
	6 or more	≤ 8 hours	N	N
		> 8 hours	N	Y
Water storage tank (including pools used as tanks) - without redundant water mains and tank acts as secondary supply only	1	≤ 10 hours	N	N
		> 10 hours	N	Y
	2-5	≤ 6 hours	N	N
		> 6 hours	N	Y

Impairment (Water-Based Systems, Groups B, F, M and S)	Building/ Location Height – Stories Above Grade	Estimated Repair Time	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
	6 or more	≤ 3 hours	N	N
		> 3 hours	N	Y
Water storage tank (including pools used as tanks) - without redundant water mains and tank acts as break tank for primary supply	1	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	2-5	≤ 3 hours	Y	N
		> 3 hours	Y	Y
	6 or more	≤ 1 hours	Y	N
		> 1 hours	Y	Y
Obstructions in water supply – Lack of Flushing/MIC	1	≤ 8 hours	N	N
		> 8 hours	Y	Y
	2-5	≤ 6 hours	N	N
		> 6 hours	Y	Y
	6 or more	≤ 4 hours	N	N
		> 4 hours	Y	Y
Fire department access (fire hydrant, fire command center, fire pump and FDC access)	1	≤ 4 hours	N	N
		> 4 hours	Y	Y
	2-5	≤ 4 hours	N	N
		> 4 hours	Y	Y
	6 or more	≤ 4 hours	N	N
		> 4 hours	Y	Y

TABLE P103.1(b)
FIRE ALARM SYSTEMS – USE GROUPS B, F, M, S

Impairment (Fire Alarm System, Groups B, F, M and S)	Building Height - Stories	Estimated Repair Time [1]	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
Main FACU Not Operational (No Stand-alone Nodes)	1	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	2-5	≤ 2 hours	Y	N
		> 2 hours	Y	Y
	6 or more	≤ 1 hour	Y	N
		> 1 hour	Y	Y
Main FACU Not Operational (Stand-alone Nodes are available)	1	≤ 5 hours	Y	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	N
	6 or more	≤ 5 hours	Y	N
		> 5 hours	Y	Y
Node FACU panel is down	1	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	2-5	≤ 4 hours	Y	N
		> 4 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Strobe power supply is down	1	≤ 5 hours	N	N
		> 5 hours	N	Y
	2-5	≤ 5 hours	N	N
		> 5 hours	N	Y
	6 or more	≤ 5 hours	N	N
		> 5 hours	N	Y
Audio Panel is down	1	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	6 or more	≤ 4 hours	Y	N
		> 4 hours	Y	Y
Single detection circuit is down	1	≤ 5 hours	N	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	N	N
		> 5 hours	Y	N
	6 or more	≤ 5 hours	Y	N
		> 5 hours	Y	Y
Single alarm circuit is down	1	≤ 5 hours	N	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	N	N
		> 5 hours	Y	N

Impairment (Fire Alarm System, Groups B, F, M and S)	Building Height - Stories	Estimated Repair Time [1]	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
	6 or more	≤ 5 hours	Y	N
		> 5 hours	Y	Y
Single detection device not operational	1	≤ 10 hours	N	N
		> 10 hours	Y	N
	2-5	≤ 10 hours	N	N
		> 10 hours	Y	N
	6 or more	≤ 10 hours	N	N
		> 10 hours	Y	N
Single Notification Device not operational	1	≤ 10 hours	N	N
		> 10 hours	Y	N
	2-5	≤ 10 hours	N	N
		> 10 hours	Y	N
	6 or more	≤ 10 hours	N	N
		> 10 hours	Y	N
Monitoring Panel not operational (fire sprinkler and fire alarm systems still operational)	1	≤ 24 hours	N	N
		> 24 hours	Y	Y
	2-5	≤ 24 hours	N	N
		> 24 hours	Y	Y
	6 or more	≤ 24 hours	N	N
		> 24 hours	Y	Y
Ground Fault	1	≤ 10 hours	N	N
		> 10 hours	Y	N
	2-5	≤ 10 hours	N	N
		> 10 hours	Y	N
	6 or more	≤ 10 hours	N	N
		> 10 hours	Y	N
Single Notification Card in Panel	1	≤ 5 hours	Y	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Single Detection Card in Panel	1	≤ 5 hours	Y	N
		> 5 hours	Y	N
	2-5	≤ 5 hours	Y	N
		> 5 hours	Y	Y
	6 or more	≤ 3 hours	Y	N
		> 3 hours	Y	Y
Recall	1	NA	NA	NA
	2-5	≤ 5 hours	N	N
		> 5 hours	N	Y
	6 or more	≤ 3 hours	N	N

Impairment (Fire Alarm System, Groups B, F, M and S)	Building Height - Stories	Estimated Repair Time [1]	Fire Watch Req'd	Notify Dispatch and Fire Code Official for possible additional measures per section P101.4.3
		> 3 hours	N	Y
Automatic Doors not Releasing Automatically	1	≤ 2 hours	N	N
		> 2 hours	N	Y
	2-5	≤ 2 hours	N	N
		> 2 hours	N	Y
	6 or more	≤ 2 hours	N	N
		> 2 hours	Y	Y
Smoke Control Panel (automatic mode works)	1	≤ 5 hours	N	N
		> 5 hours	N	Y
	2-5	≤ 5 hours	N	N
		> 5 hours	N	Y
	6 or more	≤ 3 hours	N	N
		> 3 hours	N	Y
Smoke Control Panel (automatic mode does not works)	NA	NA	N	Y
Fire fighter communication systems (fire phones and radio systems)	NA	NA	N	Y

When the building is protected with a fully functional fire sprinkler system, the "Estimated Repair Time" hours shown in this column may be doubled.

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3.3.16 Limited-Combustible (Material)

3.3.16* Limited-Combustible (Material). Deleted in its entirety throughout this standard. This term shall have no ordinary accepted meaning as noted in Section 3.1 as it relates to the installation of limited-combustible material for the installation of sprinkler systems. This deletion shall apply throughout this standard and throughout all referenced codes and standards as stated in the International Fire Code Section 102.7 and all applicable standards or requirements that are not set forth in this code as stated in the International Fire Code Section 102.8 when involving sprinkler systems.

5.3.2.1 Ordinary Hazard (Group 2)

5.3.2.1 Ordinary Hazard (Group 2) Ordinary hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents is moderate to high, where stockpiles of contents with moderate rates of heat release do not exceed 12 ft (3.66 m), and stockpiles of contents with high rates of heat release do not exceed 8 ft (2.4m).

Occupancies containing Casinos, Mini-Storage Facilities, and Shell Buildings, regardless of occupancy classification (unknown tenants and/or floor layout), shall be designed to meet the requirements of Ordinary Hazard Group 2.

6.1.3 Rated Pressure

6.1.3 Rated Pressure. System components shall be rated for the maximum system working pressure to which they are exposed but shall not be rated at less than 175 psi (12.1 bar) for components installed aboveground and 150 psi (10.4 bar) for components installed underground. When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 305), or 50 psi greater than the system design pressure, whichever is greater.

6.2.9.7.1

6.2.9.7.1 The list shall be on a machine-engraved metal or rigid plastic sign with capitalized lettering a minimum 14 point (¼ inch high) in Arial or similar font and include the following:

(1) Sprinkler Identification Number (SIN) if equipped; or the manufacturer, model, orifice, deflector type, thermal sensitivity, and pressure rating.

(2) General description.

(3) Quantity of each type to be contained in the cabinet.

(4) Issue or revision date of the list.

6.3.1.1.2

6.3.1.1.2 Pipe or tube shall have a minimum Corrosion Resistant Ratio (CRR) of 1.

7.1.3 Auxiliary Systems

7.1.3 Auxiliary Systems. A wet pipe system shall be permitted to supply an auxiliary antifreeze, dry pipe, or preaction system provided the auxiliary system covers less than 10% of the system size.

7.2.3.1

7.2.3.1 The system capacity (volume) controlled by a dry pipe valve shall be determined by 7.2.3.2 or 7.2.3.5.

7.2.3.3

Section 7.2.3.3 Intentionally Deleted.

7.2.3.4

Section 7.2.3.4 Intentionally Deleted.

7.2.3.5

7.2.3.5 System size shall be based on dry systems being calculated for water delivery in accordance with 7.2.3.6. Testing of the system shall be accomplished by the methods indicated in 7.2.3.7.

7.2.6.3 Air Supply

7.2.6.3 Air Supply

7.2.6.3.1 The compressed air supply shall be from a source available at all times.

7.2.6.3.1.1 The compressed air device shall be hardwired or connected to the power source in an approved manner.

7.2.6.3.1.2 The compressed air supply device shall be secured in place in an approved manner.

7.2.6.6.5

7.2.6.6.5 A high/low pressure supervisory signal to a constantly attended location shall be installed.

7.3.2.3.1.3

7.3.2.3.1.3 The system size for double-interlock preaction systems shall be based on calculating water delivery in accordance with 7.2.3.6, anticipating that the detection system activation and sprinkler operation will be simultaneous. A system meeting the requirements of this section shall be required to also meet the requirements of 7.2.3.7.

7.6.2.3

7.6.2.3 An antifreeze solution shall be prepared with a freezing point at or below 2° F (-16.7° C).

7.9.2.2

Section 7.9.2.2 Intentionally Deleted.

