Designation: F2562/F2562M – 15

Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage[1]

This standard is issued under the fixed designation F2562/F2562M; 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, impact resistance, pipe stiffness, flattening, buckling, tensile strength of seam, joint systems, perforations, and markings for steel reinforced thermoplastic pipe and fittings of nominal sizes 8 in. [200 mm] through 120 in. [3000 mm]. The steel reinforced, spirally formed thermoplastic 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 for gravity flow and non-pressure applications, such as storm sewers, sanitary sewers, industrial waste applications and drainage pipes.

1.2 *Units*—The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text the SI units are shown in brackets. The values stated in each system may not be exact equivalents: therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *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.*

1.4 There is no similar or equivalent ISO standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

A1011/A1011M Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

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

D2444 Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

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

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 *American Association of State Highway and Transportation Officials (AASHTO)*[3]

AASHTO LRFD Bridge Construction Specification Section 26

AASHTO M294-05 Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter

2.3 *Federal Standards:*[4]

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

2.4 *Military Standards:*

MIL-STD-129 Marking for Shipment and Storage

[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] Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, http://www.transportation.org.

[4] DLA Document Services Building 4/D 700 Robbins Avenue Philadelphia, PA 19111-5094 http://quicksearch.dla.mil/

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 *gravity flow, n*—a condition where liquid flow through a piping system results from a downward pipeline slope, but flow is less than full, except during conditions when the system may become temporarily surcharged in which case, the system is subject to temporary internal hydrostatic pressure that is limited to piping system joint capabilities.

3.2.2 *steel reinforced thermoplastic pipe, n*—ribbed thermoplastic pipe with steel reinforcing strips encapsulated within the ribs (See Fig. 1).

3.2.3 *encapsulation thicknesses, n*—the thicknesses of the HDPE covering on both sides of the steel reinforcement as well as the thickness of the closure at the top (outside) of the rib and the thickness of the profile directly under (inside) of the reinforcement.

3.2.4 *wrap width, n*—the width the helically wrapped strip covers when measured across the strip, perpendicular to the ribs (See Fig. 1).

4. Significance and Use

4.1 Steel reinforced thermoplastic pipes are used for underground applications where soil provides support to their flexible walls. Their main use is for gravity flow and non-pressure drainage of surface water, sanitary sewage and industrial waste.

NOTE 1—Industrial waste disposal lines should be installed only upon the specific approval of the governing code, or other authority, and after determining the suitability of the product under the anticipated environment, temperature, and other end-use conditions. Users should consult the manufacturer for the required product information.

4.2 This specification covers pipe products made in various stiffness classes according to Table 1 at 5 % deflection when tested in accordance with Test Method D2412. The required stiffness class shall be determined by structural design calculations based on the application of the pipe.

4.3 This specification covers pipe products using the following different joining systems;

4.3.1 *Bell and spigot, gasketed type* —seal is affected by a gasket compressed between the spigot and bell ends of the pipe.

4.3.2 *Internal coupling, sealant type*—seal is affected by applying an industrial sealant between the external surface of the coupling and the internal surface of the pipe.

4.3.3 *Other*—Where these connections are impractical or undesirable because of space, layout or other requirements, it is permissible to use joining methods such as flanging, internal coupling (gasketed type), extrusion welding, electro-fusion, butt fusion, and others. Methods proposed should be evaluated by the engineer for suitability.

5. Materials

5.1 *Polyethylene Materials:*

5.1.1 Polyethylene materials used in the manufacture of steel reinforced thermoplastic pipe shall meet or exceed the requirements of cell classification of 335420C or E (335430C or E for sanitary sewer applications) as defined and described in Specification D3350.

5.1.2 Polyethylene materials used in the manufacture of rotationally molded joints, fittings and couplings shall meet or exceed the requirements of cell classification 213320C or E (213330C or E for sanitary sewer applications) as defined and described in Specification D3350.

5.1.3 Polyethylene materials used in the manufacture of injection molded joints, fittings and couplings shall meet or exceed the requirements of cell classification 314420C or E (314430C or E for sanitary sewer applications) as defined and described in Specification D3350.

