PART 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)

.2 American Society of Mechanical Engineers International (ASME)

.1 ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.

.2 ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

.3 ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.4 ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.3 Canada Green Building Council (CaGBC)

.1 LEED Version 4, Building Design and Construction

.4 American Society for Testing and Materials International (ASTM)

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

.2 ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).

.5 American Water Works Association (AWWA)

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

.6 Canadian Standards Association International (CSA)

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

.7 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

.8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.9 Manufacturer's Standardization Society (MSS)

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

.10 National Research Council of Canada (NRCC)

.1 NRCC 38728, National Plumbing Code of Canada (NPC).

.11 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals: submit maintenance for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 60 00 – Product Requirements.

.2 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 in dry location and in accordance with manufacturer's recommendations.

.2 Store and protect piping materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 Products

2.1 PIPE

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ASME B16.15.

.3 Cast copper, solder type: to ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ASME B16.22.

.5 NPS 2 and larger: ANSI/ASME B16.18 or ASME B16.22 roll grooved to CSA B242.

.6 NPS 1 and smaller: wrought copper to ASME B16.22 cast copper to ASME B16.18.

2.3 JOINTS

.1 Rubber gaskets, latex-free, 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin copper alloy.

.4 Teflon tape: for threaded joints.

.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.

.6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

PART 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with Manitoba Plumbing Code.

.2 Install pipework in accordance with Section 23 05 05 – Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

3.3 PRESSURE TESTS

.1 Conform to requirements of Section 23 05 01 – Common Work Results for Mechanical.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.4 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

3.5 START-UP

.1 Timing: start up after:

.1 Pressure tests have been completed.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:

.1 Establish circulation and ensure that air is eliminated.

.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.

.3 Bring hot water tank up to design temperature slowly.

.4 Monitor piping DHW and DHWR piping systems for freedom of movement, pipe expansion as designed.

.5 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.6 PERFORMANCE VERIFICATION

.1 Scheduling:

.1 Verify system performance after pressure and leakage tests and Certificate of Completion has been issued by authority having jurisdiction.

.2 Procedures:

.1 Verify that flow rate and pressure meet Design Criteria.

.2 Verify performance of temperature controls.

.3 Verify compliance with safety and health requirements.

3.7 CLEANING

.1 Perform cleaning in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers International (ASME)

.2 Canada Green Building Council (CaGBC)

.1 LEED Version 4, Building Design and Construction

.3 Canadian Standards Association International (CSA)

.1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

.2 CSA C22.2 No. 88, Construction and Test of Industrial Heating Equipment.

.3 CSA C22.2 No. 110, Construction and Test of Electric Storage-Tank Water Heaters.

.4 CSA C191, Performance of Electric Storage Tank Water Heaters for Domestic Hot Water Service.

.4 Electrical Testing Laboratory (ETL)

.5 Underwriters Laboratories (UL)

.1 UL 499, Electric Heating Appliances.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate:

.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 60 00 – Product Requirements.

.2 Deliver materials to Site in original factory packaging, labelled with manufacturer's name, address.

1.5 WARRANTY

.1 For the Work of this Section, 12 months warranty period prescribed is extended to number of years specified for each product.

.2 Contractor hereby warrants domestic water heaters in accordance with Invitation to Tender (ITT), but for number of years specified for each product.

PART 2 Products

2.1 ELECTRIC HOT WATER TANKS (HWT-1 & HWT-2)

.1 Performance: Refer to schedule on drawing M06.

.2 Tank shall be Vitraglas® lined heavy gauge steel tank, protective magnesium anode rods, 51 mm (2”) non-CFC foam tank insulation, 19 mm (3/4”) NPT factory-installed true dielectric fittings for water connections, factory-installed heat traps, installed temperature and pressure relief valve, and an ETL certified product.

.3 Provide drain valve as required and drain to nearest floor drain.

.4 Acceptable Product: Refer to schedule on drawing M06.

