6.1.3.2

6.1.3.2 Fire extinguishers shall be located along normal paths of travel, including exits from areas, unless the *fire code official* determines that the hazard posed indicates the need for placement away from normal paths of travel.

Justification: This amendment is to correlate with the requirements set forth in the IFC Section 906.5.

6.1.3.10.1

6.1.3.10.1 Cabinets housing fire extinguishers shall not be locked~~,~~. ~~except where fire extinguishers are subject to malicious use and cabinets include a means of emergency access.~~

Exceptions:

1. Where portable fire extinguishers subject to malicious use or damage are provided with a means of ready access.
2. In Group I-3 occupancies and in mental health areas in Group I-2 occupancies, access to portable fire extinguishers shall be permitted to be locked or to be located in staff locations provided the staff has keys.

Justification: This amendment is to correlate with the requirements set forth in the IFC Section 906.8.

6.2.1.3.1.1

6.2.1.3.1.1 Up to two water-type extinguishers, each with 1-A rating, shall be permitted to be used to fulfill the requirements of one 2-A rated extinguisher~~.~~ for light (low hazard) occupancies only.

Justification: This amendment is to correlate with the requirements set forth in the IFC Table 906.3(1).

6.6.3

6.6.3 All solid fuel cooking appliances (whether or not under a hood) with fire boxes of 5 ft^3 (0.14 m^3) volume or less shall ~~at least have a listed 2-A rated water-type fire extinguisher or 1.6 gal (6 L) wet chemical fire extinguisher listed for Class K fires.~~ have a minimum 2.5 gallon (9 L) or two 1.5 gallon (6 L) Class K wet-chemical portable fire extinguishers located in accordance with the IFC Section 904.11.5.

Justification: This amendment is to correlate with the requirements set forth in the IFC Section 904.11.5.1.

6.6.4

6.6.4 When hazard areas include deep fat fryers, listed Class K portable fire extinguishers shall be provided as follows:

(1) For up to four fryers having a maximum cooking medium capacity of 80 pounds (36.3 kg) each: One Class K portable fire extinguisher of a minimum 1.5 gallon (6 L) capacity.
(2) For every additional group of four fryers having a maximum cooking medium capacity of 80 pounds (36.3 kg) each: One additional Class K portable fire extinguisher of a minimum 1.5 gallon (6 L) capacity shall be provided.
(3) For individual fryers exceeding 6 square feet (0.55 m^2) in surface area: Class K portable fire extinguishers shall be installed in accordance with the extinguisher manufacturer's recommendations.

Justification: This amendment is to correlate with the requirements set forth in the IFC Section 904.11.5.2.

5.3.2

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.

Justification: This amendment intends to specify that casino floor areas, mini-storage facilities, and shell buildings of unknown use, shall be considered Ordinary Hazard Group II areas. For Casinos, traditionally the State Fire Marshal has required in their code that Casinos be considered Ordinary Hazard Group II. Due to the fire load that can be present in casino areas, this design is justified. The only item to address with casinos would be to ensure that the sprinklers are of quick-response type, due to the type of occupant loading in casinos. For mini-storage facilities, the designation of Ordinary Hazard Group II is more than warranted. There is no restriction that can be enforced on users in mini-storage facilities, and therefore the fire load can be significant in these buildings. Finally, with shell buildings of unknown use, these are commonly use for office or retail purposes. While office use only requires a light hazard system, retail uses would require Ordinary Hazard Group II systems. In order to ensure that the system can accommodate future use, it is necessary to require ordinary hazard systems for shell buildings.

6.1.3

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 200), or 50 psi greater than the system design pressure, whichever is greater.

Justification: This amendment intends to require higher pressure ratings for underground lines that can be fed by FDC. Delivery of water at FDC can cause pressures that exceed 150 psi. Typically, use of 200 psi rated line can withstand the pressures delivered at the FDC. However, when higher pressures are required at the FDC due to system demands, the underground line is required to be listed for 50 psi above that demand pressure. The 50 psi above design pressure is to allow for pipe to be listed for the pressure used during the hydrostatic test.

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.

Justification: The intent of this proposal is to require professionally engraved signs to be used for the sprinkler cabinet sign. For years, these plates have been installed as a sticker using permanent marker or a metal plate using a scribing tool. The areas where this cabinet is usually placed on a property are generally dusty and/or exposed to the extreme heat of the Las Vegas Valley. Our findings have shown that permanent marker is good for less than five (5) years when these are regularly exposed to these conditions. Two other problems are consistently noted with these plates being installed with permanent marker or a scribing tool. The first deals with those written in permanent marker. Not everyone prints well and the information required often cannot be written small and legibly enough with a permanent marker or a scribing tool to make the information permanently readable. The other deals with the scribing tools and the fact that most scribing tools give very thin lines that again are not readable. People often make mistakes with these also which leads to other issues with their readability

6.3.1.1.2

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

Justification: The purpose of this amendment is to require that the thickness of the sprinkler pipe is such that the pipe is resistant to internal corrosion. With the water hardness prevalent in the valley, it is necessary to require the thicker pipe walls. The CRR of 1 is also used in NFPA 13 Section 8.16.4.2.2. It is used here so that the requirement is associated with other requirements for installation of sprinkler pipe.

6.8.1.4

6.8.1.4 The minimum number of required inlets shall be one 2 ½ inch inlet for every 250 gpm of the sprinkler and/or standpipe demand, or fraction there of. Fire Department Connections (FDC) 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 FDC shall be considered internal check valves.

Justification: This amendment intends to require that multiple FDC inlets be provided in order to deal with larger system demands. Use of the 250 gpm per inlet follows from specification sheets of major FDC manufacturers. The intent of the requirement for FDC design to allow flow into one or more inlets, and not necessarily all inlets simultaneously, is to address shop-made FDC's consisting of multiple single-snoot inlets on main piping. There is a need to require that such FDC's are installed in a manner that if the responding engine only ties into one or two FDC inlets, all of the water being delivered by the engine will enter into the system, and not be allowed to come back out of the other inlets. The use of FDC caps to maintain water is not permitted. The committee feels that the preferred method for shop-fabricated FDC's will be to install a check valve behind each single snoot FDC to achieve code compliance. Manufacturer FDC connections with internal clapper valves are seen to meet the intent of this amendment

6.9.1

6.9.1 General. Waterflow alarm devices shall be listed for the service and so constructed and installed that any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler of the smallest K-factor installed on the system will result in an audible alarm on the premises ~~within~~ no less than 15 seconds and no greater than 60 seconds ~~5 minutes~~ after such flow begins and until such flow stops.

Justification: The amendment is provided to shorten the time from water flow to begin and for alarms to sound and be transmitted. A minimum time frame of 15 seconds is introduced to avoid false alarms due to water surges. This change increases the safety provided to building occupants, and quickens the response time that the fire service can provide to a fire emergency

7.1.3

7.1.3 A wet pipe system shall be permitted to supply an auxiliary antifreeze, dry pipe, or preaction~~, or deluge~~ system ~~provided the water supply is adequate~~ provided the auxiliary system covers less than 10% of the system size.

Justification: This amendment intends to prohibit the installation of auxiliary deluge systems, to limit the size of auxiliary systems, and to allow auxiliary antifreeze systems. There has been recent increase in the use of this clause to allow large dry pipe systems for garden centers of home improvement stores, and this has caused situations where there are multiple flow alarms for a single incident. Multiple flow alarms cause confusion to responding personnel as to where to go to respond to fire flow. Deluge systems are required to have primary supply due to the fact that deluge systems are usually large in area, and therefore do not meet what is considered by the committee to be auxiliary. Also, different systems may have different maintenance requirements. Disabling a system because another system requires maintenance is not preferred. By limiting the size of the auxiliary system to 10% of the system area, the impact of the auxiliary system on the primary system is reduced

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, ~~7.2.3.3, 7.2.3.4~~, 7.2.3.5~~, or 7.2.3.7~~.

Justification: The amendment eliminates options to exceed time limit restraints on dry pipe systems. The result is that the time limit restraints that are contained in Section 7.2.3.2 and/or Table 7.2.3.6.1 shall be met for all dry pipe systems. The hazard of fire is the same regardless of system volume. The longer a fire is allowed to grow without suppression, the more difficult for the system to control the fire. The use of 30% increase in design may not be sufficient to handle an unlimited delay in discharge of water. In order to afford a consistent level of safety for all areas with dry pipe systems, the time restraint needs to be applied to all systems regardless of volume. By removing the allowances for exceeding the time constraints, this is achieved. The reference to 7.2.3.7 is removed in preparation of approval to the proposed amendment to 7.2.3.5, which will require satisfaction of both 7.2.3.5 and 7.2.3.7 simultaneously, rather than separate from each other as indicated in base Section 7.2.3.7

A.7.2.3.1

~~**A.7.2.3.1** The 60 second limit does not apply to dry systems with capacities of 500 gal (1893 L) or less, nor to dry systems with capacities of 750 gal (2839 L) or less if equipped with a quick opening device.~~

Justification: This deletion is necessary with the amendment to Section 7.2.3.1. The intent of Section 7.2.3.1 is to require a time limit restraint for all dry pipe systems, regardless of system size. This appendix material would conflict with that amendment, and thus needs to be deleted if the amendment to Section 7.2.3.1 is approved.

7.2.3.3

~~**7.2.3.3** A system size of not more than 500 gal (1893 L) shall be permitted without a quick opening device and shall not be required to meet any specific water delivery requirement to the inspection test connection.~~

Justification: This deletion is necessary with the amendment to Section 7.2.3.1. The intent of Section 7.2.3.1 is to require a time limit restraint for all dry pipe systems, regardless of system size. Section 7.2.3.3 would conflict with that amendment, and thus needs to be deleted if the amendment to Section 7.2.3.1 is approved.

7.2.3.4

~~**7.2.3.4** A system size of not more than 750 gal (2839 L) shall be permitted with a quick opening device and shall not be required to meet any specific water delivery requirement to the inspection test connection.~~

Justification: This deletion is necessary with the amendment to Section 7.2.3.1. The intent of Section 7.2.3.1 is to require a time limit restraint for all dry pipe systems, regardless of system size. Section 7.2.3.4 would conflict with that amendment, and thus needs to be deleted if the amendment to Section 7.2.3.1 is approved.

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.

Justification: This amendment requires that when a dry pipe system is designed by way of computer calculation, that a method of testing such system be provided. Such method of testing is indicated in Section 7.2.3.7. This amendment intends that the criteria of 7.2.3.7 be satisfied whenever the calculation method of 7.2.3.5 is proposed. The computer method is new and has not been field tested in this jurisdiction. In order to allow the new technology, verification of suitability is necessary. By providing a test of the system, with a method as prescribed in Section 7.2.3.7, the calculation method proposed in 7.2.3.5 can be accepted.

7.2.6.6.3

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

Justification: For years, dry pipe systems have utilized high/low pressure switches. The NFPA 72 standard still maintains the requirements for how to install such switches. However, the base NFPA 13 code does not clearly require the installation of such a switch. This amendment adds this requirement. For areas subject to freezing, this switch can prevent accidental filling of pipe and possible freezing of pipe. Further, this switch will help to avoid high air pressure within dry pipe systems, which can lead to longer delays in water delivery to a fire.

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.

Justification: This amendment mirrors an amendment made for dry pipe systems. This amendment requires that when a dry pipe system is designed to meet a flow test per Table 7.2.3.6.1, then the design needs to be validated by a computer program. This amendment intends that a calculation be provided to satisfy 7.2.3.5 whenever a design proposes to utilize the criteria of 7.2.3.7, which are repeated for double interlock preaction systems in section 7.3.2.3.1.3. The time limits in Table 7.2.3.6.1 are new and not commonly used in this jurisdiction. In order to allow the new methodology, verification of design by computer analysis as discussed in 7.2.3.5 is necessary. By validating system design by computer analysis, the method proposed in 7.3.2.3.1.3 can be accepted during plan review.

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)

Justification: The record measured low in the Las Vegas valley is 8° F. Understanding that temperatures vary from those that are recorded, it is prudent to select a temperature somewhat less than the low recorded temperature. This amendment defines the temperature for ease of design and review.

7.10.2.2

~~7.10.2.2 Sprinklers or automatic spray nozzles in ducts, duct collars, and plenum chambers shall not be required where all cooking equipment is served by listed grease extractors.~~

Justification: The base code allows for the deletion of protection in the duct and plenum when listed grease extractors are used. The efficiency of grease extractors is not seen by the committee to be such that this allowance is warranted. Therefore, the code section is deleted, thus requiring protection to be provided in the duct and plenum.

7.10.2.6

7.10.2.6 Sprinklers protecting cooking exhaust ducts shall be supplied from dedicated supply risers separate from overhead sprinkler systems. Activation of the associated water flow switch shall shut down the fuel and/or electrical power supply to the associated cooking equipment and the makeup air supplied internally to the hood.

Justification: The fire sprinklers that are installed for protection of cooking equipment and duct take the place of traditional wet chemical systems. Traditionally, wet chemical systems are interlocked with the cooking equipment to cause shutdown of the supply to the cooking equipment. This amendment intends to require a separate dedicated riser with flow switch for the sprinklers protecting cooking equipment and duct, and having that flow switch tied to the cooking equipment, to replicate the function of the traditional wet chemical system.

7.10.3.1

7.10.3.1 Unless the requirements of 7.10.3.2 or 7.10.3.4 are met, exhaust ducts shall have one sprinkler or automatic spray nozzle located at the top of each vertical riser, ~~and~~ 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.

Justification: The purpose of this amendment is to require additional sprinkler protection in vertical exhaust ducts that penetrate multiple floor levels. With many installations in large facilities, the grease duct vertical riser can penetrate multiple floor levels. If the grease duct has horizontal offsets, then intermediate height sprinklers will occur at the top of each vertical riser. However, if the grease duct exhaust includes risers with no offsets, such risers could have heights of 100 feet or more, and have no protection other than one sprinkler at the top of the riser. The mechanical code has reduced the protection requirements for grease ducts, which justifies additional protection. For building service chutes, which can be considered of equal or even less hazard, more protection is required, in the form of sprinklers at alternate floor levels (see Section 21.16.2.1.1.4). This proposal seeks to use that same protection requirement for the sprinkler protection of the grease exhaust duct as is provided in 21.16.2.1.14

8.2.4

8.2.4 When acceptable to the authority having jurisdiction, ~~M~~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. The maximum system size shall comply with 8.2.1

Justification: It is assumed here that the term "multiple buildings" refers to separate structures, in terms of type of construction, structural systems, etc. The base code in 8.2.4 allows for one sprinkler system to serve what would be considered separate buildings, so long as the buildings are attached by roof or wall structures. If the buildings are truly considered as separated structures, the systems should be separated to ensure that maintenance or work in one building does not cause the system to be disabled. Oftentimes, separate buildings are given separate base addresses. Having the riser from one address cover a building with a different address is not seen as appropriate. Further, in situations where a fire wall is provided to separate buildings, the base language for 8.2.4 would seem to allow both of the buildings to be served by the same fire riser. Again, in most cases, buildings that are truly separate are better served with separate sprinkler systems, regardless of whether the separate buildings share a roof or wall element. The proposal adds language that would require AHJ acceptance prior to permitting one sprinkler riser to serves multiple buildings

8.2.6

8.2.6 In multi-story buildings, each story requires a separate system with control valve and water flow switch.

Justification: Each system requires a separate control valve and a flow switch. If a sprinkler is activated on a floor, the flow switch on that floor's system will help indicate on what floor the event is occurring so the firefighters can quickly discover the fire. If a system needs to be shutdown, each floor can be shutdown separately. This will allow for easier maintenance of the system.

8.2.7

8.2.7 For spaces adjacent to and having public access exclusively through an adjacent assembly space, such as leased spaces adjacent to casinos, covered mall buildings, and other assembly spaces, the spaces shall be provided with individual isolation control valves. For the purposes of this section, the isolation control valve does not define a separate sprinkler system, such that the overall size of the sprinkler system serving the

space(s) and adjacent assembly spaces must meet size limitations of 8.2.1 when measured from the control valve located on the system riser.

Justification: The intent of this amendment is to require that spaces adjacent to and having access from assembly spaces, such as covered malls, casinos, and other assembly areas, have individual auxiliary control valves. The intent is to allow remodel work to occur in the space within the demising walls, without concern for maintenance of the sprinkler system serving the rest of the adjacent areas. These retail/assembly spaces are seen as requiring significant shut down of sprinklers, due to the frequent changeover of space use. This amendment intends to provide continued sprinkler protection for the areas outside the space. This amendment is in line with language contained within the IFC for covered mall buildings. The scope is broadened in this amendment due to the fact that many "mall-like" areas within casino properties are not strictly defined as covered mall buildings, although the hazard is the same as for covered mall buildings. The amendment also indicates that this is an auxiliary valve, and not a separate system valve. Thus, the auxiliary valve does not define a separate sprinkler system, such that it is apparent that the size limitations of 8.2.1 cannot be circumvented by indicating the auxiliary valves create separate sprinkler systems

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 3.6.2.9

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

(3) Standard response sprinklers used for modifications or additions, within the existing compartment, to existing ~~light hazard~~ systems equipped with standard response sprinklers

(4) Standard response sprinklers used where individual standard response sprinklers are replaced in existing ~~light hazard~~ systems

Justification: The intent is to require quick-response sprinklers in all assembly spaces, regardless of whether such assembly spaces are classified as light hazard occupancies. Quick-response sprinklers provide greater life safety protection than standard response sprinklers. Although the systems proposed for casinos and exhibition spaces are not defined as light hazard occupancy systems, the need for life safety exists in these spaces, due to the fact that they are assembly spaces. By specifically adding the terms "casinos" and "exhibition areas", it is clear that the quick-response sprinkler requirement applies to those areas, even though the amendments may not define those spaces as light hazard occupancies. Further, this code intends to require quick response sprinklers in shell buildings of combustible construction. This is to ensure compliance with 8.15.1.3. In addition, the code is changed to allow the use of standard response heads only when an existing compartment is expanded, not just when the system is expanded. Therefore, new compartments may be required to have quick response sprinkler heads, regardless of the response type of existing heads on the sprinkler system. The strike-out of "light hazard" in items (3) and (4) are to indicate that items (3) and (4) apply to all occupancies in the charging statement, to include light hazard occupancies, casinos, and exhibition areas

8.6.4.1.1.3

8.6.4.1.1.3 The requirements of 8.6.4.1.1.1 shall not apply for light and ordinary hazard occupancies with ceilings of noncombustible ~~or limited combustible~~ construction, as follows:

(A) Where there is a vertical change in ceiling elevation within the area of coverage of the sprinkler creates a distance of more than 36 in. (914 mm) between the upper ceiling and the sprinkler deflector, a vertical plane extending down from the ceiling at the change in elevation shall be considered a wall for the purpose of sprinkler spacing as shown in Figure 8.6.4.1.1.3(A).

(B) Where the distance between the upper ceiling and the sprinkler deflector is less than or equal to 36 in. (914 mm), the sprinklers shall be permitted to be spaced as though the ceiling was flat, provided the obstruction rules are observed as shown in Figure 8.6.4.1.1.3(B).

