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AUTOMATIC FIRE SPRINKLER AND STANDPIPE SYSTEMS

7.1 Scope. The purpose of this standard is to clarify existing Code and City of Bellevue Fire Department requirements relating specifically to automatic fire sprinkler and standpipe systems in commercial buildings, with the exception of section 7.6 which applies to one and two family residential. This information is to supplement existing code requirements and does not cover all aspects.
The City of Bellevue has adopted the 2010 edition of NFPA 13, 14, 20 and 72.

7.2 General. All automatic fire sprinkler systems and standpipe systems whether voluntary or required shall be designed, installed and tested as specified in compliance with the currently adopted editions of the International Building Code (IBC), International Fire Code (IFC) Chapter 9 and nationally recognized standards listed in Reference Standards of the IFC; and specified in this standard.

7.3 Permit Documents. Number sheet 66 covers fire sprinkler system design submittal requirements for typical commercial facilities. A sprinkler permit with review is required for any installation involving 15 heads or more and all installations installing new valves. Underground fire main installation requires a separate permit (type FD).

7.3.1 Seismic restraint. Sprinkler and standpipe shop drawing submittals shall include seismic restraint or bracing calculations with supporting details as required by the 2010 edition of NFPA-13.

7.3.2 Fire pump boosted system design. The intent of Amended IFC 903.3.1.4 is to ensure that the public supply, for systems utilizing a booster pump, can still supply a reasonable floor height above grade. Typically this will be interpreted by the Fire Plan Reviewer as requiring the first, second and third floors above grade to be hydraulically designed to be supplied by city pressure alone (non-boosted supply), unless otherwise approved by the Fire Code Official.

7.3.3 Records. Records of all system inspections, tests and maintenance required by the associated reference standards shall be maintained on the premises for a minimum of three years.

7.4 Water Supply. Current water supply computer modeling obtained from the City of Bellevue Utility shall be submitted with all hydraulically engineered sprinkler and standpipe systems.

7.4.1 Water supply cushion. Hydraulically engineered sprinkler systems shall be designed and calculated so the system demand curve including hose stream allowances is at least ten (10) percent, or 10 psi, whichever is greater, below the water supply curve.
Exception: Residential sprinkler systems.

7.4.2 Secondary Supply. A secondary water supply is required for high rise buildings within the City of Bellevue, as per IFC 903.3.5.2, as amended. The definition of water

supply includes both the water reservoir and the ability to pump it to the roof. Therefore a separate pump associated with the reservoir is required. The reservoir must be sized in accordance with IFC 903.3.5.2 and must comply with NFPA-22 (Water Tanks) and be equipped with an automatic fill assembly that will refill the tank within 4 hours.

7.4.3 Water Storage Tank. The storage tank volume must provide the net usable volume requirements of IFC 903.3.5.2 as amended by the City of Bellevue. The net usable volume is calculated based on delivering positive pressure at the pump suction flange for tanks located below the centerline of the pump or calculated based on delivering -3psi at the pump suction flange for tanks at or above the centerline of the pump, in accordance with NFPA 20-10, 4.14.3.2.

7.5 Special Condition Sprinkler Installations. The following items identify common omissions or interpretations that must be complied with in the City of Bellevue.

7.5.1 Protection of laundry, furnace and other ignition. In systems designed and installed in compliance with NFPA 13, or 13-R, closets, regardless of size, containing laundry equipment, furnaces and other sources of ignition shall be sprinklered. Intermediate temperature sprinklers shall be used, except as modified by NFPA-13. The index of response shall be appropriate to the overall occupancy.

7.5.2 Electrical Rooms. Electrical or communications equipment rooms or closets shall be provided with automatic sprinkler protection in accordance with Amended 903.2, unless meeting the requirements of Amended 903.3.1.1.1 Exempt locations.

7.5.3 Soffits, displays, etc. Interior soffits, valances, canopies, lights, displays or any architectural structure shall be sprinklered beneath when the condition creates an obstruction to ceiling sprinkler discharge.

7.5.4 Display Cases. Display cases, wall shelving, display windows, etc. shall comply with the sprinkler obstruction limitations of NFPA 13-2010, Chapter 8.

7.5.5 Coolers/Freezers. Enclosed coolers or freezer display cases less than 84 inches tall and with an inside width or length less than 36” need not be sprinklered.

7.5.6 Concealed Spaces. The intent of NFPA 13, as stated in 8.1.1 (1), is that sprinklers must be installed throughout the premises. Under certain conditions, however, the omission of sprinklers is acceptable. Section 8.15 identifies these spaces and conditions and must be adhered to.

