

PART 1 GENERAL

1.1 SUMMARY

- .1 Includes piping within, buried beneath and to 1.0 metre beyond the wet well and meter vault as follows:
 - .1 Wet Well outlet
 - .2 Meter Vault inlet
 - .3 Inside Meter Vault
 - .4 Meter Vault outlet
- .2 The piping shown is intended to define the general layout, configuration, routing, method of support, pipe size and pipe type. The drawings are not pipe construction or fabrication drawings.
- .3 It is the Contractor's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided and to provide and install all spools, spacers, adapters, connectors, etc., for a complete and functional system.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI).
 - .1 ANSI B16.1-98, Cast Iron Pipe Flanges and Flanged Fittings
 - .2 ANSI B16.3-98, Malleable Iron Threaded Fittings.
 - .3 ANSI B16.25, Butt Welding Ends.
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A53/A53M-02, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
 - .2 ASTM A106-95, Seamless Carbon Steel Pipe for High-Temperature Service.
 - .3 ASTM-B88-03, Standard Specification for Seamless Copper Water Tube.
 - .4 ASTM D2564-84, PVC Solvent Cement Joint Assembly.
- .3 American Water Works Association (AWWA).
 - .1 AWWA C210-03, Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-B137.3-99. Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications.
 - .2 CAN/CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
 - .3 CSA W59.1-77, Welding of Steel Structures.

1.3 STANDARDS

- .1 In addition to the above, all work to be carried out in accordance with, but not limited to, the following codes and standards deemed to be a part of this specification:
 - .1 Alberta Building Code.
 - .2 Alberta Plumbing and Drainage Regulations.
 - .3 The American Society of Mechanical Engineers.

1.4 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

1.5 SHOP DRAWINGS

- .1 Submit drawings in accordance with Section 01 33 00 - Submittal Procedures.

1.6 WELDING

- .1 Welding materials and labour must conform to ASME Code and the Provincial Board of Labour Legislation.
- .2 Use welders fully qualified and Licensed by Provincial Authorities.

1.7 MATERIAL DELIVERY, STORAGE AND PROTECTION

- .1 All piping materials, fittings, valves and accessories shall be delivered in a clean and undamaged condition and stored off the ground, to provide protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.9 CLEANING

- .1 Cleaning to be done in accordance with Section 01 74 11 - Cleaning.
- .2 After construction of the work, remove all remaining pipe and cuttings, joining and wrapping materials, and other scattered debris from the site. Hand over the entire piping system in a clean and functional condition.

PART 2 PRODUCTS

2.1 PIPE & FITTINGS:

.1 SP1, SP2 & SP3 – CARBON STEEL –Water, Wastewater & Natural Gas:

SPECIFICATION CODES:		
CARBON STEEL PIPE	ANSI CLASS: 150	Water, Wastewater & Natural Gas
Maximum Pressure /Temperature: 150psig (1050kPA) / 200°F(95°C)		
ITEM	SIZE (mm)	DESCRIPTION
Pipe (Grooved)	15-50	Carbon steel, Sch 40/80, Smls, ASTM A53, Gr B
	65-600	Carbon steel, Sch 40/80, Smls or ERW, ASTM A53, Gr B, bevelled ends
	65-600	Ductile Iron, Sch 40/80, ASTM A536, Gr 65-45-12,Grooved
Fittings: (Elbows, Tees & Reducers)	15-50	Carbon steel, 150LB MI, ASTM A47, screwed.
	65-600	Carbon steel, Std Wt, Smls, ASTM A234, Gr WPB butt weld
Grooved	65-600	Ductile Iron, 150LB, ASTM A536, Gr 65-45-12,Grooved
Fittings		
Nipples	All sizes	Carbon steel, Sch 80, SMLS, ASTM A53, Gr B, TBE
Swages	15-50	Carbon steel, Sch 80, Smls, ASTM A53, Gr B
Branches	15-50	Thredolet, 3000#, ASTM A105.
	65-600	Weldolet, Std. Wt, ASTM A105.
		Note: Weldolets & Thredolets shall be used when the diameter differences between the branch and the main are greater than 4 Pipe Diameters.
Instrument Connections		1/2", 3000# Thredolet, ASTM A105.
Flanges	15-50	Carbon steel, 150LB, RF, ASTM A105, screwed.
	65-600	Carbon steel, 150LB, RF, WN, ASTM A105, ANSI B16.5
Gaskets	All sizes	Grade "E" EPDM, ASTM D2000, non-asbestos type 1/8" thick, 150LB, Raised face
Bolting	All sizes	Machine bolts, carbon steel, ASTM A307, Gr B, ANSI B18.2.1
		Carbon steel, nuts, ASTM A194, Gr 1, heavy unfinished hex.
		Washers, flat, carbon steel, SAE, two per bolt.

