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Model Specification for Large Diameter Profile Wall High Density Polyethylene Pipe

1. GENERAL

1.1.Scope

1.1.1. This model specification provides minimum requirements for Large Diameter High Density Profile Wall Polyethylene Pipe for use in continuous low pressure applications, such as irrigation piping and hydroelectric water supply piping. The model specification may be adopted in full or modified by the specifier to suit the project requirements. *[Options for the specifier are denoted by square brackets and italics].*

1.2.References

1.2.1. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the bid date of the project.

Reference		Title
ASTM	D2321	<i>Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications</i>
	D3212	<i>Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals</i>
	D3350	<i>Standard Specification for Polyethylene Plastic Pipe and Fittings Materials</i>
	F894	<i>Standard Practice for Underground Installation of Thermoplastics Pipe for Sewers and Other Gravity Flow Applications.</i>
ISO	9001:2008	<i>Quality Systems, Model for Quality Assurance in Production and Installation</i>
PPI	PPI Handbook	<i>The Plastic Pipe Institute Handbook of Polyethylene Pipe, Second Edition.</i>

2. PRODUCTS

2.1. Qualification of manufacturers

- 2.1.1. The general quality assurance practices and methods shall be in accordance with ISO 9001:2008 standard.
- 2.1.2. *[Upon request the customer or engineer shall be allowed access to the manufacturer's plant facilities to audit, witness and inspect the methods, practices, tests and procedures of the quality assurance program.]*

2.2. Materials

- 2.2.1. The closed profile wall pipe shall be manufactured from a high density polyethylene material which meets or exceeds the minimum cell classification requirements for base materials as specified in ASTM F894 when classified in accordance with ASTM D3350.
- 2.2.2. The pipe material shall contain 2% - 3% well dispersed carbon black. Additives which can be conclusively proven not to be detrimental to the pipe may also be used, provided the pipe produced meets the requirements of this specification.
- 2.2.3. The pipe material shall be resistant to corrosion resulting from the presence of Hydrogen Sulfide and pH values between 2 and 13.

2.3. Approved pipe and manufacturers

- 2.3.1. Weholite from Infra Pipe, or approved equal.

2.4. Pipe and Fittings

- 2.4.1. The pipe shall be manufactured in accordance with the requirements of ASTM F894 which shall be verified by a 3rd party certification body accredited by ANSI or the Standards Council of Canada.
- 2.4.2. The geometry of a Profile Wall pipe intended for service as a continuous (low) pressure pipe shall be demonstrated by finite element analysis to not exceed a polyethylene material wall stress of 5 Mpa (725 psi) when subjected to continuous internal pressures of [**15 psi**] *[Specify the continuous operating pressure in the pipeline system in psi]*.
- 2.4.3. Pipe shall be manufactured with [**Profile Cut**] *[Select 'profile cut' or 'straight cut']* ends¹.
- 2.4.4. The pipe shall have a Ring Stiffness Class (RSC)² [**250**] *[Select RSC 250 or 400]* as necessitated by structural evaluation of burial, installation and application loads.
- 2.4.5. The pipe shall be manufactured in pipe lengths of [_____].

¹ Profile-cut ends enable pipes to be field extrusion welded. Profile cut or straight cut ends can be mechanically coupled.

² Ring Stiffness Class (RSC) as defined in ASTM F894

[For sizes ≤ 96" NPS the standard laying length are 16.5ft/5.03m, 25ft/7.62m and 50ft/15.24m. For sizes > 96" NPS the standard length is 40ft/12.19m.]

- 2.4.6. No other laying lengths may be used without the Engineer's written approval.
- 2.4.7. The pipe shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.

2.5.Fittings

- 2.5.1. Flanges, elbows, reducers, tees and other fabricated fittings supplied by manufacturer shall be constructed with dimensions and tolerances in accordance with the manufacturer's internal manufacturing standard.

3. MARKING AND SHIPPING

3.1.Marking

- 3.1.1. The pipe shall be marked in accordance with the ASTM F894 standard.

3.2.Shipping

- 3.2.1. Unless otherwise specified by the purchaser, all pipe and fittings shall be prepared in accordance with the manufacturer's instructions. Care shall be taken to prevent cuts, scratches and other damage.

4. CONSTRUCTION PRACTICES

4.1.Inspection of Materials

- 4.1.1. The customer shall inspect all pipe and accessories for shortages, loss or damage upon receipt of the shipped material at the time of unloading, recording this information directly on the waybill received from the carrier.
- 4.1.2. The customer shall notify their Sales Manager and/or Infra Pipe Customer Service immediately in writing detailing any shortages, loss or damages. Where possible electronic photos should be taken of all damage claims.

4.2.Handling and Storage

- 4.2.1. Handle the pipe in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2 using approved strapping and equipment rated for loads encountered.
- 4.2.2. Minor scuffing or scratching does not reduce the serviceability of the pipe. Gouges or sharp cuts that are greater than 10% of the wall shall be repaired as per pipe manufacturer's recommendation.

- 4.2.3. When handling the pipe with slings, use wide fabric choker slings capable of safely carrying the load. Use such slings for lifting, moving, and lowering pipe and fittings. When lifting the pipe, two (2) lift points are required. This may be accomplished by using an inverted 'Y' or a spreader bar to separate the fabric slings. Wire rope and chains are prohibited.

5. JOINING METHODS

- 5.1.1. Joining shall be accomplished by [_____]. *[Select one of the two acceptable joint types¹: Mechanical coupling, Extrusion welding joint].*
- 5.1.2. Extrusion welded joints, and joints made using suitable couplers shall meet the joint qualification requirements of ASTM D3212.
- 5.1.3. Joining shall be in accordance with the pipe manufacturer's construction and installation guidelines.
- 5.1.4. Extrusion welding shall be performed by the pipe manufacturer's field service technician(s) or other party(s) as approved by the engineer.

6. INSTALLATION

6.1.General

- 6.1.1. Safe Working Environment: Through all steps of construction, all necessary precautions shall be taken to ensure a safe working environment in accordance with all applicable safety codes and standards.
- 6.1.2. Installation by burial shall be in accordance with ASTM D2321, and product specific requirements contained in the pipe manufacturer's construction and installation guidelines.

7. TESTING

7.1.Leak Testing

- 7.1.1. Leakage tests shall be carried out as infiltration, exfiltration or the individual joint tests as determined by the engineer.²

7.2. Deflection Test

- 7.2.1. Pipe deflection shall be tested in accordance with PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2 either by pulling a mandrel through the pipe, or by measuring vertical inside diameter.

END SECTION

¹ Refer to your Infra Pipe representative for application limits of each joint type.

² A standard practice for leak testing is available from the manufacturer outlining the procedures for Infiltration testing, Exfiltration testing, or individual joint testing.