SECTION 21 00 00 – Fire Suppression

Document revision history: 10/2024 – Original Publication

Date	Section	Description of Change

PART 1 – GENERAL

1.1 Summary

a. Section includes general provisions for Fire Suppression.

1.2 Design Guidelines

a. See also Section 08 30 00 – Specialty Doors & Frames.
b. See also Section 09 50 00 – Ceilings.
c. See also Section 09 90 00 – Painting & Coating.
d. See also Division 33 for Utility Standards.
e. Fire Suppression system design requires review and approval by UO Environmental Health and Safety (EH&S).
f. All materials and workmanship shall comply with all applicable codes, specifications, Local and State ordinances. Fire suppression systems may involve a plan review focused on building loss prevention, which involves submitting preliminary construction documents and incorporating recommendations from the department of UO (EHS), UO Fire Marshal Office (UOFMO) and Property Loss Control Engineering Consultants. Coordinate submittal with UO Project Manager/Owner Representative.
g. In case of conflict between the contract documents developed through Owner direction, and the requirements of any Code or Authority Having Jurisdiction (AHJ), the most stringent requirement shall apply.
h. NO demolition of one item shall occur to repair and/or replace another item.
i. ALL demolished or abandoned fire suppression equipment **must** be removed and not abandoned in place.
j. Systems and system components in new construction, remodels, and retrofits are to be compatible with existing systems and system components to the extent possible
k. New building projects will be 100% sprinkler protected.
l. All exit signs and egress lighting must be on a dedicated generator or UPS circuit or approved by the UO Fire Marshal Office.

PART 2 – PRODUCTS

2.1 Water Based Fire Suppression

a. See Section 21 10 00

PART 3 – EXECUTION

3.1 Installation

a. See Section 21 10 00
b. In the Operations and Maintenance Data, provide the following information on each

type of fire suppression system:

- Name and 24/7/365 contact information for system installer and General Contractor.
- Floor plans showing the layout and location of all sprinkler heads, valves, flow sensors, risers, service entry, standpipes, fire department connections, etc. for each floor.
- Separate floor plans graphically depicting system zoning for each floor.
- Reduced scale copy of system zoning plans to permanently mount in riser room.
- Parts and material specifications for specialized system components that require routine maintenance or replacement in the event of activation.
- ALL/ANY item that requires special tools and/or test equipment must be brought to the attention of the pertinent Owner's personnel prior to specification and/or installation.

3.2 Training

a. The vendor shall provide FS, OR, and EH&S training of maintenance and operational aspects, both described and demonstrated.
b. Training shall be conducted by a manufacturer's representative thoroughly familiar with the characteristics of the installed system.
c. A minimum of 6 hours of total training is to be provided.
d. **Service:** The system vendor must employ factory trained technicians and maintain a service organization within 125 miles of the project and be capable of responding to service calls within 4 hours.
e. **1-Year Warranty Inspection:** Contractor to conduct a 1-year inspection with FS and EH&S of system equipment and system operational functions prior to expiration of 1 year warranty and correct any found items at the cost of the Contractor. Provide report to FS, PM, and EH&S.

SECTION 21 10 00 – Water-Based Fire Suppression Systems

Document revision history: 10/2024 – Original Publication

Date	Section	Description of Change

PART 1 – GENERAL

1.1 All spaces in the building must be fully protected by fire sprinklers in accordance with NFPA-13, 13R, or 13D, whichever is applicable and the AHJ. This requirement includes all spaces below suspended ceilings and above suspended ceilings where combustible materials are or are intended to be located.

1.2 Water Based Fire Systems

a. System component locations should be designed and located in areas that are not exposed to the weather therefore requiring additional insulation, heat tape, etc. measures.
b. The Design Professional shall use hydrant or fire pump flow test information obtained within the last 12- months as the water supply basis for the sprinkler system design.
c. All kitchen spaces / applications must reference UL 300 compliance and the City Fire Suppression Requirements regarding kitchen hoods and ventilation. Generally, the local jurisdiction is more stringent than the IFC.
d. Furnish and install tamper switches, flow switches and weatherproof exterior bell. Electrical connection to be by building monitor contractor. Coordinate connection to ensure proper function of alarm and supervisory devices.
e. Systems shall be based on hydraulic designs that include a minimum 10-psig safety margin to allow for deterioration in available static and residual pressures in the water supply.

