.4 Drying time to touch: 4 h maximum.

.5 Drying time firm: 48 h maximum.

.6 Service temperature: minus 29 to plus 93 °C.

.7 Application temperature: 4.4 °C minimum.

.8 Moisture permeability: 3.2 mm wet film at 37.3 °C.

.9 90% relative humidity: to ASTME96, 02 perms.

.10 Shelf life: 12 months.

.4 Silicone caulking for joining faces of rigid urethane insulation.

.1 Colour: black.

.2 Specific gravity: 1.07.

.3 Tensile strength: 25 kg/cm^2.

.4 Tear strength: 8 kg/cm^2.

.5 Service temperature: 205°C maximum.

2.7 Warning Tape

.1 Polyethylene tape: 150 mm wide by 0.15 mm thick as approved by Engineer.

.2 Tape for water mains: blue in colour with factory applied markings at one metre intervals, i.e. "Caution Buried Water Line".

2.8 Pipe Bedding and Surround Materials

.1 Granular material to following requirements:

.1 Crushed or screened stone or sand consisting of hard, durable, particles, free from clay lumps, cementation, organic material and other deleterious materials to Section 02315.

.2 ASTMC136 and ASTMC117. Sieve sizes to CAN/CGSB-8.1.

2.9 Backfill Materials

.1 Backfill material in accordance with Section 02315 Excavating, Trenching and Backfilling.

PART 3

PART 3 EXECUTION

3.1 Unloading and Handling of Pre-insulated Polyethylene Pipe

.1 Unload from trucks or containers by hand or by lifting apparatus with fabric slings. Do not use cables or chains.

.2 Once removed, store on smooth surface. Lay pipes flat. Where sleepers are desired use several lengths of wide planks to provide broad bearing surface.

.3 Lift, do not drag, insulated pipes from storage area to job site.

.4 Follow manufacturer's recommendations.

3.2 Repairing Damaged Pre-insulated Pipe

.1 Repair any damage to outer jacket by applying heat shrink sleeve to approval of Engineer or cover using heated HDPE UV resistant adhesive backed tape.

3.3 Trenching

.1 Do trenching work in accordance with Section 02315 - Excavating, Trenching and Backfilling.

.2 Trench depth to provide cover over pipe of not less than 1 m from finished grade.

.3 Trench alignment and depth require Engineer's approval prior to placing bedding material or pipe.

3.4 Granular Bedding and Surround

.1 Place bedding and surround material in unfrozen condition.

.2 Place materials in uniform layers not exceeding 150 mm compacted thickness up to 300 mm above top of pipe. Compact each layer before placing succeeding layer. Avoid compaction directly over pipe with less than 300 mm of cover.

.3 Shape bed true to grade to provide continuous uniform bearing surface for pipe exterior. Do not use blocks when bedding pipe.

.4 Shape transverse depressions in bedding as required to make joints.

.5 Compact each layer full width of bed to at least 90 % maximum density to ASTMD698.

.6 Fill authorized excavation or unauthorized over excavation below design elevation of bottom of specified bedding with compacted bedding material.

3.5 Concrete Bedding and Encasement

.1 Do concrete work in accordance with Section 03300 - Cast-in-Place Concrete. Place concrete to details indicated.

.2 Pipe may be positioned on concrete blocks to facilitate placing of concrete. When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

.3 Do not backfill over concrete within 24h after placing concrete.

3.6 Pipe Installation

.1 On dry ground, assemble shipping lengths of pipe into suitable installation lengths by heat butt-fusion.

.2 Provide trained personnel and jointing machine approved by pipe manufacturer for butt-fusion jointing of polyethylene pipe. Obtain services of trained technician from pipe manufacturer to certify and/or train Contractor's personnel on jointing procedures and inspect jointing machine. Obtain letter from manufacturer certifying that Contractor's representative(s) who will perform jointing, is/are qualified and that jointing equipment has been inspected and is suitable for pipe supplied.

.3 Follow manufacturer's instructions in butt-fusion of joints.

.4 Join pipes at flanged ends in accordance with manufacturer's recommendations.

.5 Recheck pipe joints assembled above ground after placing in trench to ensure no movement of joints has taken place.

