



Standard Specification for Coextruded Composite Pipe¹

This standard is issued under the fixed designation F1488; 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.

^{ε1} NOTE—12.2.2 was editorially corrected in March 2018.

1. Scope*

1.1 This specification covers coextruded composite pipe, produced by a coextrusion die system, in which the concentric layers are formed and combined before exiting the die.

1.1.1 The function of this specification is to provide standardization of product, to produce technical data, and to serve as a purchasing guide.

1.2 Compounds that do not meet the requirements of the material section are excluded.

1.3 The coextruded composite pipe is permitted to be perforated in accordance with any specified standard or by agreement between the purchaser and the supplier.

1.4 The coextruded composite pipe is permitted to be belled for joining by solvent cementing or belled for joining by an elastomeric seal (gaskets), in accordance with any specified standard or by agreement between the purchaser and the supplier.

1.5 Recommendations for storage, joining, installation, and rationale are listed in [Appendix X1](#), [Appendix X2](#), [Appendix X3](#), and [Appendix X4](#), respectively.

1.6 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 The text of this specification references notes, footnotes, and appendixes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of this specification.

1.8 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—Related specifications are as follows: [D2661](#), [D2665](#), [D2729](#), [D2750](#), [D2751](#), [D2949](#), [D3034](#), [F512](#), [F628](#), [F758](#), [F789](#), and [F891](#).

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The following standards contain provisions which, though referenced in this specification, constitute provisions of this specification. All standards are subject to revision and parties using this specification shall reference the most recent edition of the standards listed as follows.

2.2 *ASTM Standards:*²

[D618 Practice for Conditioning Plastics for Testing](#)

[D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dilatometer](#)

[D883 Terminology Relating to Plastics](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)

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. Current edition approved Dec. 1, 2014. Published January 2015. Originally approved in 1994. Last previous edition approved in 2009 as F1488 – 09^{ε1}. DOI: [10.1520/F1488-14-10.1520/F1488-14E01](#)

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.

*A Summary of Changes section appears at the end of this standard

- D1898 Practice for Sampling of Plastics (Withdrawn 1998)³
- D1972 Practice for Generic Marking of Plastic Products (Withdrawn 2014)³
- D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
- D2235 Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic 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 Practice for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
- D2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
- D2661 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
- D2665 Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- D2729 Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- D2750 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastics Utilities Conduit and Fittings (Withdrawn 1997)³
- D2751 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings (Withdrawn 2014)³
- D2855 Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
- D2949 Specification for 3.25-in. Outside Diameter Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- D3034 Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- D3965 Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings
- D4000 Classification System for Specifying Plastic Materials
- D4396 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Nonpressure Applications
- D5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics (Withdrawn 2007)³
- F402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- F412 Terminology Relating to Plastic Piping Systems
- F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F493 Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- F512 Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation
- F545 Specification for PVC and ABS Injected Solvent Cemented Plastic Pipe Joints (Withdrawn 2001)³
- F628 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core
- F656 Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- F758 Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
- F789 Specification for Type PS-46 and Type PS-115 Poly(Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings (Withdrawn 2004)³
- F891 Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core
- F913 Specification for Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- 2.3 *ANSI Standards:*
- ANSI Z 34.1 American National Standard for Certification-Third-Party Certification Program⁴
- ANSI Z 34.2 American National Standard for Certification-Self-Certification by Producer or Supplier⁴
- 2.4 *Federal Standard:*
- Fed. Std. No. 123 Marking for Shipments (Civil Agencies)⁵
- 2.5 *Military Standard:*
- MIL-STD-129 Marking for Shipment and Storage⁵
- 2.6 *Uniform Classification Committee Standard:*
- Uniform Freight Classification⁶
- 2.7 *National Motor Freight Traffic Association Standard:*
- National Motor Freight Classification⁷

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

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ DLA Document Services Building 4/D 700 Robbins Avenue Philadelphia, PA 19111-5094 <http://quicksearch.dla.mil/>

⁶ Available from the Uniform Classification Committee, Suite 1106, 222 South Riverside Plaza, Chicago, IL 60606.