PART 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's factory trained, certified personnel to start up and commission DHW heaters.

3.4 CLEANING

.1 Perform cleaning in accordance with Section 01 74 11 – Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B40.100, Pressure Gauges and Gauge Attachments.

.2 ASME B40.200, Thermometers, Direct Reading, and Remote Reading.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 14.4, Thermometers, Liquid-in-Glass, Self-Indicating, Commercial/Industrial Type.

.2 CAN/CGSB 14.5, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

.3 Efficiency Valuation Organization (EVO)

.1 IPMVP, International Performance Measurement and Verification Protocol.

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 thermometers and pressure gauges and include product characteristics, performance criteria, physical size, finish, and limitations.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 60 00 – Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store thermometers and pressure gauges in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect thermometers and pressure gauges from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 Products

2.1 GENERAL

.1 Design point to be at mid-point of scale or range.

.2 Ranges: as indicated.

2.2 DIRECT READING THERMOMETERS

.1 Industrial, variable angle type, mercury-free, liquid filled, 125mm scale length: to CAN/CGSB 14.4 and ASME B40.200.

.1 Resistance to shock and vibration.

2.3 REMOTE READING THERMOMETERS

.1 100 mm diameter mercury-free, liquid filled, vapour activated dial type: to ASME B40.200 and CAN/CGSB 14.5, accuracy within one scale division, brass movement, stainless steel capillary, stainless steel spiral armour, stainless steel bulb and polished stainless steel case for wall mounting.

2.4 THERMOMETER WELLS

.1 Copper pipe: copper or bronze.

.2 Steel pipe: brass or stainless steel.

2.5 PRESSURE GAUGES

.1 112 mm, dial type: to ASME B40.100, Grade 2A, stainless steel or phosphor bronze bourdon tube having 0.5% accuracy full scale unless otherwise specified.

.2 Provide:

.1 Siphon for steam service.

.2 Snubber for pulsating operation.

.3 Diaphragm assembly for corrosive service.

.4 Gasketed pressure relief back with solid front.

.5 Bronze stop cock.

.6 Oil filled for high vibration applications.

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 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 GENERAL

.1 Install thermometers and gauges so they can be easily read from floor or platform.

.1 If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.3 THERMOMETERS

.1 Install in wells on piping. Include heat conductive material inside well.

.2 Install in locations as indicated on drawings.

.3 Install wells (without thermometers) for balancing purposes as indicated.

.4 Use extensions where thermometers are installed through insulation.

3.4 PRESSURE GAUGES

.1 Install in locations as follows:

.1 Suction and discharge of pumps.

.2 In other locations as indicated.

.2 Install gauge cocks for balancing purposes, elsewhere as indicated.

.3 Use extensions where pressure gauges are installed through insulation.

3.5 NAMEPLATES

.1 Install engraved lamicoid nameplates in accordance with Section 23 05 53 – Identification for Mechanical Piping and Equipment.

3.6 CLEANING

.1 Perform cleaning operations in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Upon completion remove surplus materials, rubbish, tools, and equipment.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by thermometer and gauge installation.

END OF SECTION

PART 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for piping, valves and fittings for gas fired equipment.

1.2 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.5, Pipe Flanges and Flanged Fittings.

.2 ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.

.3 ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

.4 ASME B18.2.1, Square and Hex Bolts and Screws Inch Series.

.2 American Society for Testing and Materials International (ASTM)

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

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

.3 ASTM B75, Standard Specification for Seamless Copper Tube.

.4 ASTM B837, Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems.

.3 Canadian Standards Association International (CSA)

.1 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

.2 CSA B149.1, Natural Gas and Propane Installation Code.

.4 Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings, and equipment.

.2 Indicate on manufacturers catalogue literature following valves.

.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

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

.5 Instructions: submit manufacturer's installation instructions.

.6 Closeout Submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 60 00 – Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, and address.

PART 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53, Schedule 40, seamless as follows:

.1 NPS ½ to 2, screwed.

