

## SECTION 15330 - AUTOMATIC FIRE SPRINKLER SYSTEM

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### *SPECIFIER:*

*CSI MasterFormat 2004 number: 211313*

*NOTE TO SPECIFIER: Refer to Design Criteria and NFPA 13 and coordinate drawings and this section. Edit this section to suit specific project requirements. The drawings and these specifications shall provide the necessary criteria for the final design of the system by a "dedicated engineer" as set forth in Florida Administrative Rules, Chapter 61G15-32.*

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### PART 1 GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Wet automatic fire sprinkler systems including fire pump, fire pump controller, alarms, safety devices, piping, sprinklers and related accessories, sized and spaced for the occupancy shown on the drawings.
2. Different sprinkler piping systems, including necessary accessories to combine into one system.

##### B. Related Sections:

1. 07840 - Firestopping and Fire and Smoke Sealing.
2. 09900 - Painting.
3. 15047 - Identification.
4. 15300 - Fire Protection (General Requirements).
5. 15320 - Fire Pump and Controls.
6. 16721 - Fire Detection Alarm Systems.

#### 1.2 REFERENCES

##### A. American Society of Mechanical Engineers/American National Standards Institute, Inc. (ASME/ANSI).

1. ASME/ANSI B2.1, B16.1, B16.3, B16.4, B16.9, B16.25, B18.2, B31.

##### B. American Society for Testing and Materials (ASTM), latest publications:

1. A47 Standard Specification for Ferritic Malleable Iron Castings.
2. A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. A135 Standard Specification for Electric-Resistance-Welded Steel Pipe.
4. A234 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

##### C. Underwriters Laboratories (UL), Factory Mutual (FM) or other OSHA approved Nationally Recognized Testing Laboratory (NRTL).

##### D. Federal Specifications (FS) WW-H-171E, Pipe Hangers and Supports.

E. National Fire Protection Association (NFPA).

1. NFPA 13 - Standard for the Installation of Sprinkler Systems.
2. NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection.
3. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
4. NFPA 25 – Standard for the Inspection, Testing and Maintenance of Water Base Fire Protection Systems.
5. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:

1. Provide a hydraulically designed installation of automatic sprinklers with 100 percent coverage of the facilities except for areas indicated to be excluded.
2. Sprinkler head arrangement shall be symmetrically laid out on ceiling tile. Coordinate with partitions, columns, beams, lighting fixtures, ceiling grilles, and other architectural elements. Sprinkler heads shall be spaced, located, and positioned according to NFPA 13.
3. Use maximum allowable spacing of sprinkler heads for the hazard occupancy type designed within the available system flow and pressure.
4. Furnish guards on sprinkler heads located near heaters, boilers, in stair enclosures, and under air conditioning ducts or building obstructions below 8'-0" above finish floor and as required by NFPA 13.
5. Calculations, drawings, referenced diagrams, performance curves, and data used to layout and identify system shall be signed and sealed by a Florida registered professional engineer acting as the delegated engineer.
  - a. Design density shall be as required for the hazard classification of the spaces protected. Design shall avail itself of any reductions in area of coverage permitted by NFPA 13. All such reductions shall be clearly identified in the design drawings and calculations.

1.4 SUBMITTALS

A. Submit properly identified manufacturer's literature.

B. Submit shop drawings for the following. Drawings and calculations shall be signed and sealed by a Florida Professional Engineer being the delegated engineer in accordance with Florida Administrative Rules, Chapter 61G15-32.

1. Valves and appurtenances.
2. Pipe hangers and supports.
3. Sprinkler heads.
4. Piping.
5. Flow switches and control devices.
6. Submit complete, 1/8" scale, drawings of fire sprinkler system layout.
7. Hydraulic calculations in accordance with NFPA 13.

## 1.5 QUALITY ASSURANCE

- A. Fire protection equipment, valves and devices shall be listed in the Underwriters Laboratories Certification Directory, FM Approval Guide, or other OSHA approved NRTL, for service intended. Equipment shall be installed in conformance with standards of National Fire Protection Association (NFPA) and Factory Mutual (FM).
- B. Products meeting the requirements manufactured by Stockham, Jenkins, Walworth, Mueller, Kennedy, Potter Roemer, Larsen's, Guardian, or others as approved by the A/E .
- C. Install equipment according to the requirements of its listing.
- D. Electrical installation shall comply with NEC and local codes.

