

SECTION 21 00 10: FIRE PROTECTION SYSTEMS

1. GENERAL

- A. This section applies to the design and performance information for fire protection and suppression systems.
- B. All fire protection materials and equipment to be approved by FM Global.
- C. Components required for a complete installation that are not available with the FM approval to be listed by Underwriters Laboratories, Inc.
- D. System design criteria to be confirmed with Brown's designated FM GLOBAL loss prevention representative. The contract documents shall clearly state the basis of design as reviewed and approved by the FM loss prevention consultant.
- E. Design of the fire protection systems requires submission of key information, at various design phase milestones, for review and approval by the project team. As the design progresses the information submitted shall be updated and revised to reflect the associated decision making process and design development. The information submitted shall include the following:
 1. Basis of Design: For each type of system (Fire Sprinkler, Standpipe, Fire Suppression, Fire Pump) within the building provide the following:
 - i. Design Assumptions: Provide a list of the basic assumptions used when developing the fire protection systems design. Items to be included are the following:
 - Types of fire protection systems
 - Dry or wet systems
 - Extent of system coverage
 - Use and hazard classification for the building
 - New system, modification to existing system, replacement of existing system
 - For modifications to existing system, reuse of materials, verification of compliance and/or compatibility
 - Water supply source
 - Adequacy of the existing water supply or need for fire pump
 - ii. Narrative Description of System Types: Provide a narrative description of the fire protection, inclusive of the following:
 - Design Responsibility: Who is responsible for the design of the system and who is serving as the Engineer of Record
 - System Description
 - a. System zoning
 - b. Equipment and piping types, location, and space requirements
 - c. Routing and locations (exposed vs. concealed) of piping & equipment in sensitive (historic or critical use) locations
 - d. Locations of protection, and areas where protection will be omitted
 - e. Types of sprinklers
 - f. Location and types of exterior components (Fire Department Connection, Exterior Bell, PIV, drain, etc.)

- Hydraulic Design Criteria
 - Water Supply Information:
 - a. Providence Water hydrant flow test data
 - b. Provide fire pump test report
 - System Interfaces: Describe how each system interfaces with the other systems in the building
 - Safeguards During Construction: Identify if an existing system is to be impaired during construction and the applicable requirements in accordance with the Brown FM [Utility and Critical System Outage Planning Process \(OCL\)](#). [Blank OCL form provided to the contractor by the Brown project manager](#)
2. Fire Sprinkler System Sketches: Provide schematic floorplans and one-line riser diagram that graphically corresponds to the narrative.
3. Hydraulic Calculations:
- i. Fire protection systems to be hydraulically designed for each hazard group density in a project and the available water utility infrastructure in the area by a qualified and licensed fire protection engineer.
 - ii. Develop the basic layout, scope of the project, locations and routing of pipe mains and riser locations for review language and objective is to review all exposed piping installations and coordination for aesthetic purposes when concealed in ceilings, reviewed for accessibility with other building systems.
- F. Shop Drawings:
- 1. Riser diagram of the proposed system, showing all major isolation valves, equipment and accessories.
 - 2. Riser diagram to be “geographically correct” with regard to the building configuration.
 - 3. Floor plans showing equipment and valve locations and routing of pipe.

2. PIPING, FITTINGS, & JOINTS

- A. The selection of piping types is to be reviewed in the project design phase
- B. Schedule 10 piping is allowed for most sprinkler system applications
- C. Wet System Sprinkler Piping:
 - 1. Steel:
 - Schedule 40 black steel with grooved or threaded joints
 - Schedule 10 black steel with grooved joints
 - 2. Copper:
 - Type K or L
 - Provide dielectric fittings between copper and ferrous piping
- D. Dry Pipe & Pre-action Sprinkler Systems:
 - 1. Schedule 40 black steel with grooved malleable iron screwed fittings
 - 2. Cast iron fittings can be used only in auxiliary drains at system low points

VALVES

- E. Above ground and within buildings: OS&Y gate type valves at fire service entrance
- F. Manufacturer: Victaulic

