

# DIVISION 21 FIRE SUPPRESSION

Table of Contents

<b>21 00 00 FIRE SUPPRESSION</b> .....	<b>2</b>
A. REFERENCE ABBREVIATIONS.....	2
B. GENERAL.....	2
C. DESIGN REQUIREMENTS .....	2
D. DOCUMENTATION .....	2
<b>21 08 00 FIRE SUPPRESSION COMMISSIONING</b> .....	<b>2</b>
A. PIPE CLEANING .....	2
B. PIPE TESTING .....	3
<b>21 12 00 STANDPIPES</b> .....	<b>3</b>
A. STANDPIPE AND HOSE SYSTEMS .....	3
<b>21 13 00 SPRINKLER SYSTEMS</b> .....	<b>3</b>
A. WET PIPE SYSTEMS .....	3
B. DRY PIPE SYSTEMS.....	4
C. PREACTION SYSTEMS.....	4
D. DOUBLE INTERLOCKED PREACTION SYSTEMS .....	4
<b>21 30 00 FIRE PUMPS</b> .....	<b>5</b>
A. GENERAL.....	5

*Unless stated otherwise, the standards in this Facilities Design Manual (FDM) are directed to the Design Professional to incorporate into the Project.*

*Although the Owner encourages improved concept, method and product recommendations by the Design Professional, deviation from these standards, including product requests for “approved equivalent” status, requires written justification from the Design Professional and written approval from the Owner’s Representative before completion of Design Development Documents.*

## 21 00 00 FIRE SUPPRESSION

### A. REFERENCE ABBREVIATIONS

1. NFPA National Fire Protection Association

### B. GENERAL

1. Do not specify dampers that use fusible links; if such dampers must be used, do the following.
  - a. Specify a minimum of 2 extra links per damper.
  - b. Specify extra spare links furnished at the rate of 20% of the total number of links specified.
2. Test Connections
  - a. For each water flow indicator, specify an inspector's test connection that consists of a test pipe not less than 1 inch diameter that terminates in a smooth bore corrosion resistant orifice giving a flow equivalent to one sprinkler head of the type installed on the system.
    - 1) Specify the test connection discharging to the building exterior.
    - 2) Locate the control valve for the inspector's test connection not more than 7 feet above finished floor.
3. Equipment Type Acceptance
  - a. Specify Factory Mutual approved and labeled sprinkler heads, valves, fittings and components.
  - b. Specify the main control valves furnished with tamper-proof contacts for connection to the building fire alarm system.
4. Hydraulic Design Submittal
  - a. In addition to the distribution of drawings specified in the General Conditions, submit to the Owner's Representative one set of shop drawings showing the complete automatic sprinkler system that includes the following.
    - 1) All reference nodes from the supply to and including the clearly identified remote area.
    - 2) One complete set of hydraulic calculations, including detail and summary sheets.
5. For pipe material, see FDM Part 2/Support Docs for Div 22/[ISU Standard Pipe Schedule And Specifications.pdf](#).
6. See alarm standards in Section 28 31 00 in FDM Part 2/[Div 28 Electronic Safety And Security.pdf](#).

### C. DESIGN REQUIREMENTS

1. Specify that installation of automatic sprinkler systems for fire protection comply with the following current codes and standards.
  - a. State Building Code
  - b. Fire Marshal's Rules
  - c. NFPA 13, **Standard for** Installation of Sprinkler Systems.
  - d. Common motor requirements

### D. DOCUMENTATION

1. Submit to the Owner's Representative a complete set of drawings, specifications and hydraulic calculations approved by the Fire Marshal.

## 21 08 00 FIRE SUPPRESSION COMMISSIONING

### A. PIPE CLEANING

1. Specify underground piping 6 inches and smaller flushed at a minimum rate of 750 gallons per minute.
2. Specify interior piping flushed to remove loose scale and other foreign material before placing the system into service.

## **B. PIPE TESTING**

1. Specify the completed installation of sprinkler heads, valves, fittings and other components prior to conducting the final hydrostatic test witnessed by the Owner's Representative and Design Professional.
2. Specify the entire system is hydrostatically tested at not less than 200 psig for a minimum of 2 hours.
  - a. Specify pressure is read from a gauge located at the low point of the system tested.
  - b. For interior piping, specify maximum leakage of zero quarts per hour.
  - c. For a 6 inch underground main, specify maximum leakage of 2.5 quarts per 100 joints per hour.
3. For water used for testing and water remaining in piping, specify water sterilized with chlorine.
4. To verify adequate water flow, specify that flow is tested at the inspector's test connection.
5. Specify hydraulic calculations based on flow tests performed by the Owner.
  - a. Hydraulic calculations will be reviewed by the Owner's Representative and insurance carrier.
6. To verify that the building fire alarm system activates, specify to test the alarm system by operating the inspector's test connection or alarm test valves.
7. Specify that test results are reported to the Design Professional.
8. At completion, specify the Contractor to complete and submit a Contractor's Material and Test Certificate for Above Ground Piping to the Owner's Representative.