## 1.6 DRAWINGS

- A. The intent of the drawings is to provide the fire sprinkler contractor information on the areas to be covered and the basis of design as a framework for bidding a system as specified herein and designed by the contractor's delegated engineer.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. The use of chlorinated polyvinyl chloride (CPVC) piping for fire sprinkler systems is not allowed by M-DCPS.
- B. Steel Piping:
  - 1. Pipe shall be new, designed for 175 psi working pressure, conforming to ASTM specifications, along with the applicable ASTM standard marked on each length of pipe.
  - 2. Pipe shall be steel, Schedule 40, black, and according to ASTM A135 Grade A or ASTM A53 Grade A seamless.
  - 3. For sizes above 2 inches only, pipe may be steel, Schedule 10, black, and according to ASTM A135 Grade A.
  - 4. Black steel pipe for use with push-on fittings (Schedule 40 or 10) shall conform to ASTM A135 tolerances and fitting manufacturer's tolerances.
  - 5. Coat black steel pipe with a suitable protective coating. Sprinkler piping exposed to the weather or used in a corrosive atmosphere, as noted on drawings, shall be galvanized.
- C. Steel Pipe Fittings:
  - 1. Threaded: malleable or banded cast iron. ANSI B16.4 and B16.3, Class 125. Threaded joints shall comply with ANSI B1.20.1.
  - 2. Flanged fittings, ANSI B16.5. Gaskets shall be full face, minimum 1/8 inch thick rubber. Flange bolts as per ANSI B18.2.
  - 3. Victaulic fittings with grooved joint couplings and EPDM gaskets.
  - 4. Welded Fittings: ANSI B16.25. Welded joints shall comply with ANSI B31.

D. Valves and Appurtenances:

1. Gate and Butterfly Valves: Shall be UL or other NRTL listed, or FM approved.
  - a. 2-1/2 inches and larger: Shall be flanged or grooved connection ends, butterfly with weatherproof actuator housing or outside screw and yoke, cast or ductile iron body and bonnet, 175 WWP Class.
  - b. 2 inches and smaller: Shall be OS & Y threaded bronze, rising stem 175 WWP Class.
2. Check Valves: Shall be UL or other NRTL listed, or FM approved
  - a. 2-1/2 inches and larger: Shall be flanged or grooved end connection ends, cast or ductile iron body with bronze or iron disc and seat, 175 WWP Class.
  - b. 2 inches and smaller: Shall be threaded bronze swing type, 175 WWP Class.
3. Globe Valves: Bronze body and disc, screwed bonnet, 200 psi wog, threaded ends.
4. Provide control valves with tamper indicators monitored by the Fire Alarm System.
5. Audible electrically operated sprinkler alarms shall be as specified under Division 16.
6. Escutcheons: Chromium plated steel or chromium plated brass, either one piece or split patterns.
7. Valve Directory: Plastic laminated on solid backing, giving number, location, and function of each valve.
  - a. Where it is necessary to operate more than one valve to control a section of piping, note this fact and show the number of second valve on directory.
8. Inspector's Test Connections: One test pipe and valve connection of not less than 1 inch diameter, terminating in a smooth bore, 1/2" brass outlet, discharging through a suitable air gap connection to sanitary collection system.

E. Hangers and Supports:

1. Provide adjustable hangers as required for proper support of pipe lines according to requirements of NFPA 13, Fed.Spec.WW-H-171E, and is UL listed. Hangers shall allow for expansion and contraction of pipelines and be wrought iron clevis type. Wire type hangers are not allowed.
2. Piping Supported from Concrete Slabs: Use hangers attached to galvanized rods suspended from concrete inserts. Powder actuated fasteners and devices are not allowed. "Redhead" self-drilling concrete expansion anchors are acceptable.
3. Single Pipe Runs: Support with adjustable swivel ring hangers. Wire type hangers are not acceptable.
4. Piping Supported from Walls or Columns: Use welded steel brackets and adjustable swivel ring hanger.
5. Standpipes Supported from Walls with Wrought Strap: Grinnell Fig.262.

F. Sleeves: Per NFPA regulations.

G. Sprinkler Heads:

1. Sprinkler head rating shall be as per NFPA 13 with fusible link or heat sensitive bulb.
2. Provide accepted head types shown on the drawings or as follows:

- a. Unfinished Areas: Pendent sprinklers with standard finish and polished brass escutcheon plates.
- b. Finished Suspended Ceiling Areas: Chrome plated, flush type, sprinkler heads.
- c. Sidewall mounted sprinkler heads.

3. Spare Sprinklers and Devices:

- a. Provide a stock of spare sprinklers of all types and ratings installed. Quantity shall be as required in NFPA 13.
- b. Provide a sprinkler wrench for each type of sprinkler and one water flow stopper suitable for interrupting sprinkler head discharge.
- c. Sprinklers shall be kept in a cabinet provided by and installed by the Contractor at a location designated by the A/E and/or school administration.

H. Flow Switches:

1. Provide liquid flow switch at sprinkler main branches. Signal from switches shall be wired to Fire Alarm Panel.
2. Wiring and conduit shall be provided under Division 16.
3. Flow switch shall be of paddle type, tamper proof, adjustable retarding device to prevent false alarms from line surges.
4. Two single pole, double throw microswitches to operate separate circuits, rated at 10 A, 120 VAC and 2 A, 30 VDC, in separate wiring chambers.