.2 NPS 2½ and over, plain end.

.2 Copper tube: to ASTM B837.

2.2 JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste.

.2 Welded fittings: to CSA W47.1.

.3 Flange gaskets: non-metallic flat.

.4 Brazing: to ASTM B837.

2.3 FITTINGS

.1 Steel pipe fittings, screwed, flanged, or welded:

.1 Malleable iron: screwed, banded, Class 150.

.2 Steel pipe flanges and flanged fittings: to ASME B16.5.

.3 Welding: butt-welding fittings.

.4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47.

.5 Bolts and nuts: to ASME B18.2.1.

.6 Nipples: schedule 40, to ASTM A53.

.2 Copper pipe fittings, screwed, flanged, or soldered:

.1 Cast copper fittings: to ASME B16.18.

.2 Wrought copper fittings: to ASME B16.22.

2.4 PRESSURE REGULATORS

.1 CSA-approved, direct acting, spring operated gas regulator with pressure relief valve.

2.5 VALVES

.1 Provincial Code approved, lubricated plug or ball type.

PART 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PIPING

.1 Install in accordance with Section 23 05 05 – Installation of Pipework, CSA B149.1, and applicable Provincial Codes, supplemented as specified.

.2 Install drip pockets:

.1 At low points in piping system.

.2 At connections to equipment.

3.3 VALVES

.1 Install valves with stems upright or horizontal unless otherwise approved by Consultant.

.2 Install valves at branch take-offs to isolate pieces of equipment, and as indicated.

.3 Install pressure regulator sized to suit the requirements of the equipment served.

3.4 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Test system in accordance with CSA B149.1 and requirements of local authorities having jurisdiction.

.2 Manufacturer's Field Services:

.1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, protection, and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.

.2 Provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.

.3 Schedule site visits to review work at stages listed:

.1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.

.2 Twice during progress of work at 25% and 60% complete.

.3 Upon completion of work, after cleaning is carried out.

.3 Obtain reports within three (3) days of review and submit immediately to Consultant.

3.5 ADJUSTING

.1 Purging: purge after pressure test in accordance with CSA B149.1.

.2 Pre-Start-Up Inspections:

.1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.

.2 Check gas trains, entire installation is approved by authority having jurisdiction.

3.6 CLEANING

.1 Perform cleaning in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Upon completion remove surplus materials, rubbish, tools and equipment.

.2 Clean piping in accordance with Section 23 05 01 – Common Work Results for Mechanical, CSA B149.1, and requirements of local authority having jurisdiction.

END OF SECTION

PART 1 General

1.1 REFERENCE STANDARDS

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

.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)

.1 ASME B16.1, Gray 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 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

.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.

.4 CSA International

.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)

.1 MSS SP-67, Butterfly Valves.

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

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

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:

.2 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.

PART 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.2 To NPS 6: Schedule 40.

2.2 PIPE JOINTS

.1 NPS 2 and under: screwed fittings with PTFE tape.

.2 NPS 2-1/2 and over: welding fittings and flanges to CSA W48.

.3 Roll grooved: standard coupling to CSA B242.

.4 Flanges: plain or raised face, slip-on or weld neck.

.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 ANSI B18.2.1 and ANSI/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 A47 and ASME B16.3.

.5 Fittings for roll grooved piping: ductile iron to ASTM A536 or malleable iron to ASTM A47.

2.4 VALVES

.1 Connections:

.1 NPS 2 and smaller: screwed ends.

.2 NPS 2-1/2 and larger: Grooved or flanged ends.

.2 Ball Valves

.1 NPS 2 and under:

.1 To ASTM B62, 4 MPa WOG, bronze body, screwed ends, TFE seal, hard chrome solid ball, Teflon seats and lever handle.

.2 Acceptable product: Toyo Figure 5044A, Crane, Grinnell or approved equal.