## **21 12 00 STANDPIPES**

### **A. STANDPIPE AND HOSE SYSTEMS**

1. The Owner depends on personnel and equipment of the Ames Fire Department to fight a fire.
  - a. Specify the minimum code required equipment and components needed by the Owner.
2. Because the Owner has no on-site fire fighting personnel, do not specify hose systems.
3. Specify wet standpipes for use by the Ames Fire Department.
  - a. Coordinate with Ames Fire Department personnel and the Owner's Representative.
4. For taller buildings, unless required by the Ames Fire Department, do not specify fire pumps.
  - a. Coordinate with Ames Fire Department personnel and the Owner's Representative.

## **21 13 00 SPRINKLER SYSTEMS**

### **A. WET PIPE SYSTEMS**

1. Because the Owner tests fire suppression systems following NFPA requirements, design the system as follows.
  - a. To test the system residual pressure, adequately accommodate the full flow through the main drain of the system.
    - 1) A floor drain in the same room is not an acceptable solution.
    - 2) Pipe drains to a building sump or to outside the building.
  - b. Provide one inspector's test valve for each zone of the system, with outlets located to allow visual identification of flow and the control of flow for a prolonged period of time.
  - c. Design and specify the installation of the system to be completely drained, without water remaining trapped in the system.
2. Looped or double riser cross-connected systems are acceptable if flow alarm issues are successfully resolved.

3. Design one or more zones per floor, using major smoke/fire barriers as perimeters.
  - a. For each zone, specify the following.
    - 1) control valve with tamper switch
    - 2) flow switch
    - 3) test and drain valve
4. Specify 4 inch to 12 inch butterfly valves with worm gear actuators and built-in tamper switch.
5. Specify 1 inch to 2 inch butterfly valves with built-in tamper switch.
6. Specify combination three-way test and drain valves.
7. Do not specify gate valves.
8. Do not specify plastic bodied flow sight glasses.
9. For sprinkler heads in the elevator machine room, top of the elevator shaft, and elevator pit, specify each head to have a shut-off valve with built-in tamper switch.
10. Specify semi-recessed type sprinkler heads with glass bulb.

#### **B. DRY PIPE SYSTEMS**

1. Instead of using the building control system as an air source, specify a separate compressor with manual controls.
2. Locate condensation "drum drips" to allow for regular draining without the use of a ladder.
3. Specify an air pressure monitoring device and alarm connected to the Owner's Building Automation System (BAS).
  - a. For information on the BAS, see FDM Part 2/[Div 25 Building Automation.pdf](#).

#### **C. PREACTION SYSTEMS**

1. Design as a stand-alone system with a local control panel and separate detection.
  - a. Do not rely on the building fire alarm system for operation.
  - b. Connect the control panel to the building fire alarm control panel as an annunciated zone, along with the trouble indication from the system.
2. Give special attention to the following.
  - a. The need to dry the system after it fills.
  - b. The placement of drains and condensate traps, which are usually over specialized areas.
3. Specify an air pressure monitoring device and alarm connected to the Owner's BAS.

#### **D. DOUBLE INTERLOCKED PREACTION SYSTEMS**

1. These systems utilize a detector system and pressurized air or gas in the sprinkler piping.
2. Design as a stand-alone system with a local control panel and separate detection.
  - a. Do not rely on the building fire alarm system for operation.
  - b. Connect the control panel to the building fire alarm control panel as an annunciated zone, along with the trouble indication from the system.
3. Give special attention to the following.
  - a. The need to dry the system after it fills.
  - b. The placement of drains and condensate traps, which are usually over specialized areas.
4. Specify an air pressure monitoring device and alarm connected to the Owner's BAS.

## **21 30 00 FIRE PUMPS**

### **A. GENERAL**

1. To determine if a fire pump is needed for a particular building, do the following steps.
  - a. Determine the hazard classification of all areas.
  - b. If stand pipes are required, design a manual wet standpipe system.
  - c. Determine water flow and system pressure required by the fire protection system.
  - d. Request the Owner's Representative to conduct a water distribution system flow test in the area of this project that reflects normal operating conditions.
  - e. Compare the water distribution system test results obtained from the Owner's Representative with the calculated fire protection system demand.
  - f. If a fire pump appears to be required, include the minimum fire pump size and proposed location in the document.
2. Submit to the Owner's Representative written documentation that includes test results, calculations and analysis that support the resulting determination on whether a fire pump is required or is not required for the building.
  - a. Personnel of ISU Environmental Health & Safety (EH&S) and the Ames Fire Department (AFD) will review the documentation.
  - b. Personnel of the State Building Code Bureau will be consulted to determine a final ruling.
  - c. The Owner's Representative will communicate the final ruling to the Project Design Team.

**END OF DIVISION 21 FIRE SUPPRESSION**