

# 21 00 00 FIRE PROTECTION

## FIRE SPRINKLER SYSTEM SPECIFICATION

### 1 - CONDITIONS

#### 1.1 DESCRIPTION OF WORK

- A. This scope of work is a **new fire suppression system** / a modification to an existing fire suppression system. Scope of work includes:
1. Wet pipe fire sprinkler system(s)
  2. Dry pipe fire sprinkler system(s)
  3. Pre-Action fire sprinkler system(s)
  4. Deluge fire sprinkler system(s)
- B. Provide all labor, services, material and related items necessary to complete the fire protection work indicated on drawings and described in the specifications herein and in accordance with applicable codes listed below.
- C. At no time shall work be less than the applicable codes and standards listed below. Proposed alternatives, discrepancies, or questions shall be addressed by written Request for Information.

#### 1.2 RELATED WORK

- A. Applicable provisions of Division 0 and 1, including Firestopping and Painting.
- B. Section 21 30 13, Electric-Driven Fire Pumps
- C. Section 21 30 16, Diesel-Driven Fire Pumps
- D. Section 28 31 00, Fire Detection and Alarm

#### 1.3 DESIGN CRITERIA

- A. Applicable Codes, Standards, and Publications:
1. The building code as indicated in architectural plans and specifications.
  2. NFPA 13 – 2010 / 2013 / 2016 / 2019 / 2022 Edition
  3. NFPA 13R – 2010 / 2013 / 2016 / 2019 / 2022 Edition
  4. NFPA 14 – 2010 / 2013 / 2016 / 2019 / 2022 Edition
  5. NFPA 20 – 2010 / 2013 / 2016 / 2019 / 2022 Edition
  6. NFPA 24 – 2010 / 2013 / 2016 / 2019 / 2022 Edition
  7. FM Global Data Sheets
  8. Owner Design and Installation Standards
  9. AWWA M14 – Backflow Prevention and Cross-Connection Control
  10. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory
  11. Factory Mutual Engineering Corporation (FM) Approval Guide
- B. Design Criteria:
1. Provide hydraulic calculations in accordance with applicable standard(s) from Section A.

#### Commented [JM1]: Editor's Notes:

-- GREEN and BLUE highlights are an either-or selection. Do not keep both.  
-- YELLOW highlights are additional options. Delete if not applicable.

Commented [JM2]: Editor's Note: Design criteria is the single most-important duty of the Professional Engineer in a fire sprinkler system specification. Careful attention and responsibility must be paid to the criteria. If criteria is to be listed in the specification, every type of space *must* be listed to clearly communicate the intent for all areas of a building. Provide no ambiguity to the intent of the hazard classification.

2. The minimum hydraulic safety factor required for calculations shall be 5 psi / 10 psi / 10% below the available water supply curve.
3. Hydraulic design area reduction for use of quick response sprinklers shall be permitted where allowed in NFPA 13 / is not allowed.
4. Hazard classifications shall be as follows: / Refer to drawings for design criteria for this project.

Area	Hazard Classification
Break Rooms, Classrooms, Conference Rooms, Corridors, Lobby, Office, Restaurant Seating, Restroom Areas	Light Hazard
Electrical, Mechanical, Server Areas	Ordinary Hazard Group 1
Mercantile, Parking Miscellaneous Storage (12-ft or less) Areas	Ordinary Hazard Group 2
[any other areas not listed]	[hazard classification in NFPA 13 / insurance]

C. Water Supply Information

1. Base the water supply on the following flow test information:
  - Location:
  - Static Pressure:
  - Residual Pressure:
  - Flow at Residual Pressure:
  - Elevation of Static/Residual Hydrant:
  - Date and Time of Test:
2. Base the water supply on the following latest fire pump test information:
3. Refer to drawings for provided water supply information.

D. Zones

1. Refer to drawings for sprinkler system zoning.

E. Seismic Protection

1. Seismic protection is not required / required for the fire sprinkler system. Building Seismic Design Category is A / B / C / D / E / as indicated in structural drawings and specifications.

## 1.4 SUBMITTALS

A. Working Drawings

1. Submit detailed plans which includes all items listed NFPA 13 for working drawings. Drawings which do not include all items listed in NFPA 13 will be rejected.
2. Working drawings shall be designed by a NICET Level III or Level IV / designed by a NICET Level IV or designed by a NICET Level II or greater and stamped by a Registered Professional Engineer who is knowledgeable and has experience in the field of Fire Protection / licensed in the field of Fire Protection.
3. Working drawings shall be electronically prepared.
4. Scale shall be scaled at 1/8-inch minimum (1:100).

