

## SECTION 21 12 00

### FIRE-SUPPRESSION STANDPIPE

#### PART 1 – GENERAL

##### 1.01 SECTION INCLUDES

- A. Wet standpipe system.
- B. Piping accessories.
- C. Valves.
- D. Gauges.
- E. Pipe hanger and support.
- F. Fire department connection.
- G. Fire hose cabinets.
- H. Water flow alarm switch.
- I. Drains.
- J. Ball drips.
- K. Escutcheon.

##### 1.02 RELATED SECTIONS

- A. Section 05 70 00, Decorative Metal
- B. Section 09 91 00, Painting
- C. Section 20 10 13, Common Materials and Methods for Facility Services
- D. Section 20 20 13, Common Materials and Method for Facility Services – Fire Suppression, Plumbing and HVAC
- E. Section 20 40 13, Identification for Facility Services
- F. Section 33 05 28, Trenching and Backfilling for Utilities

##### 1.03 MEASUREMENT AND PAYMENT

- A. General: Separate measurement or payment will not be made for the work required under this Section. Costs in connection with the Work specified herein will be considered to be included or incidental to the Work of this Contract.

**1.04 REFERENCES**

- A. American Society for Testing Materials (ASTM):
1. ASTM A123 Specification for Zinc (Hot, Dip Galvanized) Coatings on Iron and Steel Products
  2. ASTM A153 Specification for Zinc Coating (Hot, Dip) on Iron and Steel Hardware
  3. ASTM A395 Specification for Ferritic Ductile Iron Pressure Retaining Castings
  4. ASTM B16 Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines
  5. ASTM F437 Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
  6. ASTM F438 Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
  7. ASTM F439 Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
  8. ASTM F442 Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
  9. ASTM F493 Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- B. American Welding Society (AWS):
1. AWS D10.9 Specification for Qualification of Welding Procedures and Welders for Piping and Tubing
- C. National Fire Protection Association (NFPA):
1. NFPA 13 Standard for the Installation of Sprinkler Systems
  2. NFPA 14 Standard for the Installation of Standpipe and Hose Systems
  3. NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
  4. NFPA 72 National Fire Alarm and Signaling Code

**1.05 SUBMITTALS**

- A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

- B. Shop Drawings: Submit Shop Drawings, hydraulic calculations, and manufacturers' product data, indicating pipe materials used, jointing methods, supports, floor and wall penetration seals and piping layout, valves, fire department connections, fire pumps, maintenance data, hanger locations and details, and recommended spare parts. Shop Drawings shall show the complete system, including construction phasing. Partial submittals will be rejected for resubmission of complete submittals.
- C. Certified Test Reports: Submit certified test reports of aboveground and underground piping as indicated in NFPA 13.
- D. Product Data: Submit manufacturer's product data for manufactured items of materials and equipment and sprinkler heads.
- E. Operation and Maintenance Data: Submit operation and maintenance data for the equipment and system provided, in accordance with Section 01 78 23, Operation and Maintenance Data.
- F. State Fire Marshal: Separate Shop Drawings of the wet standpipe system shall be submitted to the State Fire Marshal and the local representative of the State Fire Marshal for approval. Approval shall be obtained before beginning installation work. The Contractor shall submit a copy of the Contractor's transmittal to the State Fire Marshal for the Engineer's information.

#### **1.06 QUALITY ASSURANCE**

- A. The system installer of subcontractor shall possess a valid C-16 California Contractor's License. The fire suppression system shall be designed by an experienced and qualified individual of firm regularly engaged in the design of fire suppression systems. Drawings and Calculations shall be sealed and stamped by a currently registered California Professional Engineer.
- B. Materials shall be clearly marked or stamped with the manufacturer's name, nameplate data or stamp, rating, and conformance with ASTM standards, with corresponding standard number clearly marked, as applicable.
- C. Fire protection material and equipment shall be tested and shall be listed by a nationally recognized testing laboratory of fire protection equipment. In addition, valves and grooved fittings shall also be approved for fire protection service by an organization concerned with product evaluations for compliance with appropriate standards for production of listed items.
- D. Galvanizing shall conform with the requirements of ASTM A123. Galvanized nuts, bolts, and washers shall conform to the requirements of ASTM A153.