2.2 COUPLINGS

- .1 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.
- .2 Acceptable Manufacturers: Victaulic, Anvil, Grinnell.

2.3 CAM-LOCK COUPLINGS

- .1 ANSI Class: 150
- .2 Type: Studded Flange
- .3 Materials of Construction
 - .1 Body: Carbon Steel
 - .2 Cam Bolt: ASTM A108-1045 Zinc Coated
 - .3 Grease Nipple: Alemite Model 1610
 - .4 Cam: ASTM A216-WCB Zinc Coated
 - .5 Spring: Composite
 - .6 O-Ring: Composite
 - .7 Flange: ASTM A105 / ASTM A216-WCB Zinc Coated
 - .8 Stud: Steel, Zinc Coated
 - .9 Nut: Steel, Zinc Coated
 - .10 Cover and Chain: Aluminum
 - .11 Ball: Steel
- .4 Acceptable Manufacturers: Ritepro

2.4 LINK SEALS

- .1 Link seals: EPDM seal element and stainless steel bolts and nuts.

2.5 GASKETS

- .1 Flanged gaskets: 1.6 mm thick.
- .2 Use red rubber ring type gasket for raised face flange. Use full face gasket for flat faced flange.

2.6 PIPE HANGERS AND SUPPORTS

- .1 Refer to Section 44 41 19 - Supports, Anchors and Seals for Process Piping.

2.7 INTERNAL LINING

- .1 Steel piping: internally lined with an epoxy coating approved for potable water service, conforming to AWWA C210-03 and having NSF-61 and AEP approval.

- .1 Sandblast the interior of all steel piping to “Near White” SSPC SP-10.
- .2 Line the interior of all steel piping with two coats of Ameron (formerly Valspar) V78-W-3PR hi-build epoxy.
- .3 Minimum dry film thickness: 6.0 to 8.0 mils per coat.
- .4 Total film thickness: 14.0 to 18.0 mils
- .5 Follow manufacturer’s instructions for preparation, application and curing.

2.8 CHECK VALVES

- .1 The forcemain will have a check valve mounted in the meter vaults. The valve will conform to the following specification.
 - .1 Cast iron body
 - .2 Aluminum core ball c/w NBR (nitrile rubber) coating
 - .3 Stainless steel bolting
 - .4 FF 125/150#, red rubber 1/8” thick gasket
 - .5 Flanges drilled to ANSI B16.1 Class 125.
 - .6 HDL Type 5087 Check Valve or approved equal

2.9 PLUG VALVES

- .1 Plug valves shall be the round port eccentric plug type with cast iron body and have ANSI B16.1 Class 125 drilling. Plug shall have a resilient nitrile rubber coating for wear and corrosion resistance.
 - .1 Lever operated.
 - .2 Welded nickel seat
 - .3 Cast iron plug
 - .4 Metallic, self-lubricated stainless steel bearings
 - .5 Self-adjusting shaft seals
 - .6 Flanged ends
 - .7 Pratt Eccentric Plug Valve or equal, complete with operating lever.

