

SECTION 317

P.E. PLASTIC DRAINAGE PIPE

317.01 Scope This specification covers the requirements for polyethylene plastic pipe products to be used for storm sewers, pipe culverts, and subdrains. This specification covers non-pressure polyethylene plastic pipe with nominal pipe diameters of 100mm through to 900mm.

317.02 Applicable Documents This specification refers to the following Standards, specifications or publications:

Canadian Standards Association:

CSA B182.8 – Profile Polyethylene Storm Sewer and Drainage Pipe and Fittings

American Society for Testing Materials:

ASTM D883: Standard Terminology Relating to Plastics

ASTM D2122: Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D2412: Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

ASTM D2444: Standard Test Method for the Determination of Impact Resistance of Thermoplastic Pipe and Fittings by means of Tup (Falling Weight)

ASTM F405: Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings

ASTM F667: Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings

ASTM D3350: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials

American Association of State Highway and Transportation Officials:

AASHTO M252: Corrugated Polyethylene Drainage Tubing

AASHTO M294: Corrugated Polyethylene Pipe, 12-36-in. Diameter

317.03 Definitions For the purpose of this specification the following definitions apply:

Polyethylene Plastic: means a plastic based on polymers made with ethylene as essentially the sole monomer.

Corrugated Inner Wall Pipe: means a single walled pipe product with a corrugated inner waterway where the wall is formed into a series of alternating ridges and grooves.

Profile: means a pipe wall construction that presents an essentially smooth surface in the waterway but includes ribs or other shapes, which can be either solid or hollow, that help brace the pipe against diametrical deformation.

Open Profile Pipe: means a pipe product that has an essentially smooth waterway braced circumferentially or helically with outside corrugations, forming an open profile pipe.

317.04 Pipe Types and Materials The pipe, fittings and couplers shall be manufactured from virgin polyethylene plastic for the type of polyethylene pipe.

Type	Profile	Materials (See Note 1)
Flexible Subdrain Tubing	Corrugated Inner Wall	The moulding and extrusion material for pipe and fittings shall be polyethylene plastic according to the requirements of ASTM F405 or ASTM F667.
Flexible Culvert	Corrugated Inner Wall	The moulding and extrusion material for pipe and fittings shall be polyethylene plastic according to the requirements of AASHTO M252 or AASHTO M294.
Smooth Inner Wall Culvert or Storm Sewer	Open Profile	The moulding and extrusion material for pipe and fittings shall be polyethylene plastic according to the requirements of CSA B182.8 for open profile pipe.

Note (1) Clean, rework PE material generated from the manufacturer’s own production of pipe, fittings, or accessories shall be permitted to be recycled by the manufacturer in the respective product, provided that the pipe, fittings, or accessories produced meet all of the requirements of the respective standards. Post-consumer recycled plastic resin shall not be used as a component of the HDPE compound during pipe manufacture.

317.05 Joining Systems

317.05.01 Flexible Subdrain Tubing Couplings shall conform to the requirements of ASTM F405 (100mm – 150mm) or ASTM F667 (200mm – 600mm)

317.05.02 Flexible Culvert Couplings shall conform to AASHTO M252 (100m – 250mm) or AASHTO M294 (300mm – 900mm)

317.05.03 Smooth Inner Wall Culvert or Storm Sewer Joining system for open profile pipe shall conform to the requirements of CSA B182.8. Couplings shall be specified as non-gasketed corrugated external split couplings, or integral bell and gasket. Non-gasketed double bell snap type couplings are only permitted for 100mm to 200mm diameters.

Integral bell and gasket joint shall be comprised of an elastomeric vulcanized rubber gasket provided on the spigot end of the pipe residing in the corrugation valley or crest of the corrugation. Joint shall be certified by CSA to meet to leakage requirements of ASTM D3212.

Foam type gaskets shall not be permitted.

317.06 Requirements

317.06.01 Quality of Work – The pipe shall be homogenous throughout and free from visible cracks, flaws, foreign inclusions or other injurious defects. The pipe shall be uniform in colour, opacity and other physical properties

317.06.02 Pipe Diameter

- 1) Nominal Diameter – shall be the average inside diameter rounded to the nearest whole number (mm).
- 2) Inside Diameter – the permissible inside diameter tolerances shall be +3% and –1.5%. Measurements shall be taken in accordance with ASTM D2122.

317.06.03 Length Laying length shall be 6m for all diameters otherwise specified on the Purchase Order, Work Order or Drawings. A tolerance of +/- 25mm on the nominal laying length will be permitted.

317.06.04 Pipe Stiffness The minimum pipe stiffness shall be:

- I) Flexible Subdrain Tubing: 210kPa at 5% when tested in accordance with ASTM D2412.

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II) Flexible Culvert: 210kPa at 5% when tested in accordance with ASTM D2412.

III) Smooth Inner Wall Culvert or Storm Sewer: 320kPa at 5% when tested in accordance with ASTM D2412. Pipe stiffness shall be documented on the CSA Plant Certificate for the appropriate pipe diameters.

317.07 Markings All pipe shall be clearly marked at intervals of no more than 1.5m with 5mm or larger letters with the following information:

- Manufacturer's name or trademark
- Nominal diameter
- Material designation and cell class: 322420C
- The words "Drainage" or similar
- Pipe stiffness: (ie. 320 kPa)
- The applicable Specification designation (ie. CSA B182.8)
- Date of manufacture and plant designation

For Smooth Inner Wall Culvert or Storm Sewer, the pipe shall be embossed with the CSA Trademark confirming the product is certified by the Canadian Standards Council.

317.08 Quality Assurance Testing

- a) The supplier shall develop and maintain an effective quality control system to ensure that adequate inspection coverage is maintained throughout the manufacturing process. Evidence of such inspection shall be available to the authorized inspector of the Ministry prior to shipment from the place of manufacture or the supplier's storage facility.
- b) The Ministry reserves the right to maintain surveillance over the Supplier's quality control system to ensure conformance with this specification.

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317.09 Physical Properties the physical properties of corrugated HDPE pipe such as impact strength, pipe flattening and other tests shall meet these requirements for:

- 1) Flexible Subdrain Tubing – ASTM F405 or ASTM F667
- 2) Flexible Culvert - AASHTO M252 or AASHTO M294
- 3) Smooth Inner Wall Culvert or Storm Sewer – Certified to CSA B182.8 for open profile pipe.

317.10 Certificate

- a) Flexible Subdrain Tubing and Flexible Culvert: Suppliers shall provide a certificate upon request to indicate that the product was produced and tested according to the appropriate specification requirements.
- b) Smooth Inner Wall Culvert or Storm Sewer: The supplier shall provide, upon request from the Ministry Representative, a copy of the CSA Plant Certificate indicating the plant location, pipe sizes, pipe stiffness and pipe joining systems.

317.11 Inspection

- a) The Ministry Representative shall have access to the fabrication plant for inspection and every facility shall be extended for this purpose.
- b) Inspection may include checks on physical dimensions and general quality of work.
- c) For the purpose of sampling for SS 317.06 and SS 317.09, one piece from each lot of 50 pipes or fraction thereof in a shipment shall be selected for sampling. All test specimens shall be cut from the selected pipe(s).
- d) If the test sample fails to meet the requirements of SS 317.06 when tested in accordance with SS 317.09, that batch will be rejected and shall be replaced by the supplier with a new batch that conforms to this specification at no additional cost to the Ministry.