7.5.7 Cable trays and bundles in non sprinklered spaces. Non-combustible ceiling or floor cavities and similar spaces must be sprinklered unless they meet the requirements of NFPA 13-2010 Section 8.15.1.2 Concealed Spaces Not Requiring Sprinkler Protection. In particular, the following will require localized protection:

1) All cable trays
2) Cable rings greater than 6 inches in diameter
3) Bundles of cabling (exceeding 20 cables)

Cables must have 24 inches of separation to be considered as a separate bundle/tray.

NOTE 1: *Minor quantities of combustible materials can be present in concealed spaces constructed of noncombustible materials but should not typically be viewed as requiring sprinklers. It is not the intent of this section to require sprinklers, which would not otherwise be required, in the interstitial space of a typical office building solely due to the presence of the usual amount of cabling within the space. Cable trays and bundles in excess of 20 cables are considered to be beyond "minor quantities".*

7.5.8 Commercial cooking hoods and ducts. Commercial cooking hoods protected with a UL300 system require exhaust duct sprinklers when the duct exceeds 75ft. in length (NFPA 13-2010, Section 7.10.3.4). The use of a listed grease extractor does not eliminate the requirement for sprinkler protection in the exhaust ducts.

7.5.9 Exterior roofs, canopies, etc. Sprinklers shall be installed under exterior roofs, canopies, porte-cocheres, balconies, decks, or similar projections exceeding 4 ft (1.2 m) in width, unless the requirements of NFPA 13-2010, Section 8.15.7.2, 8.15.7.3, or 8.15.7.4 are met.

7.5.10 Exterior roofs, canopies, etc with storage beneath. Sprinklers shall be installed under roofs, canopies, porte-cocheres, balconies, decks, or similar projections greater than 2 ft (0.6 m) wide over areas where combustibles are stored.

7.6 Single and two-family dwellings. The sprinkler system must be designed and installed in accordance with the 2010 edition of NFPA 13D and the following requirements:

a. Attached garage shall be (substantially) protected to the extent a wet system allows. Porches, carports and similar structures do not require sprinkler protection.
b. Bellevue Utilities Dept. authorizes the water tap and meter size and can provide maximum flow capabilities for meters.
c. Where water-filled piping is installed under an insulation blanket in a cold attic or other cavity, details of this protection must be clearly shown on the shop drawings. Additionally, the inspector may inspect the insulation as a condition of occupancy, or require a letter certifying that the insulation is installed in a manner that will prevent freezing
d. A local waterflow alarm is required to be provided and must be visible from the public right-of-way, or driveway. An exterior alarm can be of benefit in areas where a neighbor could alert the fire department, or to enhance the ability for an assisted rescue by a passerby, or notification of broken piping.
e. Sprinklers are required in closets and bathrooms when the threshold limits of NFPA 13D are exceeded.
f. Sprinklers under unheated projections like patios, deck canopies, etc. are required when the dwelling has only one exit.
g. Fuel fired equipment in attics or crawl spaces must be protected with at least one quick response intermediate temperature sprinkler. 2010 13D section 8.6.5.1.
h. All areas in the residence shall be protected unless stated otherwise in section 8.6 of NFPA 13D.

7.7 Loading docks. Covered or below grade loading docks shall be protected as Extra Hazard Group 1, having a minimum design of 0.29 gpm/sqft over 3,250 square foot area (dry system area).

7.8 Fire department connections (FDC's). Fire department connections shall be installed in accordance with NFPA 14- 2010 as adopted by City of Bellevue Ordinance, and shall comply with IFC Sections 903.3.1, 903.3.7, 905, and 912.

7.8.1 Location. The fire department connection shall be located within fifty (50) feet of the nearest fire hydrant and arranged such that the location requirements of 912.2 are met. The FDC shall be located adjacent to the curb cut of the main entrance of the project site or building it serves. The FDC shall be arranged to face the street or fire apparatus access route as specified by the Fire Department.

7.8.2 Arrangement. FDCs shall be arranged so the lowest point on the inlet connection is between 18-48" inches above finished grade at its location. Wall mounted FDC's shall comply with NFPA 13 – 2010, Section A8.17.2.

7.8.3 Painting. If the FDC is not chrome or brass, the fire department hose connection and cast plate surrounding it shall be painted Rustoleum Regal Red or equivalent. Where yard style fire department hose connections are installed, the entire riser and hose connections above grade shall be painted as specified. Painting of the fire department hose connections shall not interfere with the operation of the swivel or cap connections.