1.3 Dry Pipe Suppression Systems

a. Nitrogen supervision pressure and pre-action system shall be the preference in dry pipe suppression systems above two-inch pipe diameter
b. Dry systems serving twenty heads or less may not require nitrogen air. Confirm with the UO Fire Marshal.
c. Where small areas of fire suppression are to be installed in freeze prone locations it will be allowable to install a pressurized air dry pipe. Liquid antifreeze systems are not acceptable.

PART 2 – PRODUCTS

2.1 Interior Pipe shall be:

a. Steel Pipe: black steel; Schedule 40 or 10; ASTM A-53 or ASTM A-135; Type E; Grade A or B.
b. Steel pipe 2-1/2" and larger is to be Schedule 40 or 10 and shall be verified to have a CRR of 1.0 or greater.
c. Fire protection system to include a standalone 120V fire system Alarm bell to be

directly activated from an electrical pulse from a flow switch located in the fire standpipe system.

d. CPVC piping is not allowed.
e. Mechanical couplings and fittings shall be from the same manufacturer.
f. Reductions in pipe sizes shall be made with one piece reducing fittings.
g. Flanged joints or mechanical grooved couplings shall be provided where indicated or required by IBC Standard.
h. Fittings which are ***not*** allowed:
   - Lock screw plain end joints/fittings.
   - Snap-Let outlet.
   - F.I.T. fittings.
   - Gasket plain-end joints/fittings.
   - Saddle type mechanical tees, valves, or fittings.

i. Additional piping joint requirements
   - Joints shall be in accordance with ANSI B1.20.
   - Mechanical pipe couplings shall be of the bolted type and consist of a housing fabricated with a synthetic rubber gasket, nuts, and bolts to secure the unit together.
   - Provide listed and approved flexible couplings see following section on flex sprinkler couplings.
   - Install UL approved hangers and earthquake bracing in place of supporting sprinkler piping from other utilities.
   - Provide loops with grooved Victaulic style couplings where piping crosses seismic joints in construction.
   - Wherever dissimilar piping materials are connected, use a brass coupling, bronze valve or union to join.

a. Valves
   - Auxiliary/Utility Valves: Manufacturers known to be acceptable: United Brass Works; Central; Gem; Kennedy; Victaulic.

b. Valves ***not*** acceptable:
   - Milwaukee Butterball Ball Valves

2.2 Sprinklers

a. Quick Response Pendent Heads:
   - Manufacturers known to be acceptable: Viking; Reliable; Globe; Tyco.
   - Sprinklers being replaced shall be replaced with quick response heads of same temperature and orifice sizes.

b. Quick Response Upright Heads:
   - Manufacturers known to be acceptable: Viking; Reliable; Globe; Tyco.
   - Sprinklers being replaced shall be replaced with quick response heads of same temperature and orifice sizes.

c. Flexible sprinkler hose with fittings intended for use in sprinkler systems between the branch line and sprinkler when installed in accordance with ANSI/NFPA 13 and UL 2443, “Flexible Sprinkler Hose with Fittings for Fire Protection Service”.

- Flexible hose couplings shall be UL 2443 listed and FM 1637 approved.
- The maximum nominal design length of flexible hose coupling section shall be thirty-seven (37) inches (including inlet nipple and hose termination ferrule). Requests for longer hose sections must be formally requested and submittal will be accompanied by a written justification for exception.
- Factory Mutual (FM) Design Criteria will be utilized for friction loss calculations, unless designer provide support for a superior design utilizing another method approved by the AHJ.
- Installed minimum bend radius shall follow FM Design Criteria.

2.3 Hangers

a. Hangers shall be in accordance with IBC Standard 9-1.
b. Manufacturers known to be acceptable: Michigan, Tolco.

