

SECTION 21 13 00.00

WET-PIPE FIRE SUPPRESSION SPRINKLERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME A17.1 (1996) Safety Code for Elevators and Escalators

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1015 (1993) Double Check Backflow Prevention Assembly

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651 (1992) Disinfecting Water Mains

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825 (1999) Approval Guide

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR-USC List of Approved Backflow Prevention Assemblies

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58 (1993) Pipe Hangers and Supports - Materials, Design and Manufacture

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13 (2002) Installation of Sprinkler Systems

NFPA 24 (2002) Installation of Private Fire Service Mains and Their Appurtenances

NFPA 70 (2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL Fire Prot Dir (1999) Fire Protection Equipment Directory

UL 262	(1994; R 1998) Gate Valves for Fire-Protection Service
UL 789	(1993; R 1994) Indicator Posts for Fire-Protection Service
UFC 3-600-01	Unified Facilities Criteria

1.2 SYSTEM DESCRIPTION

Design and provide new automatic wet pipe fire extinguishing sprinkler systems for complete fire protection coverage throughout.

1.3 SPRINKLER SYSTEM DESIGN

Design automatic wet pipe fire extinguishing sprinkler systems in accordance with the required and advisory provisions of NFPA 13 and UFC 3-600-01 except as modified herein, by hydraulic calculations for uniform distribution of water over the design area. Discharge from individual heads in the hydraulically most remote area shall be between 100 percent and 120 percent of the specified density. Each system shall include materials, accessories, and equipment inside and outside the building to provide each system complete and ready for use. Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed working drawings to be submitted for approval. Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air supply diffusers. Provide sprinkler heads and piping system layout. Devices and equipment for fire protection service shall be UL Fire Prot Dir listed or FM P7825 approved for use in wet pipe sprinkler systems. Design systems for earthquake protection.

1.3.1 Location of Sprinkler Heads

Heads in relation to the ceiling and the spacing of sprinkler heads shall not exceed that permitted by NFPA 13, and UFC 3-600-01 for ordinary hazard occupancy. Uniformly space sprinklers on the branch piping.

1.3.2 Water Distribution

Distribution shall be uniform throughout the area in which the sprinkler heads will open. Discharge from individual heads in the hydraulically most remote area shall be 100 percent of the specified density.

1.3.3 Density of Application of Water

Size pipe to provide the specified density when the system is discharging the specified total maximum required flow. Application to horizontal surfaces below the sprinklers shall be 0.10 gpm per sq ft for Light Hazard areas; 0.15 gpm per sq ft for Ordinary Hazard Group I areas; and 0.20 gpm per sq ft for Ordinary Hazard Group II areas.

1.3.4 Sprinkler Discharge Area

Area shall be the hydraulically most remote 1500 sq ft area as defined in NFPA 13.

1.3.5 Outside Hose Allowances

Hydraulic calculations shall include an allowance of 250 gpm for outside hose streams.

1.3.6 Friction Losses

Calculate losses in piping in accordance with the Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping.

1.3.7 Water Supply

Base hydraulic calculations on a water flow test to be performed by the contractor. Static pressure, flow and residual pressure at the juncture with the water system shall be submitted to the contracting officer for review and approval.

1.3.8 Detail Drawings

Prepare 24 by 36 inch detail working drawings of sprinkler heads and piping system layout in accordance with NFPA 13, "Working Drawings (Plans)." Show data essential for proper installation of each system. Show details, plan view, elevations, and sections of the systems supply and piping. Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams. Submit drawings signed by a registered fire protection engineer.

1.3.9 As-Built Drawings

After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes. Submit 24 by 36 inch drawings on reproducible Mylar film with title block similar to full size contract drawings. Furnish the as-built (record) working drawings in addition to as-built contract drawings required by Division 1, "General Requirements."

1.4 SUBMITTALS

Submit the following:

Shop Drawings

Sprinkler heads and piping system layout;

Electrical wiring diagrams;

Product Data

Piping;

Alarm valves;

Valves, including gate, check, and globe;

Sprinkler Heads;

Water motor alarms;

Pipe Hangars and Supports;

Pressure or flow switch;

Fire department connections;

Backflow Preventer;

Annotate descriptive data to show the specific model, type, and size of each item.

Design Data

Sprinkler system design;

Submit computer program generated hydraulic calculations to substantiate compliance with hydraulic design requirements. Submit name of software program used.

Test Reports

Preliminary tests on piping system;

Certificates

Qualifications of installer;

Operation and Maintenance Data

Alarm valves;

Backflow preventer;

Closeout Submittals

As-built drawings of each system;

1.5 QUALITY ASSURANCE

1.5.1 Qualifications of Installer

Prior to installation, submit data showing that the Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a firm contractual agreement with a subcontractor having such required experience. Data shall include names and locations of at least two installations where the Contractor or the subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

Qualifications of System Technician: Installation drawings, shop drawing and as-built drawings shall be prepared, by or under the supervision of, an individual who is experienced with the types of works specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with minimum

Level-III certification in Automatic Sprinkler System program. Contractor shall submit data for approval showing the name and certification of all involved individuals with such qualifications at or prior to submittal of drawings.