7.8.4 Vehicle Impact Protection. Where fire department hose connections (FDC) are subject to vehicular damage, they shall be protected by bollards as specified in IFC Section 312.

7.8.5 Swing check valve. All FDCs shall be outfitted with a swing check valve, drainage provisions and accessibility in accordance with NFPA 13-2010, Section 8.17.2.5 for each fire department hose connection. All swing check valves shall be installed in such a way as to be accessible for service and maintenance.

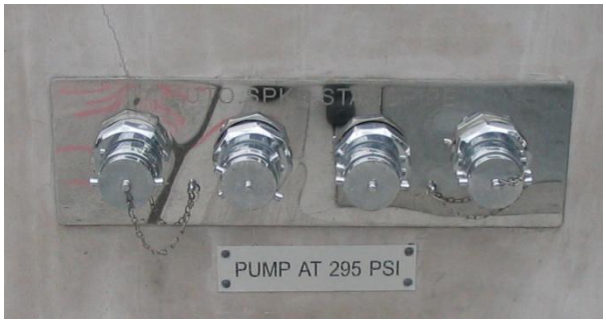
7.8.6 Signs. A metal or weather resistant sign shall be securely affixed at the fire department hose connection. It shall be attached to the building wall immediately above the fire department connection for wall mounted, or secured with rigid material (no chains) just below the fire department connection. It shall be a minimum 4" x 6" in size, be a red background with white, 1" lettering, (except where chrome or brass is utilized) and describe the type of connection as listed below. Signage shall be approved by the Fire Code Official.

(Top Line)

Automatic sprinklers only..... "AUTO SPRK"
Class I or III standpipes (wet)..... "STANDPIPES"
Combined, sprinklers & standpipes..... "COMBINED"
Dry standpipes..... "DRY STANDPIPE"
Required Pump Pressure..... "PUMP AT _____PSI"
The noted pressure shall be the higher of the required pressure for hose stream at the top of the building or to overcome the highest PRV setting.

(Bottom Line – Information Line)

Multiple, Single Standpipes....."ONE OF __#__"
Basement Only....."BASEMENT ONLY"



Sprinkler and Standpipe (FDC) Sign Examples

7.9 Supervision and alarms. Sprinkler system supervision and alarms shall be provided in accordance with IFC 903.4. Tamper switches shall be installed on all valves controlling the water supply to automatic sprinkler systems.

Exception: Existing control valves located outside a building and in a locked underground vault or pit need not be electronically supervised provided the valves are locked in the "open" position in a manner approved by the Fire Department.

7.9.1 Exterior alarm devices. In accordance with Amended IFC 903.4.2, every new or substantially altered automatic sprinkler system shall have waterflow activated alarm devices on the exterior of the building in an approved location. Off-premises supervision alone shall not be construed to meet this requirement. Local alarm must be visible from the public right-of-way or as otherwise approved by the Fire Department.

7.10 Control valve identification. All sprinkler and wet standpipe system controlling valves shall be clearly marked in accordance with NFPA 13- 2010, Section 8.16.1.1.8 as to the portion of the building or fire protection system they control. (Ref. IFC 509.1).

7.11 Floor control valves. Approved supervised indicating control valves shall be provided on each floor in accordance with Amended IFC 903.4.3, so that an individual floor may be isolated without impairing additional floors.

Exception 1: Sprinkler systems designed and installed in compliance with NFPA Standard 13-D or for R-3 occupancies.

Exception 2: Separate dry systems for parking garages, will be required to meet the above noted floor control valve requirement, where more than two levels of parking are provided.

7.12 Elevator hoistways. Elevator hoistway sprinkler protection shall be installed in accordance with NFPA 13 -2010, Section 8.15.5.

7.13 Elevator Shunt Trip. Where elevator hoistways or elevator machine rooms containing elevator control equipment are protected with sprinklers, shunt trip is required in accordance with 2009 IBC 3006.5.

7.13.1 Shunt trip detector. Where thermal detectors are used for the shunt trip, they shall be an auxiliary function of the elevator equipment only, and shall be identified with signs reading: **"Elevator Control Only-- DO NOT TEST"**. The signs shall have letters at least one-half (±) inch high on a contrasting background.

