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## Model Specification for High Density Polyethylene Vertical Structures

### 1. GENERAL

#### 1.1.Scope

1.1.1. This specification establishes the design, material, manufacturing and testing requirements for circular vertical structures (e.g. sewer manholes, pump stations, landfill riser shafts etc.) fabricated from HDPE components.

#### 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>
	D3350	<i>Standard Specification for Polyethylene Plastic Pipe and Fittings Materials</i>
	F714	<i>Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter</i>
	F894	<i>Standard Practice for Underground Installation of Thermoplastics Pipe for Sewers and Other Gravity Flow Applications.</i>
	F1759	<i>Standard Practice for Design of High-Density Polyethylene (HDPE) Manholes for Subsurface Applications</i>
	F2620	<i>Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings</i>
ISO	9001:2008	<i>Quality Systems, Model for Quality Assurance in Production and Installation</i>
DVS		<i>Deutscher Verband für Schweißen (German Welding Standards)</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.
- 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 manufacturers

- 2.2.1. Infra Pipe, or approved equal.

### 2.3. Materials

- 2.3.1. The materials for the vertical structures shall only be a high density polyethylene meeting the requirement of cell classification PE 334433C or higher cell classification as defined in ASTM D3350.
- 2.3.2. Materials other than those specified above may be used as part of the vertical structures appurtenances (ladders, grates, etc.). Appurtenance materials shall be as agreed between the manufacturer and purchaser.
- 2.3.3. The HDPE materials shall be resistant to corrosion resulting from the presence of hydrogen sulfide and pH values between 2 and 13.

### 2.4. Fabrications Requirements

- 2.4.1. The structure body shall be made from the large diameter profile wall high density polyethylene pipe meeting the requirements of ASTM F894 with a nominal ID of [\_\_\_\_\_] and Ring stiffness Class (RSC)<sup>1</sup> [\_\_\_\_\_] as necessitated by structural evaluation of burial, installation and application loads.
- 2.4.2. The manway access shall be made either from the large diameter profile wall high density polyethylene pipe meeting the requirements of ASTM F894 with a nominal ID of [\_\_\_\_\_] and minimum Ring Stiffness Class RSC of 160 lb/ft, or solid wall pipe meeting the requirements of ASTM F714 with a nominal OD of [\_\_\_\_\_].
- 2.4.3. Stub-out pipes shall be made either from the closed profile wall pipe meeting requirements of ASTM F894, or solid wall pipe meeting the requirements of ASTM F714.
- 2.4.4. The ladder used in HDPE manholes shall be made either from FRP or FRP coated metal core fabrication and shall conform to current OSHA guidelines.
- 2.4.5. Joints & Connections: All joints and connections between PE components shall be made by means of extrusion welding or fusion (butt, or socket) welding.

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<sup>1</sup> Ring Stiffness Class (RSC) as defined in ASTM F894

- 2.4.6. Where butt or socket fusion is used, it shall meet the requirements of ASTM F2620-Standard Specification for Butt Heat Fusion of Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- 2.4.7. Where extrusion welding is used, it shall be undertaken by joining technicians under the direction of DVS certified extrusion-welding trainers.
- 2.4.8. Unless otherwise agreed to by the manufacturer and purchaser, the vertical structures shall be factory leak tested with low pressure air (2psi/14kPa) to assess the integrity of all joints /connections. The factory test shall be completed in accordance with a documented testing procedure.
- 2.4.9. The testing may be witnessed by the purchaser's inspector when the purchaser so specifies on the purchase order. The inspector shall have access to the inspection area of the manufacturer's plant. The fabricator shall furnish a certificate of compliance to these specifications upon request to do so in the purchase order.

### **2.5.Design requirements**

- 2.5.1. Where buoyancy may be a factor, anti-buoyancy calculations are to be provided as a part of the submittal package.
- 2.5.2. When the ground water table is above the elevation of the base, the base shall be assessed for suitability in accordance with ASTM F1759.
- 2.5.3. When live loading is in excess of structural capacity of the buried structure a designed live-load cap shall be used.

## **3. MARKING AND SHIPPING**

### **3.1.Marking**

- 3.1.1. Pipe used in the fabrication of a PE structures shall be marked in accordance with the requirements of the applicable pipe specification.
- 3.1.2. The structures shall have an affixed label adjacent to any locations where pressure gauges were located used to pressure test the fitting, indicating that the fabrication met the pressure testing requirements.
- 3.1.3. Each extrusion weld made during fabrication of the structure assembly shall be identified using either an indenting tool or with a stamp (with initial(s) particular for each operator). The stamp mark shall be placed on the side of the weld for root welds and applied on the extrusion weld seam for final welds.
- 3.1.4. All fabricated structures shall have a permanent label affixed which shall indicate the nominal pipe size(s), RSC(s), the location of production and date of production (e.g. HYYMMDD). In addition marking label shall indicate the drawing number.
- 3.1.5. The structure shall be legibly marked in such a way as to not lower its quality and shall remain legible after installation and inspection.

### **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. Upon receipt, the customer shall inspect the structure for damage, recording any damage information directly on the waybill received from the carrier.
- 4.1.2. The customer shall notify their sales manager and/or manufacturer's customer service representative immediately in writing detailing any damages. Where possible electronic photos should be taken of all damaged areas.

### **4.2.Handling and Storage**

- 4.2.1. Proper handling of structures is necessary to avoid damage to the structure and to avoid injuries to site personnel.
- 4.2.2. Nylon slings are recommended for handling of vertical structures. Do not use chains, wire ropes, or metal cables to lift the HDPE structures.
- 4.2.3. The structure shall not be rest on hard objects that would create a point loading on the structure. Store the structure on a flat area.
- 4.2.4. Avoid storing the structure in such manner that its weight is supported by any of stub outs or appurtenances.
- 4.2.5. Minor scuffing or scratching does not reduce serviceability. Gouges or sharp cuts that are greater than 10% of the wall shall be repaired as per pipe manufacturer's recommendation.

## **5. INSTALLATION**

### **5.1.General**

- 5.1.1. 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.
- 5.1.2. Installation shall be in accordance with ASTM D2321, and product specific requirements contained in the manufacturer's design and installation guidelines and applicable local, state and federal regulations.

END SECTION