.6 Complete installation of rigid polyurethane halves on joints after laying pipe in trench and after successful pressure testing of pipe.

.1 Trim half shells to required length with handsaw to provide tight-fit in insulation gap between ends of factory insulation.

.2 No seam to exceed 3 mm in width at any joint. Match outer surface of shell with outer surface of installation on pipe within tolerance of plus or minus 6 mm. Shave off any sharp edge with rasp.

.3 Hold half shells in place with masking tape while installing heat shrink sleeve.

.7 Install heat shrink sleeves using large broad flame propane torch to produce 600 mm flame.

.1 Peel back release liner 12 cm from end, centre sleeve over joint and press firmly down. Wrap sleeve around pipe, removing release liner as it is wrapped. If corner on underlap is not precut, then cut off about 25 mm from each corner.

.2 Before completing overlap wrapping, warm underlap area approximately 12 cm until adhesive starts to appear at edge. Smooth out any wrinkles with gloved hand.

.3 Remove remaining release liner and complete wrapping.

.4 Remove release paper from closure seal, prewarm adhesive slightly, centre seal over overlap and press down until well bonded. Heat closure seal, and press down with gloved hand to remove any bubbles and wrinkles.

.5 With torch, start at centre of sleeve and shrink it all around joint. Keep torch moving using broad circumferential strokes to avoid burning. Continue shrinking sleeve toward one end until about 50mm is left. Then aim torch inward towards centre and shrink edges. Repeat this operation on other end of sleeve. Finish off by applying long horizontal strokes of torch all around sleeve.

.6 Pay special attention to sleeve overlap area, ensuring no void remains along underlap edge. Use roller, or gloved hand to firmly and thoroughly press down along underlap edge. Start in centre and work outwards.

.7 Allow joint and sleeve to cool for at least 30 min before lowering pipe into trench.

.8 Lay pipes on prepared bed, true to line and grade as indicated. No deviations to be made without written approval of Engineer. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Take out and replace defective pipe. Correct pipe that is not in true alignment or grade, or pipe that shows undue settlement after installation. Change method or equipment for setting alignment or grade if requested by Engineer.

.9 Do not lay pipe on frozen bedding.

.10 Do not let rocks or other foreign material, which might damage insulation jacket, fall on pipe.

.11 Keep jointing materials and installed pipe free of dirt and water and other foreign materials. Install removable watertight bulkhead at open end of pipe to prevent entry of foreign materials.

3.7 Insulation of Fittings

.1 Cut pipes as required to accommodate fittings and fitting insulation kits without damaging pipe insulation or its jacket. Leave smooth end at right angles to pipe axis.

.2 Cracks larger than 6.4 mm to be filled with insulation foamed-in-place in following manner:

.1 Use strip of thin galvanized sheet metal wide enough to overlap both insulation kit and pipe by at least 8 cm and long enough to wrap around pipe leaving 2.5 cm opening on top.

.2 Hold metal in place with two tension metal or nylon straps, one at either end.

.3 Spray foam through opening on top into cavity.

.4 Spray until cavity is almost half-filled on both sides of pipe. Foam will rise to complete filling.

.5 Allow to cure for 10 to 15 min.

.6 Trim top and apply waterproofing sealant asphalt mastic, HDPE tape or heat shrink tape.

3.8 Pipe Backfilling

.1 Do backfilling work in accordance with Section 02315 - Excavating Trenching and Backfilling.

.2 Lay continuous runs of warning tape on top of surround material 300 mm directly above water mains.

.3 Upon completion of pipe laying and after Engineer has inspected work in place, surround and cover pipes between joints.

.4 Protect pipe from freezing if temperatures lower than minus 5°C.

.5 When Engineer accepts testing results, surround and cover joints and fittings with surround material placed and compacted as specified.

.6 Place backfill material above pipe surround, in uniform layers not exceeding 150 mm compacted thickness.

.7 Mechanically compact each layer to at least 90 % maximum density to ASTMD698.