I. Joint Compound: White-Tite Seal or other accepted equivalent by A/E.

## PART 3 EXECUTION

### 3.1 INSTALLATION

A. Fire Sprinkler System:

1. Installation shall be in accordance with NFPA 13.
2. Place main piping with minimum 12 inch clearance between other mechanical and electrical services.
3. Branch piping shall clear light fixtures by at least 6 inches.
4. Where automatic sprinkler protection is indicated for suspended ceiling, install piping above ceiling with sprinkler heads installed below ceiling in pendant position.
5. Arrangement and locations of fire protection systems shall be as indicated on approved submittals and as specified.
6. Submit to the A/E detailed drawings of proposed departures from approved submittals due to actual field conditions or other causes.
7. Materials installed in fire sprinkler system shall be suitable for pressures and temperatures encountered.
8. Coordination of Drawings:
  - a. Because of the scale of drawings, it is not possible, nor is it the intent, to indicate required offsets, fittings, and accessories on the bid documents.
  - b. Investigate structure and other trades involved including finish conditions affecting work and arrange such work accordingly.

- c. Furnish such fittings, valves, and accessories as needed to meet such conditions at no additional cost to M-DCPS.
  - d. Provide coordination drawings between this and all other trades.
9. Cutting and Repairing: Lay out in advance. Excessive cutting of construction is not allowed. Damage to buildings, piping, wiring, or equipment because of cutting for installation shall be repaired by mechanics skilled in the trade involved at no additional expense to M-DCPS.
  10. Protection to Materials and Equipment: Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury. Upon completion of work, materials and equipment shall be thoroughly cleaned, adjusted, and operated.
  11. Provide test and drain lines as required by NFPA 13. Pressure gauges, signs, and other standard appurtenances shall be furnished as required for a complete installation according to NFPA 13.
  12. Install sprinkler piping so it can be thoroughly drained, and where practical, arranged to drain at the main drain valves. Drips and drains shall conform to NFPA 13.
- B. All work shall be done by experienced mechanics.
- C. Piping:
1. Run piping enclosed in wall chases, partitions, and ceilings where provided.
  2. Use reducing fittings for changes in pipe size. Bushings are not allowed.
  3. Use extra heavy pipe for nipples where unthreaded portion is less than 1-1/2". Close nipples are not allowed. Use saddle nipples.
  4. Install piping to allow freedom of movement during expansion and contraction operations, without causing warping, by using expansion joints and pipe loops.
  5. Offset piping as necessary to avoid interference with other work and to maintain headroom.
  6. Provide proper drain and drip where necessary.
  7. Run pipe in the most direct, straight mechanical manner, parallel to building lines and properly graded.
- D. Identification: Identify piping, valves, and specialties as specified under Section 15047.
- E. Joints:
1. Make joints in screwed piping with acceptable compound on male threads only. Threads shall be perfect, clean cut, and of proper length. Pipe shall be properly reamed after cutting and threading.
  2. Make flanged joints with full-face rubber gaskets or stainless steel.
- F. Hangers and Supports:
1. Properly support piping by accepted hangers and supports.
  2. Chain, straps, perforated bar, or wire hangers are not allowed.
  3. Provide necessary supplemental steel for proper support or attachment of hangers.

G. Sleeves:

1. Provide sleeves large enough to accommodate pipes passing through floors, ceilings, walls, or partitions.
2. Pack sleeves through firewalls or slabs according to UL requirements.
3. Provide square ends projecting 2 inches above floor for sleeves through floors.
4. Make sleeves passing through walls or beams flush with adjacent sides.
5. Provide flashing for sleeves passing through roof.
6. Make sleeves watertight (where required) by caulking space between pipe and sleeve.

H. Caps and Plugs: Keep openings closed during construction with cast-iron or malleable caps, plugs, or blind flanges.

I. Pipe Anchors: Provide anchors to support risers, to maintain pipes in position, and to properly regulate expansion.

J. Escutcheons:

1. Provide escutcheons on both side of piping in partitions, ceilings, and floors.
2. Fit and firmly secure escutcheons to pipes passing through finished floors, ceilings and walls with escutcheons of sufficient outside diameter to cover sleeved openings
3. Set in fire retardant mastic.

K. Valves:

1. Control Valves:

- a. Place valves in readily accessible locations or with suitable means of access.
- b. Seal gate valves in open position with riveted straps or wire and lead seals designed for this purpose.

2. Alarm Valves, Variable Pressure:

- a. Provide in each main automatic sprinkler system riser, where indicated, an accepted variable pressure alarm valve complete with trim.
  - 1) Circuit Closer Switch: Designed for 100 volts AC with two pairs of reversible contacts for connection to and suitable for operation of the alarm system.

L. Inspector's Test Connections:

1. Extend from highest point of automatic sprinkler system to a point where discharge can be readily observed.
2. Locate test valve at an accessible point, not over 7 feet from the floor.

### 3.2 FIELD QUALITY CONTROL

A. Flush fire mains with clean water until clean and accepted.

1. Maintain a flow of 7 feet per second velocity for a period of time consistent with length of pipe or as required to accomplish flushing.

- B. Upon completion of the work, notify any local authorities having jurisdiction and A/E, and arrange to have their authorized inspectors present when final job inspection and tests are conducted.
- C. Test all parts of system hydrostatically at 200 psi for a minimum 2 hour period according to NFPA 13 and 24.
  - 1. Repair all defects and retest.

END OF SECTION