5.1.4 Slow crack growth resistance of the polyethylene materials shall be determined by testing in accordance with Test Method F2136. The applied stress shall be 600 psi [4100 kPa]. The test specimens shall exceed 24 h with no failures. Testing shall be done on polyethylene material taken from the finished pipe, joint, fitting or coupling.

5.1.5 *Other pipe materials*—It is permissible to use materials other than those specified under base materials as part of the profile construction, for example to weld the spiral seam together or the welding of couplings, provided that these materials are compatible with the base material, and in no way compromise the performance of the pipe products in the intended use.

5.1.6 *Carbon Black Content*—For compounds utilizing carbon black, the carbon black content shall be a maximum of 3.0 wt. % of the total of the polyethylene compound.

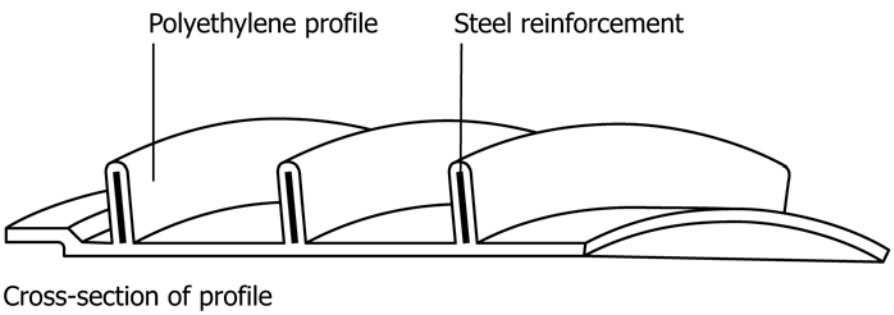

FIG. 1 Steel Reinforced Thermoplastic Ribbed Pipe Profile

TABLE 1 Pipe Stiffness Classes and Buckling Limits

Nominal Pipe Size	Inside Diameter	Class 1		Class 2		Class 3		Class 4		Class 5	
		Pipe stiffness	Buckling Limit	Pipe stiffness	Buckling Limit	Pipe stiffness	Buckling Limit	Pipe stiffness	Buckling Limit	Pipe stiffness	Buckling Limit
in.	in. [mm]	psi [kPa]	%	psi [kPa]	%	psi [kPa]	%	psi [kPa]	%	psi [kPa]	%
8	8 [200]	50 [345]	20	16 [110]	20	32 [221]	20	46 [317]	20	63 [434]	20
9	9 [225]	50 [345]	20	16 [110]	20	32 [221]	20	46 [317]	20	63 [434]	20
10	10 [250]	50 [345]	20	16 [110]	20	32 [221]	20	46 [317]	20	63 [434]	20
12	12 [300]	50 [345]	20	16 [110]	20	32 [221]	20	46 [317]	20	63 [434]	20
15	15 [375]	42 [290]	20	16 [110]	20	32 [221]	20	46 [317]	20	63 [434]	15
18	18 [450]	40 [275]	20	16 [110]	20	32 [221]	20	46 [317]	20	63 [434]	15
21	21 [525]	38 [260]	20	16 [110]	20	32 [221]	20	46 [317]	15	63 [434]	10
24	24 [600]	34 [235]	20	16 [110]	20	32 [221]	20	46 [317]	15	63 [434]	10
27	27 [675]	30 [205]	20	16 [110]	20	32 [221]	20	46 [317]	12	--	--
30	30 [750]	28 [195]	20	16 [110]	20	32 [221]	20	46 [317]	12	--	--
33	33 [825]	25 [170]	20	16 [110]	20	32 [221]	15	46 [317]	10	--	--
36	36 [900]	22 [150]	20	16 [110]	20	32 [221]	15	46 [317]	10	--	--
40	40 [1000]	20 [140]	20	16 [110]	20	32 [221]	10	46 [317]	10	--	--
42	42 [1050]	20 [140]	20	16 [110]	20	32 [221]	10	46 [317]	10	--	--
48	48 [1200]	18 [125]	15	16 [110]	15	32 [221]	10	46 [317]	10	--	--
54	54 [1350]	16 [110]	15	16 [110]	15	32 [221]	10	46 [317]	10	--	--
60	60 [1500]	14 [97]	15	16 [110]	15	32 [221]	10	46 [317]	10	--	--
66	66 [1650]	14 [97]	12	16 [110]	12	32 [221]	10	46 [317]	10	--	--
72	72 [1800]	14 [97]	12	16 [110]	12	32 [221]	10	46 [317]	10	--	--
78	78 [1950]	14 [97]	10	16 [110]	10	32 [221]	10	--	--	--	--
90	90 [2250]	14 [97]	10	16 [110]	10	32 [221]	10	--	--	--	--
96	96 [2400]	--	--	16 [110]	10	--	--	--	--	--	--
100	100 [2500]	--	--	16 [110]	10	--	--	--	--	--	--
108	108 [2700]	--	--	16 [110]	10	--	--	--	--	--	--
120	120 [3000]	--	--	16 [110]	10	--	--	--	--	--	--