7.9.3.1

7.9.3.1 Unless the requirements of 7.9.3.2 or 7.9.3.4 are met, exhaust ducts shall have one sprinkler or automatic spray nozzle located at the top of each vertical riser, at the midpoint of each offset, and an additional sprinkler shall be installed within the duct at 20-foot intervals on vertical risers where not otherwise provided with sprinklers due to offsets in buildings over two stories.

7.9.9 Dedicated Supply and Indicating Valves

7.9.9 Dedicated Supply and Indicating Valves. A dedicated supply riser, including flow switch, check valve, and a listed indicating valve shall be installed in the water supply line to the sprinklers and spray nozzles protecting the cooking and ventilating system.

8.2.4 Floor Control Valve Assemblies

8.2.4 Floor Control Valve Assemblies.

8.2.4.1* Multistory buildings shall be provided with a floor control valve, check valve, main drain valve, and flow switch for isolation, control, and annunciation of water flow on each floor level.

8.2.4.2 The floor control valve, check valve, main drain valve, and flow switch required by 8.2.4.1 shall not be required where sprinkler systems protecting atriums, covered mall buildings, and other areas with non-standard ceiling heights within the building, are supplied by piping from ~~on~~ the protected floor system below.

8.2.4.3 Intentionally deleted.

8.2.5

8.2.5 When acceptable to the authority having jurisdiction, multiple buildings that are assigned the same street address, without independent building numbers, and are attached by canopies, covered breezeways, common roofs, or a common wall(s) shall be permitted to be supplied by a single fire sprinkler riser.

8.3.3.1

8.3.3.1 Sprinklers in light hazard occupancies, shell buildings of combustible construction, casinos, and exhibition areas shall be one of the following:

(1) Quick-response type as defined in 3.6.4.8.

(2) Residential sprinklers in accordance with the requirements of 8.4.5.

(3) Quick response CMSA sprinklers.

(4) ESFR sprinklers.

(5) Standard response sprinklers used for modifications or additions, within the existing compartment, to existing systems equipped with standard response sprinklers.

(6) Standard response sprinklers used where individual standard response sprinklers are replaced in existing systems.

8.7.5.3.2

8.7.5.3.2 Sprinklers shall be installed under fixed obstructions over 4 ft (1.2 m) wide such as ducts, decks, open grate flooring, cutting tables, and overhead doors.

Exception: *Garage overhead door within garages that service a single tenant in residential occupancies.*

8.8.5.3.2

8.8.5.3.2. Sprinklers shall be installed under fixed obstructions over 4 ft (1.2 m) wide such as ducts, decks, open grate flooring, cutting tables, and overhead doors.

Exception: *Garage overhead door within garages that service a single tenant in residential occupancies.*

8.9.5.3.2

8.9.5.3.2 Sprinklers shall be installed under fixed obstructions over 4 ft (1.2 m) wide such as ducts, decks, open grate flooring, cutting tables, and overhead doors.

Exception: *Garage overhead door within garages that service a single tenant in residential occupancies.*

8.15.1.2.10

8.15.1.2.10 Intentionally deleted.

8.15.1.2.11

8.15.1.2.11 Intentionally Deleted.

8.15.4.1 General

8.15.4.1 General. Unless the requirements of 8.15.4.4 are met, where moving stairways, staircases, or similar floor openings are unenclosed and where sprinkler protection is serving as the alternate to enclosure of the vertical opening, the floor openings involved shall be protected by closely spaced sprinklers supplied by a dedicated sprinkler riser in combination with draft stops in accordance with 8.15.4.2 and 8.15.4.3.

8.15.7.1

8.15.7.1 Unless the requirements of 8.15.7.2 or 8.15.7.4 are met, sprinklers shall be installed under exterior projections exceeding 4 ft (1.2 m) in width.

8.15.7.2

8.15.7.2 Sprinklers shall be permitted to be omitted where the exterior canopies, roofs, porte-cocheres, balconies, decks, and similar projections are constructed entirely with materials that are noncombustible and where the exterior projections do not support occupancy above.

8.15.7.3

8.15.7.3 Intentionally deleted.

8.15.8.1.1

8.15.8.1.1 Sprinkler protection shall be provided in all bathrooms.

8.15.8.1.1.1

8.15.8.1.1.1 Sprinkler protection shall not be required in separate rooms that contain solely a toilet fixture, that contain no counters, shelving, closet doors, or other fixtures, and that have a maximum area of 55 ft^2 (5.1 m^2). Such rooms shall be surrounded by walls and doors that completely enclose the room.

8.15.8.2 Closets and Pantries

8.15.8.2 Closets and Pantries. Sprinklers protection shall be provided in clothes closets, linen closets, and pantries.

8.15.11.1

8.15.11.1 Sprinkler protection shall be required in electrical equipment rooms.

8.15.11.2

8.15.11.2 Intentionally deleted.

8.15.15.1

8.15.15.1 Drop-out ceilings are not permitted to be installed beneath fire sprinklers.

8.15.15.2

8.15.15.2 Intentionally deleted.

8.15.15.3

8.15.15.3 Intentionally deleted.

8.15.15.4

8.15.15.4-Intentionally deleted.

8.15.15.5

8.15.15.5-Intentionally deleted.

8.15.20.1.1

8.15.20.1.1 Unless hydraulically calculated, each one-inch outlet shall supply a maximum of one sprinkler head providing protection below a ceiling, and if necessary, a maximum of one head above the ceiling. Such sprinkler head(s) shall have a k-factor equal to the k-factor of existing upright sprinklers.

8.15.20.1.2

8.15.20.1.2 Unless otherwise hydraulically calculated, a one-inch outlet shall be allowed to supply a maximum of two sprinkler heads where the two sprinkler heads protect areas that are physically separated by a ceiling, walls and/or doors with a minimum lintel depth of 8 in (203 mm) and maximum total area of door openings into the room of 50 ft^2 (4.6 m^2). The sprinklers shall have a k-factor equal to the k-factor of existing upright sprinklers.

8.15.20.1.3

8.15.20.1.3 When approved, sprinkler heads installed under a ceiling may have a k factor less than the overhead sprinklers, provided the occupancy hazard classification for the area under the ceiling is less than the classification that the overhead sprinklers are designed for.

8.15.20.1.4

8.15.20.1.4 Flexible sprinkler hose drops shall be proven by hydraulic calculations.

8.15.27 Temporary Exhibit Booths Within a Permanent Building

8.15.27 Temporary Exhibit Booths Within a Permanent Building. Where sprinkler protection is required in temporary exhibit booths constructed in a permanent building, such systems shall comply with Section 8.15.27.

8.15.27.1 Hydraulic Design. Systems shall meet Density/Area Method requirements of Section 11.2.3.2 or the Pipe Schedule method of Section 23.7. The minimum design shall be for Ordinary Hazard Group 2, or higher design to accommodate the hazard within the temporary exhibit booth

8.15.27.2 Bracing. Bracing shall not be required for temporary piping serving temporary exhibit booths.

8.15.27.3 Hangers. Hangers conforming to Section 9.1 shall be provided for temporary piping to temporary exhibit booths. Hangers shall be permitted to be attached to the temporary exhibit booth structure.

8.15.27.4 Exposed CPVC Piping. CPVC piping listed for fire protection service shall be permitted to be exposed when installed as temporary piping to serve temporary exhibit booths.

8.15.27.5 Valve. A valve and open pipe shall be provided from the most hydraulically remote point to allow for inspection of piping to prove that the piping is charged with water and void of trapped air.

8.16.1.1.2.1

8.16.1.1.2.1 Valves on connections to water supplies, sectional control and isolation valves, and other valves in supply pipes to sprinkler and other fixed water-based fire suppression systems shall be electrically supervised by a:

(1) Central station, proprietary, or remote station signaling service

Numbers 2-4 of this Section Intentionally Deleted.

8.16.1.1.2.3

8.16.1.1.2.3 The requirements of 8.16.1.1.2.1 shall not apply to underground gate valves with roadway boxes or to valves at backflow prevention devices at the municipal water supply connection where the valves are locked in the open position.

8.16.1.2.5

8.16.1.2.5 Means shall be provided downstream of all pressure-reducing valves for flow tests at sprinkler system demand. Such means shall consist of a tee outlet downstream of the pressure reducing valve identical in size to the sprinkler system feed, available for connection to field testing devices, or other method approved by the AHJ.

8.16.4.1.4

8.16.4.1.4 Intentionally Deleted.

8.16.4.1.4.1

8.16.4.1.4.1-Intentionally Deleted.

8.16.4.1.4 2

8.16.4.1.4.2-Intentionally Deleted.

8.16.4.1.5.1 Design Temperature and Duration

8.16.4.1.5.1 Design Temperature and Duration. The minimum criteria for an engineered solution in calculating heat loss for the requirement to maintain 40°F (4.4°C) shall be 0° F (-17.8°C) for 8 hours. The initial starting temperature of the water shall be no greater than 50°F (10°C).

8.17.1.1 Local Waterflow Alarms Units

8.17.1.1. Local Waterflow Alarms Units. A local waterflow alarm unit shall be provided on every sprinkler system. Such waterflow alarm units shall be installed in accordance with 6.8.

8.17.2.4.1.3

8.17.2.4.1.3 The fire department connection shall be located not less than 18 in (457 mm) and not more than 4 ft (1.2 m) above the level of the adjacent grade or access level.