⁷ Available from National Motor Freight Traffic Association (NMFTA), 1001 N. Fairfax St., Alexandria, VA 22314, <http://www.nmfta.org>.

3. Terminology

3.1 Definitions:

3.1.1 Definitions are in accordance with Terminologies D883 and F412. Abbreviations are in accordance with Terminology D1600. Plastic materials are classified in accordance with Classification System D4000. Generic marking is in accordance with Practice D1972.

3.1.2 *coextrusion*—a process whereby two or more heated or unheated plastic material streams forced through one or more shaping orifice(s) become one continuously formed piece.

3.1.3 *compound*—a mixture of a polymer with other ingredients, such as fillers, stabilizers, catalysts, processing aids, lubricants, modifiers, pigments, or curing agents.

3.1.4 *dimension ratio*—the average specified diameter of a pipe divided by the minimum specified wall thickness.

3.1.5 *out-of-roundness*—the allowed difference between the maximum measured diameter and the minimum measured diameter (stated as an absolute deviation).

3.1.6 *virgin plastic, adj*—material in the form of pellets, granules, powder, floc, or liquid that has not been subjected to use or processing other than that required for its initial manufacture. (1985, D883)

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *coextruded composite pipe*—pipe consisting of two or more concentric layers of the same or different material bonded together in processing by any combination of temperature, pressure, grafting, crosslinking, or adhesion with a specific purpose to serve as pipe.

3.2.2 *IPS-DR-PS Series*—coextruded pipe produced to an iron pipe outside diameter (OD) with a dimension ratio (DR) and pipe stiffness (PS).

3.2.3 *IPS Schedule 40 Series*—coextruded composite pipe produced to an iron pipe outside diameter (OD) with a Schedule 40 wall thickness.

3.2.4 *lot*—all pipe produced of one size and from one extrusion line, during one designated 24-h period.

3.2.5 *qualification test*—an evaluation, generally nonrepetitive, conducted on an existing, altered, or new product to determine acceptability.

3.2.6 *rework composite pipe material*—a blend of the different materials used in the different layers of the coextruded composite pipe.

3.2.7 *Sewer and Drain DR-PS Series*—coextruded composite pipe produced to a sewer and drain outside diameter (OD) with a dimension ratio (DR) and pipe stiffness (PS).

4. Classification

4.1 Coextruded composite pipe produced in compliance with this specification in different dimension ratios (DR) and pipe stiffness (PS) is used for different applications.

4.1.1 *IPS Schedule 40 Series*—Coextruded composite pipe is used for above or below ground installation for communication conduit, electrical conduit, drain, waste, and vent pipe, and plastic underdrain systems for highway, airport, and similar drainage, where a Schedule 40 IPS is required.

4.1.2 *IPS-DR-PS Series*—Coextruded composite pipe is used for above or below ground installation for communication conduit, electrical conduit, and drain, waste, and vent pipe.

4.1.3 *Sewer and Drain DR-PS Series*—Coextruded composite pipe is used for gravity flow sewer and drain pipe, and plastic underdrain systems for highway, airport, and similar drainage.

4.2 Before installing coextruded composite pipe in an industrial waste disposal system, the approval of the cognizant building code authority is required. Some coextruded composite pipe is designed for temperature use in excess of 180°F (82°C). Consult the manufacturer for recommendations on use.

5. Ordering Information

5.1 Orders for coextruded composite pipe produced in compliance with this specification shall include the following:

5.2 ASTM designation (F1488) and year of issue,

5.3 Series size,

5.4 Footage of each size, and

5.5 Materials.

6. Material

6.1 *Basic Materials*—The outer layer shall be made of virgin material that contains pigments or screening agents to provide protection against UV radiation. The material shall conform to the requirements prescribed in the material specification.

6.1.1 Materials listed in the material section are to be used in any layer of the coextruded composite pipe. When coextruded composite pipe is produced with three layers, the middle layer is to be solid or closed-cell cellular plastic.

