

SECTION 13915 - FIRE-SUPPRESSION PIPING AND SPRINKLERS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

0.2 SUMMARY

- A. This Section includes fire-suppression piping and equipment for the following building systems:
 - 1. Wet-pipe, fire-suppression sprinklers, including piping, valves, specialties, and automatic sprinklers.

0.3 DEFINITIONS

- A. CPVC: Chlorinated polyvinyl chloride plastic.
- B. Hose Connection: Valve with threaded outlet matching fire hose coupling thread for attaching fire hose.
- C. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.

0.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Design sprinklers and obtain approval from authorities having jurisdiction.
- B. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:
 - 1. Include 10 psi margin of safety for available water flow and pressure.
 - 2. Include losses through water-service piping, valves, and backflow preventers.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
 - a. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500- sq. ft. area.
 - 4. Maximum Protection Area per Sprinkler: 130 square feet.
- C. Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

0.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
- B. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer and NICET Level 3 sprinkler designer, as indicated above. Base calculations on results of fire-hydrant flow test.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.
- D. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- E. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with NFPA 13, "Installation of Sprinkler Systems."

0.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Refer to Fire Protection Drawings and specifications.

0.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

0.3 PIPES AND TUBES

- A. Ductile-Iron Pipe: AWWA C151, mechanical-joint type; with cement-mortar lining and seal coat according to AWWA C104. Include gland, rubber gasket, and bolts and nuts according to AWWA C111.
- B. Standard-Weight Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 and smaller.
- C. Thinwall, Threadable Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10.
- D. Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 and smaller and NFPA 13 specified wall thickness in NPS 6 to NPS 10.
- E. Thinwall Steel Pipe: ASTM A 135 or ASTM A 795, threadable, with nonstandard OD and wall thickness less than Schedule 10.

0.4 PIPE AND TUBE FITTINGS

- A. Ductile-Iron Fittings: ASTM A 47, malleable-iron or ASTM A 536, ductile-iron casting complying with AWWA pipe size; with ends factory grooved according to AWWA C606.
- B. Cast-Iron Threaded Flanges: ASME B16.1.
- C. Cast-Iron Threaded Fittings: ASME B16.4.
- D. Malleable-Iron Threaded Fittings: ASME B16.3.
- E. Steel, Threaded Couplings: ASTM A 865.
- F. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
- G. Steel Flanges and Flanged Fittings: ASME B16.5.
- H. Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

0.5 JOINING MATERIALS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for pipe-flange gasket materials and welding filler metals.
- B. Ductile-Iron, Keyed Couplings: UL 213 and AWWA C606, for ductile-iron pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts.
- C. Ductile-Iron, Flanged Joints: AWWA C115, ductile-iron or gray-iron pipe flanges, rubber gaskets, and steel bolts and nuts.
- D. Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for dry-pipe service for couplings for dry piping.

0.6 POLYETHYLENE ENCASEMENT

- A. Polyethylene Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, film, 0.008-inch minimum thickness, tube or sheet.

0.7 FIRE-PROTECTION-SERVICE VALVES

- A. General: UL listed and FM approved, with minimum 175-psig nonshock working-pressure rating. Valves for grooved-end piping may be furnished with grooved ends instead of type of ends specified.
- B. Gate Valves, NPS 2 and Smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.
- C. Indicating Valves, NPS 2-1/2 and Smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
- D. Gate Valves, NPS 2-1/2 and Larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
- E. Indicator-Post, Gate Valves: UL 262, iron body, bronze mounted, solid-wedge disc, and nonrising stem with operating nut and flanged ends.
- F. Indicator Posts: UL 789, horizontal, wall type, cast-iron body, with windows for target plates that indicate valve position, extension rod and coupling, locking device, and red enamel finish.
- G. Swing Check Valves, NPS 2 and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.
- H. Swing Check Valves, NPS 2-1/2 and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.

0.8 SPECIALTY VALVES

- A. Wet main alarm check valve shall be approved type for a wet-pipe sprinkler system main drain valve, pressure gauges and other required trimming. Valve shall be equal to Reliable, Model No. E for variable pressure vertical installation, with water motor and gong. Electric water gong shall be located on outside of building, where directed by Architect, with head and identification tag.
- B. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4, ball check device with threaded ends.
- C. Dry alarm valve shall be UL listed and FM approved for a dry pipe sprinkler system, complete with drain valve, priming water valve, ball drip valve, alarm test valve, priming chamber, fill line attachment, pressure gauges and air control valve assembly. Reliable Model D. or approved equal.
- D. To maintain air pressure in the dry pipe system, furnish and install a listed air compressor with pressure switch and starter to operate compressor automatically. Compressor to be sized as required for system in accordance with NFPA #13

- E. If required, and to accelerate operation of the dry valve, furnish and install Reliable Model B or approved equal accelerator with integral anti-flooding device.
- F. Valve trim is to include pressure activated electric alarm switch and low air pressure alarm switch.
- G. The Fire Protection Subcontractor shall provide any devices required to interface with the building fire alarm system and should include the details of interface between the fire protection and the other contractors (HVAC, ATC, Electrical, etc.)

0.9 SPRINKLERS

- A. Automatic Sprinklers: With heat-responsive element complying with UL 199, for applications except residential.
- B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
- C. Refer to Drawing FP-0.1 for Sprinkler Types, Manufacturer and Model Numbers.