PART 3 – EXECUTION

3.1 Fire Suppression Piping, Fittings, and Joints

a. Fire sprinkler piping should be routed at highest level directly underneath structural deck, above all other MEP systems.
b. Joints shall meet applicable ANSI and ASTM requirements.
c. Wet sprinkler piping shall be provided with automatic or manual air relief vents at high points of the system. (Similar to Potter Model PAV, with strainer and a ball valve in-line immediately upstream to facilitate servicing or replacing without impairing the sprinkler system.)
d. Dry sprinkler piping shall be provided with components necessary for bleeding systems to drain.
e. Dry Sprinkler Systems must be resettable externally by a plunger, i.e. Tyco DPV1 preferrable. For sensing Waterflow and Low Air, must use Potter PS10-2A for Waterflow and Potter PS40-2A for Low Air. If an accelerator is needed, Tyco Vizor must be used. Other equipment of equivalent function may be considered case-by-case upon **approval of UO Fire Marshal Office.**
f. Overstock, tools and supplies to be included in each sprinkler head cabinet:
   - Sprinkler heads: minimum six (6) per head type and shall be same manufacture as the installed sprinklers.
   - Sprinkler head wrenches: minimum two (2) per sprinkler head cabinet plus two (2) spares to be delivered to Over Stock Room.
   - Sprinkler head cabinet: one (1) per sprinkler riser.

3.2 Accessibility of Fire Suppression Equipment

a. Refer to and abide by all OSHA requirements, as appropriate.
b. A drawing layer of 'Maintenance Access' is to be incorporated into ALL drawings and system designs. This layer MUST be maintained through all phases of design and construction.
c. Always locate sprinkler riser in a riser room or in a mechanical room. Ensure that room is heated by a permanent fixed means or electrical heat source. Electrical heating tapes shall not be considered as an acceptable alternative means for freeze protection.

d. Drawing shall indicate the location of all standpipes, tamper switches and flow switches. Provide a riser diagram showing major components, inspector's tests, auxiliary drains and low point drains.
e. Fire system gang and main drains must drain to an appropriately sized sanitary drain. Coordinate with Division 22. Access to standpipe and riser rooms must be via a corridor or mechanical room only.
f. All necessary access points for maintenance must be provided and coordinated. Minimum of 12" clearance at access points are to be maintained
g. Utility risers must be provided with a door (3ft x 7ft). Access panels are not allowed for riser access.
h. All valves controlling water supplies for sprinkler systems of portions thereof, including floor control valves, shall be located for convenient access and operable from the floor level or another location approved by the AHJ/Fire Marshal. All sprinkler valves and controls shall be labeled as required in appropriate NFPA standard.
i. Sprinkler FDC shall be located forty (40) feet from structure when possible and location pre-approved by the local Fire Department. Connection shall be labeled as to what building or portion of the building the connection serves, I.e. "Wet sprinklers and wet standpipe", and include identification of building or portion thereof.
j. Locate Backflow Preventers inside building. Otherwise in an exterior vault. Do not use riser mounted air compressors. Use the largest air compressor allowed by code. Air compressor shall be hardwired with a protected circuit, or if plugged in, install a system that secures the plug into the outlet.
k. All Exit signs and Egress lighting must be on a dedicated Generator or UPS circuit or approved by the UO Fire Marshal Office.
   - The use of self-luminous exit signs containing radioactive material is prohibited unless specifically approved by the department of Environmental Health & Safety (EHS) Radiation Safety Officer.
   - Install an exterior water flow bell in a location that is in direct line of sight of the fire department connection and shall have a "IF BELL RINGS, CALL 9-1-1" sign attached.
   - All auxiliary drains, low point drains & inspector's tests to be piped to ground level and accessible without the use of a ladder and piped to exterior if possible or an UPC approved floor sink with 3" drain. When piped to exterior drain provisions to ensure against damage to or flooding of landscape are required.
l. Fire Suppression Access Panels
   - Sprinkler valves and/or equipment shall be provided with an access panel large enough to readily pass equipment/manpower through to make repairs.
   - Panel location is subject to review by the Architect, Engineer, and FS EH&S.
   - Panel shall be rated the same as wall or ceiling in which it is located.
   - Labeling of what component(s) is behind an access panel. Red label with 1" white lettering.
   - Doors less than 24" shall be provided with a concealed pivoting rod hinge. Doors 24" or larger shall be provided with a continuous piano hinge. The door shall contain latch screws for securing the door.