9.1.3.9.3

9.1.3.9.3 Powder-driven fasteners shall be allowed for branch lines less than or equal to 2 in. (50 mm) pipe.

9.1.3.9.4

9.1.3.9.4 Increaser couplings shall not be permitted with powder-driven studs.

9.2.1.3.3.5

9.2.1.3.3.5 Where flexible sprinkler hose fittings are supported by a ceiling that does not meet design and installation criteria set forth in 9.2.1.3.3.2, such fitting shall be provided with hangers in accordance with 9.2.3.5, unless the flexible hose fitting is provided with a hanger assembly specifically approved by a Nationally Recognized Testing Laboratory for both the flexible sprinkler hose fitting and the specific method of installation.

9.3.5.9.3.1

9.3.5.9.3.1 The value of S_s used in Table 9.3.5.9.3 shall be 0.95 or derived from seismic hazard maps.

10.1.2

10.1.2* All piping used in private fire service mains shall be rated for the maximum system working pressure to which the piping is exposed but shall not be rated at less than 150 psi (10 bar). When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 305), or 50 psi greater than the FDC design pressure, whichever is greater.

10.2.2

10.2.2 All fittings used in private fire service mains shall be rated for the maximum system working pressure to which the fittings are exposed, but shall not be rated at less than 150 psi (10 bar). When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 305), or 50 psi greater than the FDC design pressure, whichever is greater.

11.3.3.3

11.3.3.3 The water supply to the water curtain shall be added to the water demand of the hydraulic calculations and be balanced to the calculated area demand.

11.3.6 NONSTORAGE OCCUPANCIES WITH HIGH CEILINGS

11.3.6 NONSTORAGE OCCUPANCIES WITH HIGH CEILINGS

11.3.6.1 Light and Ordinary Hazard Group 1 and 2 Occupancies with ceiling heights between 25 and 50 feet. Light and Ordinary Hazard 1 and 2 occupancies shall be designed to provide a minimum density of 0.10 gpm/ft^2, 0.15 gpm/ft^2 and 0.20 gpm/ft^2 respectively. The minimum design area shall be equal to the ceiling height times 100. The sprinkler system shall utilize listed quick response sprinklers with a K-factor of 11.2 or greater. The maximum sprinkler discharge pressure allowed is 30 psi.

11.3.6.2 Non-storage occupancies with ceiling heights over 50 feet. All structures, regardless of occupancy or hazard classification, with ceiling heights exceeding 50'-0", require a design analysis from a licensed Fire Protection Engineer. This analysis must be submitted to the Authority Having Jurisdiction for review and approval prior to the start of construction. Deluge systems shall be installed using sprinklers with a minimum k-factor of 11.2 with a maximum sprinkler discharge pressure of 30 psi.

11.3.6.3 Extra Hazard Occupancies with ceiling height over 25 feet. Extra Hazard occupancies with ceiling heights over 25 feet require a design analysis from a licensed Fire Protection Engineer. This analysis must be submitted to the Authority Having Jurisdiction for review and approval prior to the start of construction.

11.3.6.4 Exhibition Spaces and Stages with Fly Galleries. For design criteria for Exhibition Spaces and Stages with Fly Galleries, see Section 11.3.5.

11.3.7 SPRINKLER PROTECTION FOR EXHIBITION SPACES AND STAGES WITH FLY GALLERIES

11.3.7 SPRINKLER PROTECTION FOR EXHIBITION SPACES AND STAGES WITH FLY GALLERIES

11.3.7.1 Exhibition Spaces and Stages with Fly Galleries with ceiling heights up to 35 feet. Sprinkler systems protecting exhibition spaces and stages with fly galleries with ceiling heights up to 35 feet shall be designed to provide a minimum density of 0.30 gpm/ft^2. The minimum design area shall be 2,500 square feet. The sprinkler system shall utilize standard coverage quick response sprinklers with a k-factor of 8.0 or greater. The maximum sprinkler discharge pressure allowed is 30 psi. A hose stream demand of 500 gpm shall be provided.

11.3.7.2 Exhibition Spaces and Stages with Fly Galleries with ceiling heights between 35 and 60 feet. Sprinkler systems protecting exhibition spaces and stages with fly galleries with ceiling heights between 35 and 60 feet shall be designed to provide a minimum density of 0.45 gpm/ft^2. The minimum design area shall be 2,500 square feet.

The sprinkler system shall utilize standard coverage quick response sprinklers with a k-factor of 11.2 or greater. The maximum sprinkler discharge pressure allowed is 30 psi. A hose stream demand of 500 gpm shall be provided.

11.3.7.3 Exhibition Spaces and Stages with Fly Galleries ceiling heights over 60 feet. Exhibition spaces and stages with fly galleries with ceiling heights exceeding 60'-0", require a design analysis from a licensed Fire Protection Engineer. This analysis must be submitted to the Authority Having Jurisdiction for review and approval prior to the start of construction. Deluge systems shall be installed using standard coverage sprinklers with a minimum k-factor of 11.2 with a maximum sprinkler discharge pressure of 30 psi. A hose stream of 500 gpm shall be provided.

22.15.2.2.1.3.1 Chute Sprinkler Supply

22.15.2.2.1.3.1 Chute Sprinkler Supply. Sprinklers serving chutes shall be on separate dedicated supply risers.

22.38 Protection Matrix for IBC Group R Division 3 Occupancies and buildings built under the IRC

22.38 Protection Matrix for IBC Group R Division 3 Occupancies and buildings built under the IRC.

22.38.1 General. When a sprinkler system is being installed to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, for a IBC Group R Division 3 Occupancy and buildings built under the IRC, the design requirements in Table 22.38.1 shall be applied.

Table 22.38.1 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC[4]

Building Area Size Range [6]	PROTECTION RESIDENTIAL System Type[1,3]	Separate Sprinkler Lead-in Required [5]	Minimum Underground Pipe Size [5]	Minimum Water Meter Size[7]	Sprinklers Required In Areas Subject To Freezing.
<3,600 sq ft	Standard NFPA 13D [2]	See NFPA 13D for design requirements.			
>3,600 sq ft & <10,000 sq ft	Enhanced NFPA 13D [1,2]	See NFPA 13D for design requirements			
>10,000 sq ft & <15,000 sq ft	Enhanced NFPA 13R [1]	See NFPA 13R for design requirements			
> 15,000 sq ft	Modified NFPA 13 [1]	Yes	N/A	N/A	Yes

N/A = Not Applicable

1. This protection constitutes a building "protected with an approved fire sprinkler system" per the IFC.
2. Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
3. Free-standing detached buildings with one or more sleeping rooms shall be protected by a minimum Enhanced NFPA 13D system.
4. Excluding Group Care Homes.
5. U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
6. Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte cocheres.
7. Water meters used for residential sprinkler systems shall be residential fire service meters or other meters approved by the water purveyor.

22.38.2 Modified 13 Design Criteria. When Table 22.38.1 requires a Modified 13 Design, the sprinkler system shall be installed to meet the requirements of this code, with the exception of the following items, as required by the AHJ:

1. **Fire Department Connections (FDC):** A 2½-inch fire department connection is required. A single snoot connection will be accepted. The FDC shall be located on the garage wall facing the street except for special circumstances where the FDC may be freestanding and located adjacent to the street or private drive. A freestanding FDC in these circumstances may be designed into the mailbox column.
2. **Riser Room:** Risers shall be located in either the garage or within a dedicated room with an exterior door. Provided the garage/room is fully insulated the requirement for maintaining 40°F will not require a source of heat.
3. **Inspectors Test Connection:** The inspectors test location may be piped off the system riser.
4. **Piping in locations less than 40°F:** Dry pipe systems are not permitted for the protection of living spaces, anti-freeze systems shall be used. The protection of non-living spaces such as attics may be protected by dry-pipe systems.
5. **Anti-Freeze Loops:** The capacity shall not exceed 80 gallons.
6. **Separate Water Supply:** A separate water lead-in for the fire sprinkler system along with an approved (by the local water authority) back-flow prevention device is required. The back-flow prevention device shall be located at the street with in an approved insulated enclosure. The lead-in shall be sized using the minimum pipe size available that provides the calculated flow.
7. **Control Valves:** All valves used to control the sprinkler system are required to be indicating. A Post Indicator Valve (PIV) is not permitted.
8. **Electrical Supervision:** When required by the *fire code official*, the main control valves shall be electrically supervised. The back-flow valves are not required to be electrically supervised.
9. **Fire Pumps:** Electric fire pumps normally accepted in NFPA –13D systems for residential use (UL listed jockey pump) are acceptable.
10. **Notification Devices:** Interior – One (1) interior horn/strobe shall be installed in a location specified by the homeowner. Exterior – One (1) exterior horn/strobe shall be located above the FDC or other acceptable location. The sprinkler flow switch shall activate both of the required devices.
11. **Residential Sprinkler Heads:** Residential sprinkler heads shall be utilized and the design allowances specified in section 11.2.3.2.3.1 (reduction to design area) may be applied.
12. **Hangers and Earthquake Bracing:** The hanging of sprinkler pipe shall be in accordance Chapter 9. Earthquake bracing is not required.
13. **Garages:** Garages shall be protected as specified in NFPA 13R section 7.3 'Design Criteria – Garages'.
14. **Location of Sprinklers:** Sprinklers shall be installed in all areas except where omissions are permitted as follows:

    a. Inaccessible attic spaces.

    b. Exterior overhangs, porches, and carports.

    c. Rooms not provided with environmental control.

    d. Showers, saunas, steam rooms or other areas that would necessitate the installation of corrosion proof heads.

    e. Unconditioned spaces such as storage rooms or exterior accessible spaces that are subject to freezing.

