

# 21 00 00 FIRE PROTECTION

## FIRE SPRINKLER SYSTEM SPECIFICATION

**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.

## 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)
  5. Manual, wet standpipe system.
  6. Manual, dry standpipe system.
  7. Automatic, wet standpipe system.
  8. Automatic, dry standpipe system.
- 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. Provide all work in accordance with the applicable codes and standards listed below. No work shall be fail to meet the minimum required codes and standards. Submit written Request for Information for questions, discrepancies, or any proposed alternatives.

### 1.2 RELATED WORK

- A. Applicable provisions of Division 0 and 1, including Firestopping and Painting.
1. Section 21 30 13, Electric-Driven Fire Pumps
  2. Section 21 30 16, Diesel-Driven Fire Pumps
  3. Section 28 31 00, Fire Detection and Alarm
  4. Section 33 16 15, Water Storage Steel Tanks

### 1.3 DESIGN CRITERIA

- A. Applicable Codes, Standards, and Publications: / Refer to drawings for applicable codes and standards.
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 22 – 2003 / 2008 / 2013 / 2018 / 2023 Edition

7. NFPA 24 – 2010 / 2013 / 2016 / 2019 / 2022 Edition
8. FM Global Data Sheets
9. Owner Design and Installation Standards
10. AWWA M14 – Backflow Prevention and Cross-Connection Control
11. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory
12. Factory Mutual Engineering Corporation (FM) Approval Guide

B. Design Criteria:

1. Provide hydraulic calculations in accordance with applicable standard(s) from Section A.
2. Provide a minimum hydraulic safety factor of 5 psi / 10 psi / 10% below the available water supply curve.
3. Hydraulic design area reduction for use of quick response sprinklers is permitted where allowed in NFPA 13 / is not allowed.
4. Provide hazard classifications as follows: / Refer to drawings for design criteria for this project.

**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.

| 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. / Provide seismic protection for systems where the Building Seismic Design Category is C, D, E, or F.
2. Building Seismic Design Category is A / B / C / D / E / F / 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. Provide working drawings **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 has a minimum four years documented experience exclusively in a fire protection role / licensed in the field of Fire Protection.**
  - 3. Provide working drawings that are electronically prepared.
  - 4. Provide scaled working drawings 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 has a minimum four years documented experience exclusively in a fire protection role / licensed in the field of Fire Protection.**

4. Provide written Quality Assurance / Quality Control Program for delivery, handling, storage (onsite/offsite), installation, testing and commissioning for review.
- B. Material and Equipment
1. Provide all equipment and devices of a make and type listed by UL or approved by FM for the purpose for which it will be used.
  2. Provide all materials and equipment free from defect.
  3. Provide all materials and equipment 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. Provide all components that are rated for the maximum working pressure of the system, but in no case be less than 175 psi (1207 kPa).

### 2.2 PIPE & FITTINGS

- A. Underground Pipe & Fittings
1. Provide pipe and fittings for underground water service 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. Provide 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. Provide pipe and fittings for the fire sprinkler system(s) in accordance with NFPA 13 / and FM Global.
  2. Provide welded, flanged, threaded, or grooved-end type fittings. 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. Provide black steel Schedule 30 Schedule 40 for pipe sizes 1-inch (25 mm) / 1 ¼-inch (32 mm) / 1 ½-inch (40 mm) / 2-inch (50 mm) and smaller with threaded or grooved end connections.
  4. Provide black steel Schedule 10 for pipe sizes 1 ¼-inch (32 mm) / 1 ½-inch (40 mm) / 2-inch (50 mm) / 2 ½-inch (65 mm) and larger with grooved end connections. Provide roll-groove type in Schedule 10 pipe; cut-groove is not permitted.

