Designation: F2435 – 07

AmAmerican National Standard

Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe[1]

This standard is issued under the fixed designation F2435; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers requirements and test methods for materials, dimensions, workmanship, elongation, impact resistance, pipe stiffness, perforations, and markings for steel reinforced corrugated polyethylene (PE) piping systems of nominal sizes 8 in. (200 mm), through 80 in. (2000 mm). The steel reinforced polyethylene pipes governed by this standard are intended for use in underground applications where soil provides support for their flexible walls. These pipes will be used to collect or convey stormwater runoff for storm sewers and drainage pipes, or both.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 There is no similar or equivalent ISO standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A591/A591M Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight [Mass] Applications (Withdrawn 2005)[3]

A653/A653M Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

A1008/A1008M Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

D618 Practice for Conditioning Plastics for Testing

D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

D2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

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

D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

F412 Terminology Relating to Plastic Piping Systems

F449 Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage or Water Table Control

F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

F2136 Test Method for Notched, Constant Ligament-Stress (NCLS) Test to Determine Slow-Crack-Growth Resistance of HDPE Resins or HDPE Corrugated Pipe

2.2 *AASHO Standard*[4]

Standard Specification for Highway Bridges, Division II, Section 30, "Metal Culverts."

2.3 *Federal Standards:*[5]

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

2.4 *Military Standards:*[5]

MIL-STD-129 Marking for Shipment and Storage

3. Terminology

3.1 *Definitions*—Definitions used in this specification are in accordance with Terminology F412, unless otherwise noted.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *double-wall, adj*—polyethylene corrugated pipe with steel reinforcing helical V-shaped profiles encapsulated within the corrugations and with an closed channel on the inside of the pipe (See Fig. 1).

[1] This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.11 on Composite.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001.

[5] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

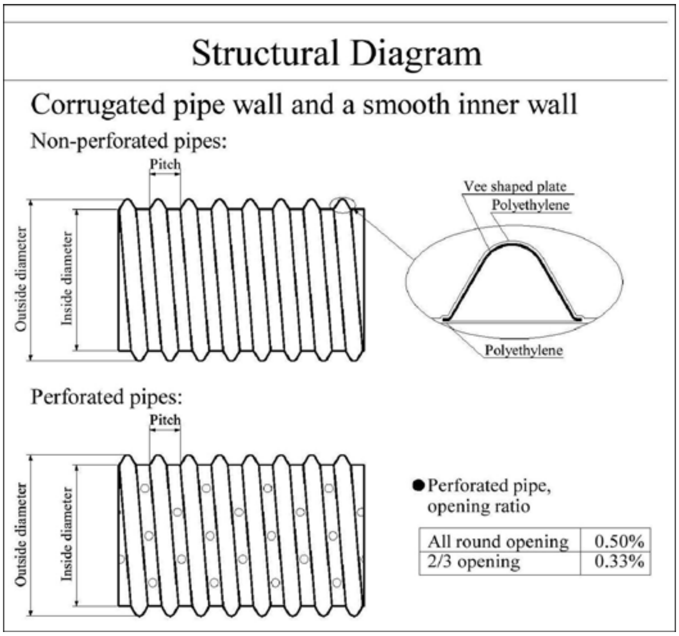

FIG. 1 Double - Wall Steel Reinforced Corrugated Polyethylene Pipe

3.2.2 *single-wall, adj*—polyethylene corrugated pipe with steel reinforcing helical V-shaped profiles encapsulated within the corrugations and with a open channel on the inside of the pipe (See Fig. 2).

3.2.3 *triple-wall, adj*—polyethylene corrugated pipe with steel reinforcing profiles either helical V-shaped profiles or U-shaped profiles encapsulated within the corrugations and with steel reinforcing helical flat profiles encapsulated within the exterior polyethylene layer and with a closed channel (polyethylene layer) on the inside of the pipe (See Fig. 3 and Fig. 4).

4. Significance and Use

4.1 Steel reinforced corrugated PE pipes are used for underground applications where soil provides support to their flexible walls. Their major use is to collect or convey storm water run-off for sewers and drains, or both.

4.2 Exclusions from recommended use:

4.2.1 Permanent exposure to sunlight and exposure to chemicals whose compatibility with the pipe and fittings is not known.