6.2 *ABS Material Specification*—The ABS shall be virgin plastic ABS material conforming to the requirements of Specification **D3965** and shall meet all of the requirements for Cell Class 4-2-2-2.

6.2.1 The color and form of the material shall be by agreement between the purchaser and the supplier.

6.3 *PVC Material Specification*—The PVC shall be virgin plastic material conforming to the requirements of Specification **D4396** and shall meet all of the requirements for Cell Class 1-1-4-3-2.

6.3.1 The color and form of the material shall be by agreement between the purchaser and the supplier in accordance with Specification **D4396**.

6.3.2 Individual cell class values are permitted to be greater than those listed.

6.4 *CPVC Material Specification*—The CPVC shall be virgin plastic material conforming to the requirements of Specification **D4396** and shall meet all of the requirements for Cell Class 2-2-4-2-4.

6.4.1 The color and form of the material shall be by agreement between the purchaser and the supplier in accordance with Specification **D4396**.

6.4.2 Individual cell class values are permitted to be greater than those listed.

6.5 *Rework Material*—A blend of clean rework material generated from the manufacturer’s own pipe production may be used by the same manufacturer, provided the pipe produced meets all of the requirements of this specification.

6.5.1 Rework material is excluded from standard definitions of recycled materials in accordance with Guide **D5033**.

6.5.2 Rework material generated from composite pipe shall not be used in the outer layer.

6.5.3 Rework material generated from composite pipe with a closed-cell cellular plastic layer shall not be used in the inner or outer layer.

7. Performance Requirements

7.1 *Pipe Stiffness*—The minimum pipe stiffness at 5 % deflection when measured in accordance with Test Method **D2412**, shall equal or exceed the value in **Table 1**, **Table 2**, **Table 3** or **Table 4**, as applicable. The rate of crosshead motion shall be 0.20 to 0.25 in./min. (5.1 to 6.3 mm/min). Three specimens shall be tested. If all three meet this requirement, the sample meets this requirement. If one or two fail, additional testing shall be conducted in accordance with **7.1.1**. If all three fail, the sample does not meet the requirement.

7.1.1 *Pipe Stiffness and Lower Confidence Limit*—In the event that one or two of the specimens tested in **7.1** fail to meet the minimum requirement, the average pipe stiffness of eleven specimens shall meet or exceed the minimum requirement given in **Table 1**, **Table 2**, **Table 3**, or **Table 4** as applicable. The 99 % lower confidence limit (LCL) shall be within 15 % of the average value. The LCL shall be calculated using the Student’s “t” distribution, with *N*-1 degrees of freedom, where *N* is the number of specimens (11). The critical *t* value shall be used to at least three significant digits. Alternatively, if the LCL exceeds the minimum PS requirement in **Table 1**, **Table 2**, **Table 3** or **Table 4** as applicable, but is not within 15 % of the average, the sample meets the requirements of the Pipe Stiffness testing. The eleven specimens include the three tested under **7.1**, and an additional eight with rotation by 35°, as specified in **D2412**, continuing throughout the remaining specimens.

The LCL based on testing eleven specimens is calculated as follows:

$$\text{LCL} = (\text{Avg. PS}) - \{2.76(\text{Std. Dev})/\sqrt{N}\} \quad (1)$$

TABLE 1 Minimum Wall Thickness Required for Pipe Stiffness and Impact Strength for IPS Schedule 40 Series^A

| Nominal Pipe Size, in. | Minimum Wall Thickness, in. | Minimum Pipe Stiffness, lbf/in./in. at 5 % Deflection | Minimum Impact Strength at 32°F (0°C), ft-lbf |
|------------------------|-----------------------------|---|---|
| 1¼ | 0.140 | 140 | 25 |
| 1½ | 0.145 | 140 | 25 |
| 2 | 0.154 | 140 | 25 |
| 2½ | 0.203 | 140 | 25 |
| 3 | 0.216 | 140 | 25 |
| 3½ | 0.226 | 140 | 25 |
| 4 | 0.237 | 140 | 40 |
| 5 | 0.258 | 140 | 40 |
| 6 | 0.280 | 140 | 40 |
| 8 | 0.322 | 90 | 60 |
| 10 | 0.365 | 90 | 60 |
| 12 | 0.460 | 90 | 60 |

^A The maximum wall thickness shall not be greater than 1.12 times the minimum.

