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Model Specifications for Sclairpipe® High Density Polyethylene (HDPE) Pipe

1. GENERAL

1.1.Scope

1.1.1. This model specification provides minimum requirements for Sclairpipe HDPE pipe and fittings for pressure and non-pressure applications. 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
AWWA	C651	<i>Standard for Disinfecting Water Mains</i>
	C901	<i>Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) 3 In. Through (76 mm) for Water Service</i>
	C906	<i>Polyethylene (PE) Pressure Pipe and Fittings 4 In. (100 mm) Through 63 In. (1,600 mm) for Water Distribution and Transmission</i>
	M55	<i>PE Pipe—Design and Installation</i>
ASTM	D2321	<i>Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications</i>
	D2774	<i>Standard Practice for Underground Installation of Thermoplastic Pressure Piping</i>
	D3035	<i>Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter</i>
	D2837	<i>Standard Test Method for Obtaining Hydrostatic Design Basis for thermoplastic Pipe Materials</i>
	D3350	<i>Standard Specification for Polyethylene Plastic Pipe and Fittings Materials</i>

Reference		Title
ASTM	F714	Standard Specification for Polyethylene Plastic Pipe Based on Outside Diameter
	F1290	Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings
	F1417	Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
	F2164	Standard Practice for Field Leak Testing of Polyethylene(PE) Pressure Piping Systems Using Hydrostatic Pressure
	F2620	Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
ISO	9001:2008	Quality Systems, Model for Quality Assurance in Production and Installation
NSF/ANSI	61	Drinking Water System Components -Health Effects
PPI	TN-38	Bolt Torque For Polyethylene Flanged Joints
	TN-46	Guidance for Field Hydrostatic Testing Of High Density Polyethylene Pressure Pipelines: Owner's Considerations, Planning, Procedures, and Checklists
	TR-4	Plastic Pipe Institute (PPI) Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe
	TR-33	Generic Butt Fusion Joining Procedure For Field Joining of Polyethylene Pipe
	TR-41	Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping

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.
- 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. Approved pipe and manufacturers

- 2.2.1. Sclairpipe from Uponor Infra, or approved equal.

2.3. Materials

- 2.3.1. The pipe shall be made from a HDPE material having a minimum material designation code of [_____] [Select PE4710 or PE3608]. The material shall have a minimum cell classification of [_____] [Select 445484C¹ for PE4710 or 345464C for PE3608 a] as defined in ASTM D3350. PE4710 resins shall have a minimum PENT value of 2,000 hours and PE3608 resins shall have a minimum PENT value per ASTM F1473 of 100 hours and. The Hydrostatic Design Stress (HDS) at 23°C (73.4°F) shall be 1,000 psi for resin designated by PE4710 and 800 psi for resin designated by PE3608, and shall be listed in the name of pipe manufacturer in PPI TR-4. In addition, the material shall be listed as meeting NSF/ANSI 61.
- 2.3.2. 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.

2.4. Pipe

- 2.4.1. The pipe shall be manufactured in accordance with [AWWA C901 or ASTM D3035 for sizes 1/2" thru 3" IPS. AWWA C906 or ASTM F714 or ASTM D3035 for sizes 4" and above IPS or DIPS].
- 2.4.2. The pipe shall contain no recycled compound except that which is generated in the manufacturer's own plant, from resin of the same specification and from the same raw material supplier.
- 2.4.3. Tables 1 and 2 give the Pressure Class or Pressure Rating and Total Allowable Pressure during surge events for pipe made with PE4710 and PE3608 respectively. Other DR's and pressures are available.

The design pressure rating shall be derived using an HDS of 1,000 psi at 23°C (73.4°F) for a PE4710 designation and an HDS of 800 psi at 23°C (73.4°F) for a PE3608 designation.

Table 1: Pressure Class or Pressure Rating and Total Allowable Pressure during surge events for pipe made with PE4710 materials

<i>Pipe Standard Dimension Ratio (DR)</i>	<i>Pressure Rating (PR) or, Pressure Class (PC) for water @ 73°F, psig</i>	<i>Allowable Total Pressure During Recurring Surge</i>	<i>Allowable Total Pressure During Occasional Surge</i>
32.5	63	95	126
26	80	120	160
21	100	150	200
17	125	188	250
13.5	160	240	320
11	200	300	400
9	250	375	500
7.3	320	480	640

¹ XXXX8XC8 means the PENT value shall exceed 2,000 hours.