22.38.3 Other Protection Designs: For the other protection designs listed in Table 22.38.1, see the respective revised codes for NFPA 13D and NFPA 13R design requirements.

23.4.1.7

23.4.1.7 The maximum velocity for use in hydraulic calculations shall be 32 ft/sec (9.8 m/sec).

23.4.1.8

23.4.1.8 Hydraulically calculated fire sprinkler systems shall be designed to ensure the required system pressure is a minimum of ten (10) psi below the available supply pressure.

25.5.1

25.5.1 The installing contractor shall identify a hydraulically designed sprinkler system with a machine-engraved weatherproof metal or rigid plastic sign with capitalized lettering a minimum 14 point (¼ inch high) in Arial or similar font secured to the riser it serves with corrosion-resistant wire, chain, or other means approved by the AHJ. Such signs shall be placed at the alarm valve, dry pipe valve, preaction valve, or deluge valve supplying the corresponding hydraulically designed area. Signs located at the system control riser shall be allowed to be combined with the General Information Sign described in 25.6.

25.6.1.1 & 25.6.1.2

25.6.1.1 Such general information shall be provided with a machine-engraved weatherproof metal or rigid plastic sign with capitalized lettering a minimum 14 point (¼ inch high) in Arial or similar font, secured with corrosion resistant wire, chain, or other acceptable means.

25.6.1.2 Such signs shall be placed at each system control riser, antifreeze loop, and auxiliary system control valve. Signs located at the system control riser shall be allowed to be combined with the Hydraulic Design Information Sign described in 25.5.

4.5 Working Plans. Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following list that pertain to the design of the system:

1. Name of owner.
2. Location, including street address.
3. Point of compass.
4. Full height cross section.
5. Ceiling/roof heights and slopes not shown in the full height cross section.
6. Location of partitions, lintels, and doorways. Lintel openings require a cross section view to indicate the area of the opening.
7. Name and label for each area or room.
8. For systems supplied by city mains, location and size of city main in street, and location, size, and type of domestic line, including length to city connection, and water meter location and size. Static and residual hydrants that were used in flow tests shall be shown. The location of the 5 gpm domestic demand shall be indicated.
9. Make, type, model, temperature rating, nominal K-factor, and number of each type of sprinkler, including sprinkler identification number.
10. Pipe type and schedule of wall thickness.
11. Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions). Where typical branch lines prevail, it shall be necessary to size only one typical line.
12. Location and size of riser nipples and drops.
13. Type of fittings and joints.
14. Type and locations of hangers, and methods of securing sprinklers when applicable.
15. Location and size of all valves and drain pipes.
16. Location and size of water gauges.
17. Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear.
18. A summary of the hydraulics, including the static pressure, residual pressure, and flow of the water supply, the pressure and flow demands at the point of connection to the water supply, and the pressure and flow demands at the bottom of the system riser.
19. Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets.
20. Relative elevations of sprinklers, junction points, and supply or reference points.
21. A graphic representation of the scale used on all plans.
22. Name, address, phone number, and contractor’s license number of contractor.
23. Nevada State Fire Marshal registration number.
24. Signature and NICET number, or engineer’s seal, of the designer.
25. Indicate by note the minimum rate of water application per sprinkler head, the maximum spacing for each head, and the domestic demand.

26. Information about antifreeze solution used. Indicate the type of antifreeze used, the amount of antifreeze in the system, and information about antifreeze compatibility with the pipe.
27. General notes as required by the AHJ.
28. Edition year of NFPA 13D to which the sprinkler system is designed.
29. Utility plans and/or plumbing plans necessary to show connection from water supply to fire sprinkler system.

6.2.3.1

6.2.3.1 The control valve shall be required to serve the domestic water supply.

6.3.1

6.3.1 A multipurpose piping system shall be installed in accordance with 6.3.2 through 6.6.8

6.5 Passive Purge Multipurpose Systems

6.5 Passive Purge Multipurpose Systems. Passive purge multipurpose systems shall supply a minimum of one toilet fixture. These systems may be used both with a single-outlet meter or a dual-outlet water meter, which may be required by the water purveyor. Such systems shall be considered acceptable by this standard where designed in accordance with 6.5.1 through 6.5.8.

6.5.1 An accessible check valve shall be installed on the fire sprinkler riser to maintain system pressure.

6.5.2 (*No Change*)

6.5.3 Where a single-outlet meter is provided, a common underground supply for both domestic and fire sprinkler needs is permitted. No separate control valve controlling only the fire sprinkler system shall be permitted. The domestic supply shall serve all domestic fixtures except for the toilet in the master bathroom.

6.5.4 Where a dual-outlet meter is provided, the fire sprinkler system shall be piped separately from the domestic system starting at the discharge side of the water meter. There shall be no separate control valve that controls only the fire sprinkler system (See UDACS for details). The domestic supply shall serve all hot water fixtures, and all cold water fixtures except for the toilet in the master bathroom.

6.5.5 The installation of a backflow preventer, water treatment and filtration device, or a pressure reducing valve between the water meter and the fire sprinkler system is prohibited.

6.5.6 The fire sprinkler system piping shall be designed as a looped system, with vertical and horizontal looping, in a manner that water circulates throughout the system. Dead-end supply lines off of the loop to individual sprinkler heads shall be permitted where each individual dead end does not exceed 50 feet in total length.

6.5.7 A supply line from the sprinkler system loop shall feed into the toilet in the master bathroom.

6.5.8 A pressure gauge shall be installed on the supply side of the check valve

6.6 Network Multipurpose Systems

6.6 Network Multipurpose Systems. Network multipurpose systems shall provide supply for all interior domestic fixtures and fire sprinkler needs. This design may be used with a single-outlet meter, but is prohibited from use with a dual-outlet meter, which may be required by the water purveyor. Such systems shall be considered acceptable by this standard where designed in accordance with 6.6.1 through 6.6.8.

6.6.1 In common water supply connections serving more than one dwelling unit, 5 gpm (19 L/min) shall be added to the sprinkler system demand to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

6.6.2 Where a single-outlet meter is provided, a common underground supply for both domestic and fire sprinkler needs is required. No separate control valve controlling only the fire sprinkler system shall be permitted. The network system shall serve all cold water domestic fixtures served by the water softener loop and all fire sprinklers.

6.6.3 Where a dual-outlet meter is provided, the use of a network system is prohibited. System design shall be in accordance with 6.5.

6.6.4 The fire sprinkler system piping shall be designed as a networked system, with interconnection of all domestic fixtures and fire sprinkler heads, in a manner that water circulates throughout the system when any domestic fixture is flowing. Dead-end supply lines shall only be permitted to supply domestic fixtures.

6.6.5 Where required by the *fire code official*, networked systems shall be performance tested to prove one-head and two-head flow scenarios, in addition to other inspections and approvals required by this code. Testing shall replicate the effect of devices that restrict flow and pressure, such as water filtration systems, water softeners and pressure reducing valves.

6.6.6 A warning sign, with minimum ¼ in. (6.4 mm) letters, shall be affixed adjacent to the main shutoff valve and state the following:

> **Warning:** The water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign.

6.6.7 Where water treatment and filtration loops are installed, the network sprinkler design shall incorporate one of the following conditions:

1. The flow restriction and pressure loss through the water treatment equipment shall be taken into account in the hydraulic calculations.
2. An automatic bypass shall be installed around the water treatment equipment that directs all water directly to the system.

6.6.8 A pressure gauge shall be installed on the supply side of the dwelling unit control valve in the garage or other accessible location. Where a pressure reducing valve is installed after the control valve, the pressure gauge shall be installed on the outlet side of the pressure reducing valve.

7.1.1

7.1.1 A single control valve arranged to shut off both the domestic system and the sprinkler system shall be installed.

7.1.2

7.1.2 The sprinkler system piping shall not have a separate control valve installed.

7.5.6.1.1

7.5.6.1.1 Temperature ratings for sprinklers stored or installed in unconditioned environments where the maximum ambient temperature exceeds 100^0 F (38^0 C) shall comply with 7.5.6.2.

7.7 Unconditioned Spaces

7.7 Unconditioned Spaces

When nonmetallic piping is installed in unconditioned spaces, the piping shall be insulated or covered with insulation to a minimum of R-2 level insulation shall be provided on the unconditioned space side of the piping to avoid exposure of the piping to temperatures in excess of the pipe's rated temperature.

8.1.3.1.2

8.1.3.1.2 Where construction features or other special conditions exist that are outside the scope of sprinkler listings, listed sprinklers shall be permitted to be installed beyond their listing limitations, provided the installation conforms to a modification or alternative materials and methods report that has been approved by the authority having jurisdiction.

8.3.4.1

8.3.4.1 Attached garages with any habitable rooms above shall be required to be protected with fire sprinklers.

8.4 **Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC**

8.4 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC

8.4.1 General. When a sprinkler system is being installed to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the design requirements in Table 8.4 shall be applied.