#### **1.07 SITE CONDITIONS**

- A. Excavations where products will be buried shall be dry. Inspect surfaces and structures where the water supply system will be installed before the work of this Section begins. Provide surfaces and structures capable of supporting the system and its weight.

- B. Coordinate the installation of the water supply system with other building systems and components so as to avoid conflicts of installation. Contract Drawings are diagrammatic and not necessarily to scale. Do not scale drawings for exact locations of installation of pipelines, valves, and equipment.

**PART 2 – PRODUCTS**

**2.01 WET STANDPIPE SYSTEM**

- A. Design standards: Design the wet standpipe system per NFPA 14 and the BART Facilities Standard Design Criteria, Mechanical, Stations and Station Sites.
- B. The system shall be provided as indicated and shall conform with NFPA 14 and the approved Shop Drawings.

**2.02 EXPOSED AND EMBEDDED PIPE AND FITTINGS**

- A. Aboveground (except Parking Structures): Class S, as specified in Section 20 10 13, Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- B. Aboveground in Parking Structures: Class R, as specified in Section 20 10 13, Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- C. Underground: Class K, as specified in Section 20 10 13, Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

**2.03 PIPING ACCESSORIES**

- A. Provide piping accessories of types and sizes as indicated.
- B. Provide piping passing through floors, walls, and ceilings with chrome split-wall plates.
- C. Place flexible connections above and below each riser valve assembly, and between exposed and embedded piping.

**2.04 VALVES**

- A. Refer to Section 20 10 13, Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for check valves, butterfly valves, air release valves, angle valves, and valve supervisory switches. Main system isolation valve shall be located inside the building at the utility entrance and shall be an OS&Y valve.

**2.05 GAUGES**

- A. 3 1/2 inch dial type conforming with NFPA 14.

**2.06 PIPE HANGER AND SUPPORT**

- A. Furnish and install in accordance with Section 20 20 13, Pipe Sleeves, Supports, and Anchors for Facility Services.
- B. Seismic and Support Requirements:
  1. Seismic restraints, anchorages, and reinforcements shall be provided for equipment and piping in accordance with the California Building Code, NFPA 13 and Appendix A, NFPA 14 and local code standards and regulations. Equipment and piping shall be anchored to withstand forces generated by earthquake movement.
  2. The seismic bracing shown on the drawings sets forth minimum requirements. Contractor shall furnish and install additional seismic bracing at: a) base and top of risers in conjunction with supports to prevent uplift, b) changes in direction, c) offsets with emphasis on restraining longitudinal motion, d) on longitudinal piping supported by clevis type hangers exceeding 6 inch distance between pipe centerline and mounting surface, e) on longitudinal piping supported by angle bracket type hangers exceeding 8 inch distance between pipe centerline and mounting surface, and f) at other locations in accordance with NFPA 13 and appendices thereto. Seismic bracing shall be designed to prevent both transverse and longitudinal displacement forces with lateral restraints located, as a minimum, 40 foot on center and four way (longitudinal/transverse) restraints located as a minimum 80-foot on center.
  3. Pipe hanger supports shall be capable of supporting a total weight equal to five times the weight of the equipment or pipe, full of water, plus weight of valves and fittings attached, plus 250 pounds with the force acting at the pipe center or equipment center of gravity. Only clevis or minimum 1/4 inch thick by times 2 inch wide fabricated steel hangers that are hot dipped galvanized after fabrication shall be used and all nuts shall be nylon lock tight or threads coated with Engineer approved adhesive.

**2.07 FIRE DEPARTMENT CONNECTION**

- A. Provide two-way brass or bronze, wall or flush type, with “knock-off” caps, conforming to NFPA 14. Provide self-closing clapper valve in each inlet, and local fire department inlet hose threads.
- B. Fire department connection shall be labeled as WET STANDPIPE in raised cast letters on surface of fitting, wall plate or escutcheon. Labels shall include “BART” along with service design. Exposed parts, including escutcheon, shall have high visible red painted finish.