Justification: Base 8.6.4.1.1.3 is confusing in the manner in which it is written, particularly with the first sentence. The first sentence of 8.6.4.1.1.3 gives a blanket exception where compliance with 8.6.4.1.1.1 is not required for ceilings of noncombustible or limited combustible construction. Section 8.6.4.1.1.1 is the section that requires deflectors to be within 1-12 inches from the ceiling. With the first sentence, there is an express exception, such that the code seems to allow the deflectors to be more than 12 inches from the ceiling, so long as the ceiling is noncombustible or limited combustible. As the deflector distance is seen to be important to ensure quick operation of the sprinkler heads, and is not an issue with respect to the type of construction, then this exception does not seem to be appropriate

8.8.4.1.1.4

8.8.4.1.1.4 The requirements of 8.8.4.1.1.1 shall not apply for light and ordinary hazard occupancies with ceilings of noncombustible ~~or limited combustible~~ construction, as follows.

(A) Where there is a vertical change in ceiling elevation within the area of coverage of the sprinkler creates a distance of more than 36 in. (914 mm) between the upper ceiling and the sprinkler deflector, a vertical plane extending down from the ceiling at the change in elevation shall be considered a wall for the purpose of sprinkler spacing.

(B) Where the distance between the upper ceiling and the sprinkler deflector is less than or equal to 36 in. (914 mm), the sprinklers shall be permitted to be spaced as though the ceiling was flat, provided the obstruction rules and ceiling pocket rules are observed.

Justification: This is a companion amendment to one for section 8.6.4.1.1.3, which is a similar code section. Base 8.8.4.1.1.4 is confusing in the manner in which it is written, particularly with the first sentence. The first sentence of 8.8.4.1.1.4 gives a blanket exception where compliance with 8.8.4.1.1.1 is not required for ceilings of noncombustible or limited combustible construction. Section 8.8.4.1.1.1 is the section that requires deflectors to be within 1-12 inches from the ceiling. With the first sentence, there is an express exception, such that the code seems to allow the deflectors to be more than 12 inches from the ceiling, so long as the ceiling is noncombustible or limited combustible. As the deflector distance is seen to be important to ensure quick operation of the sprinkler heads, and not an issue with respect to the type of construction, then this exception does not seem to be appropriate

8.14.6

8.14.6 Pilot line detectors shall be permitted to be spaced more than 22 in. (559 mm) below a ceiling or deck where the maximum spacing between pilot line detectors is 10 ft (3 m) or less, and where such spacing is supported by an engineering analysis discussing sprinkler temperature and response rating, plume diameter, temperature within the plume that will pass across the sprinklers, and the expected fire size required to activate the pilot sprinklers.

Justification: The base code allows pilot line detectors (sprinklers) to be located an unlimited distance below a ceiling, as long as the pilot sprinklers are spaced at 10 feet or less. When the distance from the ceiling is increased, the pilot sprinklers are no longer expected to be activated by the ceiling jet, but rather by heat within the fire plume. Fire plume have been determined to have two diameters. One is the visible diameter, which is where smoke is expected to be visible. The other is the effective heat diameter, where significant heat from the plume is expected. Roughly, the visible diameter is expected to be one-half the height of analysis, and the effective heat diameter is expected to be one-half the visible diameter. Therefore, if pilot sprinklers are located 32 feet above the floor, the effective heat diameter would be approximately 8 feet, which is smaller than the 10 feet spacing, and could lead to no activation of the pilot sprinklers. In addition, the temperature of the plume decreases the higher the plume rises, to the point where there would be little difference in temperature between smoke and ambient for small fires with tall ceilings. Therefore, there would be a point where even if the effective heat diameter is greater than 14 feet, the heat inside that diameter would not be sufficient to activate sprinklers. The process of activating sprinklers where there is no ceiling is difficult to analyze, but is necessary to ensure that the system will work as designed. For discussion about heat and visible diameter, see Klote/Milke, *Design of Smoke Management Systems*

*8.15.1.2.1**

8.15.1.2.1* Concealed spaces of noncombustible ~~and limited combustible~~ construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. For purposes of this section, "construction" is limited to wall assemblies, floor assemblies, ceiling assemblies, and structural members.

Justification: This amendment is intended to remove the term "limited-combustible". The committee feels that allowing unprotected combustibles in concealed space is not warranted, and therefore wanted to maintain the existing amendment. Further, the committee provides language to define the term "construction".

8.15.1.2.1.2

8.15.1.2.1.2 Minor quantities of combustible materials limited to: cabling, nonmetallic piping conveying non-combustible liquids, and nonmetallic HVAC ductwork as expressly allowed by the current adopted building code, shall be permitted in concealed spaces constructed of non-combustible materials and shall not require sprinklers.

Justification: The committee desired to provide guidance as to what combustible materials are allowed in noncombustible concealed spaces. Currently, there are instances where building codes allow some combustible materials for building services in concealed spaces, where currently adopted sprinkler codes are interpreted to require sprinklers in the concealed spaces. This amendment intends to allow concealed spaces to have these combustible materials, which must be allowed by the building code, to be present in the concealed space without requiring fire sprinkler protection in that space

8.15.1.2.2

8.15.1.2.2 Concealed spaces of non-combustible ~~and limited-combustible~~ construction with limited access and minimal combustible loading and not permitting occupancy or storage of combustibles shall not require sprinkler protection. For the purposes of this section, limited access does not include access to catwalks and mechanical mezzanines. Catwalks and mechanical mezzanines require sprinkler protection, which may be designed in accordance with 8.15.1.5. Additionally, "construction" is limited to wall assemblies, floor assemblies, ceiling assemblies, and structural members.

Justification: This is partly an amendment to remove the term "limited-combustible". Also, this amendment intends to resolve what limited access means. In this interpretation, limited access means that openings into the concealed space are allowed, but such openings can not provide access to large open spaces on catwalks and mechanical mezzanines. Further, the committee felt that adding the allowance for minimal combustible loading to this section is warranted, as the committee does not feel that the hazard in spaces with limited access is substantially different than the hazard in non-accessible areas as described in section 8.15.1.2.1. Finally, the committee adds language providing definition of the term "construction"

8.15.1.2.10

~~8.15.1.2.10 Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less, and the materials have been demonstrated not to propagate fire when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed, shall not require sprinkler protection.~~

Justification: This amendment intends to delete the allowance of materials in unprotected concealed spaces due solely to a test for flame spread. There is considerable data that flame spread tests may not be appropriate tests for measuring the burning hazard of many plastics. Many plastics receive a flame spread rating of less than 25, yet exhibit melting of material, flaming droplets to the bottom of the test chamber, and continued burning at the bottom of test chamber. Note that this amendment does not specify a smoke developed rating, and therefore plastic materials that may not ordinarily be considered to be Class A materials could be allowed by this code section to be installed in unprotected concealed spaces. The term "rigid" is not seen to restrict materials. There is no definition for the term set forth in this code, and many plastic materials would rightly be considered to be rigid by standard definitions. Due to the possibility that this amendment could allow plastic materials in unprotected concealed spaces, it is recommended that this code section be deleted

8.15.1.2.11

~~8.15.1.2.11 Concealed spaces in which the exposed materials are constructed entirely of fire retardant treated wood as defined by NFPA 703, *Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials*, shall not require sprinkler protection.~~

Justification: This amendment intends to delete the use of wood in concealed spaces without fire sprinkler protection. Fire-retardant treated wood has the capacity to burn, and the base code has no limit as to how much wood is allowed in the unprotected concealed space, nor is there a limit as to whether this wood could comprise a structural member for the building. As such, this amendment intends to remove the allowance for fire-retardant wood to be installed in unprotected concealed spaces

8.15.1.2.16

8.15.1.2.16 Concealed spaces formed by noncombustible ~~or limited-combustible~~ ceilings suspended from the bottom of wood joists, composite wood joists, wood bar joists, or wood trusses that have insulation filling all of the gaps between the bottom of the trusses or joists, and where sprinklers are present in the space above the installation within the trusses or joists, shall not require sprinklers.

Justification: This amendment is to delete the term "limited-combustible". The committee feels that concealed areas of limited-combustible construction can still support fire, and thus requires those areas to be provided with sprinkler protection.

8.15.1.2.17

8.15.1.2.17 Concealed spaces formed by noncombustible ~~or limited-combustible~~ ceilings suspended from the bottom of wood joists and composite wood joists with a maximum nominal chord width of 2 in. (50.8 mm), where joist spaces are full of noncombustible batt insulation with a maximum 2 in. (590.8 mm)air space between the roof decking material and the top of the batt insulation. Facing that meets the requirements for noncombustible ~~or limited-combustible~~ material covering the surface of the bottom chord of each joist and secured in place per the manufacturer's recommendations shall not require sprinklers.

Justification: This amendment is to delete the term "limited-combustible". The committee feels that concealed areas of limited-combustible construction can still support fire, and thus requires those areas to be provided with sprinkler protection.

8.15.4.1

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 <u>supplied by a dedicated sprinkler riser</u> in combination with draft stops in accordance with 8.15.4.2 and 8.15.4.3

Justification: The intent of this amendment is to require that the sprinklers used in lieu of passive protection be on a system that is separate from adjacent overhead sprinkler systems. The passive protection is seen as redundant protection to that provided by overhead sprinkler protection, and is only necessary when the overhead sprinkler system is not functioning properly. Since the sprinklers described in this section are meant

to replace the passive protection, it is prudent to require these sprinklers to be fed from separate risers. This way, if the overhead sprinkler system is not functioning properly for some reason, there is a chance for the closely spaced sprinklers to act as the redundant system which it intends to replace.

8.15.5

8.15.5 Elevator Hoistways and Machine Rooms.

8.15.5.1* Sidewall spray sprinklers shall be installed at the bottom of each elevator hoistway not more than 2 ft (0.61 m) above the floor of the pit.

8.15.5.2 The sprinkler required at the bottom of the elevator hoistway by 8.15.5.1 shall not be required for enclosed, noncombustible elevator shafts that do not contain ~~combustible~~ hydraulic fluids.

8.15.5.3 Automatic fire sprinklers shall not be required in elevator machine rooms, elevator machinery spaces, control spaces, or hoistways of traction elevators installed in accordance with the applicable provisions in NFPA *101*, or the applicable building code, where all of the following conditions are met:

(1) The elevator machine room, machinery space, control room, control space, or hoistway of traction elevator is dedicated to elevator equipment only.
(2) The elevator machine room, machine room, machinery space, control room, <u>or</u> control space, ~~or hoistway of traction elevators~~ are protected by smoke detectors, or other automatic fire detection, installed in accordance with *NFPA 72*.
(3) The elevator machinery space, control room, control space, or hoistway of traction elevators is separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a fire resistance rating of not less than that specified by the applicable building code.
(4) No materials unrelated to elevator equipment are permitted to be stored in elevator machine rooms, machinery spaces, control rooms, control spaces, or hoistways of traction elevators.
(5) The elevator machinery is not of the hydraulic type.

8.15.5.4* Automatic sprinklers in elevator machine rooms or at the tops of hoistways shall be of ordinary- or intermediate temperature rating.

8.15.5.5* Upright, pendent, or sidewall spray sprinklers installed at the top of elevator hoistways.

8.15.5.6 The sprinkler required at the top of the elevator hoistway by 8.15.5.5 shall not be required where the hoistway for passenger elevators is noncombustible or limited-combustible and the car enclosure materials meet the requirements of ASME A17.1, *Safety Code for Elevators and Escalators*.

Justification: This amendment ensures that sprinklers are added for the bottom of the shaft for all hydraulic elevators. Further, this amendment addresses a code conflict with NFPA 72, by removing a requirement to have smoke detection to an unsprinklered hoistway.

8.15.7.1

8.15.7.1 Unless the requirements of 8.15.7.2~~, 8.15.7.3,~~ or 8.15.7.4 are met, sprinklers shall be installed under exterior projections exceeding 4 ft (1.2 m) in width

Justification: This is a companion amendment to the amendment proposing deletion of 8.15.7.3.

8.15.7.2

8.15.7.2 Sprinklers shall be permitted to be omitted where the exterior projections are constructed entirely with materials that are noncombustible~~, limited combustible, or fire retardant treated wood as defined in NFPA 703~~, and where the exterior projections do not support occupancy above.

Justification: This amendment will allow the omission of fire sprinklers for exterior roof/canopies/porte-cocheres that are entirely of non-combustible construction, unless the roof/canopy/porte-cochere supports occupancy above. There is a difference between a steel cantilevered use with nothing above the roof, and a concrete ceiling/floor assembly that allows occupancy above. This amendment intends that where occupancy is supported by the roof/canopy/porte-cochere, then the area below the roof/canopy/porte-cochere is to be protected with fire sprinklers

8.15.7.3

~~**8.15.7.3** Sprinklers shall be permitted to be omitted from below the exterior projections of combustible construction, provided the exposed finish material on the exterior projections are non-combustible, limited-combustible, or fire retardant treated wood as defined in NFPA 703, and the exterior projections contain only sprinklered concealed spaces or any of the following unsprinklered combustible concealed spaces:~~

~~(1) Combustible concealed spaces filled entirely with non-combustible insulation.~~
~~(2) Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.5m³) or less in volume, including space below insulation that is laid directly on top or within the ceiling joist in an otherwise sprinklered attic [*see 11.2.3.1.4(4)(d)*]~~
~~(3) Concealed spaces over isolated small exterior projections not exceeding 55 ft² (5.1m²) in area.~~

Justification: The purpose of this amendment is to delete the allowance of omission of sprinklers under roofs of combustible construction. There is concern that a fire from a vehicle parked under the roof could burn into the combustible structure, and that fire could subsequently move through the structure of the adjacent building. There is concern about a fire entering a building in the roof structure area, and the performance of sprinklers when a fire occurs across combustible roof construction. There is recent past history within Southern Nevada of fire sprinklered buildings burning down because the fire was able to reach the roof structure above the sprinklers, and cause collapse of the roof structure, and subsequent loss of the building. This amendment is seen as necessary to avoid this type of situation in the future

8.15.8.1.1

8.15.8.1.1 Sprinkler protection shall be provided in all bathrooms. ~~Sprinklers shall not be required in bathrooms that are located within dwelling units of hotels and motels, that do not exceed 55 ft² (5.1m²) in area, and that have walls and ceilings of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating, including the walls and ceilings behind an shower enclosure or tub.~~

Justification: There is concern with the fire loading that is seen in bathrooms. The committee feels that exempting bathrooms from sprinkler protection is not warranted.

8.15.8.2

8.15.8.2 Closets and Pantries. Sprinkler~~s~~ protection shall be ~~are not required~~ provided in clothes closets, linen closets, and pantries. ~~within dwelling units in hotels and motels where the area of the space does not exceed 24 ft^2 (2.2 m^2), the least dimension does not exceed 3 feet (0.9 m), and the walls and ceilings are surfaced with noncombustible or limited-combustible materials.~~

Justification: This amendment is intended to provide consistency for regional application of codes.. The committee feels that exempting sprinklers from closets, which may have fire loading, is not warranted. Therefore, the committee chooses to maintain the existing amendment.

8.15.11.1

8.15.11.1 ~~Unless the requirements of 8.15.10.3 are met,~~ Ssprinkler protection shall be required in electrical equipment rooms.

Justification: This amendment is proposed as a companion to the amendment that deleted section 8.15.11.3. Since section 8.15.11.3 is deleted, then the portion of this section that refers to that section should also be deleted

8.15.11.3

~~**8.15.11.3** Sprinklers shall not be required in electrical equipment rooms where all of the following conditions are met:~~

~~(1) The room is dedicated to electrical equipment only~~

~~(2) Only dry-type electrical equipment is used.~~

~~(3) Equipment is installed in a 2-hour fire-rated enclosure including protection for penetrations.~~

~~(4) No combustible storage is permitted to be stored in the room.~~

Justification: A building protected with a fire sprinkler system must have fire sprinklers throughout.

8.15.15.1

8.15.15.1 ~~Drop-out ceilings shall be permitted to be installed beneath sprinklers where ceilings are listed for that service and are installed in accordance with their listings.~~ Drop-out ceilings are not permitted to be installed beneath fire sprinklers.

Justification: This amendment intends to remove the allowance for use of drop-out ceilings below sprinklers. When ceiling tiles drop out, the ceiling jet is compromised. This could lead to a situation where no additional tiles are subject to heat, and thus too few tiles drop out to allow for full sprinkler protection. If too few tiles have dropped and the smoke plume goes through the ceiling to the level of sprinklers, the remaining tiles can be an obstruction to sprinkler discharge

8.15.15.2

~~**8.15.15.2** Drop-out ceilings shall not be installed below quick-response or extended coverage sprinkler unless specifically listed for that application.~~

Justification: This is a companion amendment to the amendment for Section 8.15.15.1. If drop-out ceilings are not allowed by changes to Section 8.15.15.1, then this section also needs to be deleted

8.15.15.3

~~**8.15.15.3** Drop-out ceilings shall not be considered ceilings within the context of this standard.~~

Justification: This is a companion amendment to the amendment for Section 8.15.15.1. If drop-out ceilings are not allowed by changes to Section 8.15.15.1, then this section also needs to be deleted

8.15.15.4

~~**8.15.15.4** Piping installed above drop-out ceilings shall not be considered concealed piping.~~

Justification: This is a companion amendment to the amendment for Section 8.15.15.1. If drop-out ceilings are not allowed by changes to Section 8.15.15.1, then this section also needs to be 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.

Justification: Each one-inch outlet can supply one sprinkler without affecting the hydraulic design of the existing sprinkler system, so there is no adverse effect on the existing system

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.

Justification: A one-inch outlet can supply two sprinklers when separated by a ceiling, walls and/or doors because it is anticipated that only one of the sprinklers will discharge at one time, and it will not adversely affect the system. Thus, if the one inch-outlet supplies a sprinkler head above the ceiling, then the outlet can supply a maximum of one additional head below the ceiling, with the ceiling providing the separation between separate sprinklered areas. If the one-inch outlet supplies no heads above the ceiling, then the one-inch outlet can supply a maximum of two heads below the ceiling, so long as those two heads are located in separate areas that are separated by walls and doors. This limitation of a maximum of two heads from 1-inch supply corresponds to the pipe schedule method. The maximum area of openings provision is adapted from NFPA 13R, with the intent of eliminating the practice of using a beam with depth greater than 8 inches to attempt to create a separate room.

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.

Justification: Sections 8.15.20.1.1 and 8.15.20.1.2 require that sprinklers below the ceiling have the same k factor as heads above the ceiling. This is to allow heads below the ceiling to go in without hydraulic calculations. Heads of a lesser k factor may not be acceptable in all cases. For instance, if the water supply pressures are not sufficient to cover an occupancy with k=5.6 heads, the calculated design could use k=8.0 or larger heads. In this case, allowing k=5.6 heads to be installed under ceilings without calculations could lead to having insufficient pressure at the head for proper coverage. However, where the overhead system is designed for a higher classification type, a lesser k factor may be acceptable without calculations. For instance, where there is a warehouse with ESFR or other larger orifice heads, it is acceptable to handle areas such as office and bathroom additions, without requiring the office and bathroom heads to be ESFR or other large orifice head

8.15.20.1.4

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

Justification: This addresses the issue of flexible sprinkler drops that are added as part of tenant improvement or other work where the flexible sprinkler hose supplies heads below ceilings. Due to the equivalent length issues that are characteristic of flexible sprinkler hose, it is necessary to require that systems using flexible sprinkler hose drops be proven by hydraulic calculation.

8.15.23.3

8.15.23.3 Where there is a noncombustible space above a noncombustible ~~or limited-combustible~~ drop ceiling that is sprinklered because it is open to an adjacent sprinklered space on only one side and where there is no possibility for storage above the drop ceiling, the sprinkler system shall be permitted to extend only as far into the space as 0.6 times the square root of the design area of the sprinkler system in the adjacent space.