- G. Floor Control Equipment:
1. Provide floor control assembly complete with indicating control valve, check valve, main drain valve, and flow switch for each floor level.
 2. Preferred location of floor zone control valves and flow switches is in stairways, either exposed or in properly sized wall cabinets; avoid installations in ceilings

3. **SPRINKLERS**

- A. Sprinkler guards to be installed in any location where sprinkler heads are subject to mechanical damage or are located below 7'6" above finished floor
- B. Manufacturer: Victaulic
- C. Dry Sprinkler Heads: Dry-type sprinkler heads including pendant, upright and sidewall types, are to be used within cold rooms /environmental rooms on wet pipe systems, and in unheated spaces such as attics on dry pipe systems
- D. Grooved Fittings & Couplings:
1. Grooved mechanical pipe couplings, fittings, valves and other grooved components are accepted
 2. Piping system to be listed for fire protection use
 3. All grooved couplings for dry-pipe system and pre-action systems should be cut-grooved to facilitate drainage of the system
 4. Manufacturer: Victaulic
- E. Flexible Sprinkler Head Whips:
1. Flexible braided type 304 stainless steel braided whips with 1-piece mounting brackets, are acceptable for final connections from branch lines to sprinkler heads
 2. Maximum length of whips is 6 ft.
 3. Manufacturer: Victaulic
- F. Backflow Preventer:
1. Install inside the building to allow ready servicing of the backflow preventers and pressure gauges on each end
 2. Manufacturers:
 - Ames
 - Wilkinson

4. **PRE-ACTION SYSTEMS**

- A. Use only in areas where the concern for water damage by accidental activation or damage to a sprinkler head is of utmost concern
- B. Provide a separate pre-action control panel for each zone to monitor the valve status, provide automatic detection and control the activation of the pre-action valve
- C. Pre-action control panel to be supervised by building main fire alarm control panel.

5. **FIRE PUMPS**

- A. Where required, use electric powered fire pumps

- B. Use horizontal, split-case centrifugal type
- C. Manufacturers:
 - 1. Aurora
 - 2. Patterson
 - 3. Peerless
- D. Controllers:
 - 1. Utilize solid-state-reduced-voltage type motor controller for “soft” starting and stopping of the fire pump
 - 2. Coordinate controller settings for ramp up/ramp down rate and current limiting with emergency generator design limitations for motor starting KVA and voltage drop.
 - 3. Manufacturers:
 - Joslyn Clark
 - Master Control
 - Firetrol
 - Emerson
 - Metron
- E. Jockey Pump Manufacturer: Grundfos
- F. Jockey Pump Controller Manufacturer: Metron

6. SYSTEM IDENTIFICATION

- A. Refer to Standards Section 01 70 10 – MEPFS Identification and Labeling for additional requirements.
- B. Valve Tags & Charts: Valve tags and charts are required to identify where valves are located and what function the valve performs. Valve function usually includes the following:
 - 1. Shut off duty for incoming service.
 - 2. Shut off duty for back flow preventer(s).
 - 3. Shut off duty for building zones and dry zones.
 - 4. Shut off duty for pumps
 - 5. Drain valves (for wet and dry zones).
 - 6. Floor zone valves.
 - 7. Hose stations.
- C. Valve Tags:
 - 1. To be engraved brass, attached to the valve with brass or aluminum chain.
 - 2. Label and tag by the valve name and designation shown on the record drawings; minimum 3/8” high black letters; Utilize a 2-line tag nomenclature per below:
 - 3. Line 1 - System Type:
 - FP - Fire Protection
 - 4. Line 2 – Valve Type & Number: Per the following, with “X” being a unique number and/or letter designation:
 - WS-X: Building Fire Service Isolation Valve.