**2.08 FIRE HOSE CABINETS**

- A. Free-standing fire hose cabinets on platforms and concourses shall comply with the requirements of Section 05 70 00, Decorative Metal.
- B. Recessed fire hose cabinets in public areas shall be of similar construction to the cabinets in Section 05 70 00, Decorative Metal. In parking structure and non-public area recessed fire hose cabinets shall be 18 gauge, Type 304 stainless steel construction with solid door with continuous stainless steel hinge. Provide No. 4 finish on visible exterior surfaces. Cabinet locations shall be as indicated.
- C. In parking structures and non-public areas surface mounted fire hoses cabinets may be used. Surface mounted fire hose cabinets shall be 18 gauge, Type 304 stainless steel construction with solid door and continuous stainless steel hinge. Provide No. 4 finish on visible exterior surfaces. Fire hose cabinet locations shall be as indicated on the Contract Drawings. Fire hose cabinet doors shall be 12 gauge Type 304 stainless steel, positive latch device and labeled “FIRE HOSE” and “FIRE EXTINGUISHER” using uppercase Univers 65 typeface with a capital letter height of 1 inch. Submit Shop Drawings for layout approval.
- D. Each cabinet shall contain a 1 1/2 inch cast-brass angle hose valve with 100 feet of 1 1/2 inch polyurethane lined, synthetic jacketed hose, mildew and rot-resistant, complete with cast-brass nipple and coupling, 1 1/2 inch red body with black bumper polycarbonate fog nozzle, hose rack, 2 1/2 inch cast-brass angle-hose valve body with 2 1/2 inch or 3 inch outlet (depending upon requirements of local fire department) with fire department hose thread end and cap with chain, escutcheon plates and spanner wrench and fire extinguisher. Hose Rack: Steel with polished chrome finished, swivel type with pins and water stop. The outlet of the 2 1/2 inch hose valve shall have a brass reducer with 2 1/2 inch female to 1 1/2 inch male, National Standard Thread (NST) for fire hose, and a 1 1/2 inch brass cap and chain. Provide minimum 1 1/2 inch clearance between valve and cabinet.

**2.09 WATER FLOW ALARM SWITCH**

- A. Provide a switch that will indicate the flow of water in the standpipe system, conforming to NFPA 72.

**2.10 DRAINS**

- A. Provide pipe to discharge at sight cones attached to drains of adequate size, to readily care for the full flow from each drain under maximum pressure.

**2.11 BALL DRIPS**

- A. Provide automatic ball drips manufactured as cast brass automatic drip connections, that close at approximately seven to ten psi on inlet side of check valve on Fire Department Connections.

**2.12 ESCUTCHEON**

- A. Provide split hinged, locking type escutcheon held in place by either internal tension spring or a set screw. Provide polished chromium-plated pressed steel material. Escutcheon shall encompass the sleeve or opening.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. Excavating and backfilling, including bedding and compacting requirements, shall conform to Section 33 05 28, Trenching and Backfilling for Utilities.
- B. Provide concrete thrust blocks for elbows, tees, valves, and appurtenances on buried piping. Thrust blocks shall be constructed as indicated.
- C. Install the wet standpipe system as indicated and in accordance with applicable requirements of NFPA 14.
- D. Install pipe, fittings, and valves without springing or forcing. Flanged joints shall be made up with a torque wrench and by tightening every other bolt around the flange, then by tightening the remaining bolts; bolt holes of flanges on horizontal pipe shall straddle pipe centerlines. Install anchors as indicated. Provide swing joints or flexible connections for transitions from embedded to exposed pipe.
- E. Install piping true to line and grade, and support and guide piping to ensure alignment under all conditions. Installed piping shall clear obstructions, preserve headroom, and keep openings and passageways clear.
- F. Make changes in direction of piping with manufactured fittings. Provide branch connections with either screwed or grooved end fittings. Welding shall be permitted for flanged connections. Welding outlets shall be a forged weldolet type fitting and shall be permitted for use at main drain connections, and main line gage connections only.