5. Submit drawings in PDF form, in accordance with Division 1 specifications.
  6. Partial submittals will not be accepted.
- B. Manufacturer's Data Sheets
1. Provide product data for all material and equipment proposed for the system.
  2. Where multiple items are shown on a data sheet, clearly identify which types, sizes, or models are proposed.
- C. Hydraulic Calculations
1. Provide hydraulic calculations in tabular form as described in NFPA 13.
- D. Seismic Calculations
1. Provide seismic calculations for bracing sizing in accordance with applicable standard(s) from Section A.
- E. General Storage Information Sign
1. Provide a complete General Information Sign including all items listed in NFPA 13 under Chapter "Systems Acceptance."
- F. Closeout Documents:
1. A copy of the as-built drawings.
  2. Material and Testing Certificates, as indicated in NFPA 13.
  3. A physical copy of the latest edition of NFPA 25.
  4. Operations and Maintenance Manuals including procedures for system startup, operation, shutdown, and routine maintenance and testing. Provide emergency contact and maintenance contact information.

## 1.5 QUALITY ASSURANCE

- A. Qualifications
1. Provide a copy of the installing contractor's license.
  2. Provide a letter demonstrating related commercial fire sprinkler work completed over the past five years.
  3. Provide a copy of the NICET certification unless drawings are stamped by a Registered Professional Engineer **who is knowledgeable and has experience in the field of Fire Protection / licensed in the field of Fire Protection.**
  4. Contractor shall provide a written Quality Assurance / Quality Control Program for delivery, handling, storage (onsite/offsite), installation, testing and commissioning for review.
- B. Material and Equipment
1. All equipment and devices shall be of a make and type listed by UL or approved by FM for the purpose for which it will be used.
  2. All materials and equipment shall be free from defect.
  3. All materials and equipment shall be new unless indicated otherwise on the drawings.

## 2 - PRODUCTS

### 2.1 GENERAL

- A. Listings
  - 1. Provide materials, equipment, and devices listed for fire protection service when required by NFPA 13 or this specification.
- B. Rated Pressure
  - 1. All components shall be rated for the maximum working pressure experienced, but in no case be less than 175 psi (1207 kPa).

### 2.2 PIPE & FITTINGS

- A. Underground Pipe & Fittings
  - 1. Pipe and fittings for underground water service shall be in accordance with NFPA 24 / and FM Global Data Sheets.
  - 2. Provide pipe and fittings from inside face of building 12-inches (300 mm) above finished floor to a distance of approximately 5-feet (1.5 m) outside the building. Pipe and fittings shall be Ductile Iron with flanged fittings and stainless steel bolts, or a continuous piece of welded stainless steel fire water service pipe from a point outside the building perimeter to at least 1-ft above finished floor.
- B. Aboveground Pipe & Fittings
  - 1. Pipe and fittings for the fire sprinkler system(s) shall be in accordance with NFPA 13 / and FM Global.
  - 2. Fittings shall be welded, flanged, threaded, or grooved-end type. Mechanical tees and mechanical outlets are only permitted where new pipe attaches to an existing system. Plain-end pipe and fittings, including mechanical couplings, devices that grip or bite into the pipe, press fittings, and field welded fittings are not permitted.
  - 3. Pipe sizes 1-inch (25 mm) / 1 ¼-inch (32 mm) / 1 ½-inch (40 mm) / 2-inch (50 mm) and smaller shall be black steel Schedule 40 with threaded or grooved end connections.
  - 4. Pipe sizes 1 ¼-inch (32 mm) / 1 ½-inch (40 mm) / 2-inch (50 mm) / 2 ½-inch (65 mm) and larger shall be black steel Schedule 10 with grooved end connections. Grooves in Schedule 10 pipe shall be roll groove only.
  - 5. Use nonferrous pipe and fittings in MRI scanning rooms.
  - 6. CPVC is permitted in areas allowed by NFPA 13 / NFPA 13R / NFPA 13D / not permitted.
  - 7. Flexible sprinkler drops shall be UL Listed, shall be braided-type, shall have a minimum inside diameter of 1-inch, and shall have a maximum length of 6-feet / are not permitted. Where used, shop drawings shall clearly indicate (1) the maximum number of bends permitted, (2) the minimum bend radius permitted, and (3) the equivalent length used in the hydraulic calculations.