5. Provide galvanized pipe for through-penetrations in exterior wall.
6. Use nonferrous pipe and fittings in MRI scanning rooms.
7. CPVC is permitted in areas allowed by NFPA 13 / NFPA 13R / NFPA 13D / not permitted.
8. Flexible sprinkler drops are / are not permitted. / Where used, provide UL Listed, braided-type flexible sprinkler drops with a minimum inside diameter of 1-inch and maximum length of 6-ft. Where used, clearly indicate the following on shop drawings: (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. Provide valves which are UL Listed or FM Approved for fire service and in accordance with NFPA 13 / and FM Global Data Sheets.

### B. Alarm Check Valve

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

### C. Automatic Ball Drip

1. Provide minimum 3/4-inch automatic ball drip with threads on both ends.
2. Provide automatic ball drip that is 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 listed for use in a Fire Suppression system.
3. 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. Provide all reduced pressure type backflow preventers above grade, installed horizontally, and provide with adequate means of draining to accept full discharge flow at the maximum working pressure of the system.
4. Provide an exterior wall-mounted test header for forward-flow testing of the backflow preventer. Interior hose valves are permitted in lieu of a test header where the room has an exterior door, floor drain, and designed a "wet" location in accordance with NFPA 70.

### E. Check Valve

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

### F. Control Valve

1. Provide control valve(s) of indicating type.
2. Manually operated control valves must be by outside stem and yoke type (OS&Y) or butterfly type.

### G. Dry Valve

1. Provide dry valve(s) complete with all trim, accessories, and connections required for the proper operation of the system.
2. Provide dry valve(s) with external reset capability.

H. Hose Valve

1. Provide hose valve with 2-1/2 inch National Standard male hose threads / and 2-1/2 inch NH female by 1-1/2 inch IPT male reducer with cap and chain.

## 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. Provide wall-mounted exposed / wall-mounted flush / freestanding type Fire Department Connection / as required by the Authority having Jurisdiction.
2. Locate the fire department connection as shown on the drawings / where required by the Authority Having Jurisdiction.

C. Finish

1. Provide brass or chrome fire department connection.

D. Other Requirements

1. Provide lockable Knox 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 metallic type which have a factory finish that matches the sprinkler. Provide escutcheon in accordance with the listing of 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 PENETRATIONS AND FIRESTOPPING

- A. Sleeves
  - 1. Provide pipe sleeves where pipe passes entirely through walls, floors, roofs, and partitions. Pipe sleeve not required where penetration is core-drilled through concrete or masonry and cavities in the penetration are grouted smooth.
  - 2. Provide clearance between pipe and interior of sleeve or core-drill in accordance with NFPA 13 / and FM Global Data Sheets.
- B. Firestopping
  - 1. Provide UL listed fill, void, or cavity material to seal both ends of penetration in fire resistant rated walls and floors.
  - 2. Firestopping shall be by the sprinkler contractor / general contractor / firestopping specialist contractor / contractor as listed in Division 0 and 1 specifications.

## 2.8 ACCESSORIES

- A. Air Compressor
  - 1. Provide a riser-mounted air compressor / tank-mounted air compressor for the dry system in accordance with NFPA 13.
- B. Air Vent
  - 1. Provide a manual / an automatic air vent.
  - 2. Pipe the drain from air vent drain to the building exterior unless an automatic air vent is used with redundant float such that it explicitly eliminates the need for a drain as identified in the manufacturer's product data.
- C. 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.
- D. Nitrogen Generator
  - 1. Provide a UL Listed or FM Approved nitrogen generator with built-in monitoring.
  - 2. Provide a nitrogen generator with a listed total capacity for the entire dry system.
- E. Pressure Switches
  - 1. Provide supervisory switches as required by NFPA 13.
- F. Relief Valve
  - 1. Provide listed relief valve at the riser in accordance with NFPA 13.
- G. 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.

H. Tamper 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.

I. Wall, Floor, and Ceiling Plates

1. Provide chrome plated steel escutcheon plate(s) for wall, floor and ceiling penetrations.

J. Waterflow Switches

1. Provide waterflow switch(es) with an adjustable delay from 0 to 60 seconds minimum for any waterflow switch not used for elevator power shunt.