Table 8.4 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC[4]

Building Area SIZE RANGE [6]	Mitigation Residential SYSTEM TYPE[1,3]	SEPARATE SPRINKLER LEAD-IN REQUIRED [5]	MINIMUM UNDERGROUND PIPE SIZE [5]	MINIMUM WATER METER SIZE[7]	SPRINKLERS REQUIRED IN AREAS SUBJECT TO FREEZING.
< 3,600 sq.ft.	Standard NFPA 13D [2]	No	1"	¾"	No
> 3,600 sq.ft. and < 10,000 sq.ft.	Enhanced NFPA 13D [1,2]	No	1"	¾"	No
> 10,000 sq.ft. and < 15,000 sq.ft.	Enhanced NFPA 13R [1]	See NFPA 13R for design requirements			
>15,000 sq.ft.	Modified NFPA 13 [1]	See NFPA 13 for design requirements			

N/A = Not Applicable

1. This mitigation constitutes a building "protected with an approved fire sprinkler system" per the IFC.
2. Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
3. Free-standing detached buildings with one or more sleeping rooms shall be protected by a minimum Enhanced NFPA 13D system.
4. Excluding Group Care Homes.
5. U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
6. Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte cocheres.
7. Water meters used for residential sprinkler systems shall be residential fire service meters or other meters approved by the water purveyor.

8.4.2.1 Where required. When Table 8.4 requires an Enhanced 13D design, sprinklers shall be installed throughout the structure except where omissions are permitted by the following:

1. Unheated attic spaces.
2. Floor/ceiling spaces.
3. Concealed combustible spaces with no access for storage or living purposes.
4. Exterior overhangs, porches, and carports

5. Showers, saunas, steam rooms or other areas that would necessitate the installation of corrosion proof heads.
6. Unconditioned spaces such as storage rooms or exterior accessible spaces that are subject to freezing.

8.4.3 Other Protection Designs. For other protection designs listed in Table 8.4, see the respective revised codes for NFPA 13 and NFPA 13R minimum design requirements.

12.1 General

12.1 General. The installer shall provide to the owner/occupant instructions on inspecting, testing, and maintaining the system. This shall include a copy of the approved fire sprinkler shop drawings.

NFPA 13R

1.1 **Scope**

1.1 Scope. This standard shall cover the design and installation of automatic sprinkler systems for protection against fire hazards in residential occupancies up to and including two stories in height in buildings not exceeding 60 ft (18 m) in height above grade plane. Residential occupancies three or more stories in height shall be protected throughout in accordance with NFPA 13.

5.1.3 Rated Pressure

5.1.3 Rated Pressure. System components shall be rated for the maximum system working pressure to which they are exposed but shall not be rated at less than 175 psi (12.1 bar) for components installed aboveground and 150 psi (10.4 bar) for components installed underground between the water supply and the system riser. When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 305), or 50 psi greater than the system design pressure, whichever is greater.

6.4.4

6.4.4 Where construction features or other special conditions exist that are outside the scope of sprinkler listings, listed sprinklers shall be permitted to be installed beyond their listing limitations, provided the installation conforms to a modification or alternative materials and methods report that has been approved by the authority having jurisdiction.

6.6.4

6.6.4 Sprinklers shall be installed in any closet used for heating and air-conditioning equipment, washers, dryers, water heaters or containing fuel-fired equipment.

6.6.7

6.6.7 Sprinklers shall not be required in closets (regardless of size) on exterior balconies and exterior breezeways/corridors, regardless of size, as long as the closet does not have doors or unprotected penetrations directly into the dwelling unit, and as long as the closet does not contain fuel-fired equipment.

6.7.2.2.1

6.7.2.2. Intentionally deleted.

6.7.2.2.1.1

6.7.2.2.1.1-Intentionally deleted.

6.7.2.2.2

6.7.2.2.2-Intentionally deleted.

6.7.2.2.3

6.7.2.2.3-Intentionally deleted.

6.7.2.3.2

6.7.2.3.2 Where water supplies are known to have unusual corrosive properties and threaded or cut-groove steel pipe is to be used, wall thickness shall be in accordance with Schedule 30 [in sizes 8 in. (200 mm) or larger] or Schedules 40 [in sizes less than 8 in. (200 mm)]. Piping shall have corrosion resistance ratio (CRR) of 1 or more.

6.8.2

6.8.2 The sprinkler system piping shall not have a separate control valve installed unless supervised by a:

(1) Central station, proprietary, or remote station alarm service.

(2) Intentionally deleted.

(3) Intentionally deleted.

6.15 Drop-Out Ceilings

6.15 Drop-Out Ceilings.-Intentionally deleted.

7.5 Protection Matrix for Group R Division 3 Occupancies

7.5 Protection Matrix for Group R Division 3 Occupancies. When a sprinkler system is being installed to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the design requirements in Table 7.5 shall be applied.

Table 7.5 Protection Matrix for Group R Division 3 Occupancies and Building Built Under the IRC[4]

Building Area SIZE RANGE [6]	Mitigation Residential SYSTEM TYPE[1,3]	SEPARATE SPRINKLER LEAD-IN REQUIRED [5]	MINIMUM UNDERGROUND PIPE SIZE [5]	MINIMUM WATER METER SIZE[5]	SPRINKLERS REQUIRED IN AREAS SUBJECT TO FREEZING.
< 3,600 sq.ft.	Standard NFPA 13D [2]	See NFPA 13D for design requirements			
> 3,600 sq.ft. and < 10,000 sq.ft.	Enhanced NFPA 13D [1,2]	See NFPA 13D for design requirements			
> 10,000 sq.ft. and < 15,000 sq.ft.	Enhanced NFPA 13R [1]	Yes	N/A	N/A	Yes
> 15,000 sq.ft.	Modified NFPA 13 [1]	See NFPA 13 for design requirements			

N/A = Not Applicable

1. This mitigation constitutes a building "protected with an approved fire sprinkler system" per the IFC.
2. Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
3. Free-standing detached buildings with one or more sleeping rooms shall be protected by an Enhanced NFPA 13D system.
4. Excluding Group Care Homes.
5. U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
6. Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte cocheres.

7.5.1 Enhanced 13R Design. When Table 7.5 requires an Enhanced 13R design, the sprinkler system shall be designed and installed in accordance with NFPA 13R, except that sprinklers shall be installed throughout the structure except where omissions are permitted by the following:

1. Unheated attic spaces that do not contain fuel fired equipment.

2. Floor/ceiling spaces.
3. Concealed combustible spaces with no access for storage or living purposes.
4. Showers, saunas, steam rooms or other areas that would necessitate the installation of corrosion proof heads.
5. Unconditioned spaces such as storage rooms or exterior accessible spaces that are subject to freezing.

7.5.2 Other Protection Designs. For other protection designs listed in Table 7.5, see the respective revised codes for NFPA 13 and NFPA 13D minimum design requirements.

8.1.7

8.1.7 Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following list that pertain to the design of the system:

(1) Project name/name of owner and occupant

(2) Location, including street address

(3) Point of compass

(4) Ceiling construction

(5) Full height cross-section or schematic diagram, including structural member information if required for clarity and including ceiling construction and method of protection for nonmetallic piping

(6) Ceiling/roof heights and slopes not shown in the full height cross section

(7) Location of partitions and fire walls, including lintels and doorways. Lintel openings require a cross section view to indicate the area of the opening

(8) Location and size of concealed spaces, attics, closets, and bathrooms

(9) Any small enclosures in which no sprinklers are to be installed

(10) Size of city main in street and the city main test results including elevation of the test hydrant. Indicate whether dead end or circulating, and, if dead end, the direction and distance to nearest circulating main

(11) Make, manufacturer, model, type, temperature rating, sprinkler identification number, nominal K-factor and orifice size of the sprinkler, and the quantity of each sprinkler installed

(12) Type and location of high-temperature sprinklers

(13) Number of sprinkler on each riser, per floor

(14) Type and location of horn/strobes

(15) Type of pipe and fittings

(16) Pipe type and schedule of wall thickness

(17) Type of protection for nonmetallic pipe

(18) Location and size of riser nipples

(19) Type of fittings and joints and the location of all welds and bends

(20) Type and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable

(21) All control valves, check valves, drain pipes, and test connections

(22) Underground pipe size, length, location, weight, material, and point of connection to city main; type of valves, meters, and valve pits; and depth at which the top of the pipe is laid below grade.

(23) Name, ~~and~~ address, phone number, and contractor's license number of sprinkler contractor

(24) Nominal pipe size with lengths shown to scale

(25) Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear

(26) A graphic representation of the scale used on all plans

(27) Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets

(28) The minimum rate of water application and the design area of water application

(29) The total quantity of water and the pressure required noted at a common reference point for each system. For hydraulically designed systems, the information on the hydraulic data nameplate

(30) Relative elevations of sprinklers, junction points, and supply or reference points

(31) Information about backflow preventers (manufacturer, size, type)

(32) Information about antifreeze solution used (type and amount)

(33) Size and location of hydrants, showing size and number of outlets; static and residual hydrants that were used in flow tests or models shall be shown

(34) Size, location, and piping arrangement of fire department connections

(35) Location of fuel-fired equipment and heating and air-conditioning equipment

(36) Locations of closets on exterior balconies, and any doors or penetration between the closet and the dwelling unit

(37) Edition year of NFPA 13R to which the sprinkler system is designed

(38) Occupancy, label, and name for each area or room

(39) Make, type, model, and size of alarm or dry pipe valve

(40) Approximate capacity in gallons of each dry pipe system

(41) Nevada State Fire Marshal registration number

(42) Signature and NICET number, or engineer's seal, of the designer

(43) General notes as required by the AHJ

NFPA 14

4.2.3.2

4.2.3.2 Where system pressures exceed 300 psi, piping expected to experience greater than 300 psi at zero flow shall be rated for the pressures expected, and have minimum nominal pipe wall thickness in accordance with Schedule 40.