3.9 Testing

1. Give five (5) days written notice of date for tests.
2. Insulted or conceal work only after testing and approval by Engineer.
3. Engineer reserves the right to be present during testing.
4. Bear costs including retesting and making good.
5. Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.
6. Hydrostatically test the high density polyethelene piping systems prior to installation in accordance with the following procedures, as recommended by the pipe manufacturer:

    .1 Over a period of three (3) hours, slowly raise the pressure in the pipe to 1.5 times the rated pressure of the pipe.

    .2 During the next 1 hour, maintain the required test pressure.

    .3 Start the test after the above described initial "pipe stretch" period.

    .4 Observe and record the hydrostatic pressure in the pipe over the next 3 hour period at ½ hour intervals.

.5 At the end of the 3 hour test period, measure the amount of makeup water required to be added to the system to return the pipe to the test pressure.

.6 An acceptable test is one for which the amount of makeup water does not exceed the following:

Nominal Pipe Size	Maximum Allowable Makeup Water @ 23°C.
100	5.0
250	7.8
300	12.6

Correction (Mulitplication) factor to be applied to make up water.

Pipe Testing Temperature	Allowance in Table Above
23°C	1.0
22°C	0.875
20°C	0.75
18°C	0.66
16°C	0.60
14°C	0.53
12°C	0.47
10°C	0.42
8°C	0.36
6°C	0.325

For pipe testing temperatures between those listed above, interpolate correction factor.

For pipe testing temperatures above or below limits tabulated, contact Engineer.

.7 Allow a minimum of 8 hours between successive polyethelene pipe tests to allow pipe to "relax".

.8 Hydrostatically test steel piping system by pressurizing with water to 860kPa, and maintaining this pressure for a period of 4 hours without leakage.

.9 Flush out all new piping with fresh, clean water for a period of one (1) hour following final pressure test.

.10 Provide written documentation of all test results, for acknowledgement by Engineer.

3.10 Flushing and Disinfecting Water Lines

.1 Flushing and disinfection operations shall be carried out by the Contractor and must be witnessed by the Public Works Representative, or Engineer. Notify the Engineer at least five (5) days in advance of the proposed date when disinfecting operation will commence.

.2 Complete all leakage procedures, standards and tests before flushing and disinfection.

.3 Before being placed into service, all new process piping shall be flushed and disinfected.

.4 Flush all piping through available outlets with a sufficient flow to produce a velocity of 1.5 m/s, within the pipe for thirty (30) minutes, or until all foreign materials have been removed and the flushed water is clear. This includes the intake casings and is to be completed prior to final installation.

.5 Supply materials and test kits to carry out disinfection tests for total and fecal coliforms; and total and residual chlorine at no additional cost to the Owner.

.6 Disinfect immediately after flushing. Disinfect all potable water pipes. Use either Method A or B as indicated:

Method A

.1 Fill piping system with chlorine/water solution with a strength of at least 50mg/L. Ensure pipe is full and no air pockets remain.

.2 Leave solution in piping system for 24 hours, while maintaining a pressure of 175 kPa.

.3 After 24 hours sample and test the chlorine solution for total and fecal coliform (FC) levels. If the chlorine residual is at least 25 mg/L and the FC levels are within acceptable limits, the disinfection will be considered successful. Flush chlorine solution from the piping system. Protect against contamination of the disinfected system.

.4 If the chlorine residual is less than 25 mg/L or the total and FC levels are unacceptable, flush the piping system, clean any deleterious material, reflush and disinfect again. Repeat until satisfactory.

Method B

.1 Introduce chlorine solution into the intake casing to achieve a chlorine residual of 50 mg/L in the discharge pipe, which is to be recirculated back to the pump.

.2 Operate the pump and allow the chlorine solution in the intake casing. Operate continuously for 2 hours.

.3 After 2 hours sample and test the chlorine solution and the total and fecal coliform (FC) levels. If the chlorine residual is at least 25mg/L and the total and FC levels are within acceptable limits, the disinfection will be considered successful. Flush chlorine solution from the piping system. Protect against contamination of the disinfected system.

.4 If the chlorine residual is less than 25mg/L or the total and FC levels are unacceptable, flush the piping system, clean any deleterious material, reflush and disinfect again. Repeat until satisfactory.