PART 2 PRODUCTS

2.1 ABOVEGROUND PIPING SYSTEMS

Provide fittings for changes in direction of piping and for connections. Make changes in piping sizes through tapered reducing pipe fittings; bushings will not be permitted. Perform welding in the shop; field welding will not be permitted. Conceal piping in areas with suspended ceilings.

2.1.1 Sprinkler Piping

NFPA 13, except as modified herein. Steel piping shall be Schedule 40. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical coupling and fittings which use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. Rubber gasket grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe size 1.5 inches and larger. Fittings shall be UL Fire Prot Dir listed or FM P7825 approved for use in wet pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees using rubber gasket fittings shall not be permitted. Sprinkler pipe and fittings shall be metal.

2.1.2 Sprinkler Heads

Provide nominal 0.50 inch or 0.53 inch orifice sprinklers. Sprinklers with internal O-rings shall not be used. Sprinklers shall be used in accordance with their listed coverage limitations. Provide Recessed, Pendent, Upright, Sidewall and quick response sprinklers as indicated and/or required. Provide polished stainless steel ceiling plates, or recessed flush white heads as indicated on drawings, or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings. Recessed Sprinklers shall have a white polyester finish. Deflector shall not be more than 3 inches below suspended ceilings. Ceiling plates shall not be more than 0.5 inch deep. Ceiling cups shall not be permitted.

2.1.3 Cabinet

Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to each alarm valve. The number and types of extra sprinkler heads shall be as specified in NFPA 13.

2.1.4 Alarm Valves

Provide variable pressure type alarm valve complete with retarding chamber, alarm test valve, alarm shutoff valve, drain valve, pressure gages, accessories, and appurtenances for the proper operation of the system.

2.1.5 Water Motor Alarms

Provide alarms of the approved weatherproof and guarded type, to sound locally on the flow of water in each corresponding sprinkler system. Mount alarms on the outside of the outer walls of each building at a location as directed. Provide separate drain piping directly to exterior of building.

2.1.6 Pressure or Flow Switch

Provide switch with circuit opener or closer for the automatic transmittal of an alarm over the facility fire alarm system. Alarm actuating device shall have mechanical diaphragm controlled retard device adjustable from 10 to 60 seconds and shall instantly recycle.

2.1.7 Pipe Hangers and Supports

Provide in accordance with NFPA 13. Attach to steel joists with MSS SP-58, Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor.

2.1.8 Valves

NFPA 13. Provide valves of types approved for fire service. Gate valves shall open by counterclockwise rotation. Provide an OS&Y valve beneath each alarm. Check valves shall be flanged clear opening swing-check type with flanged inspection and access cover plate for sizes 4 inches and larger. Provide double check valve assembly type backflow preventer with OS&Y gate valves on both ends. Each check valve shall have a drain. Each OS&Y gate valve shall be supervised; minimum contact ratings shall be 2.5 amps at 24 volt DC. Provide supervision against valve closure or tampering of valve. Double check valve assembly shall be tested and certified under ASSE 1015.

2.1.9 Backflow Preventer

Provide double check valve assembly backflow preventer with OS&Y gate valve on both ends. Each check valve shall have a drain. Backflow prevention assemblies shall have current "Certificate of Approval from the Foundation for Cross-Connection Control and Hydraulic Research, FCCCHR-USC. Listing of the specific make, model, design, and size in the FCCCHR-USC shall be acceptable as the required documentation."

2.1.10 Identification Signs

NFPA 13. Attach properly lettered and approved metal signs to each valve and alarm device. Permanently affix hydraulic design data nameplates to the riser of each system.

2.1.11 Test Connections

2.1.11.1 Inspector's Test Connection

Provide test connections approximately 6 feet above the floor for each sprinkler system or portion of each sprinkler system equipped with an alarm device; locate at the hydraulically most remote part of each system. Provide test connection piping to a drain location that can accept full flow where the discharge will be readily visible and where water may be discharged without property damage. Discharge to janitor sinks or similar fixtures shall not be permitted. Provide discharge orifice of same size as corresponding sprinkler orifice.

2.1.11.2 Backflow Preventer Test Connection

Provide downstream of the backflow prevention assembly listed hose valves with 2.5 inch National Standard male hose threads with cap and chain. Provide one valve for each 250 gpm of system demand or fraction thereof. Provide a permanent sign in accordance with paragraph entitled "Identification Signs" which reads, "Test Valve."

2.1.12 Main Drains

Provide separate drain piping to discharge at safe points outside each building. Provide auxiliary drains as required by NFPA 13. Provide precast concrete splash block under each exterior drain discharge.