5.1.7 *Rework Material*— It is permissible to use clean rework polyethylene material generated from the manufacturer's own pipe production provided the material and the pipe produced meet all the requirements of this specification.

5.2 *Steel Materials*— The steel material shall be uncoated cold or hot rolled, formable steel meeting the requirements of either Specification A1008/A1008M or Specification A1011/A1011M. In special circumstances it is permissible for galvanized, coated or stainless steel materials to be used. All steel materials must have a minimum yield strength of 20 305 psi [140 MPa].

5.3 *Gaskets*—Elastomeric gaskets shall comply with the requirements specified in Specification F477, and be as recommended by the pipe manufacturer.

5.4 *Lubricant*—The lubricant used for assembly of gasketed joints shall be as recommended by the pipe manufacturer and have no detrimental effect on the gasket or on the pipe.

5.5 *Industrial sealant*—Sealants, such as moisture cure urethane materials used for repairs or assembly of the internal coupling joint shall be as recommended by the pipe manufacturer and have no detrimental effect on the pipe materials.

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 encapsulation of the steel reinforcement. Holes deliberately placed in perforated pipe are permitted. The steel reinforcing materials shall have a maximum burr tolerance of 5% of the guage thickness, shall be free of tears, and shall not be exposed.

6.2 *Pipe Dimensions and Tolerances:*

6.2.1 Various different types of steel reinforced ribbed polyethylene pipes are available depending on the diameter and the stiffness class of pipe. The profile shown in Fig. 2 is an example of a typical profile only. The pipe profile shall be suitably designed and the actual materials used shall be specified so as to accommodate expected in-service conditions, including temporary system surcharge pressures, soil loads and external hydrostatic pressures due to groundwater conditions.

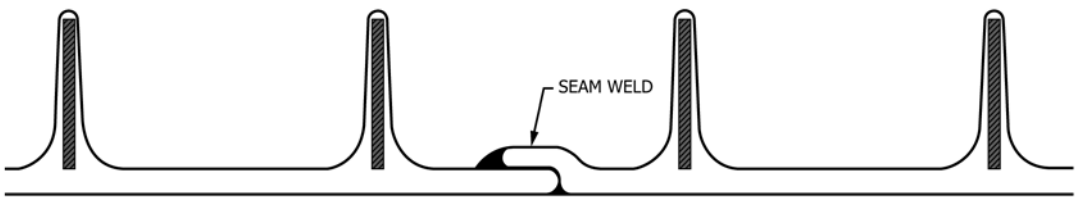

FIG. 2 Typical Profile of Steel Reinforced Thermoplastic Pipe Profile

It is permissible for the shape and number of ribs of individual extrusion profiles to be varied.