.7 The Contractor shall collect two (2) samples of disinfectant solution for bacteriological testing. The Contractor is responsible for submitting the samples to an accredited laboratory for total and fecal coliform testing for verification of field tests. The results are to be sent to the Engineer for confirmation.

.8 If, in the opinion of the Engineer, any component of the potable water system becomes contaminated after disinfection, it shall be flushed and disinfected again at no additional cost to the Owner.

.9 Do not discharge flush water or disinfection solution to the Mackenzie River. Flush water is to be disposed of at the community sewage lagoon.SPEC NOTE: Re 3.11. Delete where not applicable.

END OF SECTION

PART 1 GENERAL

1.1 Related Work

.1 Section 02315- Excavating, Trenching and Backfilling.

.2 Section 02559- Factory Pre-insulated Piping Systems for Utility Applications.

.3 Section 05500- Metals Fabrication

1.2 References

.1 CGSB 1-GP-183M-77, Coating, Zinc Rich, Epoxy.

1.3 Shop Drawings and Product Data

.1 Submit shop drawings and product data in accordance with Section 01330 - Submittal Procedures.

.2 Cross-reference to contract documents.

.3 Shop drawings to include:

- .1 Plans, elevations, sections.
- .2 Piping isometrics.
- .3 Construction details [where not specifically detailed on plans].

.4 Shop drawings to show:

- .1 Details of field connection points.
- .2 Branch connections.
- .3 Expansion joints, guides and anchors.
- .4 Vents and drains.
- .5 Pipe supports.
- .6 Pipeline identification data.

.5 Scale: to suit project conditions.

1.4 Welding

.1 To Section 05500 Metals Fabrication.

PART 2 PRODUCTS

2.1 Manholes

.1 General description:

- .1 Designed to suit specific project location and requirements.

.2 Factory fabricated, fully welded, watertight, insulated, air tested.

.3 Complete with all factory installed and tested distribution piping, fittings, valves and other accessories and equipment, thermal insulation, ladders, vents, lifting lugs, as indicated.

.4 Delivered to site ready for installation.

.2 Sizes:

.1 As indicated.

.3 Construction:

.1 Vaults are to be constructed of a steel inner and outer shell with 125 mm of polyurethane insulation in the annular space. Steel should be 6 mm thick.

.2 Bottom: steel plate, 10 mm thick, 2830 mm square with 38 mm thick Styrofoam insulation on the bottom.

.3 Sump: 400 mm outside diameter x 200 mm deep x 6 mm thick steel sides and bottom.

.4 See drawings for further details on construction.

.4 Lifting lugs: minimum 2, welded to sides with gussets as required.

.5 Access:

.1 800 mm square, hinged lockable steel access cover, gasketted and waterproofed.

.2 Access hatch to be 500 mm above finished grade.

.3 Gaskets to be specially compounded to resist aging and to have low permanent set properties.

.6 Ladder:

.1 All welded construction.

.2 12 mm thick steel stringers welded to manhole shell at top and bottom and with stand-offs welded to manhole shell and stringers.

.3 20 mm diameter x 450 mm wide embossed steel rungs.

.4 First rung to be within 300 mm of access hatch.

.5 To Section 05500 Metals Fabrication and indicated on drawings.

.7 Lugs for anodes: weld to side of manhole for attachment of cathodic protection anodes.

.8 Finishes:

.1 Exterior including all piping: primed and coated with 1.5 mm thick minimum colloidal resin.

.2 Interior: zinc rich coatings to CGSB 1-GP-183M.

.9 Distribution piping inside manhole:

.1 Distribution piping: to Section 02511- Water Mains.

.2 Provide stub-outs through manhole walls positioned to match distribution piping system.

.3 Distribution piping system to Section 02559 - Factory Pre-Insulated Piping Systems for Utility Applications.

.4 Anchors for distribution piping: design by manufacturer. Reinforce manhole as necessary.

.10 Tests:

.1 Distribution piping: to Section 02511- Water Mains.

.2 Manhole: air to 35 kPa for 4 h to ensure air and watertightness. Examine for leaks using soap solution.

.3 Seal off ventilation openings (and, if necessary, access hatch) before performing tests.

.11 Engineer to witness and certify tests.