7.13.2 Power disconnects. Power for the automatic disconnect control circuit shall be derived from the load side of the elevator power main disconnecting means. The disconnect control device shall be located in the elevator equipment room, and shall be provided with a sign reading **"ELEVATOR AUTOMATIC DISCONNECT."** The sign shall have letters at least one-half (±) inch high on a contrasting background.

7.14 Adequate heat. Rooms or areas where wet pipe systems or any sprinkler equipment is installed shall be maintained at a minimum of 40 degrees F.

7.15 Heat trace. All proposals for heat tracing must be approved by the Fire Code Official prior to submittal of sprinkler drawings. Sprinkler designs lacking this prior approval or substituting heat tracing for proper routing through conditioned spaces will not be accepted. In accordance with IFC 102.8, the City of Bellevue Fire Dept. interpretation is that heat tracing is to be allowable in "*small unheated areas*" (NFPA 13- 8.16.4.1.2) and per Section 8.16.4.1.3, is not intended to be used for large areas such as parking garages, which is why they identify open areas, cold rooms, passageways.

7.15.1 Circuit Supervision. All heat tracing circuits shall be supervised by the building fire alarm system for power supply and temperature. A Special Inspection may be required by a representative of the manufacturer to verify the heat trace is installed in accordance with the manufacturer's installation instructions and the terms of the heat trace listing.

7.15.2 Piping length. Heat tracing may not exceed 50ft (length of piping protected).

7.16 Solvent cement. Where solvent cement is used as the pipe and fittings bonding agent, sprinklers shall not be installed in the fittings prior to the fittings being cemented in place, with cement dried.

7.17 Standpipe systems. Class I Standpipe design and location of hose connections must be in accordance with IFC 905 as amended by the City of Bellevue, and NFPA 14 -2010.

7.17.1 Class III standpipe systems. Class III standpipe systems are not allowed in the City of Bellevue.

7.17.2 Standpipe design criteria. Standpipes shall be designed by hydraulic calculation described in NFPA-13, the coefficient of roughness (C-factor) must be 100 for dry standpipes utilizing black steel pipe. The design of the standpipes shall meet two design points: 1) NFPA 14 - 2010, Chapter 7 Design and 2) 2009 IFC Section 905 as amended by the City of Bellevue.

7.17.3 Inlet pressure. Standpipe systems without a fire pump shall be designed to operate with a Fire Department Connection (FDC) inlet pressure of 200 psi unless otherwise approved by the Fire Department.

7.17.4 Combined systems. Where combined standpipe systems are installed or required no portion of that standpipe system may be dry.

7.18 Standpipe hose connections. Standpipe hose connections shall be provided with National Standard Threads, and the threads shall be protected by a rocker lug (pin) cap**.**

7.18.1 Location. Class I Standpipe hose connections shall be provided in locations specified in IFC 905.4, as amended by the City of Bellevue.

7.18.2 Arrangement. All hose outlet valves for fire department use shall be arranged so they are between thirty-six (36) and forty-eight (48) inches above finished floor, with the outlet oriented to the clear working space.

7.18.3 Clearance. All hose outlet valves shall have adequate clearance around them to accommodate a fire department hose appliance having a dimension of ten (10) inches by ten (10) inches.

7.18.4 Hose caps. In accordance with IFC 509.2, approved access shall be provided and maintained for all fire protection equipment to permit immediate safe operation. Valve handles in any position shall be not less than four (4) inches from any surface (cabinet, wall, etc.), and shall be arranged so a twelve (12) inch wrench can operate the valve. Plastic thread protection is not acceptable.

7.18.5 Hose reach. Hose reach requirements of Amended IFC 905.4 must be complied with. Travel distances in parking garages may not include travel between stalls unless they remain open and are marked as “NO PARKING”.

7.19 System testing, maintenance and inspections. All sprinkler systems shall be tested and maintained in accordance with IFC Section 901.

7.19.1 Fire inspections. Inspection and testing of all systems is required when revised or modified. Call the Fire Inspection Request line at 425-452-6875 at least 24 hours in advance (Fire Alarm systems=48 hrs.).

7.19.2 Impairments. Before a fire protection system is taken out of service notify the Bellevue Fire Department with the following information: name of caller & phone number, company caller with, building name, address, permit # (if one), contact name &

phone # (if different), reason for out of service & estimated time to back in service. Call 425-452-1950 or email impairmentnotification@bellevuewa.gov

7.19.2.1 Fire Watch. A fire watch is required during shutdown of any fire protection system. The fire protection system shall be placed back in service during all periods of non-work.