

SECTION 15510  
HYDRONIC PIPING

## PART 1 GENERAL

## 1.1 REFERENCES

- A. ANSI/ASME SEC 9: Welding and Brazing Qualifications.
- B. ANSI/ASME B16.3: Malleable Iron Threaded Fittings Class 150 and 300.
- C. ANSI/ASME B16.23: Cast Copper Alloy Solder Joint Drainage Fittings-DWV.
- D. ANSI/ASME B16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings-DWV.
- E. ANSI/ASME B31.9: Building Services Piping.
- F. ANSI/AWS D1.1: Structural Welding Code.
- G. ANSI/AWWA C105: Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- H. ASTM A53: Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- I. ASTM A234: Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- J. ASTM B32: Solder Metal.
- K. ASTM B88: Seamless Copper Water Tube.
- L. ASTM D1785: Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- M. ASTM D2466: Socket-Type PVC Plastic Type Fittings, Schedule 40.
- N. ASTM D2467: Socket-Type PVC Plastic Type Fittings, Schedule 80.
- O. ASTM D2855: Making Solvent-Cemented Joints with PVC Pipe and Fittings.

## 1.2 SUBMITTALS

- A. Submit under provisions of Section 15000.
- B. Product Data: For each product used in this project, provide catalog data for pipe materials, pipefittings, valves, and accessories.
- C. Mechanical Equipment Rooms (AHU): Obtain 3/8" scale ductwork drawings from the sheet metal contractor. Provide 3/8" scale piping drawings with ductwork shown.
- D. Air Cooled Chillers and CHW Pumps: Provide 1/4" scale piping drawings.
- E. Water Cooled Chillers, CHW and CW Pumps, and Cooling Towers: Provide 1/4" scale piping drawings.
- F. Samples: Not required.
- G. Provide welders certification of compliance with ANSI/ASME SEC 9 and ANSI/AWS D1.1.

## 1.3 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Welding Materials and Procedures: Conform to ANSI/ASME SEC 9.
- C. Welders Certification: In accordance with ANSI/ASME SEC 9 and ANSI/AWS D1.1.
- D. Regulatory Requirements: Conform to ANSI/ASME B31.9.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver valves to site in original factory packaging, labeled with manufacturer's identification.
- B. Store valves in original factory packaging, and protect from weather and construction traffic.

## PART 2 PRODUCTS

### 2.1 HEATING WATER AND GLYCOL PIPING, BURIED

- A. Steel Pipe: ASTM A53, Schedule 40, black (ERW).
  - 1. Fittings: ASTM A234, forged steel welding type.
  - 2. Joints: ANSI/AWS D1.1, welded.
- B. Factory Pre-insulated Steel Pipe:
  - 1. Carrier: ASTM A53, Schedule 40, black (ERW).
  - 2. Fittings: ASTM A234, forged steel welding type.
  - 3. Joints: ANSI/AWS D1.1, welded. Insulate and seal per manufacturer's recommendations.
  - 4. Casing: PVC Type 1, Grade 1, ASTM D1785. Minimum thickness shall be as follows: 0.070" for 3" pipe and smaller; 0.080" for 4" and 5" pipe; 0.100" for 6" pipe, 0.120" for 8" pipe, 0.140" for 10" pipe; 0.160" for 12" pipe; 0.180" for 14" pipe.
  - 5. Insulation: Factory foamed in-place closed-cell polyurethane foam completely filling the annulus between the steel pipe and casing. Minimum thickness shall be 1". For insulation ends, provide factory applied, vapor barrier mastic end seals.
  - 6. Performance specification is based on Pre-insulated Piping Systems, INSUL-TEK 250 Steel. Other pre-insulated piping systems satisfying the specifications are acceptable.

### 2.2 HEATING WATER AND GLYCOL PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53, Schedule 40, black (ERW).
  - 1. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings.
  - 2. Joints: Screwed for pipe 2" and under; ANSI/AWS D1.1 welded for pipe over 2".
- B. Copper Tubing: ASTM B88, Type L, hard drawn.
  - 1. Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 solder wrought copper.
  - 2. Joints: ASTM B32, solder, Grade 95TA.

### 2.3 CHILLED WATER PIPING, BURIED

- A. Steel Pipe: ASTM A53, Schedule 40, black (ERW).
  - 1. Fittings: ASTM A234 forged steel welding type, long radius.
  - 2. Joints: ANSI/AWS D1.1, welded.
- B. Factory Pre-insulated Steel Pipe:
  - 1. Carrier: ASTM A53, Schedule 40, black (ERW).
  - 2. Fittings: ASTM A234, forged steel welding type, factory pre-fabricated.
  - 3. Joints: ANSI/AWS D1.1, welded. Insulate and seal per manufacturer's recommendations.
  - 4. Casing: PVC Type 1, Grade 1, ASTM D1785. Minimum thickness shall be as follows: 0.070" for 3" pipe and smaller; 0.080" for 4" and 5" pipe; 0.100" for 6" pipe, 0.120" for 8" pipe, 0.140" for 10" pipe; 0.160" for 12" pipe; 0.180" for 14" pipe.
  - 5. Insulation: Factory foamed in-place closed-cell polyurethane foam completely filling the annulus between the steel pipe and casing. Minimum thickness shall be 1". For insulation ends, provide factory applied, vapor barrier mastic end seals.
  - 6. Performance specification is based on Pre-insulated Piping Systems, INSUL-TEK 250 Steel. Other pre-insulated piping systems satisfying the specifications are acceptable.