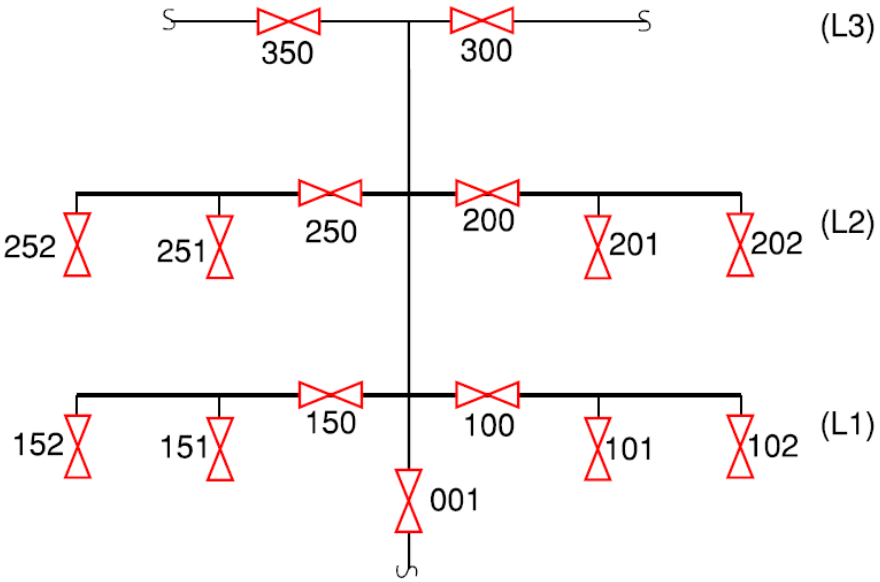
- Panel door shall have rounded safety corners, be fabricated from 16 gage galvanized steel, and shall have a factory prime coat finish suitable for painting.
- Panel frame shall be one piece construction and provide concealment of the rough wall opening without visible miters or welds on the face.
- The wall frame shall be provided with 1/4" mounting hose for fastening with the furred space.
- Manufacturers: ELMDOOR Manufacturing Co.; or approved.

3.3 Inaccessible Equipment

a. If after meetings, reviews, comments, etc., there are documented and/or discussed changes not incorporated into the construction documents and installed equipment is not accessible for operation and maintenance, equipment shall be removed and reinstalled at no additional cost to the UO or the project.
   - 'Accessible' is defined as being capable of being reached without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and ductwork. Access must not exceed 14ft in height, a typical ladder working height.

3.4 Minimum Identification

a. Hydraulic information signs required at main riser.
b. Upon purchase, piping shall be marked with the manufacturer's name and material specification on each length.
c. Provide labels and flow direction arrows on mains and cross mains every 20 feet.
d. Re-label units if/when labels begin to fade or fall off.
e. During finish construction, labeling is to be reviewed and approved by FS PM and Maintenance.
f. Provide permanent signage, interior and exterior, at all utility boxes, vaults, manholes, main valves, etc.
g. Signage shall meet NFPA requirements for rooms containing main fire sprinkler controls.
h. Signage shall also be required for the fire department connection, fire extinguishers, and fire pump room per the OFC.
i. Each system riser shall be fitted with design criteria placard in accordance with NFPA 13. Placards to be updated with design changes.
j. Zoned systems must have clearly defined valves.
k. Label equipment, piping, etc. with description or verbiage and direction of flow. No color banding.
l. Label all valves with numbers, numbering should be consecutive to the installation location or zone and match schematics and fire piping plans. **For example**:



m. Covering or painting of any existing sign/label requires replacement.
n. Label piping to fire hose cabinets as such and not 'Fire'. (Existing conditions only.)
o. Label ceilings or ceiling grid (not the tile) at key access points, valves, equipment, etc. with a clear adhesive label and bold black lettering with equipment, etc. ID information.