6.2.2 Pipe Dimensions (for both perforated and non-perforated pipe) shall comply with Table 2, when measured in accordance with Test Method D2122. Other diameters that are within the range of pipe sizes shown in Table 2 are permissible. The minimum wall thickness and other properties shall be interpolated from the adjacent values given in the table below. Fig. 3 is provided as a schematic representation of the steel reinforced thermoplastic pipe profile.

6.2.3 *Inside Diameter*— The tolerance on the inside diameter shall be ± 1.0 %, when measured in accordance with section 8.3.1.

6.2.4 *Pipe waterway wall*—Minimum waterway wall thickness shall be as required in Table 2 when measured in accordance with 8.3.2.

NOTE 2—Enhanced waterway wall thicknesses may be provided for applications where the pipe is to convey slurry or other suspension of particularly abrasive particles.

6.2.5 *Length*—The pipe shall be sold in any length agreeable to the user. Length shall not be less than 99 % of the specified length, when measured in accordance with section 8.3.3.

6.2.6 *Encapsulation thickness,*—The minimum thickness of the HDPE encapsulation at the sides, top (outside) and bottom (inside) of the reinforcement shall be as shown in Fig. 2 and Fig. 3. Factory cut pipe ends shall have the cut rib ends encapsulated to meet the requirements of Fig. 3 for the top (outside) of the ribs. Encapsulation thicknesses shall be measured in accordance with 8.3.4.

6.2.7 *Perforations:*

TABLE 2 Nominal Pipe Sizes, Inside Diameters, and Minimum Waterway Wall Thicknesses

Nominal Pipe Size	Inside Diameter	Minimum Waterway Wall Thickness, t_1	Minimum Encapsulation Thickness (Bottom), t_2
in.	in. [mm]	in. [mm[	in. [mm]
8	8 [200]	0.039 [1.0]	0.039 [1.0]
9	9 [225]	0.039 [1.0]	0.039 [1.0]
10	10 [250]	0.039 [1.0]	0.039 [1.0]
12	12 [300]	0.043 [1.1]	0.043 [1.1]
15	15 [375]	0.047 [1.2]	0.047 [1.2]
18	18 [450]	0.051 [1.3]	0.051 [1.3]
21	21 [525]	0.059 [1.5]	0.059 [1.5]
24	24 [600]	0.059 [1.5]	0.059 [1.5]
27	27 [675]	0.059 [1.5]	0.059 [1.5]
30	30 [750]	0.059 [1.5]	0.059 [1.5]
33	33 [825]	0.059 [1.5]	0.059 [1.5]
36	36 [900]	0.067 [1.7]	0.067 [1.7]
40	40 [1000]	0.071 [1.8]	0.071 [1.8]
42	42 [1050]	0.071 [1.8]	0.071 [1.8]
48	48 [1200]	0.071 [1.8]	0.071 [1.8]
54	54 [1350]	0.079 [2.0]	0.079 [2.0]
60	60 [1500]	0.079 [2.0]	0.079 [2.0]
66	66 [1650]	0.087 [2.2]	0.087 [2.2]
72	72 [1800]	0.087 [2.2]	0.087 [2.2]
78	78 [1950]	0.094 [2.4]	0.094 [2.4]
90	90 [2250]	0.094 [2.4]	0.094 [2.4]
96	96 [2400]	0.118 [3.0]	0.118 [3.0]
100	100 [2500]	0.118 [3.0]	0.118 [3.0]
108	108 [2700]	0.118 [3.0]	0.118 [3.0]
120	120 [3000]	0.118 [3.0]	0.118 [3.0]

6.2.7.1 *Drainage Pipe*—When perforations are necessary they shall be cleanly cut and uniformly spaced along the length and circumference of the pipe in a size, shape and pattern suited to the needs of the user. The perforations shall be circular, oval or rectangular with rounded corners. Perforations shall be located in the waterway wall portion of the pipe between the ribs and of a size and position to not encroach on the encapsulation of the reinforcement, the radius between this encapsulation and the waterway wall, or the weld seam. The reinforcing steel material shall not be exposed by these perforations.