Justification: This amendment is to delete the term "limited-combustible". The committee feels that concealed areas of limited-combustible construction can still support fire, and thus requires those areas to be provided with sprinkler protection without exceptions.

8.15.24

8.15.24 Openings in Rated Assemblies. Where sprinkler protection is serving as the alternative to opening protection in rated assemblies, such sprinklers shall be listed for use, and installed in accordance with their listing.

Justification: The purpose of this amendment is to ensure that sprinklers used as alternates for passive protection are listed for the purpose.

8.15.25

8.15.25 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 8.15.24.

8.15.25.1 Hydraulic Design. Systems shall meet Density/Area Method requirements of Section 11.2.3.2 or the Pipe Schedule method of Section 22.5. The minimum design shall be for Ordinary Hazard Group 2, or higher design to accommodate the hazard within the temporary exhibit booth

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

8.15.25.3 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.

8.15.25.4 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.

8.15.25.5 Inspector Test Valve. An inspector test valve constructed in accordance with Section 8.17.4.2.1 shall be provided off of the end of the most hydraulically remote branch line.

Justification: The purpose of these amendments is to provide a reasonable approach to temporary sprinkler system installation in exhibit booths when required to be fire sprinklered by the Fire Code.

8.16.1.1.1.4

8.16.1.1.1.4 Valve rooms shall be lighted and heated.

Justification: This amendment is a copy of Section 7.2.5.2.1. Section 7.2.5.2.1 provides requirements for dry pipe valves, but the code does not provide the same requirements for other system valve rooms. This amendment would require that valve rooms be provided with light and heat

8.16.1.1.1.5

8.16.1.1.1.5 The source of heat shall be of a permanently installed type.

Justification: This amendment is a copy of Section 7.2.5.2.2. Section 7.2.5.2.2 provides requirements for dry pipe valves, but the code does not provide the same requirements for other system valve rooms. This amendment would require that the heating system for valve rooms be provided permanently installed. This would prohibit plug-in systems that can be easily removed after obtaining the Certificate of Occupancy.

8.16.1.1.1.6

8.16.1.1.1.6 Heat tape shall not be used in lieu of heated valve enclosures to protect the valve and supply pipe against freezing.

Justification: This amendment is a copy of Section 7.2.5.2.3. Section 7.2.5.2.3 provides requirements for dry pipe valves, but the code does not provide the same requirements for other system valve rooms. This amendment would prohibit the use of heat tape for providing heat for the system valve

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 ~~one of the following methods:~~

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

~~(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended point~~

~~(3) Valves locked in the correct position~~

~~(4) Valves located within fenced enclosures under the control of the owner, sealed in the open position, and inspected weekly as part of an approved procedure~~

Justification: The purpose of this amendment is to indicate that sprinkler control valves are required to be electrically supervised, and that the other methods of supervision that are listed in base NFPA 13 are not permitted to be used for the purpose of supervision. This amendment brings NFPA 13 in compliance with the IFC requirements for electrical supervision

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.

Justification: The purpose of this amendment is to exempt the requirement for supervision of valves for the valves that occur at the equipment at the connection from public to private water. Several types of devices are used, such as Double Check Detector Assembly, Reduced Pressure Principle Assembly, and Backflow Preventers. These devices all have the purpose of separating the private piping on a property from the public water supply, such that contaminants within the private system will not affect the public water supply. These devices are paid for and maintained by property owners, but are located on a public easement that allows the water purveyor access to the devices. Typically, new installations are secured within a protective box.

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.

Justification: The purpose of this amendment is to prescribe a method for testing PRV control valves in fire sprinkler systems. This is a low-cost option that will allow for testing during construction and during maintenance testing. The designer is permitted to submit alternate methods for providing means to test the PRV, which can be approved by the AHJ if the alternate means provides the same ability to test both during construction and during maintenance.

8.16. 1.5

8.16.1.5 Floor Control Valve Assemblies.

8.16.1.5.1* Multistory buildings ~~exceeding two stories in height~~ 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.

8.16.1.5.2 The floor control valve, check valve, main drain valve, and flow switch required by 8.16.1.5.1 ~~8.16.1.6.3~~ shall not be required where sprinkler systems protecting atriums, covered mall buildings, and other areas with non-standard ceiling heights within the building, ~~sprinklers on the top level of a multistory building~~ are supplied by piping from ~~on~~ the protected floor system below.

~~8.16.1.5.3 The floor control valve, check valve, main drain valve, and flow switch required by 8.16.1.6.3 shall not be required where the total area of all floors combined does not exceed the system protection area limitations of 8.2.1.~~

8.16.4.1.6

8.16.4.1.6 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).

Justification: The intent of the amendment is to provide criteria for the calculation to prove that pipe does not require heat trace. There have been situations in the past where designers look to run wet system piping through unheated areas, and desire to not use heat trace. There are numerous calculation methods available, with numerous assumptions that need to be made in employing the available formulae. This amendment is provided to set reasonable assumptions that can be accepted by the AHJ.

8.17.1.1

8.17.1.1. Local Waterflow Alarms Units. A local waterflow alarm unit shall be provided on every sprinkler system ~~having more than 20 sprinklers~~. Such waterflow alarm units shall be installed in accordance with 6.9.

Justification: This amendment intends to coordinate the requirements for local waterflow alarms that are described in Section 6.9 to the waterflow alarm that is discussed in Section 8.17.1.1. This is a companion to the proposals to Section 6.9, in order to ensure that code users know to look to Section 6.9 for required design of waterflow alarms. Further, this amendment removes the trigger of 20 sprinklers, in order to coordinate with the IFC, which requires an alarm to be connected to every sprinkler system.

8.17.2.3

8.17.2.3 Size. The size of the pipe for the fire department connection shall be in accordance with one of the following:

(1) Pipe size shall be a minimum of 4 in. (100 mm) for fire engine connections when the fire department connection has three or fewer 2-1/2 in (65 mm) inlets, and shall be a minimum of 6 in. (150 mm) for fire engine connections when the fire department connection has four or more 2-1/2 in (65 mm) inlets.
(2) Pipe size shall be a minimum of 6 in. (150 mm) for fire boat connections.
(3) For hydraulically calculated systems the fire department connection shall be permitted to be less than 4 in. (100 mm) and no less than the size of system riser, where serving one system riser.

Justification: This is a companion to the amendments regarding the number of inlets required for Fire Department Connections from section 6.9 where connections are sized due to flow rate of the system. The additional size of 6-inch for larger flow systems follows the sizes provided for manufactured connections. For 3-inlet fire department connections, the outlet can be found in both 4-inch and 6-inch. For 4-inlet connections, the outlet can be found in 6-inch only.

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.

Justification: The purpose of this amendment is to codify the language dictating the height of the fire department connection. The language used in this proposal comes from the annex to Section 8.17.2. Further, this code is repeated as code language in NFPA 14. Adding this as code language will assist with review and inspections of fire department connection installations

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. ~~Representative samples of concrete into which studs are to be driven shall be tested to determine that the studs will hold a minimum load of 750 lb (341 kg) for 2 in. (50 mm) or smaller pipe; 1000 lb (454 kg) for 2 ½ in., 3 in., 3 ½ in. (65 mm, 80 mm, or 90 mm) pipe; and 1200 lb (545 kg) for 4 in. or 5 in. (100 mm or 125 mm) pipe~~.

Justification: Powder-driven fasteners require special handling. Further, there are concerns about the ability of all concrete to meet these criteria, and the ability to conduct the required testing. There is concern about the quality of such systems for large diameter pipe. For that reason, the amendment is made to reduce the allowable pipe diameter to 2-inch

9.1.3.9.4

9.1.3.9.4 Increaser couplings shall not be permitted with ~~be attached directly to the~~ powder-driven studs.

Justification: The base code allows smaller diameter studs to be used than the code would allow rod diameters to be. By making this amendment, the diameter of the stud must be equal to the required diameter for the hanger rod. The diameter of the threaded fitting of the powder-driven studs shall meet the hanger rod diameter requirements of Table 9.1.2.1

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.

Justification: Section 9.2.1.3.3.2 provides guidance for what to do when flexible sprinkler hose is supported by grid ceilings, but does not discuss what to do when flexible sprinkler hose is supported by another type of ceiling, such as gyp board. When this is the case, the intent of the amendment is to treat the flexible sprinkler hose similar to unsupported armovers in accordance with Section 9.2.3.5. However, if there is an approved hanger assembly for flexible sprinkler hose that describes a hanger assembly in the manner in which it is proposed to be hung, then that hanger assembly would be permitted.

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 ~~obtained from the authority having jurisdiction~~ or derived from seismic hazard maps.

Justification: The seismic parameters in NFPA 13 have been modified to be more inline with the ICC seismic requirements for mechanical systems. The value of S_s varies greatly across the valley, in general terms, highest in Boulder City, and decreasing as you move north. The modification to specifically state the value of S_s will make all areas the same, and reduce the number of inquiries "obtained from the authority having jurisdiction". The value of S_s = 0.95 corresponds to the current value C_p = 0.50.

9.3.6.7

9.3.6.7 Drops and armovers less than 10 feet (3048 mm) shall not require restraint. Drops and armovers of 10 feet (3048 mm) or longer shall require restraint.

Justification: This amendment adds seismic restraint requirements for longer drops and armovers. The intent is to limit damage during seismic events

10.1.5

10.1.5 Working Pressure. Piping, fittings, and other system components shall be rated for the maximum system working pressure to which they 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 200), or 50 psi greater than the FDC design pressure, whichever is greater.

Justification: This amendment is existing in part. This amendment intends to require higher pressure ratings for underground lines that can be fed by Fire Department Connections. Delivery of water at Fire Department Connections can cause pressures that exceed 150 psi. Typically, use of 200 psi rated line can withstand the pressures delivered at the FDC. However, when higher pressures are required at the FDC due to system demands, the underground line is required to be listed for 50 psi above that demand pressure. The 50 psi above design pressure is to allow for pipe to be listed for the pressure used during the hydrostatic test

11.2.3.1.4(4)

11.2.3.1.4 (4) The following unsprinklered concealed spaces shall not require a minimum area of sprinkler operation of 3000 ft^2 (279 m^2):

11.2.3.1.4(4)(a) Noncombustible ~~and limited-combustible~~ concealed spaces with minimal combustible loading having no access. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

11.2.3.1.4(4)(b) Noncombustible ~~and limited-combustible~~ concealed spaces with limited access and not permitting occupancy or storage of combustibles. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

11.2.3.1.4(4)(c) (*No Change*)

11.2.3.1.4(4)(d) Light or ordinary hazard occupancies where noncombustible ~~or limited-combustible~~ ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft^3 (4.8 m^3) or less in volume, including space below insulation that is laid directly on top or within the ceiling joist in an otherwise sprinklered attic.

11.2.3.1.4(4)(e) ~~Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less and the materials have been demonstrated to not propagate fire when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed in the space~~.

11.2.3.1.4(4)(f) ~~Concealed spaces in which the exposed materials are constructed entirely of fire-retardant treated wood as defined by NFPA 703, *Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials*.~~

11.2.3.1.4(4)(g) (*No Change*)

11.2.3.1.4(4)(h) (*No Change*)

11.2.3.1.4(4)(i) (*No Change*)

11.2.3.1.4(4)(j) Light or ordinary hazard occupancies where non-combustible ~~or limited-combustible~~ ceilings are attached to the bottom of composite wood joists either directly or on to metal channels not exceeding 1 in. (25.4 mm) in depth, provided the adjacent joist channels are firestopped into volumes not exceeding 160 ft^3 (4.5 m^3) using materials equivalent to ½ in. (12.7 mm) gypsum board and at least 3 ½ in. (90 mm) of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels.

Justification: This amendment is intended to remove the term "limited-combustible". The committee feels that allowing unprotected combustibles in concealed space is not warranted, and therefore wanted to maintain the existing amendment. Further, the committee continues the deletion of allowing materials with a flame spread of 25 and fire-retardant wood in concealed spaces without sprinkler protection.

11.3.1.1

11.3.1.1 The design area shall be ~~the area that includes the four adjacent sprinklers that produce the greatest hydraulic demand~~ <u>in accordance with either 11.2.3.2 or 11.2.3.3.</u>

Justification: This amendment is intended to provide consistency for regional application of codes.. The intent of the amendment is to require that hydraulic calculations for residential occupancies be either by

area/density method or by room design method. This amendment eliminates the use of the 4-head calculation in NFPA 13. The purpose of the amendment is to require greater sprinkler system flow to be provided to fire areas in residential units than required by the base code. There is concern that the fires within commercial residential occupancies have significant fire loads, and the fires in residential occupancies are more dangerous than other commercial occupancies due to the nature of occupants, which are considered to be asleep or otherwise less alert than other commercial applications. As such, allowing a lesser system in residential occupancies is not appropriate for this jurisdiction.

11.3.1.3

11.3.1.3 Unless the requirements of 11.3.1.4 are met, the minimum required discharge from each ~~of the four most demanding sprinklers~~ sprinkler shall be the greater of the following:

(1) In accordance with the minimum flow rates indicated in the individual listings

(2) Calculated based on delivering a minimum of 0.1 gpm/ft^2 (4.1 mm/min) over the design area in accordance with the provisions of 8.5.2.1 or 8.6.2.1.2.

Justification: This amendment is intended to provide consistency for regional application of codes. The intent of the amendment is to eliminate the use of the four head calculation method for residential occupancies. This is a companion proposal to the proposal made for Section 11.3.1.1. This amendment is required to coordinate with that amendment for Section 11.3.1.1, should that amendment be approved.

11.3.3.1

11.3.3.1 Sprinklers in a water curtain such as described in 8.15.4 ~~or~~ , 8.15.16.2 or 8.15.23 shall be hydraulically designed to provide a discharge of 3 gpm per lineal foot (37L/min per lineal meter) of water curtain, with no sprinklers discharging less than 15 gpm (56.8 L/min) or per the listing requirements of the specific head being used.

Justification: The purpose of this amendment is to ensure that sprinklers used as alternates for passive protection are listed for the purpose. This is a companion to the amendment for Section 8.15.23.

11.3.3.3

11.3.3.3 ~~If a single fire can be expected to operate sprinklers within the water curtain and within the design area of a hydraulically calculated system,t~~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.

Justification: The purpose of this amendment is to remove the ambiguity from the code section. This change forces all designers to hydraulically calculate the sprinkler system using both the water curtain and the remote area, thus providing a conservative design.

11.3.5

11.3.5 NONSTORAGE OCCUPANCIES WITH HIGH CEILINGS

11.3.5.1 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.

11.3.5.2 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.

11.3.5.3 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.

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

Justification: NFPA 13 has significant data for sprinkler protection of storage commodities in high-ceiling areas, but does not provide additional guidance for sprinkler protection in non-storage high-ceiling areas.

Tests after the McCormick Place Fire show the need for increased remote areas for tall ceilings. That is the basis for the increases in remote area for the light and ordinary occupancies shown in proposed section 11.3.5.1.

In all, the dynamics of fire in tall spaces call for increased water droplet size. In tall spaces, the forces of fire plumes are greater, and the water droplet has farther to travel in order to reach the fire. In order to have the water droplet be able to penetrate the plume intact and reach the fire, larger droplets are necessary. This is the basis for the larger k-factor and the limit on sprinkler pressure in proposed sections 11.3.5.1 and 11.3.5.2.

Delays in sprinkler activation due to loss of heat in the fire plume necessitate the higher remote areas. These remote area increases are shown in proposed section 11.3.5.1. After a height of 50 feet, there is concern that activation of sprinklers may take longer than is feasible for responsible fire protection. For that reason, analysis is required for spaces with ceiling heights over 50 feet in proposed section 11.3.5.2.

Finally, there is a requirement for analysis for extra hazard occupancies with ceiling heights exceeding 25 feet. It is recognized that the same inherent hazards of tall ceilings are present in extra hazard occupancies. However, there is little available test data providing guidance on protection for extra hazard occupancies with tall ceilings. As such, all extra hazard occupancies with ceilings over 25 feet require additional analysis prior to approvals.

11.3.6

11.3.6 SPRINKLER PROTECTION FOR EXHIBITION SPACES AND STAGES WITH FLY GALLERIES

11.3.6.1 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.

11.3.6.2 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.

11.3.6.3 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.

Justification: Portions of this proposal are derived from FM data sheets on non-storage areas with high floor to ceiling clearance. The intent of the amendment is to address fire sprinkler requirements for high-ceiling spaces for exhibition spaces and for stages with fly loft areas. NFPA 13 has significant data for sprinkler protection of storage commodities in high-ceiling areas, but does not provide additional guidance for sprinkler protection in non-storage high-ceiling areas.

During development of the Boston Convention Center, FM Global did several tests to determine sprinkler effectiveness. FM Global performed tests under a 60 foot ceiling of typical exhibit spaces. The results of the test led to criteria from FM, requiring a minimum density of 0.45 gpm/ft^2, a design area of 5,000 square feet, extra-large orifice heads (k=11.0), quick response sprinklers, a hose stream demand of 500 gpm, and a maximum sprinkler pressure of 30 psi. Later these criteria have been incorporated into FM Data Sheet 3-26, which is currently published. The criteria being presented in this amendment follow directly from the criteria for non-storage occupancies, heavy loading. In addition, the 30 psi limit for each head is added to ensure large droplet sizes.

In all, the dynamics of fire in tall spaces call for increased water droplet size. In tall spaces, the forces of fire plumes are greater, and the water droplet has farther to travel in order to reach the fire. In order to have the water droplet be able to penetrate the plume intact and reach the fire, larger droplets are necessary. This is the basis for the larger k-factor and the limit on sprinkler head pressure.

This amendment is being presented solely for exhibition spaces and for stages with fly galleries. Exhibition spaces are considered to be spaces where large exhibits, such as manufactured housing, boats, vehicles, multi-story exhibit booths, and other similar large displays are possible. In general, the space would have to allow for vehicles to drive into. Meeting rooms that do not have roll-up doors are not considered exhibition spaces. Current spaces that would be considered exhibition spaces would be the Las Vegas Convention Center, the Sands Expo, the Mandalay Bay convention center, and the MGM Grand Convention Center, to name a few. The lack of controls over what is allowed on the floors, and the fact that the spaces are constructed to handle large displays, lead to the need for this amendment.

In similar fashion, stages that are equipped with fly lofts is also being proposed for this amendment. Fly lofts are considered elevated walking areas that can support stage equipment and storage of props for “flying” into the stage box. Typically these are on grid floors. Stage props are not typically reviewed for flammability, and the amount of props on stage is not limited. Further, with fly galleries, there is the ability to deliver large props to the stage, and often there will be multiple back drops that can obstruct sprinkler coverage. Due to

the number and types of props that can occur on large stages, and the back drops that obstruct sprinklers, this amendment is necessary.

12.9.2

12.9.2 The following unsprinklered concealed spaces shall not require a minimum area of sprinkler operation of 3000 ft² (279 m²):

12.9.2(1) Noncombustible ~~and limited-combustible~~ concealed spaces with minimal combustible loading having no access. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

12.9.2(2) Noncombustible ~~and limited-combustible~~ concealed spaces with limited access and not permitting occupancy or storage of combustibles. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

12.9.2(3) (*No Change*)

12.9.2(4) Light or ordinary hazard occupancies where noncombustible ~~or limited-combustible~~ ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.8 m3) or less in volume, including space below insulation that is laid directly on top or within the ceiling joist in an otherwise sprinklered attic.