5. Materials

5.1 *Polyethylene Materials:*

5.1.1 Polyethylene compounds used in the manufacture of steel reinforced corrugated PE drainage pipe shall meet or exceed the requirements of cell classification of 444430C as defined and described in Specification D3350.

5.1.2 Slow crack growth resistance of the polyethylene natural resin shall be determined by testing in accordance with Test Method F2136. The applied stress shall be 600 psi (4100 kPa). The test specimens must exceed 24 h with no failures. Testing shall be done on polyethylene material taken from the finished pipe.

5.1.3 *Carbon Black Content*—Minimum 2.0 wt. % to a maximum 3.0 wt. % of the total of the polyethylene compound.

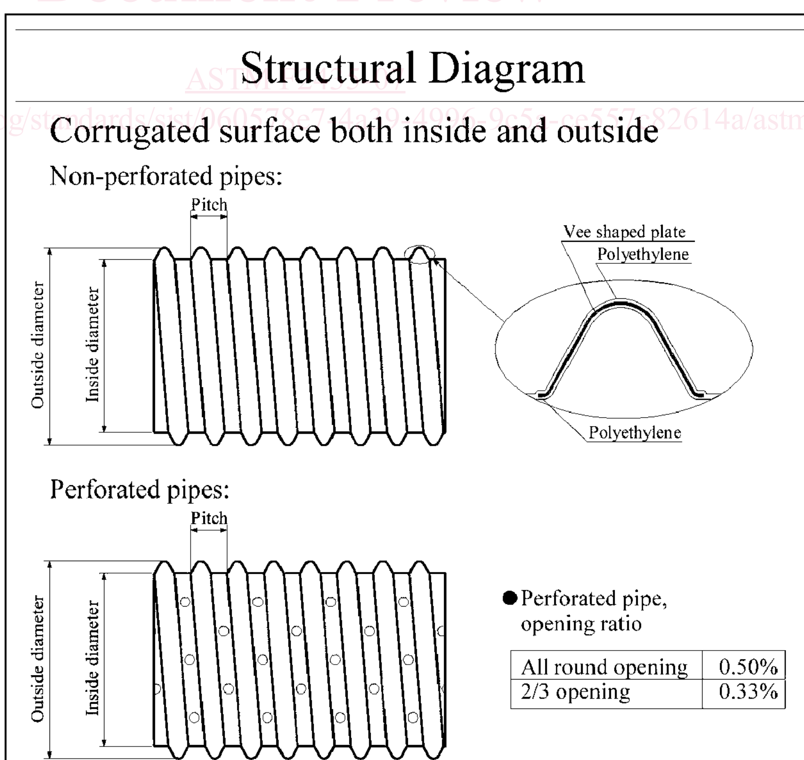

FIG. 2 Single - Wall Steel Reinforced Corrugated Polyethylene Pipe

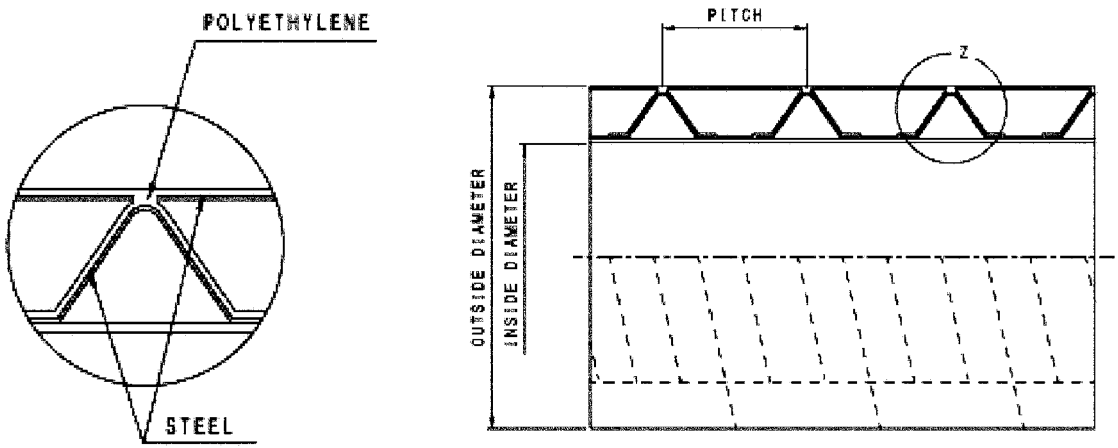

FIG. 3 Triple-Wall Steel Reinforced Corrugated Polyethylene Pipe-Type A

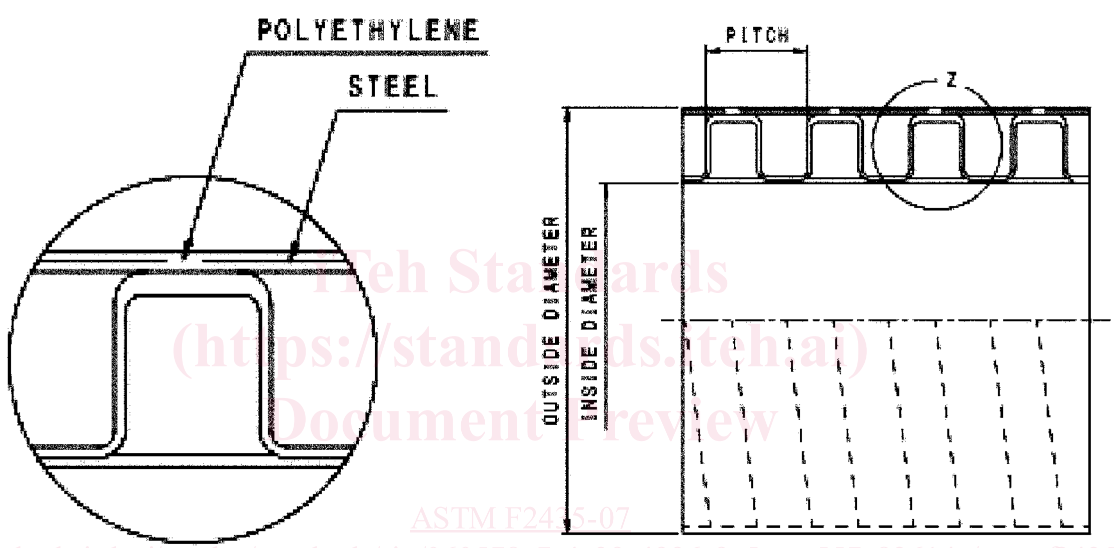

FIG. 4 Triple-Wall Steel Reinforced Corrugated Polyethylene Pipe-Type B

5.2 *Steel Materials:*

5.2.1 The minimum thickness of the steel profiles shall be 0.0078 inches (0.20 mm) and the minimum yield strength shall not be less than 20 ksi (140 MPa). The steel substrate shall conform either to Specification A1008/A1008M and have a zinc-galvanized coating shall have a minimum zinc coating designation of 20Z (intermediate coating) as defined in Specification A591/A591M or to Specification A653/A653M and have a zinc coating design of G40 as defined in Specification A653/A653M.

5.2.2 *Steel Material Content*—Maximum 46 % (±2 %) of the total weight of the pipe. The steel material is fully encapsulated by the polyethylene material with a minimum thickness of the polyethylene of 0.055 in. (1.4 mm) for single-wall and double-wall pipe and 0.020 in. (0.5 mm) for triple-wall pipe.

5.3 *Rework Material*— Rework material is not to be used in the manufacture of this product.

5.4 *Gaskets*—Elastomeric gaskets shall comply with the requirements specified in Specification F477.

5.5 *Lubricant*—The lubricant used for assembly of gasketed joints shall have no detrimental effect on the gasket or on the pipe.

6. Requirements

6.1 *Workmanship*— The inside and outside surfaces of the pipe shall be semi-matte or glossy in appearance and free of chalking, sticky, or tacky materials. The pipe wall shall not have cracks, holes, blisters, voids, foreign inclusions or other defects that are visible to the naked eye and that can affect the wall integrity or the bonding to the steel reinforcement. Holes deliberately placed in perforated pipe are permitted. The surface shall be free of bloom.

6.2 *Pipe Dimensions and Tolerances:*

6.2.1 Pipe Dimensions (for both perforated and non-perforated pipe) shall comply with Table 1 for single-wall and