4.6.1.1.1

4.6.1.1.1 Within the cabinet, the hose connections shall be located so that there is at least 2 in. (50 mm) between any part of the cabinet, other than the door and the handle of the valve when the valve is in any position ranging from fully open to fully closed, and 6 in (150 mm) clearance around the circumference of outlet/cap to any part of the cabinet.

4.8.2

4.8.2 Unless the requirements of 4.8.2.1 or 4.8.2.2 are met, the fire department connection shall have at least two 2 ½ inch (65 mm) internal threaded fittings having NHS threads, as specified in NFPA 1963. Fire Department Connections shall be provided with internal check valve(s) such that water being supplied into any inlet will not flow back out of any other inlet. For the purposes of this section, internal clapper valve devices provided by the manufacturer in listed Fire Department Connections shall be considered internal check valves. *(See Section 7.7 and 7.12 for design requirements)*.

6.3.2.1

6.3.2.1 Individual hose valves fed from the feed main shall each be provided with an isolation valve, such that maintenance of the individual hose valve can be accomplished without interrupting the supply to standpipes fed from the feed main.

6.3.7.1

6.3.7.1 System water supply valves, isolation control valves, and other valves in feed mains shall be electrically supervised in an approved manner in the open position by:

(1) A central station, proprietary, or remote station signaling service

(2) Intentionally deleted.

(3) Intentionally deleted.

(4) Intentionally deleted.

6.4.5.3.1

6.4.5.3.1 Signs shall have a red background and be professionally engraved with white lettering a minimum of 1 in. (25.4 mm) in height, with a minimum stroke of ¼ in. Signs shall consist of durable, weatherproof materials, subject to approval by the authority having jurisdiction.

7.2.3.2

7.2.3.2 Where the static pressure at a 2½ in. (65mm) hose connection exceeds 200 psi (13.9 bar), a listed pressure regulating device shall be provided to limit static and residual pressures at the outlet of the hose connection to no more than 200 psi (13.9 bar).

7.2.3.4

7.2.3.4 Where hose valve pressure regulating devices are installed on 2 ½ in. (65 mm) outlets, they shall be field adjustable, capable of being adjusted through the full adjustment range by a 3/8 in. (12 mm) rod with a maximum required torque of 30 foot-pounds (41 nm) while flowing water. Field adjustment shall not require any hose valve disassembly.

7.2.4

7.2.4 Where more than two hose connections are used downstream of a pressure-regulating device, the following conditions shall apply:

(1) In systems with multiple zones, pressure-regulating device(s) shall be permitted to be used in lieu of providing separate pumps to control pressure in the lower zone(s) as long as the devices comply with all requirements in 7.2.4. For each pressure-regulating device provided, a secondary pressure-regulating device matching the primary device shall be provided in parallel configuration.

(2) A method to isolate each of the pressure-regulating device(s) shall be provided for maintenance and repair by providing control valves on the supply and discharge side of each pressure-regulating device, in a manner where only the device being maintained and repaired is out of service.

(3) Regulating devices shall be arranged so that the failure of any single device does not allow pressure in excess of 200 (13.9 bar) to any of the multiple hose connections downstream.

(4) An equally sized bypass around the pressure regulating device(s), with a normally closed valve, shall be installed.

(5) Pressure-regulating device(s) and the bypass valve shall be installed not more than 7ft 6in (2.31 m) above the floor.

(6) The pressure-regulating device shall be provided with inlet and outlet pressure gauges.

(7) The fire department connection(s) shall be connected between the system fire pump(s) and the pressure-regulating device(s) and shall be sized and designed to allow the fire department connection to match the pressure and flow from the fire pump.

(8) The pressure-regulating device shall be provided with a pressure relief valve sized for the full anticipated system flow and capable of maintaining downstream system pressures below the maximum pressure ratings for all system components.

(9) Remote monitoring and supervision for detecting high pressure failure of the pressure-regulating device shall be provided in accordance with *NFPA 72*.

(10) A drain sufficient to allow flow of the full anticipated system flow shall be provided adjacent to the pressure-regulating devices. Use of this drain line for discharge from the pressure relief valve shall be permitted.

7.3.2.10

7.3.2.10 Additional hose connections shall be provided in unsprinklered buildings so that all floor areas of the floor or story are protected by hose valve coverage, with travel distance limited to 100 feet of hose and 30 feet of stream from each hose valve connection.

7.3.2.11

7.3.2.11 Additional hose connections shall be provided in buildings sprinklered in accordance with NFPA 13 or NFPA 13R so that all floor areas of the floor or story are protected by hose valve coverage, with travel distance limited to 100 feet of hose and 30 feet of stream from each hose valve connection.

7.3.3.1

7.3.3.1 Class II systems shall be provided with 1½ in. (40 mm) hose stations so that all portions of each floor level of the building or area thereof required to be protected are within 130 ft (39.7 m) of a hose connection provided with 1½ in. (40 mm) hose.

7.4 Number of Standpipes

7.4 Number of Standpipes. Separate standpipes shall be provided in each required exit stairway. Scissor stairs having two separate landings on each level shall be provided with a separate hose connection on each stair landing.

7.8.1 Minimum Design Pressure for Hydraulically Designed Systems

7.8.1 Minimum Design Pressure for Hydraulically Designed Systems. Hydraulically designed standpipe systems shall be designed to provide the waterflow rate required by Section 7.10 at a minimum residual pressure of 125 psi (8.6 bar) at the outlet of the hydraulically most remote 2 ½ in. (65 mm) hose connection and 65 psi (4.5 bar) at the outlet of the hydraulically most remote 1 ½ in. (40 mm) hose station.

7.8.1.2

7.8.1.2 Manual standpipe systems shall be designed to provide 125 psi (8.6 bar) at the topmost outlet with the calculations terminating at the fire department connection.

7.11.1.1.1

7.11.1.1.1 The drain riser connections shall be located on every floor with a hose valve pressure-regulating device. A drain connection shall be provided adjacent to every hose valve pressure-regulating device, even if the pressure-regulating device is not on a vertical standpipe riser.

8.1.2

8.1.2 Working plans shall be drawn to an indicated scale, on sheets of uniform size, and shall show those items from the following list that pertain to the design of the system:

(1) Name of owner(s) and occupant(s)

(2) Location, including street address

(3) Point of Compass

(4) Name, address, phone number, and contractor's license number of installing contractor

(5) For automatic and semiautomatic standpipe systems, the following:

  (a) Size of city main in street and whether dead end or circulating; if dead end, direction and distance to nearest circulating main

  (b) City main test results and system elevation relative to test hydrant

(6) For automatic and semiautomatic standpipe systems, other sources of water supply, with pressure and elevation including water storage tanks and fire department connections

(7) Approximate capacity of each dry system

(8) For automatic and semiautomatic standpipe systems, water supply capacity information, including the following:

  (a) Location and elevation of static and residual test gauge with relation to the riser reference point

(b) Flow location

(c) Static pressure [psi (bar)]

(d) Residual pressure [psi (bar)]

(e) Flow [gpm (L/min)]

(f) Date

(g) Time

(h) Name of person who conducted the test or supplied the information

(i) Other sources of water supply, with pressure or elevation

(9) Pipe type and schedule of wall thickness

(10) Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions)

(11) Manufacturer and type of fittings and joints and location of all welds and bends

(12) Type and location of hangers, sleeves, braces, methods of securing pipe, and seismic calculations

(13) All control valves, check valves, drain pipes, and test connections

(14) Make, type, model and size of alarm, dry pipe, or deluge valve

(15) Type and location of alarms

(16) Size and location of standpipes, hose outlets, hand hose, nozzles, cabinets, and related equipment with details from the manufacturer including model numbers and sizes

(17) Information on the hydraulic data plate

(18) Hydraulic reference points shown on plan including the top view, section view, and isometric view, that correspond with comparable reference points on the hydraulic calculation sheets

(19) The setting for pressure-reducing and pressure-restricting valves including direct-acting and pilot-operated valves, and provide a detail for each unique installation configuration

(20) For automatic and semiautomatic standpipe systems, size and location of hydrants, including static and residual hydrants used in flow test

(21) Size, location, and piping arrangement of fire department connections with details of the connection

(22) Scale and graphical representation of the scale

(23) Hose valve manufacturer and model

(24) Pressure-reducing valve(s) manufacturer and model

(25) Required pressure at hose outlet

(26) Location of hose valves used in hydraulic calculations

(27) Standpipe system demand (flow and pressure) at the following locations:

(a) Fire department connection (FDC) inlet

(b) Fire pump discharge flange

(c) Water supply truck discharge

(d) Water supply source if different from (a) through (c)

(28) Provide a detailed narrative describing the scope of work to be conducted including the system type and class, minimum and maximum pressure requirements, the type of freeze protection if applicable, the total

quantity of hose valves being installed, and the pressure required for the hydrostatic test, being 200 psi or 50 psi above pump churn pressure, whichever is higher

(29) Nevada State Fire Marshal registration number

(30) Signature and NICET number, or engineer's seal, of the designer

(31) General notes as required by the AHJ

(32) Provide an isometric view showing the entire system in one view including hydraulic reference points

(33) Full height cross section with ceiling construction

(34) Location of fire walls, partitions, and horizontal exits

(35) Label and name of each area or room

(36) Underground pipe size, length, location with respect to the building, weight, material, and point of connection to city main; type of valves, meters, and valve pits; and depth at which the top of the pipe is laid below grade

(37) Provide information regarding the fire pump, as applicable

(38) Provide a detail of each required sign

(39) Plan view shall show supply and drain pipe layout, pipe dimensions, attachments, braces, hangers, standpipe hose outlets, hydraulic nodes, and the coverage area from each hose valve to the remote areas of the floor plan. The coverage area shall be shown on plans and be measured along the path of travel from hose valves, around walls and through doors, to the most remote areas of the floor. The 30 feet distance assigned to the hose stream shall not be allowed to bend or turn

(40) Provide a detail of Class I, Class II, or Class III hose valves located in cabinets. The cabinet size and the placement of items within the cabinet shall be such to provide minimum clearances of 6 inches perpendicularly from the face of the valve, 1 inch around the circumference of the valve, and 6 inches around the circumference of the hose outlet cap.