### 2.4 CHILLED WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53, Schedule 40, black (ERW).
- B. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type.
- C. Joints: Screwed for pipe 2" and under; ANSI/AWS D1.1 welded for pipe over 2".
- D. Copper Tubing: ASTM B88, Type L, hard drawn, allowed only for run-outs to individual air handling units, when size of 2" and smaller, and not exceeding 20 ft in length.
- E. Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 brazed wrought copper, long radius.
- F. Joints: ASTM B32, brazed, Grade 95TA.

#### 2.5 CONDENSER WATER PIPING, BURIED

- A. Steel Pipe: ASTM A53, Schedule 40, black (ERW) with bitumen mastic coating. No insulation required.
- B. Fittings: ASTM A234, forged steel welding type.
- C. Joints: ANSI/AWS D1.1.

#### 2.6 CONDENSER WATER PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53, Schedule 40, black (ERW).
- B. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type.
- C. Joints: Screwed for pipe 2" and under; ANSI/AWS D1.1 welded for pipe over 2".

#### 2.7 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Tubing: ASTM B88, Type M, hard drawn.
- B. Fittings: ANSI/ASME B16.23 cast brass, or ANSI/ASME B16.29 solder wrought copper.
- C. Joints: ANSI/ASTM B32, solder, Grade 95TA.
- D. PVC Pipe: ASTM D1785, Schedule 40. Use only for cooling towers.
- E. Fittings: ASTM D2466, PVC.
- F. Joints: ASTM D2855, solvent weld.

#### 2.8 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe 2" and Smaller: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Over 2": 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping.

#### 2.9 GATE VALVES

- A. Pipe 2" and Smaller: Class 150, bronze body, bronze trim, rising stem, hand wheel, inside screw, solid disc, threaded ends.

#### 2.10 BALL VALVES

- A. Pipe 2" and Smaller: 600 psig, brass body, brass trim, one piece body, Teflon seats and seals, lever handle with adjustable memory stop, threaded ends. For insulated lines, provide extended neck so that lever handle clears the pipe insulation.

#### 2.11 PLUG COCKS

- A. Pipe 2" and Smaller: Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends, set screw, one wrench operator.
- B. Pipe over 2": Cast iron body and plug, pressure lubricated, Teflon packing, flanged ends, set screw, one wrench operator.

## 2.12 BUTTERFLY VALVES

- A. Pipe Over 2": Class 150, ductile iron body, 316 stainless steel disc and stem, EPT replaceable seat, lug ends, extended neck, infinite position lever handle with memory stops. For 8" and over, provide hand wheel and gear drive. For equipment isolation service, provide tapped lug ends.

## 2.13 SPRING LOADED CHECK VALVES

- A. Class 150, iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, lug, flanged ends.

## 2.14 RELIEF VALVES

- A. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

# PART 3 EXECUTION

## 3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges, or unions. Locations of flanges, unions, shall allow the easy removal of coils from air handling units, tube bundles from chillers, impellers from pumps, etc. Poor piping layouts shall be corrected by the mechanical contractor at no cost to the District and with no time extension for the mechanical contractor.
- D. After completion, fill, clean, and treat systems.

## 3.2 INSTALLATION

- A. Route piping in an orderly manner, plumb and parallel to building structure, and maintain gradient.
- B. Install piping to conserve building space, and not to interfere with the use of space and other work.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation, and access to valves, specialties, and fittings.
- F. Provide access at valves and fittings that are not exposed. Coordinate size and location of access doors. Locate valves and metering devices in easily accessible locations with adequate clearance to service devices.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Where pipe support members are welded to structural framing, scrape, brush clean, and apply one coat of zinc rich primer to welding area.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Refer to Section 09900.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Underground pipes shall be buried a minimum depth of 36" from grade to the outer surface of insulation. A plastic marking tape shall be installed directly above the buried pipe along its entire run at a depth of 12" below grade.
- L. Joints shall not be insulated, concealed or buried until after inspection, hydrostatic testing, and written acceptance of the piping system.
- M. Installation of hydronic piping and specialties shall not obstruct service access and chiller component removal.

- N At the end of each day all open pipe ends shall be sealed to prevent intrusion of foreign materials into the pipes.
- O On projects where existing chilled water system is modified the old inactive piping shall be removed to the main chilled water source and capped. In the chilled water piping that is reused the old insulation material shall be examined by the Engineer and the Owner. If found deteriorated the old insulation shall be removed and the new insulation (meeting specification requirements of the current project) shall be installed.

### 3.3 APPLICATION

- A Install unions downstream of screwed valves and at equipment connections that are not flanged.
- B Install brass male adapters on each side of valves in copper piped systems. Sweat solder adapters to pipe.
- C For balancing and shutoff service, provide adjustable memory stops for ball valves (2" and smaller) and butterfly valves (over 2").
- D For equipment isolation service, provide ball valves (2" and smaller) and tapped lug butterfly valves (over 2").
- E For insulated pipe, provide valves with extended necks or neck extensions of adequate length for the handles to clear the insulation without notching the insulation.
- F Provide ¾" gate drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe discharge to the nearest drain.
- G Use dielectric fittings or couplings for dissimilar metals.
- H Use pipe dope or Teflon tape for screwed pipe connections.

END OF SECTION