0.10 FIRE DEPARTMENT CONNECTIONS

- A. Wall, Fire Department Connections: UL 405; cast-brass body with brass, wall, escutcheon plate; brass, lugged caps with gaskets and brass chains; and brass, lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking "AUTO SPKR & STANDPIPE" or as required by Local Authority Having Jurisdiction.
- B. Refer to Drawing FP-0.1 to Fire Department Connection Detail.

0.11 ALARM DEVICES

- A. General: Types matching piping and equipment connections.
- B. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250-psig pressure rating; and designed for horizontal or vertical installation. Include two single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
- C. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
- D. Indicator-Post Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.
- E. Low Pressure Alarm Switch: Potter Electric PS40-A with 3-way Bleeder Valve (BVL) for testing.

0.12 PRESSURE GAGES

- A. Pressure Gages: UL 393, 3-1/2- to 4-1/2-inch- diameter dial with dial range of 0 to 250 psig.

PART 3 - EXECUTION

0.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article in Part 1 of this Section.
- B. Report test results promptly and in writing, including static and residual pressure, flow, number and size of outlets, elevation above sea level, conductor of test, exact location of test, and date and time of test.

0.2 EARTHWORK

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

0.3 PIPING APPLICATIONS

- A. Do not use welded joints with galvanized steel pipe.
- B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- C. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
- D. Underground Service-Entrance Piping: Use ductile-iron, mechanical-joint pipe and fittings and restrained joints.
- E. Sprinklers System Piping: Use the following:
 1. NPS 2" and Smaller for Wet Sprinkler System: Schedule 40 black steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
 2. NPS 2-1/2 and Larger for Wet Sprinkler System: Schedule 10 black steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.
 3. NPS 2" and Smaller for Dry Sprinkler System: Schedule 40 galvanized steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
 4. NPS 2-1/2 and Larger for Dry Sprinkler System: Schedule 10 galvanized steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.

0.4 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13.

- a. Shutoff Duty: Use gate valves.

0.5 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Ductile-Iron-Piping, Grooved Joints: Use ductile-iron pipe with radius-cut-grooved ends; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
- C. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
- D. Brazed Joints: Use AWS A5.8, BCuP-3 or BCuP-4 filler metals.
- E. Locking-Lug-Fitting, Twist-Locked Joints: Follow fitting manufacturer's written instructions.
- F. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fittings.
- G. Handling of Cleaners, Primers, and Solvent Cements for CPVC Pipe: Comply with procedures in ASTM F 402 for safe handling when joining CPVC piping with solvent cements.

0.6 SERVICE-ENTRANCE PIPING

- A. Connect standpipe and sprinkler piping to water-service piping of size and in location indicated for service entrance to building. Refer to Division 2 Section "Water Distribution" for exterior piping.
- B. Install shutoff valve, backflow preventer, low pressure alarm switch, pressure gage, drain, and other accessories indicated at connection to water-service piping. Refer to Division 2 Section "Water Distribution" for backflow preventers.

0.7 WATER-SUPPLY CONNECTION

- A. Connect sprinkler piping to building interior water distribution piping. Refer to Division 15 Section "Water Distribution Piping" for interior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water distribution piping. Refer to Division 15 Section "Plumbing Specialties" for backflow preventers.

0.8 PIPING INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - C. Install underground service-entrance piping according to NFPA 24 and with restrained joints.
 - D. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
 - E. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
 - F. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.
 - G. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
 - H. Install sprinkler piping with drains for complete system drainage.
 - I. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
 - J. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
 - K. Install alarm devices in piping systems.
 - L. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping.
 - M. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage, if required by local building and fire codes.
 - N. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
 - O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- 0.9 SPECIALTY SPRINKLER FITTING INSTALLATION
- A. Install specialty sprinkler fittings according to manufacturer's written instructions.

0.10 VALVE INSTALLATION

- A. Refer to Division 15 Section "Valves" for installing general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13 and NFPA 14, manufacturer's written instructions, and authorities having jurisdiction.
- B. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.
- C. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.

0.11 SPRINKLER APPLICATIONS

- A. General: Use sprinklers according to the following applications:
 - 1. Rooms without Ceilings: Upright and pendent sprinklers, as indicated.
 - 2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers, as indicated.

0.12 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical panels and tiles.
- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

0.13 CONNECTIONS

- A. Electrical Connections: Power wiring is specified in Division 16.
- B. Connect alarm devices to fire alarm.

0.14 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 15 Section "Basic Mechanical Materials and Methods."

0.15 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
- B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- C. Report test results promptly and in writing to Owner and authorities having jurisdiction.

0.16 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers having paint other than factory finish.

0.17 PROTECTION

- A. Protect sprinklers from damage until Substantial Completion.

0.18 COMMISSIONING

- A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- B. Verify that specified tests of piping are complete.
- C. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
- D. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
- E. Verify that potable-water supplies have correct types of backflow preventers.
- F. Verify that fire department connections have threads compatible with local fire department equipment.
- G. Fill wet-pipe sprinkler piping with water.
- H. Energize circuits to electrical equipment and devices. Coordinate with electrical contractor and Owner.
- I. Coordinate with fire alarm tests. Operate as required.

0.19 DEMONSTRATION

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
- B. Schedule demonstration with Owner with at least seven days' advance notice.

END OF SECTION 13915