6.2.7.2 The total inlet area of the perforations shall be a minimum of 1 square inch per linear foot [2,100 mm^2/m] of pipe, unless otherwise specified by the purchaser.

6.3 *Pipe Stiffness*— The stiffness of the pipe measured at 5 % deflection shall be one of the classes listed in Table 1 (unless otherwise specified), when tested in accordance with section 8.4.

NOTE 3—The 5 % deflection criteria was selected for testing convenience and should not be considered as a limitation with respect to in-use deflection.

NOTE 4—Stiffness and buckling limit requirements for Class 1 in Table 1 are equivalent to those specified in AASHTO M294-05.

6.4 *Flattening*—There shall be no evidence of splitting, cracking or breaking, when tested in accordance with section 8.5. Additionally there shall be no separation or de-lamination of the spiral seam or the rib at the top of its junction with the waterway wall of the pipe when tested in accordance with section 8.5.

6.5 *Buckling*—In the flattening test described in section 6.4, the load shall increase continuously with increasing deflection until after the percentage buckling deflection limit tabulated for the relevant diameter and stiffness class (in Table 1) has been exceeded. In addition, where peak load is reached before 20 % deflection, the load at 20 % deflection shall be a minimum of 75 % of the peak load.

6.6 *Impact*—there shall be no evidence of splitting, cracking or breaking when tested in accordance with section 8.6. Additionally there shall be no separation of the seam weld or the rib at the top of its junction with the waterway wall when tested in accordance with section 8.6.

6.7 *Tensile strength of seam weld*—there shall be no breaking or separation of the seam weld when tested in accordance with section 8.7.

6.8 *Fittings and Couplings*—Only fittings and couplings supplied or recommended by the manufacturer shall be used. Fabricated fittings and couplings shall be supplied with joints compatible with the overall system requirements. Bell and spigot joints are examples of typical designs.

6.9 *Joint tightness*— the joint shall be defined as one of the following classes. Only watertight joints (6.9.3) shall be used for sanitary sewer and industrial waste applications.

6.9.1 Soil tight joints are specified as a function of opening size, channel length and backfill particle size. If the size of the opening exceeds 3 mm, the length of the channel shall be at least four times the size of the opening. A backfill material

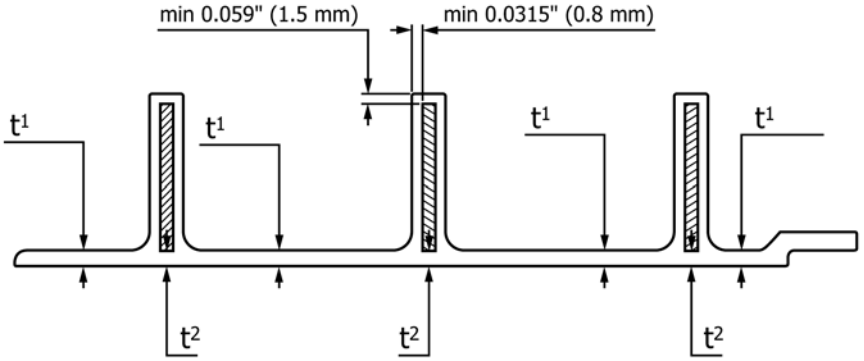

FIG. 3 Schematic Representation of Steel Reinforced Thermoplastic Pipe Profile

containing a high percentage of fine graded soils requires investigation for the specific type of joint to be used to guard against soil infiltration. Information regarding joint soil tightness criteria can be found in AASHTO LRFD Bridge Construction Specification Section 26.

6.9.2 Silt tight joints should be used where the backfill material has a high percentage of fines. Silt tight joints will utilize an elastomeric rubber seal meeting Specification F477. Silt tight joints shall meet a 2 psi [14 kPa] laboratory pressure test per Specification D3212.

6.9.3 Watertight joints will utilize an elastomeric rubber seal meeting Specification F477. Watertight joints shall meet a 10.8 psi [74 kPa] laboratory pressure test per Specification D3212.