3.5 Design Criteria and Tests / Approvals of Sprinkler System

a. All spaces in the building must be fully protected by fire sprinklers in accordance with NFPA-13, 13R, or 13D, whichever is applicable. This requirement includes all spaces below suspended ceilings and above suspended ceilings where combustible materials are or are intended to be located. Plastic piping, data cabling, and plastic ductwork are examples of combustibles.
b. In addition to the requirements of NFPA-13, the rulings and interpretations of the local AHJ/Fire Marshal and the requirements of UO must be incorporated into the design.
c. Preference is given to water-based sprinkler systems wherever conditions can be reliably maintained above 40 deg. F. Dry-pipe systems shall be used when conditions cannot be reliably maintained above 40 deg. F (see Dry Pipe Part 1), and where permitted by the AHJ. Dry risers larger than 2" require nitrogen systems.
d. Contractor shall conduct a pretest of wet system with air pressure at 50 psi for 1 hour minimum.
e. Hydrostatic Test: Test pipe of sprinkler systems with not less than 200 psig or 50 psi above normal static pressure for 2 hours in presence of Architect, Engineer, FS EH&S, or authorized representatives of Fire Department. No exceptions will be made
f. Do not impede or limit access of doors, windows, or openings. Do not impede maintenance access or serviceability to equipment.
g. Pipe openings shall be closed with caps and/or plugged after installation to prevent entrance of foreign materials before final connection.

3.6 Maintenance and Protection Requirements

a. Flushing locations shall be provided per IBC Standard in accessible locations; reviewed and approved location by the Architect / Engineer and the Facilities EH&S.
b. Flushing Connections: 1-1/4in nipples with caps at extreme ends of all cross mains.

3.7 Drains and Drips

a. Piping shall drain back to the express drain located beside the standpipe/riser. Where this is not possible auxiliary drains must be provided and discharge location to be reviewed and approved by FS EH&S.
b. Install auxiliary drains at low points in system.
c. Five or fewer trapped heads will not require a drain valve but may be drained through plugged tee.
d. Drains are to have a 3/4in hose line connection.
e. Discharge of main drains, auxiliary drains, or inspector's test connections shall be to a properly sized sanitary system drain.

3.8 Wall and Floor Penetrations

a. Holes for pipe passing through rated walls shall be filled to the manufacturer's recommended thickness with fire resistant caulk.
b. Wall and hard ceiling penetrations shall be fire stopped.
c. Provide escutcheons for pipe penetrations through finished areas.
d. Escutcheons shall be chromium plated iron or chromium plated brass, either one piece or spit pattern, held in place by internal spring tension or set-screw.

3.9 Firestopping of Penetration

a. Every penetration should be sealed by an appropriate method that not only preserves the fire/smoke rating of the penetrated construction but also sustainably prevents the entry and passage of insects and rodent pests.
    - Non-fire rated assemblies: Noncombustible penetrating items that connect not more than five stories are permitted provided that the annular space is filled to resist the free passage of flame and the products of combustion with an approved non-combustible material.

3.10 Hangers, Inserts, and Support

a. Pipe may be anchored to corridor walls using uni-strut and pipe clamp.
b. Hanging of pipes from ductwork is prohibited.

3.11 _Fire Suppression Interior Control Auxiliary/Utility Valves

a. All valves shall be installed in locations and orientations which are readily accessible for system service, maintenance, modifications, etc. Valves shall not be obstructed by, or located above piping racks, cable trays, etc. and shall be easily accessible. Access panels shall be provided, where necessary, for service and operation.
b. Pressure-reducing valves shall discharge to floor drain via piping.
c. Location and quantity of auxiliary drain valves are to be reviewed and approved by FS

EH&S.

d. Globe and Angle Valve Manufacturers known to be acceptable: United Brass Works, Inc. 45S and 46S; Central F15 and F16.
e. Ball Valves Manufacturers known to be acceptable: Central; United Brass Works.

3.12 Sprinkler Heads & Associated Equipment

a. Concealed heads are required in recreation facilities, childcare facilities, and other locations if required by the UO Fire Marshal Office.
b. Appropriately rated heads in all locations; especially skylights.

3.13 Fire-Stopping

a. Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and items penetrating the fire-stopping as demonstrated by fire-stopping manufacturer based on testing and field experience.
b. Intumescent Latex Seal Manufacturers known to be acceptable: The RectorSeal Corporation; 3M Fire Protection Products.
c. Intumescent Putty Manufacturers known to be acceptable: General Electric Co.; International Protective Coatings Corp.; 3M Fire Protection Products.

3.14 Integrated Testing

a. When two or more fire protection or life safety systems are interconnected, the intended response of subordinate fire protection and life safety systems shall be verified when required testing of the initiating system is conducted. Integrated testing shall be conducted in accordance with NFPA 4 for high-rise buildings and smoke control systems.