(41) Where the equipment is to be installed is an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear

(42) Provide details for penetrations of standpipe piping through walls, floors, and other structural members. Show detail to note clearances around the piping and/or locations of flexible connections

(43) Provide details for all penetrations in rated walls and floors, providing information regarding the method of maintaining fire rating of the wall or floor

(44) Where direct-acting pressure regulating hose valves are provided anywhere in the building, provide a chart on the plans. The chart shall have eight columns, as follows:

a. Floor Level – Provide numerical designation for all floor levels in the building

b. Static Pressure, Inlet – Indicate the static pressure at the inlet of the hose valve on all floor levels. Provide a supporting hydraulic calculation at zero flow with churn pressure, providing a node at the hose valve on each floor level to indicate the static pressure at each hose valve.

c. Residual Pressure, Full Flow, Inlet – Indicate the residual pressure at the inlet of hose valves on each floor. Provide a supporting hydraulic calculation at full standpipe design flow per NFPA 14 (750 or 1,000 gpm), providing a node on each floor level to indicate the residual pressure at each hose valve.

d. Residual Pressure, 250-gpm flow, inlet - Indicate the residual pressure at the inlet of hose valves on each floor while flowing 250 gpm. Provide a supporting hydraulic calculation at 250 gpm flow at the most remote standpipe outlet, providing a node on each floor level of the most remote standpipe to indicate the residual pressure at each hose valve.

e. Valve Make and Model – Indicate the manufacturer of the valve on all floors, and the model number for the specific valve. Provide supporting manufacturer specifications.

f. Valve Setting – Indicate the hose valve setting or bonnet number proposed for each valve. The setting or bonnet number must be associated with the manufacturer specifications for the valve.

g. Residual Pressure, Full Flow, Outlet – Indicate the residual outlet pressure at the outlet of the hose valve under the full-flow condition. For PRV installations, the residual pressure is taken from pressure relation charts provided by the manufacturer. For non-PRV installation, the residual pressure is taken by analysis of the equivalent lengths of the fittings and the hose valve.

h. Residual Pressure, 250-gpm flow, Outlet - Indicate the residual outlet pressure at the outlet of the hose valve when flowing 250 gpm. This is necessary to establish the residual pressure expected during field inspection. For PRV installations, the residual pressure is taken from pressure relation charts provided by the manufacturer.

(45) Edition year of NFPA 14 to which the standpipe system is designed

11.5.5.1.2

11.5.5.1.2 A permanent sign, engraved on metal, shall be posted on the Pressure Reducing Station showing the system set inlet and outlet pressures and flow of the device.

12.7.2

12.7.2 Where temporary standpipes normally contain water, the piping shall be protected against freezing, unless otherwise approved by the authority having jurisdiction.

NFPA 20

4.11.1.1

4.11.1.1 A liquid-filled pressure gauge having a dial not less than 3.5 in. (89 mm) in diameter shall be connected near the discharge casting with a 0.25 in. (6 mm) gauge valve.

4.11.2.1

4.11.2.1 Unless the requirements of 4.11.2.4 are met, a liquid-filled gauge having a dial not less than 3.5 in. (89 mm) in diameter shall be connected to the suction pipe near the pump with a 0.25 in. (6 mm) gauge valve.

4.15.4.1

4.15.4.1 All pumps supplied by municipal water supply shall be installed with a bypass. *(See Figure A.4.15.4.)*.

9.3.4

9.3.4 When provided, the alternate source of power shall be supplied from one of the following sources:

(1) A generator installed in accordance with Section 9.6.

(2) One of the sources identified in 9.2.2(1), 9.2.2(2), 9.2.2(3), or 9.2.2(5) where the power is provided distinctly independent of the normal source of power. Any connections to the public utility shall be considered a single source of power and subsequently cannot be utilized as both normal power and the alternate (backup) power.

10.2.1

10.2.1 Controllers shall be located as close as is practical to the motors they control and shall be within sight of the motors. Controllers shall be readily accessible and have clear access to the entrance to the room.

10.4.7.1.1

10.4.7.1.1 Where the fire pump serves a building equipped with a Fire Command Center, the signal(s) required remote from the controller shall be indicated both on a dedicated panel provided by the fire pump manufacturer and on the fire alarm control panel.

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12.2.1 Controllers shall be located as close as is practical to the motors they control and shall be within sight of the motors. Controllers shall be readily accessible and have clear access to the entrance to the room.

12.4.2.1.1

12.4.2.1.1 Where the fire pump serves a building equipped with a Fire Command Center, the signal(s) required remote from the controller shall be indicated both on a dedicated panel provided by the fire pump manufacturer and on the fire alarm control panel.

NFPA 22

5.1.1.1

5.1.1.1 Steel tanks shall be designed in accordance with AWWA D100, *Welded Steel Tank for Water Storage,* 2011, or AWWA D103, *Factory-Coated Bolted Steel Tanks for Water Storage*, 2014.

14.4.1

14.4.1 A permanent pipe connected to a water supply shall be provided to fill the tank, except as provided in 14.4.1.1. Where the tank serves as a break tank between the city supply and fire pump(s), the fill shall be through automatic fill valves that are tied to water level sensors, and a bypass line of equal size with a normally closed control valve shall be provided.

14.4.2

14.4.2 The means to fill the tank shall be sized in accordance with 4.2.1.4. Where the tank serves as a break tank between the city supply and building fire pump(s), the means to fill the tank shall be automatic and shall provide supply flow equal to 150% of the fire pump rated flow.

14.6.1.1

14.6.1.1 Discharge. The overflow pipe shall discharge water to a drain with flow capacity equal to or greater than the fill line supply flow, or to an approved exterior location subject to approval by the authority having jurisdiction.

14.9.1

14.9.1 Provisions shall be made for the installation of sensors in accordance with *NFPA 72* for two critical water temperatures and two critical water levels and two critical pressure readings (for pressure tanks only).

14.9.1.1 Where the water storage tank acts as a break tank between the city supply and fire pump(s), water level sensors shall be provided. A minimum of three sensor levels shall be provided. Two sensor levels shall activate the turn-on/turn-off of the fill valve. The third sensor level shall indicate a low level alarm. The sensor that opens the fill control valve shall be set 5 inches (127 mm) below normal (full) level, or at 90% of the normal (full) volume, whichever leaves the greater volume in the tank. The sensor that closes the fill control valve shall be set at normal (full) level. The sensor that signals a low alarm shall be set 12 inches (300 mm) below normal (full) level, or at 70% of the normal (full) volume, whichever leaves the greater volume in the tank. The low level alarm shall be transmitted to a constantly attended location to initiate response to the fill control bypass valve.

NFPA 24

6.6.2

6.6.2 A sectional valve shall be provided at the following locations:

(1) On each bank on a river, pond, or lake where a main crosses water.

(2) Outside the building foundation(s) where a main or a section of a main is installed under a building.

(3) On the underground line where there are two sources of water, after every 2 fire hydrants or building fire sprinkler connections.

NFPA 72

10.4.4

10.4.4* In areas that are not continuously occupied, automatic smoke detection shall be provided at the location of each fire alarm control unit(s), notification appliance circuit power extenders, and supervising station transmitting equipment to provide notification of fire at that location.

Exception No. 1: *Where ambient conditions prohibit installation of automatic smoke detection, automatic heat detection shall be permitted.*

Exception No. 2: *Dedicated function sprinkler monitoring systems shall not be required to have smoke detectors installed above the dedicated function control unit.*

12.2.4

12.2.3* The installation of all pathway wiring, cable and equipment shall be in accordance with *NFPA 70, National Electric Code* and the applicable requirements of 12.2.3.1 through 12.2.3.3. In all occupancies, other than residential two stories or less, all wiring, including optical fiber cables, shall be in enclosed metallic conduit or shall be MI, MC, or AC cable. (SIG-FUN)

18.3.2.4

18.3.2.4 Voltage drop calculations shall be performed using one of the following methods:

(1) The lump sum calculation method, which shall be calculated as follows:

(a) Calculate the voltage drop using one of these formulas:

i. $V_D = I * ((R * 2 * L)/1{,}000)$ **OR**

ii. $V_D = (2 * K * I * L)/CM$.