12.9.2(5) ~~Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less and the materials have been demonstrated to not propagate fire when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed in the space~~.

12.9.2(6) ~~Concealed spaces in which the exposed materials are constructed entirely of fire-retardant treated wood as defined by NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials.*~~

12.9.2(7) (*No Change*)

12.9.2(8) (*No Change*)

12.9.2(9) (*No Change*)

12.9.2(10) Light or ordinary hazard occupancies where non-combustible ~~or limited-combustible~~ ceilings are attached to the bottom of composite wood joists either directly or on to metal channels not exceeding 1 in. (25.4 mm) in depth, provided the adjacent joist channels are firestopped into volumes not exceeding 160 ft³ (4.5 m³) using materials equivalent to ½ in. (12.7 mm) gypsum board and at least 3 ½ in. (90 mm) of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels.

Justification: This amendment is intended to provide consistency for regional application of codes. to remove the term "limited-combustible". The committee feels that allowing unprotected combustibles in concealed space is not warranted, and therefore wanted to maintain the existing amendment. Further, the committee continues the deletion of allowing materials with a flame spread of 25 and fire-retardant wood in concealed spaces without sprinkler protection.

22.15.2.2.1.3.1

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

Justification: This amendment requires chute sprinklers be fed off of separate dedicated sprinkler supply risers. The chute is a separate compartment within buildings that transverses multiple floor levels. If a chute fire is to occur, it is expected that more than one chute sprinkler may activate. If the chute sprinklers are fed off of the floor system, responding fire service would have indication of a fire that has penetrated multiple floors, as evidenced from activation of water flow switches on separate floor levels. By restricting the chute sprinkler supply to a separate riser, activation of multiple floor level systems is eliminated, and the response time to the true fire location is decreased by providing correct information to responding fire service

22.38

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:

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 classified as Ordinary Hazard Group I. Commercial style QR sprinkler heads are required.
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.

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.

Justification: This amendment is intended to provide consistency for regional application of codes.. The purpose of the amendment is to provide design criteria for single family homes that are required to be protected in accordance with the protection requirements of NFPA 13D.

23.1.3

23.1.3 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 and occupant
(2) Location, including street address
(3) Point of compass
(4) Full height cross section, or schematic diagram, including structural member information is required for clarify and including ceiling construction and method of protection for nonmetallic piping
(5) Ceiling/roof heights and slopes not shown in the full height cross section
(6) Location of partitions
(7) Location of fire walls
(8) Occupancy class, label and name of ~~each~~ all areas or rooms
(9) Location and size of concealed spaces, closets, attics, and bathrooms
(10) Any small enclosures in which no sprinklers are to be installed
(11) Size of city main in street and whether dead end or circulating; if dead end, direction and distance to nearest circulating main; and city main test results and system elevation relative to test hydrant
(12) Other sources of water supply, with pressure and elevation
(13) Make, type, model, and nominal K–factor of sprinklers including sprinkler identification number
(14) Temperature rating and location of high-temperature sprinklers
(15) Total area protected by each system on each floor
(16) Number of sprinklers on each riser per floor
(17) Total number of sprinklers on each dry pipe system, preaction system, combined dry pipe-preaction system, or deluge system
(18) Approximate capacity in gallons of each dry pipe system
(19) Pipe type and schedule of wall thickness
(20) 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
(21) Location and size of riser nipples
(22) Type of fittings and joints and location of all welds and bends. The contractor shall specify on drawing any sections to be shop welded and the type of fittings or formations to be used
(23) Type and locations of hangers, sleeves, braces, and methods of securing sprinklers when applicable
(24) All control valves, check valves, drain pipes, and test connections
(25) Make, type, model, and size of alarm or dry pipe valve
(26) Make, type, model, and size of preaction or deluge valve
(27) Kind and location of alarm bells
(28) Size and location of standpipe risers, hose outlets, hand hose, monitor nozzles, and related equipment
(29) Private fire service main sizes, lengths, locations, weights, materials, point of connection meters, and valve pits; and the depth that the top of the pipe is laid below grade
(30) Piping provisions for flushing
(31) 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
(32) For hydraulically designed systems, the information on the hydraulic data nameplate
(33) A graphic representation of the scale used on all plans
(34) Name, ~~and~~ address, phone number, and contractor's license number of sprinkler contractor
(35) Nevada State Fire Marshal registration number
(36) Signature and NICET number, or engineer's seal, of the designer
(37) General notes as required by the AHJ
(38) Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets
(39) The minimum rate of water application (density or flow or discharge pressure), the design area of water application, in-rack sprinkler demand, and the water required for hose streams both inside and outside

(40)The total quantity of water and the pressure required noted at a common reference point for each system
(41)Relative elevations of sprinklers, junction points, and supply or reference points
(42)If room design method is used, all unprotected wall openings throughout the floor protected
(43)Calculation of loads for sizing and details of sway bracing
(44)The setting for pressure-reducing valves
(45)Information about backflow preventers (manufacturers, size, type)
(46)Information about antifreeze solution used (type and amount)
(47)Size and location of hydrants, showing size and number of outlets and if outlets are to be equipped with independent gate valves. Whether hose houses and equipment are to be provided, and by whom, shall be indicated. Static and residual hydrants that were used in the flow tests shall be shown
(48)Utility plans and/or plumbing plans necessary to show connection from water supply to fire sprinkler system
(49)Size, location, and piping arrangement of fire department connections
(50)Ceiling/roof heights and slopes not shown in the full height cross section
(51)Edition year of NFPA 13 that the sprinkler system is designed to.

Justification: The purpose of this amendment is to provide guidance to designers as to the necessary information required for working plans.

22.2.1

23.2.1 Water Supply Capacity Information. The following information shall be included:

(1) Location and elevation of static and residual test gauge with relation to the riser reference point
(2) Flow location
(3) Static pressure, psi (bar)
(4) Residual pressure, psi (bar)
(5) Flow, gpm (L/min)
(6) Date
(7) Time
(8) ~~Test conducted by or information supplied by~~. Flow tests shall be witnessed by the Authority Having Jurisdiction
(9) Other sources of water supply, with pressure or elevation

Justification: The purpose of this amendment is to clarify that flow tests are to be witnessed by the AHJ.

23.4.1.6

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

Justification: The purpose of this amendment is to limit the velocity in calculations, due to issues with accuracies in the calculations. As such, there is a need for this limit.

23.4.1.7

23.4.1.7 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.

Justification: This amendment is intended to provide consistency for regional application of codes. This is a companion amendment to proposed Section 23.4.1.6. The city supplies available in this valley fluctuate through the day, with the range in pressure movement exceeding several psi. In addition, as discussed in the justification for proposed Section 23.4.1.6, the use of Hazen-Williams equations bring with it an uncertainty in determining the true friction loss. The use of a safety factor will aid to overcome these deficiencies. In addition this is a State Fire Marshal regulation

25.2.3.2.2

25.2.3.2.2 The test shall measure the time to trip the valve and the time for water to be discharged from the inspector's test connection. The flow from the inspector's test shall be predominantly continuously flowing water with small amounts of air permitted. All times shall be measured from the time the inspector's test connection is completely opened.

Justification: This amendment is intended to provide consistency for regional application of codes. The purpose of this amendment is to define the point when timing is to be ceased when testing the trip time for a dry valve. During testing of dry systems, there are often spurious spurts of water that are delivered prior to achieving continuous water flow. These are not viewed as water delivery, and the spurious water should not be used to stop timing. After continuous water delivery is achieved, there may still be small amounts of air due to discharge of small air pockets. The amendment therefore is written to allow for small amounts of air.

25.2.3.2.2.1

25.2.3.2.2.1 Dry systems calculated for water delivery in accordance with 7.2.3.6 shall be required to prove the ~~exempt from any~~ specific water delivery time requirement set forth in 7.2.3.5 and 7.2.3.7.

Justification: This amendment addresses the testing requirements for dry systems designed for water delivery through calculation. This amendment follows amendments made to 7.2.3 requiring dry systems designed by calculation to be proven by a physical flow test.

25.5.1

25.5.1 The installing contractor shall identify a hydraulically designed sprinkler system with a machine-engraved ~~permanently marked~~ 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 ~~approved~~ 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.

Justification: This is not only required, but extremely important information for field inspection personnel to have while conducting inspections. This is in a sense the birth certificate of the sprinkler system and gives the Inspector immediate knowledge of what the sprinkler system is capable of producing. Rather than do research after the fact and leave a hazard for any period of time, an Inspector will have a very good general idea of how high storage can be within a building as well as what type(s) of commodities can be properly protected and to what height. It is essential that this permanent record be just that and remain permanently on the property and always be legible.

For years, these plates have been installed as a sticker using permanent marker or a metal plate using a scribing tool. The areas where these signs are hung are generally dusty and/or exposed to the extreme heat of the Las Vegas Valley. Our findings have shown that permanent marker is good for less than five (5) years when these are regularly exposed to these conditions. Two other problems are consistently noted with these plates being installed with permanent marker or a scribing tool. The first deals with those written in permanent marker. Not everyone prints well and the information required often cannot be written small and legibly enough with a permanent marker or a scribing tool to make the information permanently readable. The same applies to the scribing tools as well as the fact that most scribing tools etch very thin lines that again are not readable. People often make mistakes with these also which leads to other issues with their readability.

25.6.1

25.6.1 The installing contractor shall provide a general information sign used to determine system design basis and information relevant to the inspection, testing, and maintenance requirements required by NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

25.6.1.1 Such general information shall be provided with a ~~permanently marked~~ 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.

Justification: This is a companion to the amendment for 25.5. The purpose of this amendment is to make the sign permanent to facilitate use in future years. In addition, this amendment allows for the two signs to be combined, where applicable.

NFPA 13D

1.1.1

1.1.1 This standard shall cover the design and installation of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.

When sprinkler protection is being provided to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the minimum design criteria shall be as outlined in Section 8.7 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC.

Justification: This amendment is intended to provide consistency for regional application of codes. The purpose of this amendment is to indicate that the scope of NFPA 13D may be used to address fire code issues, such as fire flow, number of fire hydrants, and fire access, but only when the system is designed in accordance with Section 8.7. A companion amendment for a new Section 8.7 is proposed.

The fire code provides deviations in code requirements for fire flow, fire hydrants, and fire access, when the building in question is "protected throughout" with fire sprinklers. The focus of both NFPA 13D and NFPA 13R are for life safety, and not for property protection. These designs allow for a multitude of unsprinklered areas. Therefore, the use of the base codes of NFPA 13D and 13R appear to be inappropriate when modifying fire flow, fire hydrant, fire access requirements.

The protection matrix calls for increases in sprinkler protection over the base NFPA 13D and NFPA 13R base documents. With these increases, the use of amended NFPA 13D and NFPA 13R are deemed acceptable to allow trade-offs in the fire code

3.3.11.4

3.3.11.4 ***Network System.*** A type of multipurpose system utilizing a common piping system supplying all domestic fixtures and fire sprinklers ~~where each sprinkler is supplied by a minimum of three separate paths~~.

Justification: The definition is modified to correlate with the amendments to Section 6.3, 6.3.1, and 6.3.2

4.5

4.5 Working Plans ~~Documentation~~

~~Documentation shall be available on request to ensure adequate water supply, listed devices, and adequate sprinkler coverage have been addressed.~~

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.

Justification: There is little difference in the basic details of information expected to be shown on sprinkler plans submitted to the AHJ, regardless of whether the system is 13D, 13R, or 13 design. However, these three codes have drastically different lists of required information. The intent of this amendment is to update the list of items required on plans so that submittals for 13-D systems are similar to submittals for 13 systems

6.2.3.1

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

Justification: This change requires that sprinkler systems be controlled with the same valve as the domestic supply. This will prevent homeowners from shutting down their sprinkler system and keep the system in disrepair

6.3.1

6.3.1 A multipurpose piping system shall be installed in accordance with 6.3~~.2~~ through 6.6~~.5.4~~

Justification: In order to accommodate changes for the various multipurpose systems, an additional section 6.6 is added. This change is needed to reference the correct sections

6.3.1.1

6.3.1.1 All one and two-family dwellings sprinkler systems supplied by the water purveyor shall be multi-purpose, in accordance with this section. This requirement applies both to systems fed with a single-outlet water meter and to systems fed with a dual-outlet water meter, which may be required by the water purveyor.

Justification: Sets the requirements that all 13D systems must be multi-purpose

6.5

6.5 ~~Common Supply Pipes~~ 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 6.5.7.

6.5.1 ~~Where common supply pipes serve both fire sprinkler and domestic use, they shall comply with 6.5.2 and 6.5.3.~~ An accessible check valve shall be installed on the fire sprinkler riser to maintain system pressure.

6.5.2 ~~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.~~ A minimum demand of 5 gpm (19 L/min) shall be added to the sprinkler system demand at the point of domestic 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.

6.5.3 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.

~~6.5.3 Where water treatment and filtration are installed, one of the following conditions shall be met:~~

~~(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.~~

6.5.4 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

Justification: The title of the section is changed to "Passive Purge Multipurpose Systems" and language regarding the applicability of that system is added.

Section 6.5.1 is amended to insert a requirement for a check valve. The check valve is required for these "separate" systems to maintain pressure in the fire sprinkler lines.

The change to 6.5.2 is an existing amendment. The intent of the amendment is to require that a 5 gpm domestic demand be added to all designs of NFPA 13D sprinkler systems. Base code only addresses the domestic demand when the system is shared by two or more dwellings. However, domestic demand occurs in every dwelling, even when the system is only designed to serve one dwelling. The domestic usage increases the water that must flow through the system components, such as water meters. Not addressing the domestic demand could result in there being too little pressure for system operation during a fire incident. Using the 5 gpm is very liberal, as the domestic demand could easily exceed this amount. Using the Tables A.6.6.5(a) and A.6.6.5(b) from NFPA 13R, the domestic demand for a single house can be estimated to be between 10 and 15 gpm. The requirement to have the domestic demand at the discharge side of the water meter is due to the design of the water meter as stipulated herein.

The change to 6.5.3 is to address the single-outlet meter that is commonly used in current designs. The design allows a valve on the meter to shut off both domestic and fire sprinkler supplies. The domestic system will serve all fixtures except the master bathroom toilet. The deletion is because this warning sign is not applicable to the "separate" systems, as any such devices discussed in the base code would be added downstream of the fire sprinkler supply, and therefore would not affect the fire sprinkler design.

The change to 6.5.4 is intended to require separate underground supplies after the meter, with a valve on the domestic side. The purpose of this is to allow for a water purveyor to shut off the domestic feed (for repair or non-payment), while still allowing the fire sprinkler system to operate, with minimal cold water domestic fixtures still supplied. The section refers to a UDACS plate that will show the design of the water meter. The deletion is because these devices would be installed downstream of the fire sprinkler riser, and therefore would not affect the fire sprinkler system design.

The addition of 6.5.5 is to indicate that no backflow preventers, water treatment devices, or pressure reducing valves are allowed on the fire sprinkler system. The use of backflow preventers is prohibited to ensure avoid pressure losses that occur with backflow preventers. The deletion of the water treatment device is to make sure that the sprinkler water is not inhibited in delivery of water supply. The water treatment device, if desired, can still be added after the sprinkler system and prior to the toilet. The deletion of the pressure reducing valve

prior to the sprinkler system is to allow for all of the available pressure to go to the sprinkler systems. A pressure reducing valve may still be required prior to the domestic fixtures.

The addition of 6.5.6 is to require that system piping be looped, with maximum dead-end lengths of 50 feet. The purpose of this is to ensure that the water throughout the system is being circulated, to avoid designs where the connection between the sprinkler system and the domestic fixtures is not designed to circulate all sections of pipe. Multiple 50 feet lengths of dead-end pipe are permitted to allow piping over and down to specific head locations.

The addition of 6.5.7 is to require that the connection between the sprinkler system and the domestic supply by way of connection to the toilet in the master bathroom. The method in which this connection is made is not discussed here, and is left to the plumbing codes.

The addition of 6.5.8 is intended to provide consistency for regional application of codes. The code does not discuss pressure gauges for wet systems. Having a gauge on the system side of the check valve allows for verification that sufficient pressure is available for system operation

6.6

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 6.6.7

6.6.1 A minimum demand of 5 gpm (19 L/min) shall be added to the sprinkler system demand at the point of domestic 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.

Justification: A new section 6.6 is introduced, entitled "Network Multipurpose Systems". With the title is discussion about applicability of this system. Note that the system is not permitted where the water purveyor requires a dual-outlet meter, since the dual-outlet meter is used to allow for shutting off domestic supply while maintaining fire sprinkler system supply, which can not be accomplished with networked systems.

Section 6.6.1 is a reprint of an existing amendment. The intent of the amendment is to require that a 5 gpm domestic demand be added to all designs of NFPA 13D sprinkler systems. Base code only addresses the domestic demand when the system is shared by two or more dwellings. However, domestic demand occurs in every dwelling, even when the system is only designed to serve one dwelling. The domestic usage increases the water that must flow through the system components, such as water meters. Not addressing the domestic demand could result in there being too little pressure for system operation during a fire incident. Using the 5 gpm is very liberal, as the domestic demand could easily exceed this amount. Using the Tables A.6.6.5(a) and A.6.6.5(b) from NFPA 13R, the domestic demand for a single house can be estimated to be between 10 and 15 gpm. The requirement to have the domestic demand at the discharge side of the water meter is due to the design of the water meter as stipulated herein.

Section 6.6.2 is to address the single-outlet meter that is commonly used in current designs. The design allows a valve on the meter to shut off both domestic and fire sprinkler supplies. The domestic system will serve all fixtures and all fire sprinklers.

Section 6.6.3 clarifies that if a dual-outlet meter is required by the water purveyor, then a network system is not permitted, since network systems by definition combine all of the domestic fixtures with the fire sprinkler system.

Section 6.6.4 clarifies how network systems must be piped.

Section 6.6.5 requires a full flow test to be performed on network systems, as these systems are quite difficult to inspect in the field. The full flow test assures the fire code official that the system is correctly designed.

Section 6.6.6 is relating to warning signs discussing the addition of water filtration devices.

Section 6.6.7 is a reprint of the base code relating to how water filtration devices are to be installed.

Section 6.6.8 is intended to provide consistency for regional application of codes. The code does not discuss pressure gauges for wet systems. Having a gauge on the system side of the check valve allows for verification that sufficient pressure is available for system operation.