2.1.13 Fire Department Connections

Provide 4 inch connections approximately 3 feet above finish grade, of the approved two-way type with 2.5 inch National Standard female hose threads with plug, chain, and identifying fire department connection escutcheon plate.

2.2 BURIED WATER PIPING SYSTEMS

2.2.1 Pipe and Fittings

Provide outside-coated, cement-mortar lined, ductile-iron pipe, and fittings conforming to NFPA 24 for piping under the building and outside of building walls. Anchor joints in accordance with NFPA 24. Provide concrete thrust block at the elbow where the pipe turns up toward the floor, and restrain the pipe riser with steel rods from the elbow to the flange above the floor. Minimum pipe size shall be 6 inches. Minimum depth of cover shall be 3 feet at finish grade.

2.2.2 Valves

Provide as required by NFPA 24. Gate valves shall conform to UL 262 and shall open by counterclockwise rotation.

2.2.3 Post Indicator Valves

Provide with operating nut located about 3 feet above finish grade. Gate valves for use with indicator post shall conform to UL 262. Indicator posts shall conform to UL 789. Provide each indicator post with one coat of primer and two coats of red enamel paint.

2.2.4 Valve Boxes

Except where indicator posts are provided, for each buried valve, provide cast-iron or ductile-iron, valve box of a suitable size. Provide cast-iron or ductile-iron cover for valve box with the word "WATER" cast on the cover. The minimum box shaft diameter shall be 5.25 inches. Coat cast-iron and ductile-iron boxes with bituminous paint applied to a minimum dry-film thickness of 10 mils.

2.2.5 Buried Utility Warning and Identification Tape

Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall read "CAUTION BURIED WATER PIPING BELOW" or similar wording. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.3 PIPE SLEEVES

Provide where piping passes entirely through walls, floors, and roofs. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, and roofs. Provide one inch minimum clearance between exterior of piping and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of the sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with UL listed fill, void, or cavity material.

- a. Sleeves in Masonry and Concrete Walls, Floors, and Roofs: Provide hot-dip galvanized steel, ductile-iron, or cast-iron sleeves. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.
- b. Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs: Provide 26 gage galvanized steel sheet.

2.4 ESCUTCHEON PLATES

Provide split hinge metal plates for piping entering walls, floors, and ceilings in exposed spaces. Provide polished stainless steel plates or chromium-plated finish on copper alloy plates in finished spaces. Provide paint finish on metal plates in unfinished spaces.

PART 3 EXECUTION

3.1 INSTALLATION

Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 13, except as modified herein. Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings. Keep the interior and ends of new piping and existing piping affected by

Contractor's operations thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter. Inspect piping before placing into position. Provide Teflon pipe thread paste on male threads.

3.1.1 Electrical Work

Provide electrical work associated with this section under Section 26 20 00, "Interior Distribution System" Provide control and fire alarm wiring, including connections to fire alarm systems, under this section in accordance with NFPA 70. Provide wiring in rigid metal conduit or intermediate metal conduit, except electrical metallic tubing conduit may be used in dry locations not enclosed in concrete or where not subject to mechanical damage.

3.1.2 Disinfection

Disinfect the new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million (ppm) of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 ppm, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit results prior to the new water piping being placed into service. Disinfection of systems supplied by non-potable water is not required.

3.1.3 Connections to Existing Water Supply Systems

Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around the main piping; bolt valve to the branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, all without interruption of service. Notify the Contracting Officer in writing at least 15 days prior to connection date; receive approval before any service is interrupted. Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labor as required. Furnish the labor and the tapping or drilling machine for making the actual connections to existing systems.

3.1.4 Buried Piping System

Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

3.2 FIELD QUALITY CONTROL

Perform test to determine compliance with the specified requirements in the presence of the Contracting Officer. Test, inspect, and approve piping before covering or concealing.

3.2.1 Preliminary Tests

Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure. Flush piping with potable water in accordance with NFPA 13. Piping above suspended ceilings shall be tested, inspected, and approved before installation of ceilings. Test the alarms and other devices. Test the water flow alarms by flowing water through the inspector's test connection. When tests have been completed and corrections made, submit a signed and dated certificate, similar to that specified in NFPA 13.

3.2.2 Formal Tests and Inspections

Do not submit a request for formal test and inspection until the preliminary test and corrections are completed and approved. Submit a written request for formal inspection at least 15 days prior to inspection date. An experienced technician regularly employed by the system installer shall be present during the inspection. At this inspection, repeat any or all of the required tests as directed. Correct defects in work provided by the Contractor and make additional tests until the systems comply with contract requirements. Furnish appliances, equipment, electricity, instruments, connecting devices, and personnel for the tests. The Government will furnish water for the tests.

3.3 FIELD PAINTING

Field painting of fire extinguishing sprinkler system shall be specified in Section 09 91 23, INTERIOR PAINTING.

--END OF SECTION--