2.10 BALL VALVES

- .1 Drain cocks will be installed on the suction and discharge lines to facilitate draining of the lines for maintenance. Drain cocks and other valves smaller than 80 mm diameter will conform to the following:
 - .1 Body, cap, ball, stem and gland: brass
 - .2 Seat: Teflon
 - .3 Connection: threaded
 - .4 Working pressure, non-shock: 600 psi cold water
 - .5 Toyo, Red & White, Figure No. 5044A or equal

2.11 COUPLING

- .1 A coupling will be installed 1.0m outside the meter vault to connect the steel piping from the lift station to the HDPE Forcemain. The coupling will conform to the following:
 - .1 Centre Sleeve: cast ductile iron
 - .2 End Rings: cast ductile iron
 - .3 Gaskets: SBR (Buna S) Rubber
 - .4 Fasteners: 5/8" NC T304 Stainless Steel
 - .5 Coating: Corrosion Protective Epoxy Coating
 - .6 ROBAR 1506 Cast Ductile Iron Coupling

2.12 MAGNETIC FLOW METER

- .1 Electromagnetic type flow meter suitable for wastewater applications. The flow meter will conform to the following:
 - .1 NSF approved hard rubber liner
 - .2 ANSI 150 flanges
 - .3 Stainless steel grounding rings
 - .4 Remote wall mounted digital flow converter
 - .5 Krohne Enviromag 2100W or approved equal.

2.13 EXTERNAL COATING

- .1 All above ground steel piping shall be externally coated with one coat of primer and two coats of paint.
- .2 All buried steel piping, concrete encased steel piping, or steel piping within the lift station wet well shall be externally coated with epoxy.

PART 3 EXECUTION

3.1 PREPARATION

- .1 Ream pipes and tubes. Clean off scale and dirt, inside and outside, before assembly. Remove welding slag or other foreign material from piping.

3.2 ROUTES AND GRADES

- .1 Route piping in orderly manner and maintain proper grades. Install to conserve headroom and interfere as little as possible with use of space. Run exposed piping parallel to walls. Group piping wherever practical at common elevations.

3.3 PIPING INSTALLATION

- .1 General:
 - .1 Install piping to allow for expansion and contraction without unduly stressing pipe or equipment connected.
 - .2 Provide clearance for proper installation of insulation and for access to valves, air vents, drains and unions.
 - .3 Touch up any damage to epoxy lining and coating using manufacturer's approved method. Ensure Departmental Representative inspects piping for any damage to epoxy lining or coating before burial.
 - .4 Install straight, parallel and close to walls and ceilings, with specified pitch. Use standard fittings for direction changes.
 - .5 Where pipe sizes differ from connection sizes of equipment, install reducing fittings close to equipment. Reducing bushings are not permitted.
 - .6 Install flanged or welded nozzles, branch connections, welding outlets, adapters and taps true and faced at right angles to the axis of the pipe. Do not extend connection inside of pipe.
 - .7 Make pipe ends round and true, suitable for weld connection.
 - .8 Make pipe ends preparation in accordance with ANSI 16.25 for butt welding.
 - .9 Install flanges or unions to permit removal of equipment without disturbing piping systems, as required by sizing standard.
 - .10 Support piping during construction to prevent abnormal stresses on the pipe works.
- .2 Welded joints, flanged joints and flanges bolted to valves:
 - .1 Fit all flanged joints so that the gasket contact faces bear uniformly on the gasket and then made up with uniform bolt stress. All bolts to extend completely through their nuts. Use a mixture of graphite and oil, or an approved anti-seize compound on bolt threads.
 - .2 Do not weld adjacent flanges on butterfly valves when the valve is in place.
 - .3 Remove valve prior to welding.
 - .4 Clean gasket surfaces, flange faces and butt welding connections, and protect connecting surfaces.
 - .5 Fit flanges which connect piping to mechanical equipment to close parallel and lateral alignment prior to tightening the bolting so that no undue strain is placed on the equipment.
 - .6 Welded joints to requirements of CSA W59.1. Weld full depth butt, with weld metal protruding a maximum of 1.6 mm past the interior pipe wall. Do not use consumable inserts.
- .3 Flange Torque Sequence:
 - .1 Clean pipe ends and gaskets.
 - .2 Tighten bolts progressively by crossover method and not in rotation around the joint.
 - .3 Tighten bolts to the torque recommended by the manufacturer.

