1.1 REFERENCE STANDARDS

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA) (Latest edition)

.1 ANSI/AWWA C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 American Society of Mechanical Engineers (ASME) (Latest edition)

.1 ASME B16.1, Grey Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

.2 ASME B16.3, Malleable Iron Threaded Fittings: Classes 150 and 300.

.3 ASME B16.5, Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard.

.4 ASME B16.9, Factory-Made Wrought Buttwelding Fittings.

.5 ASME B18.2.1, 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, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.3 ASTM International(Latest edition)

.1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.

.3 ASTM A536, Standard Specification for Ductile Iron Castings.

.4 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.

.5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

.6 ASTM E202, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

.4 CSA International(Latest edition)

.1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.

.2 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.

.5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS) (Latest edition)

.1 MSS-SP-67, Butterfly Valves.

.2 MSS-SP-70, Grey Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71, Grey Iron Swing Check Valves Flanged and Threaded Ends.

.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS-SP-85, Grey Iron Globe and Angle Valves, Flanged and Threaded Ends.

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 systemsand include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate on drawings:

.1 Components and accessories.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

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:

.1 Valve seats: 1minimum for every ten valves, each size. Minimum one.

.2 Discs: 1minimum for every ten valves, each size. Minimum one.

.3 Stem packing: 1minimum for every ten valves, each size. Minimum one.

.4 Valve handles: 2minimum of each size.

.5 Gaskets for flanges: 1minimum for every ten flanges.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions 01 61 00- Common Product Requirements.

.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 indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect hydronic systemsfrom nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplanrelated to Work of this Section.

.5 Packaging Waste Management: remove for reuse by manufacturer and returnof packaging materials padding, pallets, crates,as specified in 01 00 10 – General Instructions.

Part 2 Products

2.1 STEAM AND CONDENSATE LINE

.1 Piping: to ASTM A53/A53M, Grade B.

.1 Steam and Feed water:

.1 NPS 1/2 to 1-1/2: Sch. 80-ERW or seamless, plain ends.

.2 NPS 2 to 12 and over: Sch. 40-ERW or seamless, bevel ends.

.2 Condensate and soft water makeup: Sch. 80-ERW or seamless, plain or bevel ends.

.2 Fittings for steam and feed water:

.1 NPS 1/2 to 1-1/2: Class 3000, 20 MPa, forged steel, socket weld, to ASTM A181/A181M, Class 70.

.2 NPS 2 to 10: Sch. 40, seamless, bevel ends, to ASTM A234/A234M, Grade WPB.

.3 Fittings for condensate and soft water makeup:

.1 Sch. 80, seamless or ERW, plain ends, to ASTM A53/A53M, Grade B.

.4 Couplings:

.1 NPS 1/2 to 1-1/2: Class 3000, 20 MPa, socket weld, to ASTM A181/A181M, Class 70.

.5 Caps and plugs for drains:

.1 NPS 1/2 to 3/4: Class 3000, 20 MPa, to ASTM A181/A181M, Class 70.

.6 Nipples for drains, vents, pressure gauges:

.1 NPS 1/2 to 3/4: Sch. 160, plain ends, to ASTM A106/A106M, Grade A.

.7 All other nipples:

.1 NPS 1/2 to 1-1/2: Sch. 80, plain ends, to ASTM A106/A106M, Grade A.

.8 Swage nipples:

.1 Sch. 80, seamless, to ASTM A106/A106M, Grade A.

.9 Welding outlets:

.1 Sch. 160, bevel ends, to ASTM A181/A181M, Class 70.

.10 Elbow welding outlets:

.1 Sch. 160, bevel ends, to ASTM A181/A181M, Class 70.

.11 Unions:

.1 NPS 1/2 to 1-1/2: Class 3000, 20 MPa, screwed socket weld ends, forged steel, steel-to-steel ground seats, to ASTM A181/A181M, Class 70.

.12 Flanges:

.1 NPS 1/2 and 3/4: Class 150, 1 MPa, raised face, socket weld or weld neck bored to match pipe, to ASTM A181/A181M, Class 70.

.2 NPS 1 to 1-1/2: Class 150, 1 MPa, raised face, weld neck, bored to match pipe, to ASTM A181/A181M, Class 70.

.3 NPS 2 to 12: Class 150, 1 MPa, raised face, weld neck, bored to match pipe, to ASTM A181/A181M, Class 70.

.13 Orifice flanges:

.1 Class 300, 2 MPa, raised face, slip-on, bored to match pipe, to ASTM A181/A181M, Class 70.

.14 Bolts and nuts:

.1 Alloy steel stud bolts to ASTM A193/A193M, Grade B7, with semi-finished hex head nuts, to ASTM A194/A194M, Grade 2H.

.15 Gaskets:

.1 EDPM Fluoroelastomer, 1.6 mm thick, full face, rated for temperature and pressure of system.

.16 Gate valves:

.1 NPS 1/2 to 1-1/2: Class 600, 4 MPa at 485 degrees C, forged steel body, socket weld, forged steel bolted bonnet and yoke, two-piece self-aligning forged steel gland-flange with stainless steel bolts, stainless steel gland, deep stuffing box, fully guided solid stainless steel wedge disc, renewable Stellite seats. Rising stem.

.2 NPS 2 to 12 and over: Class 300, 2 MPa, raised face flanged ends, cast steel body, OS&Y, flexible disc to ASTM A216/A216M, grade WCB.

.17 Globe valves:

.1 NPS 1/2 to 3: Class 600, 4 MPa, forged steel body, one piece forged steel bolted bonnet and yoke, stainless steel stem and disc, stainless steel replaceable seat, socket weld ends, OS&Y.

.18 Valves in external bypass around valves NPS 8 and larger:

.1 NPS 1 gate as specified above.

.19 Check valves:

.1 NPS 1/2 to 1-1/2: Class 800, 5.5 MPa, forged steel body, horizontal lift check, socket weld, straight pattern body.

.20 Drain valves:

.1 Gate valves, NPS 3/4 to 1-1/4, as specified above.

.21 Strainers:

.1 NPS 1/2 to 2: Class 600, 4 MPa, socket weld, cast carbon steel body to ASTM A216/A216M, Grade WCB, Y pattern with 20 x 20 mesh Type 304 stainless steel screen, steel cap to ASTM A108, Grade 117.

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 05- Installation of Pipe Work.

3.3 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valvesas indicated.

.2 Remove handwheel after installation and when TAB is complete.

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 in accordance with Section 21 05 01- Common Work Results for Mechanical.

3.6 BALANCING

.1 Balance water systems to within plus or minus 5% of design output.

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 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 00 10 – General Instructions.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

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