- G. Welding shall be performed only in the shop. Field welding will not be permitted.
  - 1. Align component parts to be welded in a manner that will ensure that no strain will be placed on the area to be welded. Do not offset pipe wall by more than 20 percent of the wall thickness. Preserve alignment during the welding operation. Provide tack welds of the same quality, and applied by the same procedure, as the completed weld. Otherwise, remove tack welds during the welding operation.
  - 2. Remove defective welds, and provide new welds as required, at no additional cost to the District.
  - 3. Electrodes shall be stored in a dry heated area. Electrodes shall be kept free of moisture and dampness during fabrication operations. Discard electrodes that have lost part of their coating.
- H. Install standpipe piping so that it can be thoroughly drained and, where practicable, arranged to drain at the main drain valves.
- I. Valves shall be accessible for operation and servicing. Valves located in furred spaces shall be accessible through access panels or access doors. Valves shall be installed as indicated, and shall have no stems located below the horizontal position.
- J. Provide escutcheon plates at finished surfaces where exposed piping passes through floors, walls, and ceilings. Fasten escutcheons to pipe or pipe coverings.
- K. Free-standing and recessed fire hose cabinets shall be installed in accordance with Section 05 70 00, Decorative Metal. Surface-mounted fire hose cabinets shall be installed in accordance with manufacturer's requirements.
- L. Piping system shall be free from grease, oil, rust and scale, and properly prepared for the application of paint. Paint standpipe system as specified in Section 09 91 00, Painting.
- M. Make provisions for expansion and contraction of pipe lines, and longitudinal, and lateral movement per Section 2.06. Apply couplings and or seismic separation assemblies as per NFPA 13 Sections 9.2.3 and 9.3.3 and at structural joints or separations. Pipe and fittings shall be free from fins and burrs. Threaded joints shall have a lubricant applied on the male threads only. Threads shall be full cut, and not more than three threads on the pipe shall remain exposed.
- N. Pipe and fittings shall be free from fins and burrs. Threaded joints shall have a lubricant applied on the male threads only. Threads shall be full cut, and not more than three threads on the pipe shall remain exposed.
- O. Route piping in orderly manner, plumb and parallel to structure. Maintain gradient.
- P. Install piping to conserve space, to not interfere with use of space and other work.
- Q. Group piping whenever practical at common elevations.

- R. Sleeve pipes passing through partitions, walls, and floors.
- S. Inserts:
  1. Provide inserts for placement in concrete formwork.
  2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  3. Where concrete slabs form finished ceiling, locate inserts flush with bottom slab surface.
  4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- T. Pipe Hangers and Supports:
  1. Install in accordance with NFPA 13 and NFPA 14.
  2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  3. Place hangers within 12 inches of each horizontal elbow.
  4. Use hangers with 1 1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  5. Support vertical piping at every floor or building level. Support riser piping independently of connected horizontal piping.
  6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- U. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- V. Prepare pipe, fittings supports, and accessories to finish painting. Where pipe support members are welded to structural framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09 91 00, Painting.
- W. Do not penetrate structural members unless indicated.
- X. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
- Y. Install approved back flow preventer assembly at wet-standpipe system water source connection.

**3.02 PAINTING**

- A. Except where indicated, piping systems shall not be painted. Where pipes are indicated to be painted, prepare pipe in accordance with Section 09 91 00, Painting.

**3.03 IDENTIFICATION**

- A. Comply with the requirements of Section 20 40 13, Identification for Facility Services.

**3.04 FIELD QUALITY CONTROL**

- A. System shall be inspected for compliance with these Specifications.
- B. Test installed systems and products hydrostatically, using testing instruments calibrated by a qualified laboratory in accordance with Section 01 45 00, Quality Control, and flush in accordance with applicable requirements of NFPA 13 and NFPA 14. Repair leaks.
- C. The Contractor shall perform tests in the presence of the Engineer and shall furnish items used in testing. The Contractor shall give 48 hour notice prior to test. The Engineer will review certificates and test reports, and will inspect the wet standpipe system to verify conformance with NFPA 14. Test shall be witnessed by BART.
- D. Provide system flushing at rate conforming to NFPA 24.
- E. Provide a complete set of signed hydrostatic testing and system flushing documents in a tabbed binder or in the O&M manual at completion of job.

**3.05 TRAINING**

- A. Refer to Section 01 79 00, Demonstration and Training, for maintenance personnel training requirements.

**END OF SECTION 21 12 00**