7. Sampling and Retest

7.1 *Sampling*—Samples of pipe and fittings sufficient to determine conformance with this specification shall be taken at random by the testing agency. Where a test report is requested for a customer order, the samples shall be taken from the production lot, (as indicated by the manufacturer's production code), representing the product to be shipped on the order.

7.2 *Retest and Rejection.*—Retesting in the event of a test failure shall be conducted on samples from the failed lot only under an agreement between purchaser and seller. There shall be no changes to the test procedures or the requirements.

8. Test Methods

8.1 *Conditioning Test Specimens* —Condition the specimen prior to test at 73.4 ± 3.6° F [23 ± 2° C] and 50 ± 5 % relative humidity for not less than 24 h prior to the test, in accordance with Procedure A in Practice D618 for those test where conditioning is required, unless otherwise specified.

8.2 *Test Conditions*— Conduct tests in a laboratory atmosphere of 73.4 ± 3.6°F [23 ± 2°C] and 50 ± 5 % relative humidity, unless otherwise specified.

8.3 *Dimensions:*

8.3.1 *Inside Diameter*— Measure the inside diameter of three, 1-ft [300 mm] long specimens, with any suitable device accurate to ± 1/32 in. [0.8 mm], at two positions, namely, any point in the circumferential direction and 90° from this point, and average the six measurements.

8.3.2 *Pipe wall*—Locate and measure the minimum wall thickness, in the waterway and in the gaps between the ribs according to Test Method D2122.

8.3.3 *Length*—Measure the pipe with any suitable device accurate to ± 1/32 in. [0.8 mm] in 10 ft. [1 mm in 3 m]. Make all measurements on the pipe while it is resting on a relatively flat surface, in a straight line, with no external tensile or compressive forces exerted on the pipe.

8.3.4 *Encapsulation thickness*—Locate and measure the encapsulation thickness by cutting a cross section and measuring in accordance with Test Method D2122. The steel rib shall be removed from the profile when the measurement is taken.

8.3.5 *Perforations*— Measure dimensions of perforations on a straight profile specimen with no external forces applied. Make linear measurements with instruments accurate to 0.01 in [0.25 mm].

8.4 *Pipe Stiffness*— Select a minimum of three pipe specimens and test for pipe stiffness F/Δy, as described in Test Method D2412, except for the following conditions:

(1) The length of the test specimen shall be a whole number of wraps, with a minimum length of 14 in [356 mm] or half the pipe diameter, whichever is greater.

(2) Randomly orient each specimen in the loading machine.

(3) Testing speed of the specimens shall be 0.5 inches [12.7 mm] per minute for testing up to 5 % deflection. For flattening beyond 5 % deflection (see section 8.5), it is permissible to increase test speeds up to 5 inches (127 mm) per minute.

8.5 *Flattening*—Flatten the three pipe samples until the vertical inside diameter is reduced by 20 %. The length of the test specimen and the rate of loading shall be the same as in Section 8.4. Examine the specimen with the unaided eye for cracking, splitting, or de-lamination. It is permissible for the ribs to lean during this test only to the extent that neither the above requirements, nor the buckling test (6.5) are failed.

8.6 *Impact*—Test pipe specimens in accordance with Test Method D2444 except six specimens shall be tested. Specimens shall be at least 14 in [356 mm] in length and impact points shall be at least 6 in [152 mm] from the end of the specimen. Impact resistance shall not be less than 100 ft-lbs [136 J]. Tup B and a flat plate specimen holder shall be used.

Condition the specimens for 24 h at a temperature of 32±1.8°F [0±1°C], and conduct all tests within 60 seconds of removal from this atmosphere.

8.7 *Tensile strength of seam*—Test in accordance with Test Method D638, with the following conditions:

(1) The sample shall be prepared according to the dimensions for Type I specimens, with the weld seam arranged centrally and perpendicular to the tensile test axis.

(2) All steel re-enforcement shall be removed from the profile.

(3) It is permissible to reduce the height of the HDPE ribs to no less than 0.1 in [2.5mm] if required to facilitate testing.