Table 2: Pressure Class or Pressure Rating and Total Allowable Pressure during surge events for pipe made with PE3608 materials

Pipe Standard Dimension Ratio (DR)	Pressure Rating (PR) or, Pressure Class (PC) for water @ 73°F, psig	Allowable Total Pressure During Recurring Surge	Allowable Total Pressure During Occasional Surge
32.5	50	75	100
26	63	95	126
21	80	120	160
17	100	150	200
13.5	125	188	250
11	160	240	320
9	200	300	400
7.3	250	375	500

2.4.4. If required for identification purposes, the pipe shall be made with [_____] stripes. [Color identifies piping service in accordance with the APWA Uniform Color Code, blue identifies potable water service; green identifies sewer (wastewater) service; and purple (violet, lavender) identifies reclaimed water service.]

2.5.Fittings

2.5.1. HDPE pipe flange assemblies shall meet the following requirements unless otherwise specified by the engineer:

- 2.5.1.1. Solid HDPE stub ends or flange adapters shall be made from PE4710 and shall be formed using extrusion or molding methods. PE4710 stub ends and flange when used with PE3608 pipe shall have the same DR as the pipe. These components shall meet the requirements of ASTM F2880.
- 2.5.1.2. Flange rings shall have bolt-holes and bolt-circles conforming to be Class 150, ANSI B16.1/B16.5 or AWWA C207 Class 150 Series B, D or E dimensional standards with exceptions. Flange rings shall be ductile iron (ASTM A536-84). They shall be protected from corrosion by [Specifier to select .. paint, coal-tar epoxy, galvanization, anodic protection, cathodic protection ... or alternative corrosion resistant material].
- 2.5.1.3. Methods for flange assembly, gasket selection and bolt torque application shall be as outlined in PPI Technical Note TN-38.

3. SUBMITTALS

- 3.1.1.1. The manufacturer shall [affirm in a Certificate of compliance that product shipped meets or exceeds the standards set forth in this specification] or [provide evidence of compliance with the standards set forth in this specification by providing a Material Test Report with specific test result data.]

4. MARKING AND SHIPPING

4.1. Marking

- 4.1.1. The pipe shall be marked in accordance with the standards to which it is manufactured [*select pipe standard : ASTM D3035 or ASTM F714 or AWWA C901 or AWWA C906*].

4.2. Shipping and Handling

- 4.2.1. Unless otherwise specified by the purchaser, all pipe and fittings shall be prepared in accordance with PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2. Care shall be taken to prevent cuts, scratches and other damage.
- 4.2.2. Unless specifically requested by the customer in writing, pipe shipments shall not be nested.

5. CONSTRUCTION PRACTICES

5.1. Inspection of Materials

- 5.1.1. 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.
- 5.1.2. Acceptable limits for cuts, gouges or scratches are 10% of the pipe minimum wall thickness.

5.2. Handling and Storage

- 5.2.1. The pipe shall be handled and stored in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition).

5.3. Joining Methods

- 5.3.1. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F2620 or PPI TR-33, and the pipe manufacturer's recommendations.
- 5.3.2. Saddle Fusion: Joints between the pipe main and service saddles, tapping tees and branch saddles shall be done in accordance with ASTM F2620 or PPI TR-41, and the fitting manufacturer's recommendations.
- 5.3.3. Socket Fusion: Joints between the pipe and socket fitting shall be done in accordance with ASTM F2620, and the fitting manufacturer's recommendations.
- 5.3.4. Electrofusion: Electrofusion joining shall be done in accordance with the electrofusion fitting manufacturer's recommendations, and ASTM F1290.

- 5.3.5. Mechanical: Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices as outlined in the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 9 and AWWA Manual of Practice M55, Chapter 6.
- 5.3.6. Fusion technicians, who have been trained in the use of the appropriate procedures and evaluated by the fusion equipment manufacturer, must conduct the fusion joining.
- 5.3.7. The critical parameters of each fusion joint, as required by the manufacturer and these specifications, shall be recorded either manually or by an electronic data logging device. All fusion joint data shall be included in the Fusion Technician's joint report.

6. INSTALLATION

6.1.General

- 6.1.1. Buried HDPE pressure pipe and fittings shall be installed in accordance with ASTM D2774 or AWWA M55.
- 6.1.2. Buried HDPE non-pressure pipe and fittings shall be installed in accordance with ASTM D2321.
- 6.1.3. Minimum bend radius shall be in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 7.

7. TESTING

7.1.Leak Testing

- 7.1.1. Hydrostatic leakage testing for pressure piping should comply with ASTM F2164 and PPI TN-46.
- 7.1.2. Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reason.
- 7.1.3. Hydrostatic leakage testing for non-pressure piping should be conducted in accordance with ASTM F1417.
- 7.1.4. If the test section fails the test, the contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the owner.
- 7.1.5. After installation and pressure testing, new water mains should be disinfected according to AWWA C651.

END OF SECTION