7.1.1 A single control valve arranged to shut off both the domestic system and the sprinkler system shall be installed ~~unless a separate shutoff valve for the sprinkler system is installed in accordance with 7.1.2~~.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to eliminate an option to have the sprinkler system on a separate control valve than the domestic water system. Having a separate valve for the sprinkler system could lead to a situation where the sprinkler control valve is left closed. Requiring a single control valve for both the domestic and sprinkler supply is seen as being more reliable, as there is less fear that the sprinkler control valve will be shut, due to the need to maintain flow through domestic fixtures

7.1.2

7.1.2 The sprinkler system piping shall not have a separate control valve installed ~~unless supervised by one of the following methods:~~

~~(1) Central station, proprietary, or remote station alarm service~~
~~(2) Local alarm service that causes the sounding of an audible signal at a constantly attended location~~
(3) ~~Valves that are locked open~~

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to eliminate an option to have the sprinkler system on a separate control valve than the domestic water system. Having a separate valve for the sprinkler system could lead to a situation where the sprinkler control valve is left closed. Requiring a single control valve for both the domestic and sprinkler supply is seen as being more reliable, as there is less fear that the sprinkler control valve will be shut, due to the need to maintain flow through domestic fixtures. This is a companion amendment to a proposal for Section 7.1.1

7.7

7.7 ~~Attics.~~ Unconditioned Spaces

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

Justification: The IECC (energy code) requires water piping installed in unconditioned spaces to be insulated to a minimum R-2 level. Fiberglass insulation with a depth of 1 inch would provide more than R-2 insulation. Commonly available tube insulation also provides R-2 insulation. The committee feels that this provision should apply to all unconditioned spaces where pipe passes through, not just attics

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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to require that an approved report be provided prior to installing fire sprinklers outside of their listing. The base code allows for the installation of fire sprinklers outside of their listing, but does not provide guidance on the limitations of this provision. Requiring the report will provide guidance on acceptable methods of installation, even if outside of the listing of the fire sprinkler

8.3.4.1

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

Justification: A fire in a garage without fire sprinklers with habitable rooms above it can undermine the structural integrity of the habitable rooms above and increase the risk of occupants within those rooms not being able to exit the structure safely.

Also, having this new section will allow a proposal to be submitted to the I.R.C committee regarding section R302.6 which requires no fire separation between the garage and dwelling unit wall adjacent to it, but does require 5/8" Type X gypsum board to separate garage and all habitable rooms above the garage. As a trade off of having fire sprinklers in the garage, we can propose to remove the 5/8" Type X gypsum board requirement.

Lastly, single story garages without habitable rooms above them typically are not insulated. Not requiring fire sprinkler in these garages helps solve the freezing issue

8.4

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 section 8.3, and 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

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.

Justification: The purpose of this amendment is to provide for minimum protection features for residential homes to still allow application of trade-offs provided for in the Fire Code. For instance, the Fire Code allows reduction in required fire flow for structures when they are fire sprinklered. However, the intent of the typical 13D system for residential is for life-safety purposes only. While the system can provide some property protection, the value of that protection decreases as the home size becomes larger. While there is some comfort in allowing the trade-offs in small homes that are protected solely with the basic NFPA 13D system, this comfort level decreases with larger homes. As such, the protection matrix requires additional protection for larger homes. In particular, homes that are larger than 5,000 square feet but less than10,000 square feet require protection in accordance with enhanced NFPA 13D. Homes less than 5,000 square feet are deemed small enough to not require additional protection higher than what is provided by the base NFPA 13D system

10.1.1.1

10.1.1.1* The system shall provide at least the flow required to produce a minimum discharge density of 0.05 gpm/ft^2 (2.04 mm/min) or the sprinkler listing, whichever is greater, to the design sprinklers including fire sprinklers required in garages per section 8.3.4.1.

Justification: Separate from the mitigation/protection matrix, it is proposed that the garages to be protected at the same density as the rest of the house.

Per appendix A.8.6.4 although NFPA 13D does not require garages to be sprinklered, some authorities having jurisdiction take it upon themselves to add this requirement locally. In such circumstances, residential or quick-response sprinklers with a two sprinkler design in the garage with the same piping used in the rest of the dwelling may be used. It is recognized that residential sprinklers have not been tested specifically for fires in garages, but field experience has shown that the sprinklers help to alert occupants to the fact that there is a fire, can reduce the possibility of flashover, and can improve the chances for occupants to escape. The 0.05 gpm/ft^2 density is also allowed by Section 6.8.3 of NFPA 13R

Also at a 0.15 protection density as proposed in the mitigation matrix, there are limitations that are put forth on the single family system. With ¾" water meters, fire sprinklers in the garage at a 0.15 density must be spaced at maximum of 83 s.f. utilizing 4.2K factor heads. This adds costs to the fire sprinkler system and makes the use of ¾" water meters very difficult.

Lastly, per section 7.5.3 and 7.5.4, commercial QR fire sprinkler heads are only allowed as dry heads and in mechanical closets.

As long as the occupants can exit the structure, then the system has done its job. Especially when we are requiring fire sprinkler in an area that otherwise would have none.

12.1

12.1 The installer shall provide to the owner/occupant instructions on inspecting, testing, and maintaining the system. <u>The instructions shall be attached to the riser or the inside of the panel access door. The instructions shall be weatherproof.</u>

Justification: With tract homes the owner at the final is not the long term owner or even who the next owners maybe over the life of the house. By mounting the information at the riser (inside the door cover) the information will stay with the system. The intent of calling for weatherproof information is to require that a laminated sheet or a weatherproof sticker be provided, either inside the panel door, or directly on the riser

NFPA 13R

1.1

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 ~~four~~ stories in height in buildings not exceeding 60 ft (18m) in height above grade plane. Residential occupancies three or more stories in height shall be protected throughout in accordance with NFPA 13.

When sprinkler protection is being provided to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access for single-family residential occupancies, the minimum design criteria shall be as outlined in Section 7.6 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC.

Justification: There are two intents with this amendment. The first is to change the scope of NFPA 13R to cover only residential occupancies that are one or two stories in height. Residential occupancies that are three of more stories in height are then required to be under the scope of NFPA 13. This amendment is similar to a code provision that is in the State Fire Marshal regulations.

The second intent is to indicate that 13R can be used for the protection matrix that is located in Section 7.5. The mitigation matrix is used when sprinkler systems are used in lieu of fire flow, hydrants provided, and fire access for single-family residences.

5.1.3

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. 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 200), or 50 psi greater than the system design pressure, whichever is greater.

Justification: This amendment intends to require higher pressure ratings for underground lines that can be fed by Fire Department Connections. Delivery of water at Fire Department Connections can cause pressures that exceed 150 psi. Typically, use of 200 psi rated line can withstand the pressures delivered at the FDC. However, when higher pressures are required at the FDC due to system demands, the underground line is required to be listed for 50 psi above that demand pressure. The 50 psi above design pressure is to allow for pipe to be listed for the pressure used during the hydrostatic test. This is identical to an amendment to NFPA 13, Section 6.1.3.

5.2.1

5.2.1 Pipe or tube used in sprinkler systems shall be of the materials specified in Table 5.2.1 or in accordance with 5.2.2. Piping shall have corrosion resistance ratio (CRR) of 1 or more.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to utilize the same limitation on pipe wall thickness as is used in the NFPA 13 standard

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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to require that an approved engineer report be provided prior to installing fire sprinklers outside of their listing. The base code allows for the installation of fire sprinklers outside of their listing, but does not provide guidance on the limitations of this provision. Requiring the engineer analysis will provide guidance on acceptable methods of installation, even if outside of the listing of the fire sprinkler

6.6.4

6.6.4 Sprinklers shall be installed in any closet used for heating and air-conditioning equipment, washers, dryers, ~~or~~ water heaters, ~~except as permitted by 6.6.7~~ or containing fuel-fired equipment

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to indicate that sprinkler protection is required for areas that contain fuel-fired equipment

6.6.6.1

6.6.6.1 Protection of Fuel-Fired Equipment. ~~When fuel-fired equipment is present, at least one quick-response intermediate temperature sprinkler shall be installed above the equipment.~~ Where protection of fuel-fired equipment is required by 6.6.4, 6.6.6 and 6.6.7, sprinkler protection shall be provided in accordance with the following:

(1) At least one quick-response sprinkler with a minimum k-factor of 5.6 shall be provided above the fuel-fired equipment. Sprinklers shall be sufficient to cover the fuel-fired equipment protection area, which is equal to the entire perimeter of the fuel-fired equipment when viewed on a plan view.
(2) Where the sprinkler(s) protecting the fuel-fired equipment is located under a ceiling with slope equal to or greater than a 4:12 pitch, a minimum of one sprinkler shall be located above the edge of the fuel-fired equipment protection area, on the upslope side of the equipment.
(3) Freeze protection shall be provided in accordance with 5.4.2.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to provide minimum design requirements for protection of fuel-fired equipment. Sections 6.6.6 (and proposed 6.6.7) require protection in spaces that contain fuel-fired equipment. However the base code does not provide criteria for protection of these spaces. One interpretation of this code section would indicate that the entire space would need to be provided with fire sprinklers. However, this is not seen as prudent, as it could lead to requiring sprinklers throughout an attic simply due to having a few pieces of fuel-fired equipment in a small portion of the attic. Therefore, this code section is proposed to simply indicate that a minimum of

one sprinkler head be located above the fuel-fired equipment. Additional sprinkler heads may be required if there are multiple pieces of equipment, which would together form an area that is called "fuel-fired equipment protection area" and is simply an area with boundaries that contain all fuel-fired equipment within those boundaries. Where there is a slope to the roof, it is felt that the heat from fire will travel up the slope of the roof. Therefore, the proposal requires that in cases where the slope exceeds 4:12, then at least one of the sprinkler heads need to be located at the edge of the protection area on the upslope side, in order to ensure that a head activates. Since many fuel-fired equipment will be located in areas that are subject to freezing, it is helpful to restate that freeze protection must be provided for sprinkler systems designed to NFPA 13R requirements

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.

Justification: This amendment is intended to provide consistency for regional application of codes. The purpose of this amendment is to address a requirement for protection of fuel-fired equipment. From section 6.6.6 of NFPA 13R, concealed spaces that contain fuel-fired equipment require sprinkler protection within that space. This amendment is intended to extend that level of protection to the closets on the exterior balconies

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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to utilize the same limitation on pipe wall thickness as is used in the NFPA 13 standard

6.8.2

6.8.2 The sprinkler system piping shall not have a separate control valve installed unless supervised by a ~~one of the following methods:~~

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

~~(2) Local alarm service that causes the sounding of an audible signal at a constantly attended location~~

~~(3) Valves that are locked open~~

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to indicate that when sprinkler control valves are installed, they are required to be electrically supervised, and that the other methods of supervision that are listed in base NFPA 13R are not permitted to be used for the purpose of supervision

6.15

~~**6.15 Drop Out Ceilings.** Drop out ceilings shall be permitted to be installed beneath sprinklers where ceilings are listed for that service and are installed in accordance with their listings.~~

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to eliminate the use of drop-out ceilings below fire sprinklers. The geometry that can occur with drop-out ceilings could lead to unacceptable sprinkler obstructions. This proposal mirrors a similar deletion of drop-out ceilings from NFPA 13

7.1.1.4

7.1.1.4 Systems installed in accordance with the single family residential protection matrix (Section 7.6) shall not require monitoring.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to address the 13R systems that are installed in single-family dwellings for the purposes of size. This does not exempt monitoring of systems installed in single-family homes that are used as care facilities, which are seen as more commercial in nature

7.6

7.6 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 7.6 shall be applied.

Table 7.6 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.

7.6.1 Enhanced 13R Design. When Table 7.6 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.

7.6.2 Other Protection Designs. For other protection designs listed in Table 7.6, see the respective revised codes for NFPA 13 and NFPA 13D minimum design requirements.

Justification: The purpose of this amendment is to provide for minimum protection features for residential homes to still allow application of trade-offs provided for in the Fire Code. For instance, the Fire Code allows reduction in required fire flow for structures when they are fire sprinklered. However, the intent of the typical 13D system for residential is for life-safety purposes only. While the system can provide some property protection, the value of that protection decreases as the home size becomes larger. While there is some comfort in allowing the trade-offs in small homes that are protected solely with the basic NFPA 13D system, this comfort level decreases with larger homes. As such, the protection matrix requires additional protection for larger homes. In particular, homes that are larger than 10,000 square feet require protection in accordance with NFPA 13R

8.1.7

8.1.7 Sprinkler plans shall indicate the following:

1. 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 clarify 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 fire walls.
8. Location of partitions, lintels, and doorways. Lintel openings require a cross section view to indicate the area of the opening.
9. Occupancy, label, and name of all ~~each~~ areas or rooms.
10. Location and size of concealed spaces, attics, closets, and bathrooms.
11. Any small enclosures in which no sprinklers are to be installed.
12. Size of city main in street; pressure; whether dead end or circulating, and, if dead end, the direction and distance to nearest circulating main; and city main test results including elevation of the test hydrant.
13. Make, manufacturer, model, type, heat-response element, temperature rating, sprinkler identification number, nominal K-factor, number of sprinklers installed, and nominal orifice size of the sprinkler.
~~14. Temperature rating and location of high-temperature sprinklers~~
~~15. Number of sprinkler on each riser, per floor~~
14. Type ~~Kind~~ and location of ~~alarm bells~~ horn/strobes.
15. Type of pipe and fittings.
16. Pipe type and schedule of wall thickness.
17. Type of protection for nonmetallic pipe.
18. Nominal pipe size with lengths shown to scale.
19. Location and size of riser nipples.
20. Type of fittings and joints and the location of all welds and bends.
21. Type and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable.
22. All control valves, check valves, drain pipes, and test connections.
23. 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.
24. In case of hydraulically designed systems, the information on the hydraulic data nameplate.
25. Name, ~~and~~ address, phone number, and contractor's license number of sprinkler contractor.
26. Nevada State Fire Marshal registration number.
27. Signature and NICET number, or engineer's seal, of the designer.
28. General notes as required by the AHJ.
29. Approximate capacity in gallons of each dry pipe system.
30. Make, type, model, and size of alarm or dry pipe valve.
31. Piping provisions for flushing.
32. 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.
33. A graphic representation of the scale used on all plans.
34. Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets.
35. The minimum rate of water application (density or flow or discharge pressure), the design area of water application, and the domestic demand.
36. The total quantity of water and the pressure required noted at a common reference point for each system.
37. Relative elevations of sprinklers, junction points, and supply or reference points.
38. Information about backflow preventers (manufacturer, size, type).
39. Information about antifreeze solution used (type and amount).
40. Size and location of hydrants, showing size and number of outlets. Static and residual hydrants that were used in flow tests shall be shown.
41. Size, location, and piping arrangement of fire department connections.
42. Location of fuel-fired equipment and heating and air-conditioning equipment.

43. Location of closets on exterior balconies, and a note indicating whether there is any type of door or penetration between the closet and the dwelling unit.
44. Edition year of NFPA 13R to which the sprinkler system is designed.
45. Utility plans and/or plumbing plans necessary to show connection from water supply to fire sprinkler system.

Justification: There is little difference in the basic details of information expected to be shown on sprinkler plans submitted to the AHJ, regardless of whether the system is 13D, 13R, or 13 design. However, these three codes have drastically different lists of required information. The intent of this amendment is to update the list of items required on plans so that submittals for 13-R systems are similar to submittals for 13 systems

3.3.6

3.3.6 High-Rise Building. A building where the floor of an occupiable story is greater than 55 ft (17 m) ~~75 ft (23 m)~~ above the lowest level of fire department vehicle access.

Justification: The intent of this amendment is to define a high-rise the same as is defined by the Building Code and State Fire Marshal regulations

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.

Justification: The intent of this amendment is to allow designers the ability to design systems at pressures exceeding 300 psi. Guidance is given to indicate that the maximum pressure occurs when the fire pump is at zero flow. Schedule 40 is required for higher pressures to ensure pipe suitability and should extend the service life

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.

Justification: The intent of this amendment is to require additional clearance around the hose valve and the hose outlet. 6 inches is required above the face of the valve. The intent of this dimension is to allow hand access to reach over the valve to allow a grip of the valve. 6 inches is required around the outlet to accommodate the use of a spanner wrench for loosening the outlet cap. The door is not to be considered with respect to the clearances from the valve, since the door will be open when the valve is in use

4.8.2

4.8.2 Each fire department connection shall have at least two, and not less than one for each 250 gpm of system demand or fraction thereof, 2 ½ inch (65 mm) internal threaded fittings having NHS threads, as specified in NFPA 1963, *Standard for Fire Hose Connections.* 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)*

Justification: This amendment is new. This amendment requires additional inlets on FDCs to provide a minimum of one for each 250 gpm of flow. The 250 gpm per inlet is derived from manufacturer specification data on preassembled FDCs. The internal check valves are being required to deal with field fabricated FDC assemblies. This mirrors amendments made to NFPA 13

4.8.2.3

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

Justification: The purpose of this amendment is to define the minimum diameter of the FDC line. The break between 4 in and 6 in follows from manufacturer specifications, where preassembled FDCs with four or more inlets have a 6 in outlet. This is similar to amendments made to NFPA 13. Where system design requires supply lines that exceed 6 inches, the proposal requires that the FDC supply line be equal in size to that supply line

5.2.1.2.1

5.2.1.2.1* Piping volume shall not be limited where the system is designed in accordance with Section 5.2.1.2.2. ~~Not more than 750 gal (2839 L) system capacity shall be controlled by one dry pipe valve~~

Justification: The purpose of this amendment (and the companion amendment to NFPA 14 Section 5.2.1.3.2) is to require all systems to meet a 3 minute delivery time, and thus allow dry systems to not be limited. Base NFPA 14 already allows for a system to be unlimited when the 3 minute delivery time is provided. However, base NFPA 14 does not provide a time limit for systems with volume less than 750 gallons. Excessive wait times can be detrimental to suppression crews. The effect of this change is to require all dry standpipe systems to meet a 3 minute delivery time.

5.2.1.2.2

5.2.1.2.2 ~~Piping volume shall be permitted to exceed the requirements of 5.2.1.3.1 where the~~ System design shall be ~~is~~ such that water is delivered to the system at the most remote hose connection in not more than 3 minutes, starting at the normal air pressure on the system and at the time of fully opened hose connection.

Justification: This amendment is new. The purpose of this amendment (and the companion amendment to NFPA 14 Section 5.2.1.3.1) is to require all systems to meet a 3 minute delivery time, and thus allow dry systems to not be limited. Base NFPA 14 allows for a system to be unlimited when a 3 minute delivery time is provided. However, base NFPA 14 does not provide a time limit for systems with volume less than 750 gallons. Excessive wait times can be detrimental to suppression crews

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.

Justification: The intent of this amendment is to require individual control valves in situations where a control valve is fed directly from the feed main. An instance occurred where a hose valve was fed from the feed main and no control valve was present. Maintenance of this hose valve necessitated the shutting down the entire system to the casino and the hotel tower, draining the entire system, replacing the hose valve, and finally filling the system back up. Not having a control valve caused the system to be out of service for approximately 6 hours. The base code Section 6.3.2 seems to indicate that a valve would be required, but this amendment clearly sets forth the requirement

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 ~~one of the following methods:~~

~~(1) A~~ a central station, proprietary, or remote station signaling service

~~(2) A local signaling service that initiates an audible signal to a constantly attended location~~

~~(3) Locking of valves in the open position~~

~~(4) Sealing of valves and an approved weekly recorded inspection where valves are located within fenced enclosures under the control of the owner~~

Justification: This amendment is new. The intent of this amendment is to require that standpipe control valves be monitored electrically at a central, proprietary, or remote station. There is concern about maintenance of the other methods described herein. This mirrors an amendment made to NFPA 13

6.4.5.2.2

~~**6.4.5.2.2** A sign also shall indicate the pressure required at the inlets to deliver the system demand~~

Justification: The purpose of this deletion is to coordinate with the amendment for Section 6.4.5.3. Note that the proposed 6.4.5.3 includes a requirement to put the minimum required pressure on a sign. As such, the base code section 6.4.5.2.2 becomes redundant and is not required.

6.4.5.3

6.4.5.3 Signs shall be provided at fire department connections, indicating the areas of the building served and the minimum required pressure and flow to be delivered through the inlets. Where a fire department connection services multiple buildings, structures, or locations, ~~a~~ the sign shall ~~be provided~~ indicate ~~indicating~~ the buildings, structures, or locations served.

