

# PART 1 - GENERAL

1.1	<u>Section Includes</u>	.1	Materials and installation for Attraction Flow Piping.
1.2	<u>Related Sections</u>	.1	Section 01 33 00 - Submittal Procedures.
		.2	Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
		.3	Section 03 30 00 - Cast-In-Place Concrete.
		.4	Section 05 50 00 - Metal Fabrications.
1.3	<u>References</u>	.1	ASTM F714: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR). Based on outside diameter.
		.2	ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
		.3	AWWA C901: Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. Through 3 in. for Water Service.
		.4	ASTM D3035: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR). Based on Controlled Outside Diameter
		.5	ASTM D401 - Standard Specification for Polypropylene Injection and Extrusion Materials.
		.6	ASTM D1784 - Standard specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
		.7	ASTM D3222 - Standard Specification for Unmodified Poly (Vinylidene Flouride) (PVDF) Molding Extrusion and Coating Materials.
		.8	ASTM A536 - Standard Specification for Ductile Iron Castings.
		.9	ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts.
		.10	ASTM F436 - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
		.11	ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
		.12	ISO 9001:2000: Model for Quality Assurance in Production and Installation.
		.13	AWWA C906: Standard for Polyethylene (PE) Pressure Pipe and Fittings 4 in. Through 63 in., for Water Distribution.
		.14	NSF 14, 61
		.15	API 15LE.
		.16	CSA B137.1: Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services.
		.17	CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
		.1	CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
		.2	CSA B182.4-02, Profile PVC Sewer Pipe and Fittings.

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- .3 CSA B182.11-02, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.
- .18 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .19 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992 (TDGA)
- 1.4 Waste Management
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan.
- .5 Divert unused metal materials from landfill to metal recycling facility for disposal approved by Departmental Representative.
- .6 Place materials defined as hazardous or toxic in designated containers.
- .7 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .8 Fold up metal banding, flatten and place in designated area for recycling.
- 1.5 Measurement For Payment
- .1 Attraction Flow Pipe: Supply and installation of new HDPE attraction flow pipe, including all fittings, flange connections, couplings, bends, cleanouts, butt fusion, valves, and all other accessories required to complete the work; and as shown on the drawings, shall be measured per linear metre (m) of pipe placed.
- .2 Contractor shall provide one (1) additional butterfly valve and three (3) additional pipe couplings to store on-site for future use. Include all costs incidental to the unit price for Attraction Flow Pipe.
- .3 No separate measurement will be made for temporarily supporting the pipe(s) and making final adjustments

to the approval of the Departmental Representative, as indicated on the drawings. All work to be considered incidental to the unit price for Attraction Flow Pipe.

PART 2 - PRODUCTS

2.1 Materials

- .1 HDPE Attraction Flow Pipe:
  - .1 The pipe shall be made from polyethylene resin compound with a minimum cell classification of PE 345464C for PE 3408 materials in accordance with ASTM D3350. This material shall have a Long Term Hydrostatic Strength of 1600 psi when tested and analyzed by ASTM D2837, and shall be a Plastic Pipe Institute (PPI) TR4 listed compound.
  - .2 The raw material shall contain a minimum of 2%, well dispersed, carbon black. Additives, which can be conclusively proven not to be detrimental to the pipe may also be used, provided that the pipe produced meets the requirements of this standard.
  - .3 The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material supplier.
  - .4 Compliance with the requirements of this paragraph shall be certified in writing by the pipe supplier, upon request.
  - .5 Manufacture's Quality System shall be certified by an appropriate independent body to meet the requirements of the ISO 9001:2000 Quality Management Program.
  - .6 The following shall be continuously indented printed on the pipe or spaced at intervals not exceeding 5 feet: Name and/or trademark of the pipe manufacturer. Nominal pipe size. Dimension ratio. The letters PE followed by the polyethylene grade per ASTM D3350, followed by the Hydrostatic Design basis in 100's of psi e.g. PE 3408. Manufacturing Standard Reference e.g. ASTM F 714 A production code from which the date and place of manufacture can be determined.
  - .7 Pipe to as per the sizes and lengths shown on the drawings.
- .2 HDPE Fittings:
  - .1 Fabricated HDPE fittings for use in pressure service are to be manufactured in the same diameters as the HDPE pipe specified, but with a heavier wall thickness than that used in the piping system. This results in a fitting with a pressure rating which is greater than or equal to the pipe itself. Unless specifically stated otherwise, the additional wall thickness is on the inside

diameter. The butt weld ends of the fittings are counter bored to meet the wall thickness of the mating pipe. Fittings are to be ordered by EDR (Equivalent Dimensional Ratio), in accordance with the manufacturer's recommendations. The pressure rating of the EDR fittings is to be the same as that associated with the DR of the matching pipe.