## 2.3 VALVES

### A. General

1. All valves shall be UL Listed or FM Approved for fire service and shall be in accordance with NFPA 13 / and FM Global Data Sheets.

### B. Alarm Check Valve

1. Alarm check valve shall be equipped with a removable cover assembly, gauge connections on the system and supply side of the valve clapper, variable pressure trim, and have an external bypass to eliminate false flow alarm.
2. Trim pipe for the alarm check shall be galvanized.

### C. Automatic Ball Drip

1. Automatic ball drip shall be minimum 3/4-inch with threads on both ends.
2. Automatic ball drip shall be listed for the orientation which it is installed.

### D. Backflow Preventer

1. Provide backflow preventer in accordance with Division 22 specifications and the applicable codes & standards.
2. Provide backflow preventer in accordance with Division 22 specifications and the applicable codes & standards / of double check type / double check detector type / reduced pressure zone type / reduced pressure zone detector type / a type which meets local requirements and applicable standards. All reduced pressure type backflow preventers shall be above grade, installed horizontally, and be provided with adequate means of draining.
3. Provide a permanent means of forward flow testing the backflow preventer which requires no system rearrangement, no system drain down, and no hoses running through the interior of the building (inside any exterior wall).

### E. Check Valve

1. Check valves must be of swing type with a flanged inspection plate.

### F. Control Valve

1. Control valves shall be indicating type.
2. Manually operated control valves must be outside stem and yoke type (OS&Y) or butterfly type.
3. Valves 2-inch (50 mm) and larger shall

## 2.4 FIRE DEPARTMENT CONNECTION

### A. Type

1. Provide a minimum of two-inlet 2 1/2-inch (65 mm) threaded connection fire department connection / Storz-type fire department connection / fire department connection of a type which meets local fire department requirements.

### B. Mount & Location

1. Fire Department Connection shall be wall-mounted exposed type / flush wall type / freestanding away from the building / located where required by the Authority Having Jurisdiction.

2. The fire department connection shall be located as shown on the drawings / where required by the Authority Having Jurisdiction.
- C. Finish
1. The fire department connection shall be brass or chrome.
- D. Other Requirements
1. Provide caps, escutcheon, and clappers in accordance with NFPA 13.
  2. Provide an automatic ball drip installed between the fire department connection and check valve with drain pipe routed to the exterior.

## 2.5 SPRINKLERS

- A. Provide sprinklers of a type as shown on the drawings / as follows:

Area	Sprinkler Type	Sprinkler Finish
[Areas with specific needs]	Concealed / Institutional	White / Black / Chrome / Custom Finish
Areas with finished ceilings (including ACT, Gypsum) not listed above	Recessed / Concealed	White / Black / Chrome / Custom Finish
Areas with structure exposed to view	Upright	Brass / White / Black / Custom Finish

- B. Escutcheon: Provide one-piece metallic type which have a factory finish that matches the sprinkler.
- C. Guards: Provide a UL Listed or FM Approved sprinkler guard(s) in accordance with NFPA 13 and when the elevation of the sprinkler is less than 7-feet 6-inches (2.3 m) above finished floor.

## 2.6 HANGERS AND SUPPORT

- A. Provide pipe hangers, supports, and restraining of pipe in accordance with NFPA 13 / and FM Global Data Sheets.

## 2.7 ACCESSORIES

- A. Air Vent
1. Provide air vent of automatic type.
  2. Air vent shall be pipe to the building exterior unless automatic air vent is designed as redundant float such that it explicitly eliminates the need for a drain.
- B. Gauges
1. Provide gauges as required by NFPA 13.
  2. Provide gauges with a range where the normal pressure of the system is roughly at the midpoint of the gauge range.
- C. Relief Valve
1. Provide listed relief valve at the riser in accordance with NFPA 13.
- D. Sprinkler Cabinet
1. Provide a sprinkler cabinet in accordance with NFPA 13 at the building riser.

2. Provide a list of all sprinklers installed in the building on the inside of the cabinet.
- E. Switches
1. Provide supervisory switches for all valves which control the supply of water to the fire suppression system, in accordance with NFPA 13 / and FM Global Data Sheets.  
Supervisory for ball and butterfly valves may be integral with the valve.
  2. Provide waterflow switch(es) with an adjustable delay from 0 to 60 seconds minimum.
- F. Wall, Floor, and Ceiling Plates
1. Provide chrome plated steel escutcheon plate(s) for wall, floor and ceiling penetrations.