Justification: The purpose of this amendment is to provide minimum information necessary for responding personnel to utilize the FDC. This amendment is a companion to the deletion of Section 6.4.5.2.2.

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.

Justification: The purpose of this amendment is to define criteria for signage that is required by section 6.4.5.3

7.2.1

7.2.1 The maximum pressure at any point in the system at any time shall not exceed 350 psi (24 bar), except where components are rated for higher pressures and are approved by an alternative materials and methods report approved by the authority having jurisdiction.

Justification: The purpose of this amendment is to allow for higher pressures in standpipe systems, so long as the components are rated for such use and are approved by a specific report to address the system design. Forthcoming NFPA 14 and NFPA 20 editions are going to force higher pressures in standpipe systems. Further, there is a desire to allow higher pressures in systems, to allow FDC operations to be conducted from ground level all the way to throughout a building. This amendment will allow for use of new standards and will accommodate FDC operations throughout the building

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) ~~175 psi (12.1 bar)~~, an approved pressure regulating device shall be provided to limit static and residual pressures at the outlet of the hose connection to 200 psi (13.9 bar) ~~175 psi (12.1 bar)~~.

Justification: The purpose of this amendment is to allow higher pressures on the 2-1/2 inch hose valves. There are many reasons for this. First, the equipment carried by firefighters in this jurisdiction is capable of sustaining higher starting/shut-off pressures. Further, by allowing higher static pressures, it is easier for commercially available PRV hose valves to be designed and still meet the 125 psi minimum static pressure

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.

Justification: The intent of this amendment is to restrict the use of direct-acting pressure reducing valves to only those that are capable of being field adjusted. There is concern about the maintenance of pressure-reducing valves, and a desire to provide valves that can be adjusted in the field to meet the needs of responding personnel. This amendment limits direct-acting pressure reducing devices to those that can be adjusted by the field

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 ~~175~~ psi (13.9 ~~12.1~~ 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 ~~to the system side of the outlet isolation valve.~~

(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 ~~in accordance with manufacturer recommendations~~.

(9) Remote monitoring and supervision for detecting high pressure failure of the pressure of the pressure-regulating device shall be provided in accordance with *NFPA 72, National Fire Alarm Code*. Such failure shall be detected by providing a supervisory flow switch downstream on the pressure relief valve.

(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.

Justification: The purpose of this amendment is to provide design criteria for the zone pressure-regulating stations.

Item (1) is amended by requiring that pressure-regulating devices (PRDs) be provided for the full range of anticipated flow, and to require redundancy for each required pressure-regulating device. The purpose for stipulating full range of anticipated flow is to address the most common mistake in sizing PRDs, which is to oversize the device. PRDs have a minimum flow. Therefore, a 6-inch PRD may be able to flow up to 1,000

gpm to satisfy the standpipe requirement, but that 6-inch PRD likely will not flow less than 100 gpm. If the system is expected to supply sprinklers, then small diameter PRDs (say 2-inch diameter) must be provided to allow for flow through of the lowest expected flow. Redundancy is required to address failures that occur with PRDs. PRDs will fail open or will fail close. Providing an automatic bypass to address when a PRD fails closed is addressed by the redundancy requirement.

Item (2) is amended by requiring control valves on both sides of each PRD, and to require that the control valves be provided in a manner to not disable flow through other devices. This is intended for guidance purposes, and to allow for maintenance of any one PRD without disabling the entire supply to the zone.

Item (3) is amended to allow the pressure to be 200 psi at hose valves, consistent with other amendments to NFPA 14.

Item (5) is amended to require the bypass valve to be within 7ft 6 in of the floor. Man access to the control valve is seen as vital, in case the valve needs to be manipulated during an event.

Item (7) is amended to clarify that the fire department connection (FDC) feeds the standpipe risers at the base of the building, and does not feed individual zones after the PRDs. The base code seems to require a FDC supply to each zone, which requires substantial lengths of piping to be sent to all PRDs throughout the building. This is excessive piping, the full volume of which needs to be pressurized in order to allow the FDC to supply flow and pressure to the zone.

Item (8) is amended to provide guidance as to the size of the pressure relief valve, requiring that the relief valve be sized to flow the full anticipated system flow, and to the design of the pressure relief valve, requiring that the relief valve be set to allow a maximum of 200 psi at hose connections on that zone.

Item (9) is amended to provide guidance as to how to detect failure of PRDs. Two methods are required. One is to require a flow switch for piping from the pressure relief valve, indicating that the pressure relief valve has experienced sufficient pressure to open. The second method is to require a pressure switch downstream of the PRDs. The pressure switch is set to 125% of the PRD setting.

Item (10) is added to require a drain line that will be used for testing of the PRD. In addition, this drain line can serve as discharge piping for the pressure relief valve

7.3.2

7.3.2 Class I Systems. Class I systems shall be provided with 2 ½ in. (65 mm) hose connections in the following locations:

(1) At the main floor landing in exit stairways

(2) On each side of the wall adjacent to the exit openings of horizontal exits, unless permitted to be omitted by the Fire Code

(3) In other than covered mall buildings, in each exit passageway at the entrance from the building areas into the passageway

(4) In covered mall buildings, at the entrance to each exit passageway or exit corridor, and at the interior side of public entrances from the exterior to the mall

(5) At the highest landing of stairways with stairway access to a roof, and on roofs with a slope of less than 4 in 12 where stairways do not access the roof

Justification: The Fire Code allows for the exclusion of hose valves at horizontal exits where the area to be covered by that outlet would already be covered by outlets located in rated stairs. This change to Item (2) is to bring NFPA 14 into conformity with the Fire and Building Codes

7.3.2.2

7.3.2.2 Class I hose systems shall be designed 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. ~~Where the most remote portion of a nonsprinklered floor or story, is located in excess of 150 ft (45.7 m) of travel distance from a hose connection in or adjacent to a required exit or the most remote portion of a sprinklered floor or story is located in excess of 200 ft (61 m) of travel distance from a hose connection in or adjacent to required exit, additional hose connections shall be provided, in approved locations, where required by the local fire department or the AHJ.~~

Justification: The purpose of this amendment is to require that Class I valves are provided to protect all floor areas, with spacing dictated by 100 feet of hose and 30 feet of stream being available from each hose valve. The last phrase regarding "where required by the…" is deleted to avoid questions from arising, as there is no question that such additional hose valves that may be required for full coverage are required

7.3.3.1

7.3.3.1 Class II systems shall be provided with 1 ½ 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 1 ½ in. (40 mm) ~~hose or within 120 ft of a hose connection provided with less than 1 ½ in (40 mm) hose~~.

Justification: The purpose of this amendment, in two parts, is to address local use of Class II hose stations. The first part addresses the requirement for Class II hose protection throughout the floor. Class II hose stations are provided solely for assembly areas in accordance with the IFC. When Class II hose stations are provided, they are only required to protect a portion of the building. The second part of the amendment addresses the hose diameter. This code section seems to imply an allowance for hose diameter less than 1 ½ inch, with no lower limit. Hose with diameter less than 1 ½ inch is not permitted for Class II hose stations, so the second part of the amendment removes the confusing language

7.4

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.

Justification: The purpose of this amendment is to address construction of scissor stairs. Scissor stairs are two separate stair paths, with separate stair landings, that coexist in one stairway. This amendment clarifies that separate hose valves are required to be located on the separate stair landings

7.8.1

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 ~~100 psi~~ (8.6 ~~6.9~~ 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.

Justification: The purpose of this amendment is to require a minimum residual pressure of 125 psi. This minimum pressure is required in order to address the worst case pressure requirement from the hose packs in the Las Vegas Valley

7.8.1.2

7.8.1.2 Manual standpipe systems shall be designed to provide 125 psi (8.6 bar) ~~100 psi (6.9 bar)~~ at the topmost outlet with the calculations terminating at the fire department connection.

Justification: This change is to require a minimum residual pressure of 125 psi at the standpipe outlets. This is necessary to address the hose packs commonly used in the valley

7.9.1.3

7.9.1.3 Where pumps are used in structures with an occupied floor located greater than 250 ft in height above the lowest level of fire department access, a redundant fire pump shall be provided for each required fire pump.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to require redundant fire pumps for tall buildings. The purpose of this is to ensure reliability in the building. The fire pump is vital in high-rise buildings, so providing a redundant pump is important in order to ensure that the fire pump capacity is maintained

7.11.1.1

7.11.1.1 The drain riser shall be equipped with tees that are of the same size as the discharge outlets of the pressure-regulating devices to be tested with internal threaded swivel fitting having NHS threads, as specified in NFPA 1963, *Standard for Fire Hose Connections*, with plugs, and shall be located ~~on~~ at ~~least~~ every ~~other~~ 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.

Justification: The purpose of this amendment is to ensure that a drain connection is provided at each pressure-regulating device to facilitate testing. Pressure-regulating devices are sensitive equipment that require care in commissioning and regular maintenance. A drain connection is necessary for both the commissioning and maintenance of pressure-regulating devices. In order to ensure that pressure-regulating devices are easy to commission and test, this code section requires that a drain connection be provided adjacent to every pressure-regulating device, even if that device is not attached directly to a vertical riser.

7.11.1.3

7.11.1.3 Where drain risers are interconnected and run to a common discharge point, all piping shall be sized for the maximum possible combined flow.

Justification: The purpose of this amendment is to ensure that the combined flow used for sizing of the interconnecting piping accommodates possibility of multiple drain lines being flowed simultaneously.

7.12.1.1

7.12.1.1 In buildings with multiple pump zones, each zone shall be provided with an express main and fire department connection from the street to each pump zone. ~~The high-zone fire department connection(s) shall not be required to be provided where 7.9.3 applies.~~

Justification: The purpose of this amendment is to ensure that all pressure zones can be supplied from a fire department connection

7.12.2.1

~~**7.12.2.1** A single connection for each zone shall be permitted where acceptable to the fire department~~

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to clarify for the user that allowing a single FDC is not acceptable to the AHJ.

7.12.3

7.12.3 Fire department connection sizes shall be based on the greater of the sprinkler system demand (if a combined system) or the standpipe system demand and shall include one 2 ½ in. (65 mm) inlet per every 250 gpm (946 L/min)

Justification: The purpose of this amendment is to require analysis of the sprinkler demand when sizing the FDC for combined systems. This correlates to the amendments made to section 6.8.1.4 of NFPA 13.

7.12.3.1

~~**7.12.3.1** An approved large diameter hose connection of a size to accommodate the required flow shall be permitted.~~

Justification: The purpose of this amendment is to disallow FDC inlets that are greater than 2 ½ inch, as are required in Section 7.12.3. The use of large diameter FDC's are not permitted.

8.1.1

8.1.1 Plans accurately showing the details and arrangement of the standpipe system shall be furnished to, reviewed, and stamped accepted by the authority having jurisdiction prior to the installation of the system.

Justification: The purpose of this amendment is to clearly indicate that AHJ acceptance of plans is required prior to the installation of the system.

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 and address 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 supply, with pressure and elevation~~
~~(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 lights of pipe (or center-to-center dimensions)~~

~~(11) Type of fittings and joints and location of all welds and bends~~

~~(12) Type and location of hangers, sleeves, braces, and methods of securing pipe~~

~~(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 outlest, hand hose, nozzles, cabinets, and related equipment~~

~~(17) Information on the hydraulic data plate~~

~~(18) Hydraulic reference points shown on plan that correspond with comparable reference points on the hydraulic calculation sheets~~

~~(19) The setting for pressure-reducing and pressure-restricting valves~~

~~(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~~

~~(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)~~

1. Provide a detailed narrative describing the scope of work to be conducted associated with the plans.
2. Name of owner and occupant.
3. Location, including street address.
4. Name address, phone number, and contractor's license number of sprinkler contractor.
5. Nevada State Fire Marshal registration number.
6. Signature and NICET number, or engineer's seal, of the designer.
7. General notes as required by the AHJ.
8. Point of compass.
9. The plan must show a top view of all areas on a common architectural scale, i.e. 1/8", 3/16", 1/4", etc. All walls and doors need to be shown, and each room must be labeled according to use. The top view must 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.
10. The plan must show section views with a riser diagram to describe the locations of mains, lines, and hose valves within the structure. A minimum of one view is required, although additional views may be necessary to determine compliance with NFPA 14. The section view must be drawn to a common architectural scale, i.e. 1/8", 3/16", 1/4", etc. The riser diagram must indicate all components on the

riser, including fire department connections; water supply components, including fire pumps and supply lines; interconnecting horizontal pipe; all standpipes on the system; control valves at the base of all standpipes; hose valves fed by the standpipes; and, where required for testing of pressure regulating valves, the drain lines.

11. The plans shall include an isometric view showing the entire system in one view.
12. A graphic representation of the scale used on all plans.
13. Ceiling construction.
14. Full height cross section.
15. Location of fire walls.
16. Location of horizontal exits.
17. Location of partitions.
18. Label and name of each area or room.
19. General notes shall be provided, as follows:
    a. Indicate compliance with NFPA 14.
    b. Indicate the type of system per Section 5.2 and the class of the system per Section 5.3.
    c. Indicate the minimum and maximum pressure requirements for the system.
    d. Indicate the minimum flow for the system and for each individual valve.
    e. Provide a description of hose valves used, detailing the manufacturer, model number(s), and outlet size.
    f. Manufacturer, schedule and type of piping.
    g. Manufacturer and type of fittings.
    h. Type of freeze protection (building heated, dry system, anti-freeze system, heat-trace, etc).
    i. Indicate the pressure required for the hydrostatic test, being 200 psi or 50 psi about pump churn pressure, whichever is higher.
    j. Indicate the quantity of hose valves shown on the submittal.
20. 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. Show the locations of fire hydrants used for water supply to the fire department connection(s), indicate the test and flow test results and label the test and flow hydrants.
21. Provide information regarding the fire pump, as applicable.
22. Other sources of water supply, including water storage tanks and fire department connections, shall be shown on plans.
23. Size, location, and piping arrangement of fire department connections, with details of the connection.
24. Fire Department Connection Signage: A sign shall be provided adjacent to each FDC indicating what systems are being served, what areas of the building are served, and the minimum required pressure and flow at the Fire Department Connection for correct system operation. Provide a detail of this sign on the plan.
25. 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 a minimum clearance of 6 inches perpendicularly from the face of the valve, a minimum of 1 inch around the circumference of the valve, and a minimum of 6 inches around the circumference of the hose outlet cap.
26. Type of pipe and fittings.
27. Pipe type and schedule of wall thickness.
28. Nominal pipe size with lengths shown to scale.
29. Type of fittings and joints and the location of all welds and bends.
30. Type and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable.
31. Show hanger locations, and provide details of hanger installations.
32. Seismic bracing information shall be provided, including locations, details, and calculations.
33. 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.
34. Provide details for all penetrations in rated walls and floors, providing information regarding the method of maintaining fire rating of the wall or floor.
35. All control valves, check valves, drain pipes, and test connections.
36. Make, type, model, and size of alarm or dry pipe valve.
37. Piping provisions for flushing and for testing.
38. 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.

39. A detail of the hydraulic data nameplate.
40. Hydraulic reference points shown on the plan, including the top view, section view, and isometric view, that correspond with comparable reference points on the hydraulic calculation sheets.
41. The total quantity of water and the pressure required noted at a common reference point for each system.
42. Edition year of NFPA 14 to which the standpipe system is designed.
43. Pressure Reducing Valves: For all pressure reducing valves, including direct-acting and pilot-operated valves, which are shown on the plans, indicate the make, model, and setting of the pressure-reducing valve, and provide a detail for each unique installation configuration.
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.

Justification: This amendment provides a list of the items required for submittal of standpipe plans. It includes many items required by the base code, and adds in items that are commonly required in the valley.

11.5.7.2

11.5.7.2 The system shall deliver a minimum of 250 gpm (946 L/min) at the hose connection within 3 minutes of opening the hose valve. ~~if the system capacity exceeds 750 gal (2480 L)~~

Justification: The purpose of this amendment is to indicate that a maximum of 3 minutes is permitted from the time of opening a hose to the time that water is delivered to the hose valve. This coincides with changes made to Section 5.2.1.3.

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.

Justification: The purpose of this amendment is to allow the AHJ the ability to approve temporary standpipes without requiring freeze protection of piping during periods of construction. In this jurisdiction, many water-based suppression systems, including standpipe systems, are subjected to the elements. This can be considered acceptable during periods of construction, due to the short time period that the systems are not protected. Due to the local climate, the risk of damage to system piping from freezing is substantially low, enough that the extra cost of freeze protection is not warranted. In cases where a project is stalled midstream, where the period of time where the piping is not protected is possibly unlimited, the AHJ can simply remove the exception, and go back to requiring the freeze protection as required. Revising this section does not prohibit the owner or contractor from adding freeze protection if such protection is desired

3.3.24

3.3.24 High-Rise Building. A building where the floor of an occupiable story is greater than 55 ft (16.8 m) ~~75 ft (23 m)~~ above the lowest level of fire department vehicle access.

Justification: Section 3.3.24 is a new section to NFPA 20, and is an extract from NFPA 5000. The local jurisdictions have changed the definition of a high-rise building to have a height of 55 feet instead of 75 feet. The purpose of this amendment is to be in conformance with the other locally adopted codes. This change is longstanding in the State of Nevada, having been established after the MGM and Hilton fires of the early 1980's, as part of the retrofit laws for defining and protecting high-rise buildings

4.1.1

4.1.1 Where a pump is used to provide booster pressure supply to multiple structures, a redundant fire pump shall be provided for each required fire pump.

Justification: The purpose of this amendment is to require redundant fire pumps when multiple buildings are serviced by one fire pump system. The purpose of this is to ensure reliability for buildings not intimately involved with a fire scenario. Where required, the fire pump is vital for protection of buildings, so providing a redundant pump is important in order to ensure that the fire pump capacity is maintained. If a single pump is used and fails during a fire, although only one building is damaged from the fire, all of the buildings would lose protection due to the failed fire pump. Providing a redundant pump helps to avoid this situation

4.10.1.1

4.10.1.1 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.

Justification: Liquid-filled gauges are easier to read due to the stability of the needle during flow and are more accurate than standard gauges. The intent of this amendment is to prohibit the use of standard gauges, and to allow only liquid-filled gauges for fire pump installations

4.10.2.1

4.10.2.1 Unless the requirements of 4.10.2.4 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.

Justification: Liquid-filled gauges are easier to read due to the stability of the needle during flow and are more accurate than standard gauges. The intent of this amendment is to prohibit the use of standard gauges, and to allow only liquid-filled gauges for fire pump installations

4.12.1.3

4.12.1.3 Fire Pump Buildings or Rooms ~~with Diesel Engines.~~ Fire pump buildings or rooms ~~enclosing diesel engine pump drivers and day tanks~~ shall be protected with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

Justification: The purpose of this amendment is to require that fire sprinkler protection be provided in all fire pump rooms. The base code already requires this protection for diesel fire pumps. This amendment will extend that protection to electric fire pumps. The intent of this amendment is to provide protection for the fire pump equipment.

4.12.3.1

4.12.3.1 An approved or listed <u>permanently installed (hard-wired for electrically powered devices)</u> source of heat shall be provided for maintaining the temperature of a pump room or pump house~~, where required,~~ above 40° F (5° C).