TABLE 2 Minimum Wall Thickness Required for Pipe Stiffness and Impact Strength for IPS-DR-PS DWV^A

| Nominal Pipe Size, in. | Dimension Ratio | | Minimum Impact Strength at 32°F (0°C), ft-lbf |
|------------------------|-----------------|-------|---|
| | DR 24 | DR 22 | |
| | Pipe Stiffness | | |
| | PS140 | PS200 | |
| 1¼ | 0.067 | 0.075 | 25 |
| 1½ | 0.077 | 0.086 | 25 |
| 2 | 0.099 | 0.108 | 25 |
| 2½ | 0.120 | 0.130 | 25 |
| 3 ^B | 0.135 | 0.148 | 25 |
| 3 | 0.142 | 0.159 | 25 |
| 3½ | 0.162 | 0.182 | 25 |
| 4 | 0.183 | 0.204 | 25 |
| 5 | 0.226 | 0.252 | 25 |
| 6 | 0.269 | 0.301 | 25 |
| 8 | 0.350 | 0.392 | 25 |
| 10 | 0.437 | 0.488 | 25 |
| 12 | 0.518 | 0.579 | 25 |

^A The maximum wall thickness shall not be greater than 1.12 times the minimum.

^B Special outside diameter of 3.25.

TABLE 3 Minimum Wall Thickness Required for Pipe Stiffness and Impact Strength for IPS-DR-PS Communication Conduit or Underground Electrical Conduit^A

| Nominal Pipe Size, in. | Dimension Ratio | | | | | Minimum Impact Strength at 32°F (0°C) ft-lbf |
|------------------------|-----------------|-------|-------|-------|---------|--|
| | DR 42 | DR 38 | DR 34 | DR 27 | DR 25.5 | |
| | Pipe Stiffness | | | | | |
| | PS25 | PS35 | PS50 | PS100 | PS120 | |
| 1¼ | 0.060 | 0.060 | 0.060 | 0.060 | --- | 25 |
| 1½ | 0.060 | 0.060 | 0.060 | 0.069 | 0.075 | 25 |
| 2 | 0.060 | 0.060 | 0.068 | 0.086 | 0.093 | 25 |
| 2½ | 0.068 | 0.076 | 0.085 | 0.106 | 0.113 | 25 |
| 3 | 0.080 | 0.090 | 0.102 | 0.127 | 0.137 | 25 |
| 3½ | 0.093 | 0.103 | 0.116 | 0.145 | --- | 25 |
| 4 | 0.104 | 0.118 | 0.132 | 0.164 | 0.177 | 25 |
| 5 | 0.129 | 0.146 | 0.164 | 0.203 | 0.219 | 25 |
| 6 | 0.154 | 0.174 | 0.195 | 0.241 | 0.260 | 25 |
| 8 | 0.201 | 0.227 | 0.254 | 0.314 | --- | 25 |
| 10 | 0.250 | 0.283 | 0.316 | 0.372 | --- | 25 |
| 12 | 0.297 | 0.335 | 0.375 | 0.465 | --- | 25 |

^A The maximum wall thickness shall not be greater than 1.12 times the minimum.