2.2 Backfill Materials

.1 Materials listed in Section 02315 Excavating, Trenching and Backfilling.

PART 3 EXECUTION

3.1 Installation

.1 Excavation and backfilling: to Section 02315- Excavating, Trenching and Backfilling, supplemented as follows:

.1 Backfill material to be hand tamped in 150 mm layers.

.2 Install manholes where indicated, to manufacturer's recommendations and instructions,.

.2 Connect to distribution piping so that manhole installation is water-tight.

3.2 Tests

.1 Pressure test all field welds in distribution piping as required by Section 02511 - Water Mains.

.2 Pressure test all field connections in electrical conduit to 35 kPa and check for leakage with soap solution.

.3 Retest manhole after installation and before backfilling with air to 35 kPa and check for leakage with soap solution.

3.3 Conduit Manufacturer's Involvement

.1 Factory trained and qualified representative to inspect excavation before installation, be present during critical periods of installation and during tests.

.2 On completion, manufacturer to provide certificate indicating complete installation to be in accordance with manufacturer's recommendations.

3.4 Backfilling

.1 Hand placed and hand tamped to Section 02315- Excavating, Trenching and Backfilling.

.2 Compaction to Section 02315- Excavating, Trenching and Backfilling.

3.5 Certificates

.1 Upon completion, furnish certificates confirming that:

.1 Work as installed conforms to all requirements of manufacturer and authority having jurisdiction.

.2 System operation meets all design requirements.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 02561 - Telethermics Pre-fabricated Steel Vaults

1.2 References

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM A53/A53M-99b, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A269-98, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307-97, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint.
- .3 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA)

- .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16.1-94, Limit States Design of Steel Structures.
- .4 CSA W48.1-M1991(R1998), Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.
- .5 CSA W48.2-M1992(R1998), Chromium-Nickel Steel Covered Electrodes for Shielded.
- .6 CSA W48.3-M1993(R1998), Low Alloy Steel Covered Electrodes for Shielded Metal Arc Welding.
- .7 CSA W48.4-95, Solid Carbon Steel Filler Metals for Gas Shielded Arc Welding.
- .8 CSA W48.5-M1990(R1996), Carbon Steel Electrodes for Flux- and Metal-Cored Arc Welding.
- .9 CSA W48.6-96, Fluxes and Carbon Steel Electrodes for Submerged Arc Welding.
- .10 CSA W59-M1998, Welded Steel Construction (Metal Arc Welding).

1.3 Shop Drawings

.1 Submit shop drawings in accordance with Section 01330 - Submittal Procedures.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 Protection

.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

PART 2 PRODUCTS

2.1 Materials

.1 Welding materials: to CSA W59.

.2 Welding electrodes: to CSA W48 Series.

.3 Bolts and anchorbolts: to ASTM A307.

.4 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 Fabrication

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Where possible, fit and shop assemble work, ready for erection.

.3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 Finishes

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164.

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

.4 Bituminous paint: to CAN/CGSB-1.108.

2.4 Isolation Coating

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.5 Shop Painting

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.

.3 Clean surfaces to be field welded; do not paint.

PART 3 EXECUTION

3.1 Erection

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Engineer such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

END OF SECTION

PART 1 GENERAL

1.1 Equipment List

.1 Complete list of equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

.2 Submit for approval at time of tender.

1.2 Protection of Openings

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.3 Painting

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.4 Spare Parts

.1 Furnish spare parts in accordance with Section 17000 – Spare Parts:

1.5 Demonstration and Operating and Maintenance Instructions

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Where specified elsewhere in Division 15, manufacturers to provide demonstrations and instructions.

.3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, Engineer may record these demonstrations on video tape for future reference.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

PART 2 PRODUCTS

2.1 Not Used

.1 Not Used.

PART 3 EXECUTION

3.1 Connections to Equipment

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

3.2 Clearances

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

3.3 Drains

.1 Install piping with grade in direction of flow except as indicated or specified otherwise.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain. Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.4 Air Vents

.1 Install combination air / vacuum valves at high points in piping systems as indicated on drawings.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

3.5 Dielectric Couplings

.1 General: Compatible with system, to suit pressure rating of system.

