Designation: A978/A978M – 08 (Reapproved 2013)

Standard Specification for Composite Ribbed Steel Pipe, Precoated and Polyethylene Lined for Gravity Flow Sanitary Sewers, Storm Sewers, and Other Special Applications[1]

This standard is issued under the fixed designation A978/A978M; 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 composite ribbed steel pipe, precoated and polyethylene lined intended for use for gravity flow sanitary sewers, storm sewers, and other special applications such as water transmission pipe, rehabilitation pipe, slip line pipe, and irrigation pipe where extra corrosion and abrasion resistance are required. The steel sheet used in the fabrication of the pipe has a polymer coating over a metallic coating of zinc on both sides. In addition, as the pipe is being fabricated, the ribs are filled with polyethylene and then a polyethylene liner is extruded onto the interior surface.

1.2 The exterior polymer precoating provides extra protection of the steel against soilside corrosion, in addition to that provided by the metallic coating, and also provides a dielectric barrier for cathodic protection. The interior polymer precoating provides an adhesive layer between the galvanized steel and the polyethylene lining. The applied lining provides internal protection against corrosion, erosion, and abrasion. By filling the rib which has a deltoid shape (smaller at the opening in the pipe wall than at the bottom of the rib), the polyethylene is mechanically connected to the pipe wall and the polyethylene liner is then thermally bonded to the filled rib.

1.3 This specification does not include requirements for bedding, backfill, or the relationship between earth cover load and sheet thickness of the pipe. Experience has shown that the successful performance of this product depends upon the proper selection of sheet thickness, type of bedding and backfill, controlled manufacture in the plant, and care in the installation. The installation procedure is described in Practice A798/A798M.

1.4 This specification is applicable to orders in either inch-pound units as A978, or in SI units as A978M. Inch-pound units and SI units are not necessarily equivalent. SI units are shown in brackets in the text for clarity, but they are the applicable values when the material is ordered to A978M.

1.5 *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]

A90/A90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

A153/A153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307 Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

A563 Specification for Carbon and Alloy Steel Nuts

A563M Specification for Carbon and Alloy Steel Nuts (Metric)

A742/A742M Specification for Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe

A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

A796/A796M Practice for Structural Design of Corrugated Steel Pipe, Pipe-Arches, and Arches for Storm and Sanitary Sewers and Other Buried Applications

A798/A798M Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

A902 Terminology Relating to Metallic Coated Steel Products

A926 Test Method for Comparing the Abrasion Resistance of Coating Materials for Corrugated Metal Pipe

A929/A929M Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe

B633 Specification for Electrodeposited Coatings of Zinc on Iron and Steel

[1] This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.17 on Corrugated Steel Pipe Specifications.

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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.

TABLE 1 Rib Requirements for Steel Pipe

Nominal Size	Deltoid Shaped Rib				Bottom Outside Radius, Min	Bottom Outside Radius,[E] Max Avg	Top Outside Radius, Min	Top Outside Radius,[E] Max Avg
	Narrowest Width,[A] Min	Widest Width,[B] Min	Depth,[C] Min	Spacing,[D] Max				
	A978, in.							
¾ by ¾ by 7 ½	0.45	0.68	0.73	7 ½	0.10	0.25	0.10+t	0.25+t
¾ by 1 by 11 ½	0.45	0.68	0.90	11 ¾	0.10	0.25	0.10+t	0.25+t
	A978M, mm							
19 by 19 by 190	12	17	19	190	2.5	6.0	2.5+t	6.0+t
19 by 25 by 292	12	17	23	298	2.5	6.0	2.5+t	6.0+t

[A]Narrowest width is a dimension of the inside of the rib measured on the inside of the pipe.
[B]Widest width is a dimension of the inside of the rib but is measured on the outside of the pipe (outside of the rib) and shall meet or exceed the stated minimum width plus two times the wall thickness (that is, 2t + 0.68 in. (2t +17mm)).
[C]Depth is an average of the ribs within a sheet width measured from the inside by placing a straight edge across the open rib and measuring to the bottom of the rib.
[D]Spacing is an average of three adjacent ribs (one sheet width) spacings for ¾ by ¾ × 7 ½ in. pipe and two adjacent rib (one sheet width) spacings for the ¾ × 1 × 11 ½ in. pipe measured center-to-center of the ribs, at 90° to the direction of the ribs.
[E]The average of the two top rib radii and of the two bottom radii shall be within the minimum and maximum tolerances. The term" outside" refers to the outside surface of the pipe.

B695 Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
C443 Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C443M Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
D638 Test Method for Tensile Properties of Plastics
D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D1005 Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers
D1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
D1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
D2240 Test Method for Rubber Property—Durometer Hardness
D1435 Practice for Outdoor Weathering of Plastics
D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
D5576 Practice for Determination of Structural Features in Polyolefins and Polyolefin Copolymers by Infrared Spectrophotometry (FT-IR)
D5630 Test Method for Ash Content in Plastics
F568M Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners (Metric) (Withdrawn 2012)[3]
F593 Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
F594 Specification for Stainless Steel Nuts
F738M Specification for Stainless Steel Metric Bolts, Screws, and Studs
F836M Specification for Style 1 Stainless Steel Metric Nuts (Metric)

2.2 *AASHTO Standard:*[4]

T 249 Test for Helical Lock Seam Corrugated Pipe
Standard Specifications for Highway Bridges, Division II, Section 26
LRFD Bridge Construction Specifications, Section 26

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology A902.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *composite, n*—the joining of steel and plastic to achieve a synergy of desirable characteristics not attainable by either material alone.

3.2.2 *deltoid shape, n*—the open triangular shape of the rib profile, which has a greater dimension at the base (away from the pipe wall) than at the peak (opening at the interior wall of the pipe).

3.2.3 *extruded liner, n*—a liner produced by a process that applies melted polyethylene into the ribs and sequentially extrudes a liner over the top of the rib openings and across the adjacent flats while the pipe is being fabricated.

4. Ordering Information

4.1 Orders for material to this specification shall include the following information as necessary, to adequately describe the desired product.

4.1.1 Name of material (composite ribbed steel pipe, precoated and polyethylene lined),

4.1.2 Type of metallic coating (zinc) (see 5.1),

4.1.3 ASTM designation and year of issue, as A978 for inch-pound units or as A978M for SI units,

4.1.4 Rib size and spacing (see Table 1). If not stated, the size and spacing combination furnished shall be at the fabricator's option,

4.1.5 Diameter of pipe (see 7.1),

4.1.6 Length, either total length or length of each piece and number of pieces,

4.1.7 Sheet thickness (see 7.2),

4.1.8 Joint connectors, number, and type (soil tight, water-resistant, or watertight),

4.1.9 Certification, if required (see 13.1), and

4.1.10 Special requirements.

[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, http://www.transportation.org.