.3 Gate Valves:

.1 NPS 2 and under:

.1 Rising stem: to MSS SP-80, Class 125, 860 kPa, bronze body, solid wedge disc.

.2 Acceptable material: Toyo Fig 206A, Crane, Grinnell, or approved equal.

.2 NPS 2-1/2 and over:

.1 Rising stem, OS & Y, bolted bonnet, solid wedge, disc flanged end, to MSS SP-70, cast iron body bronze trim.

.2 Acceptable material: Toyo Fig No. 421A, Crane, Grinnell, or approved equal.

.4 Butterfly Valves - to MSS SP-67:

.1 NPS 2-1/2 and over: Lug type:

.1 Pressure rating for tight shut-off at temperatures up to maximum for seat material.

.2 NPS 2 - 12: 200 psig.

.1 Minimum seat temperature ratings to 135 degrees C.

.3 Application: on-off operation.

.4 Operators:

.1 NPS 2 - 6: handles capable of locking in any of ten (10) positions - 0 degrees to 90 degrees. Handle and release trigger - ductile iron. Return spring and hinge pin: carbon steel. Latch plate and mounting hardware: cadmium plated carbon steel. Standard coating: black laquer.

.5 Compatible with ANSI Class 125/Class 150 flanges.

.6 Construction:

.1 Body ductile iron.

.2 Disc: aluminum bronze.

.3 Seat: EPDM.

.4 Shaft: 316 stainless steel.

.5 Taper pin: 316 SS.

.6 Key: stainless.

.7 O-Ring: EPDM.

.8 Bushings: luberized bronze.

.7 Acceptable Product: “Bray” Series 31 or approved equal.

.5 Check Valves – to MSS SP-71

.1 Swing check valves, Class 125:

.2 Body and bolted cover: with tapped and plugged opening on each side for hinge pin. Grooved or flanged ends: plain faced with smooth finish.

.1 Up to NPS 16: cast iron to ASTM A126 Class B.

.3 Ratings:

.1 NPS 2 1/2 - 12: 860 kPa steam; 1.4 MPa CWP.

.4 Disc: rotating for extended life.

.1 Up to NPS 6: bronze to ASTM B62.

.5 Seat rings: renewable bronze to ASTM B62 screwed into body.

.6 Hinge pin, bushings: renewable bronze to ASTM B62.

.7 Disc: A126 Class B, secured to stem, rotating for extended life.

.8 Seat: cast iron, integral with body.

.9 Hinge pin: exelloy; bushings: malleable iron.

.10 Identification tag: fastened to cover.

.11 Hinge: stainless steel.

.6 Balancing Valves, for TAB:

.1 Sizes: Calibrated balancing valves, as specified this section.

.2 NPS 2 and under:

.1 Threaded bronze body construction, brass ball, TFE seat rings c/w memory stop, and differential pressure readout ports.

.2 Acceptable product: Bell & Gossett Circuit Setter plus Model CB or approved equal.

.3 NPS 2-1/2 and over:

.1 Flanged cast iron body construction, c/w memory stop, and differential pressure readout ports.

.2 Acceptable Product: Bell & Gossett Circuit Setter Model CB or approved equal.

.7 Control Valves:

.1 Supplied by Section 23 09 33 – Electric and Electronic Control System for HVAC, installed by Section 23 21 13. Section 23 21 13 shall provide reducers where required if the control valve is not the same size as the pipe.

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 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PIPING INSTALLATION

.1 Install pipework in accordance with Section 23 05 05 – Installation of Pipework.

3.3 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.2 Remove hand-wheel after installation and when TAB is complete.

.3 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 in accordance with Section 23 05 01 – Common Work Results for Mechanical.

3.6 BALANCING

.1 In accordance with Section 23 05 93 – Testing, Adjusting and Balancing for HVAC Systems for applicable procedures and tolerances.

3.7 CLEANING

.1 Perform cleaning operations in accordance with Section 01 74 11 – Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.8 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