Justification: The purpose of this amendment is to definitively require heating be provided, and to indicate that the source of heat must be permanently installed. Due to the climate of this locality, freeze protection by way of heating is required. Further, to address insufficient installation practices of the past, the phrase "Permanently Installed" is added

4.12.4

4.12.4 Normal Lighting. Artificial <u>permanently installed</u> light<u>ing</u> shall be provided in a pump room or house.

Justification: The purpose of this amendment is to require that lighting is added as part of the building electrical system, not as an appliance that can be plugged into an electrical outlet

4.14.4.1

4.14.4.1 ~~Where the suction supply is of sufficient pressure to be of material value without the pump~~, ~~the~~ <u>All</u> pump<u>s supplied by municipal water supply</u> shall be installed with a bypass. *(See Figure A.4.14.4.)*

Justification: The purpose of this amendment is to require a bypass on all fire pumps, whether or not it is apparent that city supply can be of a benefit. This amendment removes the ambiguity about whether to install a bypass

5.1.1.3

5.1.1.3 Where pumps are used in structures with walking levels greater than 250 ft in height about the lowest level of fire department access, a redundant fire pump shall be provided for each required fire pump.

Justification: The purpose of this amendment is to require redundant fire pumps for tall buildings. The purpose of this is to ensure reliability in the building. The fire pump is vital in high-rise buildings, so providing a redundant pump is important in order to ensure that the fire pump capacity is maintained.

9.3.1

9.3.1 ~~Except for an arrangement described in 9.3.3,~~ At least one alternate source of power shall be provided when the requirement of 9.3.3 is not satisfied. ~~height of the structure is beyond the pumping capacity of the fire department apparatus~~.

Justification: The intent of this amendment is to require secondary power for all electrical fire pump installations. There are ongoing concerns about the reliability of the electrical service in this jurisdiction. Further, the majority of power feeds in this jurisdiction occur over overhead power lines, which is one of the items used by NFPA 20 for guidance as to what constitutes reliable power. These concerns exist in all buildings protected with electric fire pumps, regardless of height. Due to the combination of these issues, the committee feels this amendment is warranted.

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.

Justification: The purpose of this amendment is to clearly indicate that the secondary source of power must be independent of the public utility power supply. Many projects provide a second source of power feed from the public utility, and consider the second source of power as an emergency back-up power feed. However, since both the primary and secondary source of power in those situations come from the public utility, neither source of power satisfies the secondary power requirements of NFPA 20

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 by locating controllers near the entrance to the room.

Justification: This solves an enforcement issue of ensuring the fire pump controllers are located in such a manner as being readily accessible and not buried in the back of the room where one has to duck under, up, over, around piping, valves and equipment. This requirement will guide the location of fire pump controllers in a manner to be readily accessible. Further, new language is added to reiterate that the fire pump controller must meet clearance requirements of the NEC.

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.

Justification: The purpose of this amendment is to require that fire pump signals are provided in the Fire Command Center in a manner that is easy to read. The panels provided by fire pump manufacturer are easier to navigate than fire alarm systems are. This change is intended to provide information more easily to responding personnel. The signals are still required to be tied to the fire alarm control panel, which will be monitored either by central station or by proprietary monitoring.

12.2.1

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 by locating controllers near the entrance to the room.

Justification: This amendment is intended to provide consistency for regional application of codes. in part. This solves an enforcement issue of ensuring the fire pump controllers are located in such a manner as being readily accessible and not buried in the back of the room where one has to duck under, up, over, around piping, valves and equipment. This requirement will guide the location of fire pump controllers in a manner to be readily accessible. Further, new language is added to reiterate that the fire pump controller must meet clearance requirements of the NEC

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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to require that fire pump signals are provided in the Fire Command Center in a manner that is easy to read. The panels provided by fire pump manufacturer are easier to navigate than fire alarm systems are. This change is intended to provide information more easily to responding personnel. The signals are still required

to be tied to the fire alarm control panel, which will be monitored either by central station or by proprietary monitoring

5.1.1.1

5.1.1.1 Steel tanks shall be designed in accordance with AWWA D100, *Welded Steel Tank for Water Storage*, 1996, or AWWA D103, *Factory-Coated Bolted Steel Tanks for Water Storage*, 1997.

Justification: This amendment is established to address committee concerns. The documents referenced here are from Annex C of NFPA 22. The intent is to require higher standards of construction for above-ground steel tanks. There have been instances in this jurisdiction where above-ground steel square tanks have buckled under the weight of the water. There is concern about the reliability of these tanks. As such, a higher standard is needed, and is provided by this amendment.

14.4.1

14.4.1 A permanent ~~pipe connected~~ connection to ~~a~~ an approved water supply shall be provided to fill the tank. 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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to require that the permanent pipe go through an auto-fill valve for tanks used as break tanks. This is common with vertical turbine pumps. Further, a bypass with control valve is required in case of failure of the automatic fill valve.

14.4.2

14.4.2 The means to fill the tank shall be sized to fill the tank in a maximum time of 8 hours. 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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to address situations where the city supply to fire pumps is routed through the secondary supply water tank. This is common for facilities that use vertical turbine pumps. The purpose of this amendment is to clarify that when the tank serves as a break tank between the city supply and any fire pump(s), then the flow of the fill line needs to be such that it can support the full flow capability of the fire pump.

14.5.5

14.5.5 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.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to ensure that water from the overflow does not dump interior to a building. There have been some installations where the overflow pipe discharged directly into a fire pump room. By providing this code section, such installations will be prevented.

14.8.1

14.8.1 Provisions shall be made for the installation of sensors in accordance with *NFPA 72* for two critical water temperatures and two critical water levels.

14.8.1.1 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

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to clarify where float sensors are required in water tanks that are used for secondary water, specifically when those tanks are between the city water supply and the fire pump(s). This is common with vertical turbine fire pumps. The fill control valve needs two sensors, to basically tell the valve when to open to fill the tank, and then to tell the valve to close when the tank is filled. The third sensor is required in case the fill control valve does not operate, in order to signal someone to open the bypass valve.

6.5.2

6.5.2 A sectional valve shall be provided at the following locations:

(1) On each bank where a main crosses water

(2) Outside the building foundation(s) where a main or a section of a main runs 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

Justification: This amendment is established to address committee concerns. The purpose of the amendment is to specify locations of sectional valves on private mains. The purpose of the additional sectional valves is to allow for service to continue to as many fire hydrants and fire sprinkler systems as possible when there is a break in the underground line that requires maintenance.

3.3.99

3.3.99 False Alarm. Activation or reporting of an alarm for which no such alarm condition, fire or emergency actually exists. Additionally, False Alarm is the willful and knowing initiating or transmission of a signal, message or other notification of an event of fire when no such danger exists. See 3.3.307, Unwanted Alarm.

Justification: The definition for nuisance alarm was addressed in NFPA 72. The addition of false alarm will provide understanding of said condition. False alarm is desfined in the IFC, but not defined in NFPA 72 where it is needed. NFPA 72 provided definitions of four different types of unwanted alarms: Malicious; Nuisance; Unintentional; and Unknown. Adding this definition will more closely match the IFC definition.

3.3.105.4.2

3.3.105.4.2 ***Dedicated Function Fire Alarm System.*** A protected premises fire alarm system installed specifically to perform emergency control function(s) where a building fire alarm system is not required. Such systems include, but are not limited to sprinkler monitoring systems and elevator recall systems. (SIG-PRO)

Justification: This amendment is intended to clarify and provide examples to designers as to what the AHJ's consider to be dedicated function fire alarm systems in order to eliminate confusion.

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 fire alarm systems shall not be required to have smoke detectors installed above the dedicated function fire alarm control unit.

Justification: This section is limited to an approved fire alarm system including full notification throughout. Dedicated function fire alarm systems are not permitted to have full notification throughout. Therefore exception two is added to clarify that smoke detectors are not required above control units in dedicated alarm systems.

12.2.4

12.2.4* The installation of all pathway wiring, cable and equipment shall be in accordance with *NFPA 70, National Electric Code* and the applicable requirements of 12.2.4.1 through 12.2.4.4. 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)

Justification: Installing critical wiring within metallic conduit provides physical protection from damage, increases survivability of the wiring, and assists with the inspection process of installed systems. If wiring is approved by the Building Official to be abandoned in place, (see electrical code amendment), it does not become a combustibility concern.

17.5.3.1

17.5.3.1 Total (Complete) Coverage. Where required by other governing laws, codes, or standards, and unless otherwise modified by 17.5.3.1.1 through 17.5.3.1.5, total coverage shall include all rooms, halls, storage areas, and basements. Attics, lofts, spaces above suspended ceilings, and other subdivisions and accessible spaces as well as the inside of all closets, elevator shafts, enclosed stairways, dumbwaiter shafts, and chutes shall also have detectors if required by the authority having jurisdiction or to satisfy performance design criteria. Inaccessible areas may not be required to be protected by detectors.

Justification: When total coverage is required by another standard, normally the intent is to detect the products of combustion quicker to provide quicker notification. In Southern Nevada attics, lofts, spaces above suspended ceilings and other subdivision are areas that are environmentally unfriendly to initiating devices. Additionally initiating devices installed in these areas require more frequent maintenance, and are more prone to false or nuisance alarms. Therefore the code committee determined that detection in these spaces could be normally eliminated.

17.5.3.1.6

17.5.3.1.6 When area detectors are installed instead of duct smoke detectors to comply with the Uniform Mechanical Code, total coverage is defined as the area served by the air-moving equipment.

Justification: Total coverage in lieu of duct smoke detection is only needed in areas served by air-handling equipment. The intent of the requirement is to detect smoke being introduced into the space and shut down air handing equipment serving the space.

17.6.3.5.2

~~**17.6.3.5.2*** The minimum spacing of heat detectors shall not be required to be less than 0.4 times the height of the ceiling.~~

Justification: The intent of this amendment is to remove the lower limit of heat detector spacing that is provided by NFPA 72 Table 17.6.3.5.1. Please note that this analysis is not justification for the Table 17.6.3.5.1, but only an argument to remove the lower limit heat detector spacing of 0.4 times the ceiling height. From *Design of Smoke Management Systems*, Klote and Milke, equations 10.18 through 10.21, there is an evaluation of the plume temperature with respect to the ceiling height and with respect to distance from plume centerline. As can be seen from equation 10.21, the **VISIBLE** diameter of the plume is approximately half of the ceiling height. Annex B of NFPA 72, Section B.4.9.1, provides a slightly more conservative figure for the **VISIBLE** plume diameter to be approximately 0.4 times the ceiling height. However, Annex B.4.9.1 discusses spacing of beam detectors, not spacing of heat detectors. The analysis may be appropriate for smoke-sensing devices, but breaks down for heat-sensing devices. As can be seen from comparing equations 10.18 and 10.20 from Klote/Milke, the **EXCESS TEMPERATURE** plume diameter is exactly half of the **VISIBLE** diameter. The **EXCESS TEMPERATURE** is defined to be the point in the plume where the smoke temperature is one-half of the plume centerline temperature. The annex to 17.6.3.5.2 indicates that the factor of 0.4 is chosen because "the width of uniform temperature of the plume when it impinges the ceiling is approximately 0.4 times the height above the fire". This does not coincide with the information provided by Klote/Milke, which indicates a decay of plume temperature away from the plume centerline. Following the Klote/Milke information would yield a lower limit of 0.25 ceiling height. Since this is less than the smallest factor from Table 17.6.3.5.1, no lower limit is necessary. Therefore, since there is a question as to the adequacy of the 0.4 factor used in Section 17.6.3.5.2, this section is deleted.

17.7.3.1.3

17.7.3.1.3 If the intent is to protect against a specific hazard, and the detectors are not otherwise required by this code or other applicable codes, the detector(s) shall be permitted to be installed closer to the hazard in a position where the detector can intercept the smoke.

Justification: The intent is to limit the use of 17.7.3.1.3 only to situations where an owner/user is adding detectors for protection of a certain piece of equipment. The language of 17.7.3.1.3 seems to imply that smoke detectors must be allowed to be installed outside of its listings and other code requirements for all situations, so long as the argument is made that the detector is closer to a specified hazard. There is nothing in the rest of NFPA 72 that prohibits placing a required smoke detector close to the hazard, but such installation is required to comply with listing and spacing requirements. For instance, for areas with tall ceilings, past practice in various parts of the country has allowed for the installation of the smoke detector on the wall, more than 12 inches from the ceiling, just above the "hazard" being protected. This has been used for elevator lobby recall in tall lobbies, and for protection of the fire alarm control panel. It both cases, the smoke detector placed on the wall ignores the effects of a fire that can be close to the "hazard", and still not be close enough to have the plume impinge on the wall. Waiting for the smoke to fill the room, and bank down to wherever the smoke detector is installed, delays the response time of the detector, and could lead to the elevator opening onto a floor area with a developed fire. It is imperative to limit this code section only to non-required installations in order to ensure that base code forces required smoke detectors to be placed on or near the ceiling.

17.12.2

17.12.2* Activation of the initiating device shall occur ~~90~~ between 15 to 60 seconds of waterflow at the alarm-initiating device when flow occurs that is equal or greater than that from a single sprinkler of the smallest orifice size installed in the system.

Justification: To coordinate with a proposed sprinkler code amendment.

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

Wire	R	CM
No 18	7.95	1,620
No 16	4.99	2,580
No 14	3.14	4,110
No 12	1.98	6,530

Justification: This amendment is intended to standardize the way in which designers calculate voltage drops for notification circuits. The methods shown on this proposal in calculating voltage drops are consistent with the methods described in the narrative of the NFPA 72 Fire Alarm Code Handbook. The base code for NFPA 72 does not provide guidance with regards to the methods to use when calculating voltage drops.

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. ~~18.4.3 (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), as applicable.~~

Note: Section 18.4.1.4.1 through 18.4.1.4.5 remain unchanged.

Justification: IFC Section 907.5.2.1.1 specifies the requirements of NRS for the local audible notification requirements for minimum 80dB sound pressure.

18.4.1.5

18.4.1.5 The tone portion of voice messages shall ~~not~~ 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.

Justification: IFC Section 907.5.2.1.1 specifies the requirements of NRS for the local audible notification requirements for minimum 80dB sound pressure. The base code now allows that voice messages do not have to comply with minimum sound levels as long as the voice intelligibility as adequate. To be consistent in enforcing the proposed minimum 80 decibel requirement, this code section should be revised. It shouldn't matter whether the system is a voice evacuation system or a 24 vdc temporal 3 evacuation system. It should still have to meet the minimum 80 decibel requirement for the tone portion

18.4.1.7

18.4.1.7 Critical care areas of health care facilities shall be allowed to have visible notification appliances in lieu of audible notification appliances when approved by the authority having jurisdiction.

Justification: The IFC allows for this exception.

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.*

Justification: The purpose of this amendment is to clarify what strobes are required to be synchronized when a remodel project occurs. When a remodel project occurs within a space where existing strobes are not synchronized, it is difficult to determine what strobes need to be synchronized. This amendment clarifies that all strobes in the remodel area (whether new or existing devices) must meet the requirements of the current code. However, other strobes that might be in the field of view, but are clearly outside of the remodel area, would be allowed to continue operation as was permitted at the time of construction. Note that if the existing strobes were installed after adoption of the 1996, or subsequent, edition of NFPA 72, the existing strobes do have to be synchronized with the strobes in the remodel area

18.5. 5.6..2

18.5.5.6.2 Documentation provided to the authority having jurisdiction shall be stamped by a licensed engineer 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.

Justification: Since this is considered a "performance-based alternative" that involves detailed calculations, then it is appropriate to have a licensed engineer provide the required documentation.

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..

Justification: The base code does not address this specific issue. At issue is that the uses that come with exhibition spaces and uses with racks or shelving often cause disruption of visual appliances when such appliances are mounted on the wall.

Many exhibition facilities have had to install temporary devices to address severe obstructions, and others have added ceiling –mounted visual devices in rooms that are already provided with wall-mounted devices to address the issue. Enforcement to correct these issues in all occasions is not adequate. The intent of this amendment is to force ceiling-mounted devices in exhibition areas that would have obstructions of devices during the normal course of the space being used. The term "exhibition" is not defined, but is intended to address large rooms, such as found in the Las Vegas Convention Center, Cashman Center, Sands Expo, Mandalay Bay Expo Center, etc.

The fire alarm requirements for facilities such as warehouse superstores and other uses with racks or shelving is relatively new, and the issue of visual notification challenges presented by these types of uses is not currently addressed in the base code, although is indirectly addressed in the annex. It has been observed that wall-mounted visual appliances are typically obstructed by the racks or shelving, and wall-mounted appliances are more apt to be subject to mechanical damage caused by forklifts or stock. This amendment attempts to mitigate these issues.

21.3.5

21.3.5* A lobby smoke detector shall be located on the ceiling within 21 ft (6.4 m) of the centerline of each elevator door within the elevator bank under control of the detector.

~~*Exception: For lobby ceiling configurations exceeding 15 ft (4.6 m) in height or that are other than flat and smooth, detector locations shall be determined in accordance with Chapter 17.*~~

Justification: The base code seems to indicate that there is some other method of smoke detector installation when the height of a ceiling exceeds 15 feet, which would exempt the detector from being placed in accordance with 21.3.5. Chapter 17 does cover the method of smoke detector installation for detectors. Section 17.7.3.1.3 (which is proposed for deletion in a companion amendment) would seem to allow for the smoke detector to be installed in a place other than on the ceiling. There is no justification for the 15 feet height determination, and further the code does not ensure that designs utilizing the exception would have the device located in a better location. In all areas of fire protection, devices are located on or near the ceiling. These include heat detectors, smoke detectors, and fire sprinklers. Issues with stratification do exist, but

these are normally discussed with truly tall ceiling heights, such as those that exceed 50 feet high. Since the exception does not have technical basis, and could allow for a lesser level of protection, it is proposed that the exception be deleted.

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, and fire doors shall be monitored for integrity in accordance with Section 10.6.9 and Section 12.6. Duct detectors connected to fire alarm systems shall be 24 vdc system-type detectors that are powered by the fire alarm system.

> *Exception:* When duct detectors are installed in locations such as rooftops or other similar areas where extreme temperatures are to be expected, 120 vac duct detectors that are listed for the expected temperatures may be allowed to be installed when approved by the code official, as long as the duct detectors are capable of generating a trouble signal to the FACU if the power is lost, and is capable of generating a supervisory signal to the FACU when the duct detector is activated.

Justification: This amendment is to clarify that system-type 24 vdc duct detectors are required to be installed when a building has a fire alarm system. Currently, there are numerous duct detectors installed throughout the valley that are not being powered by FACU's. Therefore, when power is turned off to the HVAC unit(s), a trouble condition is reported to the FACU. When the duct detectors are powered by the FACU, they will not produce a trouble condition to the FACU when power to the unit is turned off. This amendment will help decrease the amount of troubles that are being sent to the FACU when power is turned off to the HVAC units. This problem has been occurring more frequently since the beginning of the economic downturn. This amendment also increases the chances that the wiring is being properly monitored for integrity as is required by Section 10.17 from NFPA 72.

This amendment also provides an exception to utilizing 24 vdc system-type detectors as long as a few requirements are met. Duct detectors that are installed by mechanical contractors are typically rated for the temperatures present on the roof top. Note that many system detectors are not listed for the expected temperatures and cannot take the heat during the summer. This is the main reason to include the exception.

23.2.2.4

23.2.2.4 A permit is required prior to making any changes, except for room label changes.

Justification: This amendment is intended to clarify to contractors as to when a permit will need to be pulled when modifying site-specific software.

23.8.6.5

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.

23.8.6.51 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)
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.