.2 Locations: Where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: Isolating flanges.

3.6 Pipework Installation

.1 Screwed fittings to be jointed with Teflon tape.

.2 Protect openings against entry of foreign material during construction at all times. At the end of each day, or at other ties that he contractor leaves the site, all pipe openings are to be capped using temporary caps in order to prevent the introduction of foreign matter into the pipe system.

.3 Install so that equipment can be isolated and removed without interruption to operation of any other equipment or systems.

.4 Assemble piping using fittings manufactured to ANSI standards.

.5 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of the main. Hole saw (or drill) and ream main so as to maintain full inside diameter of branch line prior to welding saddle.

.6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.7 Install concealed pipework so as to minimize furring space, maximize headroom, conserve space.

.8 Except where indicated otherwise, slope piping in direction of flow for positive drainage and venting.

.9 Except where indicated, install so as to permit separate thermal insulation of each pipe.

.10 Group piping wherever possible and as indicated.

.11 Ream pipes, remove scale and other foreign material before assembly.

.12 .12 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

3.7 Existing Systems

.1 Connect into existing piping systems at times approved by Engineer.

.2 Request written approval 10 days minimum, prior to commencement of work.

.3 Be responsible for damage to existing plant by this work.

.4 Ensure daily clean-up of existing areas.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME)

.1 ANSI/ASME B1.20.1-[1983(R1992)], Pipe Threads, General Purpose (Inch).

.2 American Society for Testing and Materials (ASTM)

.1 ASTM B62-[93], Specification for Composition Bronze or Ounce Metal Castings.

.2 ASTM B283-[91], Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).

.3 ASTM B505-[96], Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

.1 SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.

.2 SP-80-1999, Bronze Gate Globe, Angle and Check Valves.

1.2 Product Data

.1 Submit product data in accordance with Section 01330 - Submittal Procedures.

.2 Submit data for all valves specified in this section.

1.3 Extra Materials

.1 Furnish following spare parts:

.1 Valve seats: one for every 10 valves each size and type, minimum 1.

.2 Discs: one for every 10 valves, each size and type. Minimum 1.

.3 Stem packing: one for every 10 valves, each size and type. Minimum 1.

.4 Valve handles: 2 of each size and type.

.5 Gaskets for flanges: one for every 10 flanged joints for each size and type, Minimum 2.

PART 2 PRODUCTS

2.1 General

.1 Except for specialty valves, to be single manufacturer.

.2 All products to have CRN registration numbers.

2.2 End Connections

.1 Connection into adjacent piping/tubing:

.1 Steel pipe systems: Screwed ends.

.2 Copper tube systems: Solder ends.

.3 HDPE piping: Flanged.

2.3 Gate Valves

.1 Requirements common to all gate valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Bonnet: with hex. shoulders.

.3 Connections: with hex. shoulders.

.4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.

.5 Packing: high grade non-asbestos packing.

.6 Handwheel: non-ferrous. Nut: bronze to ASTM B62.

.2 NPS 2 and under, rising stem, solid wedge disc, Class 125:

.1 Body: with long disc guides, screwed bonnet.

.2 WP = 860 MPa steam, 1.4 MPa WOG.

.3 Operator: Handwheel.

2.4 Globe Valves

.1 Requirements common to all globe valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Bonnet: with hex. shoulders.

.3 Connections: with hex. shoulders

.4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.

.5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.

.6 Handwheel: non-ferrous. Nut: bronze to ASTM B62.

.2 NPS 2 and under, composition disc, Class125:

.1 Body and bonnet: screwed bonnet.

.2 WP = 860 kPa steam, 1.4 MPa WOG.

.3 Disc and seat: renewable rotating [PTFE] disc [composition to suit service conditions], regrindable bronze seat, loosely secured to bronze stem to ASTM B505.

.4 Operator: Lockshield.

2.5 Ball Valves

.1 NPS 2 and under.

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class125, 860 kPa steam, WP = 1.4 MPa WOG.

.3 Connections: Screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Stem: tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Stem seal: TFE with external packing nut.

.7 Operator: removable lever handle.

PART 3 EXECUTION

3.1 Installation

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Remove internal parts before soldering.

END OF SECTION