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- .4 Use properly sized wrenches for bolt tightening to prevent rounding of nut and bolt heads.
 - .4 Connections:
 - .1 Screw join steel piping up to and including 40 mm. Weld piping 65 mm and larger including branch connections.
 - .2 Make screwed joints with full cut standard taper pipe threads with approved non-toxic joint compound applied to male threads only.
 - .3 Use main sized saddle type branch connections or directly connected branch connections in steel pipe if main is at least one size larger than branch for up to 150 mm mains. Do not project branch pipes inside the main pipe.
 - .4 Use Thredolets instead of Tees for all pipe branches 4 diameters smaller than the main.
 - .5 Make connections to equipment and branch mains with unions.
 - .5 Cleaning:
 - .1 After fabrication and completion of the installation, remove all scale, dirt, welding electrodes, slag, rag and other foreign materials from the lines (externally and internally) to the satisfaction of the Departmental Representative.
 - .2 Cleaning may be accomplished by flushing with water or blowing down with compressed air. Contractor to dismantle and re-assemble the piping at his expense to permit satisfactory cleaning if foreign materials cannot be removed to the satisfaction of the Departmental Representative.
 - .3 Take all practical precautions to prevent the introduction of foreign material into pumps, instruments and other equipment. For flushing, temporary strainers 0.8 mm stainless steel must be placed at pump sections, control valves and other critical points.
 - .6 Protective coatings:
 - .1 Apply Denso paste and Denso tape to irregular buried fittings in accordance with the manufacturer's recommendations.
 - .2 Apply Polyken primer and tape in accordance with manufacturer's recommendations. Polyken tape to be spiral wound double wrap.

3.4 INSPECTION

- .1 Departmental Representative to inspect all pipes and fittings supplied for the work.
- .2 If any defective pipe or casting is found to have been laid that affects execution and quality of work, remove and replace at the Contractor's expense.

3.5 PRESSURE TESTING

- .1 Perform pressure tests on all process piping as follows:
 - .1 Use water for testing.
 - .2 Blank and securely brace the pipe ends.

- .3 Provide all necessary labour, materials and equipment for the test, including a suitable pump and measuring tank; pressure hoses and connection plugs; caps, gauges and all other apparatus necessary for filling the lines; pumping to the required test pressure; and recording the pressure and leakage losses.
- .4 If required by the Departmental Representative, Contractor to provide evidence that the gauges used are accurate.
- .5 Fill the test section of line slowly, taking care to expel all air from the high points. Drill and tap small holes at high points if air valves, service connections or other means of venting are required, at the Contractor's expense. Provide a suitable cock to vent air during tests. Seal the hole by means of a tight fitting plug.
- .6 For the test use a gauge pressure equal to the maximum expected operating pressure on the line plus 345 kPa, but not greater than the maximum operating pressure for the class of pipe installed. Unless otherwise specified, the maximum expected static pressure will be established by the Departmental Representative. Examine all exposed pipe, joints, fittings, valves, and other appearances for leaks, and repair or replace defective material while the test section is subject to the initial test pressure. Test for four hours once the specified pressure is attained.
- .7 Flush and clean out lines prior to pressure test.
- .8 Dispose of flushing water as directed by Departmental Representative.
- .9 Perform all pressure testing with a calibrated recorder, indicating time, temperature and pressure during test duration. Charts are to be returned to the Departmental Representative after acceptance of test.

END OF SECTION