Justification: This amendment was created to provide prescriptive requirements for calculating power loss due to wiring in emergency voice alarm communication systems. The three methods are provided for achieving a result. This amendment was also requested by industry representatives

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.

Justification: The language will clarify the location for the device to be installed.

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 ~~permitted to be~~ a supervisory ~~or alarm~~ signal.

Justification: This amendment is made to clarify the requirement for monitoring of the fire pump run signal. NFPA 72 has permissive language that does not provide clear direction as to what type of signal is required. The intent of this amendment is to make all of the fire pump signals supervisory. The assumption is that a fire pump run signal will follow a water flow switch signal, and since the water flow switch is required to transmit an alarm signal, the monitoring station will be notified of an alarm. Adding the second alarm from the fire pump

can be confusing to responders, and is not necessary to initiate response. Most fire pumps in this jurisdiction are designed to have the fire pump run signal as a supervisory signal, so this amendment will not change common current practice

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.

Justification: Fire pumps are a critical piece of any fire protection system. It's very important to immediately know when it's running, whether it has operational problems, or when the associated valves are not in their normal positions. The base code of NFPA 20 only requires that the signals be sent to a normally occupied location. Although most facilities meet this code requirement by having the fire alarm system monitor the signals, not all of them do. In reality, sometimes the fire pump annunciator isn't always located in a normally occupied location, even though that is what's required by code. This sometimes gets missed both during plan reviews and inspections. This code proposal will mitigate that problem. Another bonus would be that the signals will also be sent to an off-site monitoring facility in many cases

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.

Justification: Fire pumps are a critical piece of any fire protection system. It's very important to immediately know when it's running, whether it has operational problems, or when the associated valves are not in their normal positions. The base code of NFPA 20 only requires that the signals be sent to a normally occupied location. Although most facilities meet this code requirement by having the sprinkler monitoring system monitor the signals, not all of them do. In reality, sometimes the fire pump annunciator isn't always located in a normally occupied location, even though that is what's required by code. This sometimes gets missed both during plan reviews and inspections. This code proposal will mitigate that problem. Another bonus would be that the signals will also be sent to an off-site monitoring facility in many cases

23.8.6.2

23.8.6.2* Notification Appliances in Exit Stair Enclosures, Exit Passageways, and Elevator Cars. In buildings required to be provided with emergency voice/alarm communications systems ~~N~~notification appliances shall ~~not~~ be required in exit stair enclosures, exit passageways, and elevator cars in accordance with 23.8.6.2.1 through 23.8.6.2.4.

Justification: The base code seems to indicate that there is allowance for not having devices in exit enclosures, exit passageway, and elevator cars. However, there are instances where devices are required in these areas, and the subsections to this code have several of those instances. In order to eliminate confusion about whether alarm devices are required in these areas, this change is necessary.

23.8.6.2.3

23.8.6.2.3 The evacuation signal shall not be required to automatically operate in exit stair enclosures and exit passageways. Manually activated speakers shall be provided in exit stair enclosures and exit passageways in buildings required to have Emergency Voice/Alarm Communication systems in accordance with Section 24.4.

Justification: The base code allows for elimination of alarms in stairs and passageways. It is unclear from the base NFPA 72 code whether any audible devices are required in these areas. However, the IBC and IFC require alarms in these areas. The intent of this amendment is to clearly indicate that manually activated speakers shall be required where the building is served by a voice alarm system. Voice alarm systems are required in large facilities in case specific instructions need to be relayed to building occupants. There are an unlimited number of scenarios that can be imagined that would necessitate live voice instructions to occupants in these areas. It is important to have this capability for live messaging to all areas of a building, including exit stairs and exit passageways. A companion amendment is made for Sections 23.8.6.2.4 and 24.4.1.8.3

23.8.6.2.4

23.8.6.2.4 The evacuation signal shall not be required to automatically operate in elevator cars. Manually activated speakers shall be provided in elevator cars in buildings required to have Emergency Voice/Alarm Communication systems in accordance with Section 24.4.

Justification: The base code allows for elimination of alarms in elevator cars. It is unclear from the base NFPA 72 code whether any audible devices are required in these areas. However, the IBC and IFC require alarms in these areas. The intent of this amendment is to clearly indicate that manually activated speakers shall be required where the building is served by a voice alarm system. Voice alarm systems are required in large facilities in case specific instructions need to be relayed to building occupants. There are an unlimited number of scenarios that can be imagined that would necessitate live voice instructions to occupants in these areas. It is important to have this capability for live messaging to all areas of a building, including elevator cars. A companion amendment is made for Sections 23.8.6.2.3 and 24.4.1.8.3.

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. ~~building fire or smoke compartment boundaries, floor separations, or other fire safety subdivisions.~~ 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.

Justification: The purpose of this amendment is to limit the types of separations that can be used to create separate fire alarm zones. For small buildings, it is anticipated that the entire building will evacuate simultaneously. For large buildings, due to the number of occupants, designers often choose to evacuate only a portion of the building. This amendment intends to define what the construction separation requirements need to be for the walls and floors separating notification zones. The base code seems to imply that any barrier that is a fire safety barrier can be used to define a separate notification zone, and seems to indicate

that separate notification zones can alarm separately. It is not appropriate to allow separate alarms for all types of separate fire safety barriers. The amendment is made to require fire walls or fire barriers to separate notification zones. A companion amendment is made to Section 24.4.9.4.

24.4.2.9.4

24.4.2.9.4 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.

Justification: The purpose of this amendment is to define the types of separations that can be used to create separate fire alarm zones. For small buildings, it is anticipated that the entire building will evacuate simultaneously. For large buildings, due to the number of occupants, designers often choose to evacuate only a portion of the building. This amendment intends to define what the construction separation requirements need to be for the walls and floors separating notification zones. The base code seems to imply that any barrier that is a fire safety barrier can be used to define a separate notification zone, and seems to indicate that separate notification zones can alarm separately. It is not appropriate to allow separate alarms for all types of separate fire safety barriers. The amendment is made to require fire walls and fire barriers to separate notification zones. A companion amendment is made to Section 23.8.6.3.2.

26.4.7.1.1

26.4.7.1.1 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 fire alarm signals
5. the cause and disposition of fire alarm signals

Justification: This is to provide the fire departments and companies maintaining the systems to have documentation that can be utilized to determine if the fire alarm signals are being properly logged and properly mitigated. This may also help mitigate the causes of false activations

26.6.3.1.7.1

26.6.3.1.7.1 Internet Protocol Technology

When utilizing network interface (Internet Protocol) signal transmission equipment, the supervising station shall regularly communicate (poll) with the transmitter at least once every 75 seconds and be allowed 15 seconds for the acknowledgment of such signals. Retry shall be 3 seconds between each communications

attempt. A Secondary transmission means shall be provided per Section 26.6.3.2.1.4. The use of VOIP technology is not permitted.

Justification: The use of IP (internet protocol) communications is becoming the preferred method for central station communications not only in the Las Vegas Valley but across the country. Currently the communication integrity requirements for such IP systems are not clearly identified in NFPA 72 Section 26.6.3.1.4.3. There is equipment currently on the market that meets or exceeds the above requirement.

The current installation practice today is the installation of non UL 864 fire alarm listed VOIP device at the protected premises connected to the fire alarm DACT system and then subsequently connected to the central or supervising station. This practice does not meet the requirements of Chapter 26.

Regarding current communications integrity testing requirements, the DACT connected to the central station is only required to transmit a test signal every 24 hours based on NFPA 72 Section 26.6.2.1.5 item 6 when utilizing the public phone system. The 75 second IP test poll time is based on current IP technology.

29.8.2.2

29.8.2.2* The interconnection of smoke or heat alarms shall comply with the following:

(1) Smoke or heat alarms shall not be interconnected in numbers that exceed the manufacturer's published instructions.
(2) In no case shall more than 18 initiating devices be interconnected (of which 12 can be smoke alarms) where the interconnecting means is not supervised.
(3) In no case shall more than 64 initiating devices be interconnected (of which 42 can be smoke alarms) where the interconnecting means is supervised.
(4) Smoke or heat alarms shall not be interconnected with alarms from other manufacturers unless listed as being compatible with the specific model.
(5) When alarms of different types are interconnected, all interconnected alarms shall produce the appropriate audible response for the phenomena being detected or remain silent.
(6) For applications that require supervision, a listed control unit shall be installed.

Justification: The newly added section is right out of the commentary text of the handbook. This is a code clarification as far as what will be required once you exceed the 12 smoke alarm threshold.

NFPA 86

6.2.5.1(A) Manual Shutoff Valves.

(A) Individual manual shutoff valves for equipment isolation shall be provided for shutoff of the fuel to each piece of equipment. Valves for fuel supply lines shall be located within 6 feet (1829 mm) of the appliance served.

> **Exception:** When approved and the valve is located in the same general area as the appliance served.

Justification: This amendment is in order to correlate requirements with the IFC Section 2104.2.1.

NFPA 160

5.5.1(3)

5.5.1(3) An approved fire watch according to IFC Section 901.7 ~~capable of directing the operation of all fire protection and life safety systems installed in the building is present~~.

Justification: The fire watch should be conducted according to the IFC. The NFPA 160 criteria are too vague.

7.1.4

7.1.4 The separation distance between the flame effect and the audience shall be such that the incident thermal radiation received does not exceed that calculated by the following equation:

$T = [35 / q] ^ 1.33$

Where:

T= time in seconds

q = incident thermal flux in kW/ m^2

The value of q can also be taken from Figure A7.1 of NFPA 160.

When applying the preceding equation to an effect with a duration of 4 seconds or less, the time used in calculating the maximum acceptable level if incident thermal flux shall correspond to the root mean squared (RMS) value of the peak incident thermal flux.

The incident radiation should not cause the surface temperature of the exposed skin of a member of the audience to exceed 111° F (44.0) °C. Incident radiation shall be measured with a radiometer, Skin temperature may also be measured with an infrared surface temperature thermometer or other equivalent means.

Justification: A method of determining the separation distance between the flame effect and the audience is instituted by this amendment. This method is currently used by the CCFD and is taken from the Annex. It is Annex Section A7.1 of NFPA 160. Since this equation and method is currently in use, the committee recommends that it be included as an amendment to ensure that the preferred method is used.

8.1.3

8.1.3 The operator shall be licensed in accordance with NRS 477 and NAC 477.

Justification: The new language is proposed for consistency with the CCFD Flame Effects Guideline and codification of the Nevada State Fire Marshal Regulations.

9.2.3

9.2.3 ~~During transfer of Class I liquids,~~ ~~m~~Motors of tank vehicles or motors of auxiliary or portable pumps shall be shut down during the making and breaking of hose connections.

Justification: IFC Section 3406.6.1.3, which is a similar code requirement, doesn't state that the code section only applies to Class I liquids.

9.2.3.1

9.2.3.1 Where loading or unloading is done without requiring the use of the motor of the tank vehicle, the motor shall be shut down throughout the transfer operations. ~~of Class I liquids.~~

Justification: IFC Section 3406.6.1.3, which is a similar code requirement, doesn't state that the code section only applies to Class I liquids.

9.3.3

9.3.3 Fire extinguishers shall be kept in good operating condition at all times and shall be located in an accessible place on each tank vehicle. During unloading of the tank vehicle, the portable fire extinguisher shall be out of the carrying device on the vehicle and shall be 15 feet (4572 mm) or more from the unloading valves.

Justification: This requirement comes from the IFC Section 3406.6.4. This amendment attempts to correlate the two sections.

5.3.4

5.3.4 Emergency fuel shutoff systems shall be operationally checked at intervals not exceeding ~~6~~ 3 months. Each individual device shall be checked at least once during every 12-month period.

Justification: This amendment is an attempt to correlate code requirements found in the IFC Section 1106.6.4

5.10.1

5.10.1 Aircraft fuel servicing (also called aircraft fuel-transfer operations) shall be performed outdoors. Aircraft fuel servicing incidental to aircraft fuel system maintenance operations shall comply with the requirements of NFPA 410.

> **Exception:** In aircraft hangers built in accordance with the provisions of the International Building Code for Group F-1 occupancies, aircraft fuel transfer operations are allowed where:
>
> 1. Necessary to accomplish aircraft fuel-system maintenance operations. Such operations shall be performed in accordance with nationally recognized standards; or
> 2. The fuel being used has a flash point greater than 100 degrees F.

Justification: This amendment is an attempt to correlate code requirements found in the IFC Section 1106.17.

5.12.3

5.12.3 Parking brakes shall be set on all fuel servicing vehicles or carts before operators begin the fueling operations. At least two chock blocks not less than 5 inches by 5 inches by 12 inches (127 mm by 127 mm by 305 mm) in size and dished to fit the contour of the tires shall be utilized and positioned in such a manner as to preclude movement of the vehicle in any direction.

Justification: This amendment is an attempt to correlate code requirements found in the IFC Section 1106.5.1.3.

5.13.4

5.13.4 Where the open-hose discharge capacity of the fueling system is not more than 200 gallons per minute, a minimum of two listed portable fire extinguishers having a minimum rating of 20-B:C shall be provided. Where the open hose discharge capacity of the aircraft fueling system or equipment is more than 200 gpm ~~(750 L/min)~~ but not more than 350 gallons per minute, at least one listed wheeled extinguisher having a rating of not less than 80-B:C and a minimum capacity of 125 lb ~~(55 kg)~~ of agent shall be provided. Where the open hose discharge capacity of the fueling system is more than 350 gallons per minute, a minimum of two listed wheeled extinguishers having a minimum rating of 80 B:C each and a minimum capacity of 125 lb of agent shall be provided.

Justification: This amendment is an attempt to correlate code requirements found in the IFC Section 1105.6.

8.1.6.1

8.1.6 Fire Detection and Life Safety Systems.

8.1.6.1 Indoor pyrotechnic displays shall only be permitted in venues provided with automatic sprinklers throughout.

Justification: Automatic sprinkler systems are typically installed in venues that are likely to use indoor pyrotechnics. This Section makes the sprinkler protection, as well as enhancements given in the amended International Fire Code mandatory. These enhancements will include increased areas of application and larger sprinkler orifices for sprinklers in high ceiling venues. The increased hazard of ignitions due to indoor pyrotechnic displays warrants ensuring that sprinkler protection is provided.

8.1.6.2

8.1.6.2 Portions of fire detection ~~and life safety~~ systems specific and limited to the pyrotechnic effects shall be permitted to be ~~interrupted,~~ bypassed, only as required to prevent a nuisance alarm during the operation of ~~temporarily installed~~ pyrotechnic effects when the following conditions are met:

(1) Approval of the authority having jurisdiction and as defined on the permit application.
(2) Approval by the owner, venue operator ~~owner's~~ or their agents.
(3) Presence of an approved fire watch capable of directing the operation of all fire detection and life safety systems installed in the building.
(4) Waterflow switches and fire alarm notification systems shall not be permitted to be disabled or bypassed.
(5) System bypass shall only be performed by a licensed fire alarm contractor or an owner's representative as approved by the authority having jurisdiction.

Justification: It is reasonable to allow disabling of fire detection devices that will detect smoke and flame produced by the indoor pyrotechnics and thus avoid nuisance alarm and unwanted evacuations. Areas not likely to be affected by the pyrotechnics should remain active. This proposal is to prevent the disabling of the fire alarm and detection features in areas that should remain active. Also, the permit application information is to include a justification for the locations to be without detection and the equipment should be disabled only as necessary for the performance duration using pyrotechnics.

The owner and venue operator may not be the same entity. Revision to item 2 is to ensure that a responsible party has approved and has knowledge of the pyrotechnics.

Temporarily installed is deleted because there are permanently installed pyrotechnics in this jurisdiction that need to comply with this section.

Qualified individuals shall only be allowed to bypass fire alarm system functions to ensure that systems not associated with the pyrotechnics area are not affected.

5.1.1

5.1.1 Specifications. Specifications for total flooding and local application clean agent fire extinguishing systems shall be prepared under the supervision of a person fully experienced and qualified in the design of such systems and with the advice of the AHJ. Starting on January 1, 2012, plans for clean agent extinguishing system installations shall have a wet signature of a minimum NICET Level II designer for Special Hazards Suppression Systems. The specifications shall include all pertinent items necessary for the proper design of the system, such as the designation of the AHJ, variances from the standard to be permitted by the AHJ, design criteria, system sequence of operations, the type and extend of the approval testing to be performed after the installation of the system, and owner training requirements.

Justification: Clean agent systems incorporate elements from both fire alarm and suppression systems. We require a minimum NICET II Level designer to sign both fire alarm and suppression systems. It only makes sense to place these same requirements for designers of clean agent systems. These systems typically require hydraulic calculations, voltage drop calculations & battery calculations, among other things. The designing of these systems can often be complicated, and so it's very important that an experienced and qualified person review and sign these plans before submitting.

5.1.2.2 (23)

5.1.2.2(23) Complete step-by-step description of the system sequence of operations, including, but not limited to, the operation of all applicable initiating devices, the operation of audible and visual pre-discharge and post-discharge alarms, functioning of abort and maintenance switches, delay timers, and emergency power shutdown.

Justification: Some submittals don't contain information regarding the pre- and post-discharge audible and visual signals, among other things. This amendment clarifies that the newly added information is required to be supplied within the sequence of operations section of a submittal.

5.1.2.2 (28)

5.1.2.2(28) Pressure relief vent area, or equivalent leakage area, for the protected enclosure to prevent development, during system discharge, of pressure difference across the enclosure boundaries that exceeds a specified enclosure pressure limit. For clean agent systems that utilize inert gases as the extinguishing agent, an analysis prepared by a licensed engineer that provide vent area calculations shall be submitted and approved.

Justification: Clean agent extinguishing systems that utilize inert gases as the extinguishing agent produce a lot of pressure inside of an enclosure that could potentially significantly damage the enclosure if not properly vented. If the integrity of the enclosure is compromised, then the extinguishing agent may not be able to extinguish the fire due to some of the agent escaping from the enclosure. Damage could also be done to the sprinkler system serving the enclosure itself, and possibly damaging the sprinkler system that is adjacent to the enclosure. There have been real-life events that have occurred where the agent had discharged and had caused significant structural damage to the enclosure due to over-pressurization. This is a companion proposal to Section 5.3.6.

5.3.6 The protected enclosure shall have the structural strength and integrity necessary to contain the agent discharge. If the developed pressures present a threat to the structural strength of the enclosure, venting shall be provided to prevent excessive pressures. Designers shall consult system manufacturer's recommended procedures relative to enclosure venting. [For pressure relief vent area or equivalent leakage area, see 5.1.2.2(28)]. For clean agent systems that utilize inert gases as the extinguishing agent, a licensed engineer shall provide a report which includes the pressure relief vent area calculations and includes the design of the overall ventilation system serving the enclosure(s) in order to ensure that the ventilation system will prevent over-pressurization and potential structural damage to the enclosure(s).

Justification: Clean agent extinguishing systems that utilize inert gases as the extinguishing agent produce a lot of pressure inside of an enclosure that could potentially significantly damage the enclosure if not properly vented. If the integrity of the enclosure is compromised, then the extinguishing agent may not be able to extinguish the fire due to some of the agent escaping from the enclosure. Damage could also be done to the sprinkler system serving the enclosure itself, and possibly damaging the sprinkler system that is adjacent to the enclosure. There have been real-life events that have occurred where the agent had discharged and had caused significant structural damage to the enclosure due to over-pressurization. This is a companion proposal to Section 5.1.2.2(28).