- VV-X: System vent valve
- DV- X: System drain valve
- IV - X: Isolation valve for building services and equipment.
- ZV- X: Zone valve, for system zone isolation
- PCV - X: Pre-Action System Control Valve
- DSCV-X: Dry System Control Valve.
- DSDV-X: Dry System Drain & Drum Valve

D. Valve Charts:

1. Valve chart to be wall-mounted, and also included in system Operations & Maintenance Manuals. Coordinate chart location with FM Operations.
2. See partial sample chart below

Building Name and Address Here		
FIRE PROTECTION VALVE SERVICE	VALVE TAG DESIGNATION	ROOM NUMBER
Fire Protection Water Service	FP / WS – #	
Isolation Valve	FP / IV – #	
Drain Valve	FP / DV – #	
Zone Valve	FP / ZV – #	
Pre-Action System Control Valve	FP / PCV – #	
Dry System Control Valve	FP / DSCV – #	
Dry System Drain Valve	FP / DSDV – #	

E. Fire Protection System Signage:

1. Provide per NFPA 13 and 14
2. Shutoff valves, Pumps, Control valves and inspector’s test stations located in closets or rooms to have a sign on or near the door to indicate the device is in the closet or room. If behind a wall hatch, the sign to be mounted on or near the wall hatch.
3. Label all main branch lines from the main fire service to denote the area served. For Fire services that serve multiple building:
 - Clearly label the main fire service to include the building(s) served by the main service;
 - label the subfed building main service valve(s) to denote the main fire service origin building and room location.

4. Signs shall be provided with engraved laminated red on white finish phenolic nameplate with one quarter (1/2) inch high etched white letters and beveled edges. Securely mount signs to the sprinkler system.
 5. Inspector's Test Connection signs shall have a sign stating "INSPECTORS TEST".
 6. Exterior Drain location signs shall have a sign stating "SPRINKLER SYSTEM DRAIN".
 7. Riser Drain shall have a sign stating "RISER DRAIN" or "DRAIN".
 8. Auxiliary Drain signs shall have a sign stating "AUXILIARY DRAIN".
 9. Combined Inspector's Test and Drain shall have sign stating: "TEST & DRAIN"
 10. All sprinkler system control valves shall have an identification sign stating "CONTROL VALVE". Sign shall identify the portion of the building served or controlled, shall note that the valve must be kept open, and shall have a blank space for notification information.
 11. HYDRAULIC CALCULATION SIGN: Provide hydraulic design information signs as required by NFPA 13 for each hydraulically designed area.
- F. The exterior fire department standpipe connection(s) shall be labeled "AUTOMATIC SPRINKLER" or "AUTOMATIC SPRINKER AND STANDPIPE" with raised letters, at least one (1) inch size, cast on the face.
- G. Cross reference with MEPS Identification & Labeling
- H. PIPE LABELS
1. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
 2. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on the drawings; pipe size; and an arrow indicating flow direction.
 3. Flow Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 4. Lettering Size: At least one and one half (1-1/2) inches high.
 5. Pipe-Label Colors:
 - Background Color: Red.
 - Letter Color: White.
 - Lettering:
 - "Wet Sprinkler System"
 - "Dry Sprinkler System"
 - "Pre-Action System"
 - "Main Drain"
 - "Fire Protection Standpipe"
 6. Pipe Label Locations: Locate pipe labels as follows:
 - Within three (3) feet of each valve and control device.
 - At access doors, manholes, and similar access points that permit view of concealed piping.
 - Near major equipment items and other points of origination and termination.
 - Spaced at maximum intervals of twenty-five (25) feet along each run.

7. CLOSEOUT DOCUMENTATION

- A. For modifications to existing buildings and facilities, Contractor is responsible to modify existing system documentation to incorporate the revised system design requirements. Where such existing documentation does not exist, develop it new under the course of the renovation project.
- B. Copies of all completed systems acceptance test reports, including operation and confirmation of all interfaced systems (fire alarm, pre-action, air compressor, nitrogen generators, emergency power, engineered smoke control and similar fire life-safety components).
- C. Valve Chart
- D. State of Rhode Island or NFPA certification forms

8. TRAINING

- A. Provide minimum of four (4) hours of hands-on instruction in the operation, maintenance of the system.

End of Section