- .2 The manufacturer of the HDPE pipe shall supply all HDPE fittings and accessories as well as any adapters and/or specials required to complete the work as shown on the drawings.
- .3 Butterfly Valves:
  - .1 Standard of Acceptance: IPEX FK Series.
  - .2 Valve body shall be made of glass reinforced polypropylene (GRPP), lugged style.
  - .3 The valve shaft shall be made of 420 stainless steel.
  - .4 The disc liner shall be made of EPDM.
  - .5 O-ring seals shall be made of EPDM.
  - .6 Flange style connection, ANSI 150, to match HDPE flange fittings.
  - .7 Control style: mounted gear box.
- .4 Couplings:
  - .1 Standard of Acceptance: Victaulic style 955 N.
  - .2 Housing: ductile iron conforming to ASTM A-536, grade 65-45-12. Housing to have corrosion resistance coating.
  - .3 Bolts/nuts/washers: to be corrosion resistant, stainless steel or galvanized conforming to the housing and as recommended by manufacture for application.
  - .4 Gaskets: Grade "E" EPDM, or as per manufacturer's recommendations.

## 2.2 Design

- .1 The pipe shall be designed in accordance with the relationships of the ISO-modified formula (see ASTM F714).

$$P = \frac{2S}{(D^o/t) - 1}$$

where, S = Hydrostatic Design Stress (psi)  
P = Design Pressure Rating (psi)  
D<sup>o</sup> = OD<sub>avg</sub> for IPS Pipe  
OD<sub>min</sub> for ISO Pipe  
t = Minimum Wall Thickness  
D<sup>o</sup>/t = Dimension Ratio

- .2 The design pressure rating P shall be derived using the formula above, expressed in pounds per square inch.
- .3 The Hydrostatic Design Basis for PE 3408 materials is 1600 psi.
- .4 The pipe dimensions shall be as specified in manufacturer's literature.

PART 3 - EXECUTION

- 3.1 Preparation .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.
- 3.2 Installation .1 Where indicated on the drawings, and as directed in the field, HDPE pipe to be joined by the method of thermal butt fusion as outlined in ASTM D2657, Heat Joining Polyolefin Pipe and Fittings. Butt fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer. The temperature of the heater plate should be between 400°F and 450°F. Follow the recommendations of ASTM D2657 regarding interfacial pressures for pipe wall thickness less than or equal to 1.5". Follow the manufacturer's recommendations regarding interfacial pressures for pipe walls thicker than 1.5". Pipe or fittings may be joined by butt fusion only by technicians who have been trained and qualified in the use of the equipment.
- .2 Where indicated on the drawings, and as directed in the field, HDPE pipe to be connected to fittings or other piping systems by means of a flanged assembly consisting of a polyethylene flange adaptor or stub end, and a backup ring that has a bolting pattern meeting the dimensional requirements of Class 150, ANSI B16.1/B16.5 in sizes up through 24", and meeting Class 150 Series A, ANSI B16.47 or AWWA C207 Class B for larger sizes. Follow the manufacturer's recommendations regarding bolting techniques and the use of gaskets. The flange adapters shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with stainless steel bolts and nuts as specified in ASTM A726 and A307. All bolts shall be tightened to the manufacturers specified torques.
- .3 Where indicated on the drawings and as directed in the field, HDPE pipe to be joined by couplings, as specified. Install couplings as per manufacturer's recommendations.
- .4 Install butterfly valves as per manufacturer's recommendations. Refer to item .2 above.
- .5 Handle pipe using methods approved by Departmental Representative.  
.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

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|     | .6                   | Install pipe to lines and grades indicated on the drawings with pipe inverts smooth and free of sags or high points and as per manufacturer's recommendations.  |
|     | .7                   | Do not exceed maximum joint deflection recommended by pipe manufacturer.  |
|     | .8                   | Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.   |
|     | .9                   | Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.  |
|     | .10                  | Install plastic pipe and fittings in accordance with CSA B182.11.   |
|     | .11                  | Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe. |
|     | .12                  | Coordinate and confirm with the Departmental Representative in the field the exact location of the pipe including inlet and discharge locations.  |
| 3.5 | <u>Layout Plan</u>   | .1 Contractor to submit a pipe layout plan with location of all fittings, valves, couplings, etc. for approval prior to install.  |
| 3.6 | <u>Field Testing</u> | .1 Repair or replace pipe or pipe joint found defective.  |
|     |                      | .2 Remove foreign material from sewers and related appurtenances by flushing with water.  |
|     |                      | .3 Fill line with water and repair any leaks detected.  |