(b) Subtract this calculated voltage drop from 20.4 volts (V_S) in order to get the voltage value at the end of the circuit ($V_S - V_D = V_{EOL}$). The value for V_{EOL} shall be a minimum of 16 volts (the minimum operating voltage required for a listed 24 vdc notification device).

(2) The point-to point method, which requires a math-intensive approach where the voltage drop between each notification appliance is reiterated. This method is best done by utilizing a spreadsheet program. The calculated voltage at the last device on the circuit shall be a minimum of 16 volts (the minimum operating voltage required for a listed 24 vdc notification device).

Where:

V_D = Voltage Drop

V_S = Starting voltage (20.4vdc, or the end of useful battery life)

V_{EOL} = Voltage at the end-of-line resistor

I =Total load of the circuit in amperes utilizing current draws for each notification appliance @ 16vdc (the UL maximum draws at the minimum listed voltage).

R = Resistance in ohms per 1,000 feet, with respect to conductor

K = 10.64 ohms (the constant representing the mil-foot resistance of copper wire)

L = length of circuit in feet (distance from panel to end-of-line resistor for class B circuits)

CM = circular mill of wire, with respect to conductor

V_{SOURCE} = voltage calculated at the previous device

Conductor Properties NEC Chapter 9 Table 8 (Uncoated Copper), see AHJ for other values

Wire	R (1-Strand / 7 Strand)	CM
No 18	7.77 / 7.95	1,620
No 16	4.89 / 4.99	2,580
No 14	3.07 / 3.14	4,110
No 12	1.93 / 1.98	6,530

18.4.1.4

18.4.1.4 Audible notification appliances for alert and evacuation signal tones shall meet the requirements of 18.4.1.5.

18.4.1.5

18.4.1.5 The tone portion of voice messages shall be required to meet the audibility requirements of IFC 907.5.2.1.1. 18.4.3 (Public Mode Audible Requirements), 18.4.4 (Private Mode Audible Requirements), 18.4.5 (Sleeping Area Requirements), or 18.4.6 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), but The voice portion of voice messages shall meet the intelligibility requirements of 18.4.10 where voice intelligibility is required.

18.4.2.4

18.4.2.4 The standard evacuation signal shall be synchronized within a notification zone.

> ***Exception:*** *Where a portion of a room or space is remodeled and new or existing audible devices are within the area of the remodel, such audible devices are required to synchronize with each other, but are not required to synchronize with existing audible devices within the notification zone if the existing audible devices are outside of the remodel area.*

18.5.5.4.2

18.5.5.4.2 Visible notification appliances shall be installed in accordance with Table 18.5.5.4.1(a) or Table 18.5.5.4.1(b) using one of the following:

(1) A single visible notification appliance

(2)*Two groups of visible notification appliances, where visual appliances of each group are synchronized, in the same room or adjacent space within the field of view. This shall include synchronization of strobes operated by separate systems

(3) More than two visible notification appliances or groups of synchronized appliances in the same room or adjacent space within the field of view that flash in synchronization

> ***Exception:*** *Where a portion of a room or space is remodeled and new or existing strobes are within the area of the remodel, such strobes are required to synchronize with each other, but are not required to synchronize with existing strobes in the field of view if the existing strobes are outside of the remodel area and were installed prior to the adoption of the 1996, or later, edition of NFPA 72.*

18.5.5.6.2

18.5.5.6.2 Documentation provided to the authority having jurisdiction shall be stamped by a licensed engineer or prepared by a NICET Level IV fire alarm designer and shall include the following:

(1) Inverse Square Law calculations using each of the vertical and horizontal polar distribution angles in ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired,* or equivalent.

(2) The calculations shall account for the effects of polar distribution using one of the following:

a. The percentages from the applicable table(s) in ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired,* or equivalent.

b. The actual results of laboratory tests of the specific appliance to be used as recorded by the listing organization.

18.5.5.8

18.5.5.8 Ceiling-mounted visual appliances shall be provided in rooms and areas used for exhibition purposes, or in rooms and areas where racks or shelving that exceed 5 feet in height are expected to be installed, or in rooms and areas where wall-mounted devices may become obstructed.

21.7.2

21.7.2* If connected to the fire alarm system serving the protected premises, all detection devices used to cause the operation of HVAC systems smoke dampers, fire dampers, fan control, smoke doors, or fire doors shall be monitored for integrity in accordance with Sections 12.6 and 23.8.5.4.6.

21.7.9

21.7.9 Where duct detectors are installed in accordance with the UMC Section 608.1, automatic shut-off shall be accomplished by interrupting the power source or utilizing the stop input, if provided on the air moving equipment.

23.2.2.4

23.2.2.4 A permit is required prior to making any changes, except for room label changes.

23.8.5.1.2

23.8.5.1.2* Where connected to a supervising station, fire alarm systems employing automatic fire detectors or waterflow detection devices shall include a manual fire alarm box to initiate a signal to the supervising station. The fire alarm box shall be located adjacent to the fire alarm control unit.

Exception: Fire alarm systems dedicated to elevator recall control and supervisory service as permitted in Section 21.3 or fire sprinkler monitoring systems.

23.8.5.9.1

23.8.5.9.1 Where fire pumps are required to be monitored and a building fire alarm system is installed, a pump running signal shall be a supervisory signal.

23.8.5.9.3

23.8.5.9.3 Where fire pumps are required to be monitored and a building fire alarm system is installed, the fire alarm system shall monitor all fire pump signals required at a constantly attended location in accordance with NFPA 20.

23.8.5.9.4

23.8.5.9.4 Where fire pumps are required to be monitored and a sprinkler monitoring system is installed, then the sprinkler monitoring system shall monitor all fire pump signals required at a constantly attended location in accordance with NFPA 20.

23.8.6.3.2

23.8.6.3.2 The boundaries of notification zones shall be coincident with building outer walls, fire walls, fire barriers, or fire-resistance rated horizontal assemblies. Sprinkler systems serving a notification zone shall not cross over into another notification zone. For high-rise buildings, alarms shall activate on the floor of, floor below, and floor above the floor of incidence. For all other buildings, alarms shall activate throughout the notification zone of incidence.

23.8.6.5 Emergency Voice/Alarm Communication Notification Appliance Circuits

23.8.6.5 Emergency Voice/Alarm Communication Notification Appliance Circuits. Emergency voice/alarm communication notification appliance circuits shall be capable of full-load operation with a wiring power loss not to exceed 12.5% (0.5dB) as determined in accordance with Sections 23.8.6.5.1, 23.8.6.5.2 or 23.8.6.5.3.

23.8.6.5.1 Power Loss Calculations. A calculation for each circuit shall be provided to the authority having jurisdiction demonstrating simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB). Power loss calculations similar to the following shall be used:

PLoss = 10 * Log [1 - ((2 * RL) / (2 * RL + (VLine squared / PRated))]

RL = (RRef / 1000) * D

With variables defined as follows:

D = length of wire used (in feet)

PLoss = power loss (in dB)

PRated = power driven on line from the amplifier (in watts)

RL = wire gauge resistance (in ohms)

RRef = wire resistance based on gauge of wire used (in ohms/ft.)

VLine = voltage on line (typically 25 volts or 70 volts)

Alternatively the distance may be calculated using a calculation similar to:

D = (61 / RRef) * (VLine squared / PRated)

23.8.6.5.2 Power Loss Tables. To ensure circuits are capable of simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB), wiring shall be limited to the distance allowed in Tables 23.8.6.5.2.a and 23.8.6.5.2.b.

Table 23.8.6.5.2.a, 25 V Circuit

Loudspeaker Distribution Cable Length (in feet) and Gauge for 0.5-dB Loss

Wire Gauge (AWG)	18	16	14	12	10
Cable Ohms*	15.54	9.78	6.14	3.86	2.42
Circuit Power					
200	12	19	31	49	79

150	16	26	41	66	105
100	25	39	62	99	158
75	33	52	83	132	210
60	41	65	104	165	263
50	49	78	124	198	315
40	61	97	155	247	394
30	82	130	207	329	525
25	98	156	248	395	630

Table 23.8.6.5.2.b, 70 V Circuit

Loudspeaker Distribution Cable Length (in feet) and Gauge for 0.5-dB Loss

Wire Gauge (AWG)	18	16	14	12	10
Cable Ohms*	15.54	9.78	6.14	3.86	2.42
Circuit Power					
200	98	156	248	395	630
150	131	208	331	527	840
100	196	312	497	790	1260
75	262	416	662	1053	1680
60	327	520	828	1317	2100
50	392	624	993	1580	2520
40	491	780	1242	1975	3150
30	654	1039	1656	2633	4200
25	785	1247	1987	3160	5041

*Cable Ohms is expressed in ohms per 1000 feet (2008 NEC Ch.9 Table 8, uncoated, single strand copper, see NEC or AHJ for other values)

The length represented accounts for both wires in the circuit.

23.8.6.5.3 Manufacturers Power Loss Calculator. When allowed by the authority having jurisdiction manufacturers calculations showing circuits are capable of simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB) are acceptable.

24.4.2.9.4

24.4.9.4 The boundaries of notification zones shall be coincident with building outer walls, fire walls, fire barriers, or fire-resistance rated horizontal assemblies. Sprinkler systems serving a notification zone shall not cross over the notification zone boundary. For high-rise buildings, alarms shall activate on the floor of, floor below, and floor above the floor of incidence. For all other buildings, alarms shall activate throughout the notification zone of incidence.