

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C111/A21.11 (Latest Edition), Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .2 American Society of Mechanical Engineers (ASME)
 - .1 ASME B16.1 (Latest Edition), Grey Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - .2 ASME B16.3 (Latest Edition), Malleable Iron Threaded Fittings: Classes 150 and 300.
 - .3 ASME B16.5 (Latest Edition), Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard.
 - .4 ASME B16.9 (Latest Edition), Factory-Made Wrought Buttwelding Fittings.
 - .5 ASME B18.2.1 (Latest Edition), Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loded Head and Lag Screws (Inch Series).
 - .6 ASME B18.2.2 (Latest Edition), Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- .3 ASTM International
 - .1 ASTM A 47/A 47M (Latest Edition), Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A 53/A 53M (Latest Edition), Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
 - .3 ASTM A 536 (Latest Edition), Standard Specification for Ductile Iron Castings.
 - .4 ASTM B 61 (Latest Edition), Standard Specification for Steam or Valve Bronze Castings.
 - .5 ASTM B 62 (Latest Edition), Standard Specification for Composition Bronze or Ounce Metal Castings.
 - .6 ASTM E 202 (Latest Edition), Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.
- .4 CSA International
 - .1 CSA B242 (Latest Edition), Groove and Shoulder Type Mechanical Pipe Couplings.
 - .2 CSA W48 (Latest Edition), Filler Metals and Allied Materials for Metal Arc Welding.
- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS)
 - .1 MSS-SP-67 (Latest Edition), Butterfly Valves.
 - .2 MSS-SP-70 (Latest Edition), Grey Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS-SP-71 (Latest Edition), Grey Iron Swing Check Valves Flanged and Threaded Ends.
 - .4 MSS-SP-80 (Latest Edition), Bronze Gate, Globe, Angle and Check Valves.

- .5 MSS-SP-85 (Latest Edition), Grey Iron Globe and Angle Valves, Flanged and Threaded Ends.
- .6 Provincial Boiler, Pressure Vessel and Compressed Gas Regulation.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hydronic systems and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings:
 - .1 Components and accessories.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for hydronic systems for incorporation into manual.
 - .1 Include special servicing requirements.

1.4 EXTRA STOCK MATERIALS

- .1 Supply spare parts as follows:
- .2 Valve seats: 1 minimum for every ten valves, each size. Minimum one.
- .3 Discs: 1 minimum for every ten valves, each size. Minimum one.
- .4 Stem packing: 1 minimum for every ten valves, each size. Minimum one.
- .5 Valve handles: 2 minimum of each size.
- .6 Gaskets for flanges: 1 minimum for every ten flanges.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect hydronic systems from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2- PRODUCTS

2.1 PIPE

- .1 Steel pipe: to ASTM A 53/A 53M, Grade B, as follows:
 - .1 To NPS 6: Schedule 40.
 - .2 NPS 8 and over, Schedule 10.
 - .3 NPS 12 and over, 10 mm wall thickness.

2.2 PIPE JOINTS

- .1 NPS 2 and under: screwed fittings with PTFE tape or lead-free pipe dope.
- .2 NPS 2-1/2 and over: welding fittings and flanges to CSA W48.
- .3 Roll grooved: rigid coupling to CSA B242.
- .4 Flanges: plain for cast iron or raised face for steel, slip-on or weld neck to ANSI/AWWA C111/ A21.11.
- .5 Orifice flanges: slip-on raised face, 2100 kPa.
- .6 Flange gaskets: to ANSI/AWWA C111/ A21.11.
- .7 Pipe thread: taper.
- .8 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.
- .9 Roll grooved coupling gaskets: type EPDM.

2.3 FITTINGS

- .1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.
- .2 Pipe flanges and flanged fittings:
 - .1 Cast iron: to ASME B16.1, Class 125.
 - .2 Steel: to ASME B16.5.
- .3 Butt-welding fittings: steel, to ASME B16.9.
- .4 Unions: malleable iron, to ASTM A 47/A 47M and ASME B16.3.
- .5 Fittings for roll grooved piping: malleable iron to ASTM A 47/A 47M or ductile iron to ASTM A 536.

2.4 VALVES

- .1 Connections:
 - .1 NPS 2 and smaller: screwed ends.
 - .2 NPS 2-1/2 and larger: flanged or grooved ends.
- .2 Gate valves: to MSS-SP-70, to MSS-SP-80 application: isolating equipment, control valves, pipelines:
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: Class 125, rising stem, split wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 Elsewhere: Class 125, non- rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 NPS 2-1/2 and over:
 - .1 Mechanical Rooms: rising stem, split wedge disc, lead free bronze trim.
 - .1 Operators: chain or manual.
 - .2 Elsewhere: non-rising stem, solid wedge disc, lead free bronze trim.
 - .1 Operators: manual.
- .3 Globe valves: to MSS-SP- 80 and 85 application: throttling, flow control, emergency bypass:
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: with PTFE disc, as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 Elsewhere: globe, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 NPS 2-1/2 and over:
 - .1 With composition bronze] disc, bronze trim, as specified Section 23 05 23.02 - Valves - Cast Iron.
- .4 Balancing, for TAB:
 - .1 Sizes: calibrated balancing valves, as specified this section.
 - .2 NPS 2 and under:
 - .1 Globe as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 NPS 2 ½ and over globe, as specified Section [23 05 23.01 - Valves - Bronze].
- .5 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.
- .6 Swing check valves: to MSS-SP-71.
 - .1 NPS 2 and under:
 - .1 Class 125, swing, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 NPS 2-1/2 and over:
 - .1 Flanged or grooved ends.
- .7 Ball valves:
 - .1 NPS 2 and under: as specified Section 23 05 23.01 - Valves - Bronze.

PART 3- EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic systems installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.2 PIPING INSTALLATION

- .1 Install pipework in accordance with Section 23 05 15 – Common Installation Requirements for HVAC.

3.3 CIRCUIT BALANCING VALVES

- .1 Install flow balancing valves as indicated.
- .2 Tape joints in prefabricated insulation on valves installed in chilled water mains.

3.4 CLEANING, FLUSHING AND START-UP

- .1 In accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

3.5 TESTING

- .1 Test system to 1.5 times working pressure or 860 kPa whichever is greater for 4 hours. If leaks are detected, repair and repeat test until no leaks are detected.

3.6 BALANCING

- .1 Balance water systems to within plus or minus 5 % of design output.
- .2 In accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC for applicable procedures.

3.7 PERFORMANCE VERIFICATION

- .1 In accordance with Section 23 08 01 - Performance Verification Mechanical Piping Systems.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.9 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by hydronic systems installation.

END OF SECTION