8.8 *Joint Tightness*— Test silt tight joints and watertight joints for joint tightness in accordance with Specification D3212 at the pressures indicated in 6.9.2 and 6.9.3.

9. Installation

9.1 Pipe used in storm sewer and other applications shall be installed in accordance with Practice D2321 and the manufacturer's instructions. The steel reinforcing materials shall not be exposed.

9.2 Lateral assembly, field repairs and joint assembly shall be performed as detailed in the manufacturer's instructions. The steel reinforcing materials shall be re-encapsulated according to 6.2.5 as required, and not left exposed.

NOTE 5—Piping under this specification should be installed in accordance with Practice D2321 or applicable state or local codes and specifications. It is the incumbent responsibility of the engineer to verify and ensure that the installation practice techniques used with pipes made to this standard take into consideration heavy traffic loads, (if anticipated when installed, in roadways, highways, airports and railroad or similar applications), depth of burial, the class of foundation, embedment and backfill materials used. If not data is available for pipe bedding material consult a competent soils engineer.

10. Certification

10.1 Upon request of the user, the manufacturer shall provide certification that the product was manufactured and tested in accordance with this specification. This certification shall be furnished at the time of shipment.

11. Marking

11.1 *Quality of Marking*—The marking shall be applied to the pipe in such a manner that it remains legible (easily read) after installation and inspection. It shall be placed, at least, at the end of each length of pipe and spaced at intervals of not more than 10 ft. [3.0 m].

11.2 *Markings*—Each standard and random length of pipe in compliance with this specification shall be clearly marked by the producer with the following information: this designation, (ASTM F2562), the nominal pipe size, in inches (mm), the pipe stiffness class, the manufacturer's name, trade name, or trademark, the manufacturer's production code; identifying plant location, machine, and date of manufacture. The joints shall be marked to indicate that they are watertight, soil tight or silt tight.

12. Packaging

12.1 All pipe, unless otherwise specified, shall be packed or loaded onto a carrier, for standard commercial shipment.

13. Quality Assurance Furnished

13.1 When the product is marked with the designation, ASTM F2562, the manufacturer affirms that the product was manufactured, inspected, sampled, and tested in accordance with this specification and has been found to meet the requirements of this specification. When specified in the purchase order or contract, a report of the test results shall be provided.

14. Keywords

14.1 Helically formed; Steel reinforced; ribbed pipe; polyethylene; pipe

SUPPLEMENTARY REQUIREMENTS

GOVERNMENT/MILITARY PROCUREMENT

These requirements apply only to Federal/Military procurement, not domestic sales or transfers.

S1. *Responsibility for Inspection*—Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspections and test requirements specified herein. The producer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless the purchaser disapproves. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to ensure that material conforms to prescribed requirements.

NOTE S1.1—In U.S. federal contracts, the contractor is responsible for inspection.

S2. *Packaging and Marking for U.S. Government Procurement:*

S2.1 *Packaging*—Unless otherwise specified in the contract, the materials shall be packaged in accordance with the supplier's standard practice in a manner ensuring arrival at destination in satisfactory condition and which will be acceptable to the carrier at lowest rates. Containers and packaging

shall comply with Uniform Freight Classification rules or National Motor Freight Classification rules.

S2.2 *Marking*—Marking for shipment shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

NOTE S2.1—The inclusion of U.S. Government procurement requirements should not be construed as an indication that the U.S. Government uses or endorses the products described in this specification.

APPENDIX

(Nonmandatory Information)

X1. AUTHORITIES

X1.1 Since this product has a wide variety of uses, approval for its use rests with various agencies. The installer shall contact the relevant authority or the job specifications to obtain local installation guidelines. A partial list of authorities, according to product usage is as follows:

X1.1.1 *Farm Drainage*— U.S. Department of Agriculture, Soil Conservation Service, local office: reference, Engineering Standard 606.

X1.1.2 *Roadway Drainage*—Federal, state, county, or local highway authority.