TABLE 4 Minimum Wall Thickness Required for Pipe Stiffness and Impact Strength for Sewer and Drain-DR-PS^A

| Nominal Pipe Size, in. | Dimension Ratio | | | | | Minimum Impact Strength at 32°F (0°C), ft-lbf |
|------------------------|-----------------|-------|-------|-------|-------|---|
| | DR38 | DR34 | DR27 | DR24 | DR22 | |
| | Pipe Stiffness | | | | | |
| | PS35 | PS50 | PS100 | PS140 | PS200 | |
| 2 | 0.060 | 0.066 | 0.083 | 0.089 | 0.102 | 25 |
| 3 | 0.085 | 0.095 | 0.120 | 0.135 | 0.148 | 25 |
| 4 | 0.110 | 0.124 | 0.156 | 0.175 | 0.191 | 25 |
| 6 | 0.165 | 0.184 | 0.232 | 0.261 | 0.285 | 25 |
| 8 | 0.221 | 0.247 | 0.311 | 0.350 | 0.381 | 25 |
| 9 | 0.248 | 0.277 | 0.350 | 0.393 | 0.429 | 25 |
| 10 | 0.276 | 0.308 | 0.389 | 0.437 | 0.477 | 25 |
| 12 | 0.328 | 0.367 | 0.463 | 0.520 | 0.568 | 25 |

^A The maximum wall thickness shall not be greater than 1.12 times the minimum.

where:

$$(\text{Avg. PS}) = \frac{[\sum(\text{PS})]}{(11)}$$

$$\begin{aligned} (\text{Std. Dev}) &= \left[\frac{\sum PS^2 - (\sum PS)^2 / N}{N - 1} \right]^{1/2} \\ N &= 11 \end{aligned}$$

The 15 % requirement is calculated as:

$$(\text{Avg} - \text{LCL}) / (\text{Avg}) \times 100 \% \leq 15 \% \quad (2)$$

7.1.2 The strength and load-carrying capabilities of plastic pipe is measured and reported as pipe stiffness and determined in accordance with Test Method **D2412**. The term “crushing strength” is not applicable to plastic piping.

NOTE 2—The 5 % deflection criteria is arbitrarily selected for testing convenience. It is not to be considered as a limitation with respect to in-use deflection. The engineer is responsible for establishing the acceptable deflection limit.

7.2 *Impact Resistance*—The minimum impact resistance, when tested at the time of manufacture, shall comply with the requirements of **Table 1**, **Table 2**, **Table 3**, or **Table 4**. Test in accordance with Test Method **D2444**, using **Tap B** and **Holder B**. Use a 6-lb (2.5-kg) tup for all sizes.

7.2.1 Test 10 specimens. When 9 or 10 specimens pass, accept the lot. When 2 or more specimens fail, test 10 additional specimens. When 17 of 20 specimens tested pass, accept the lot. When 4 or more of 20 specimens fail, test 20 additional specimens. When 32 of 40 specimens pass, accept the lot. When 9 or more of 40 specimens fail, the lot does not meet the requirements of this specification.

7.2.2 Failure of the test specimen shall be shattering or any crack or break extending entirely through the pipe wall and visible to the unaided eye.

7.3 *Bond*—The bond between layers shall be strong and uniform. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers; nor shall separation of the layers occur during other tests in this specification. Refer to **10.1**. (See **7.3.1**.)

7.3.1 The bond test is conducted at the time of manufacture.

7.4 *Cellular Structure*—The closed-cell cellular plastic layer of composite pipe shall not allow the passage of water when tested at 10 ± 1 psig for a minimum of 30 min. The test sample shall be 18 ± 0.125 in. long. Create a seal on the O.D. and the I.D. of the pipe near one end in a manner that permits the exposed core to be subjected to water pressure (**Note 3**). Any sign of water emanating from the core at the opposite end after 30 min. is indication of an open cell structure and the sample does not meet the requirements of this specification. This test is not required for pipe produced with a solid middle layer.

NOTE 3—The method of sealing against the I.D. and O.D. of the pipe is not specified, as several acceptable methods are available. One such method uses an elastomeric no-hub adapter clamped to the O.D. and pneumatic or mechanical test plug to seal the I.D.

8. Other Requirements

8.1 *Dimensions and Tolerances:*

8.1.1 *Outside Diameter*—The outside diameter and tolerance shall meet the requirements of **Table 5** when measured in accordance with Test Method **D2122**. The tolerance for out-of-roundness shall apply to the pipe at the time of manufacturer.

8.1.2 *Wall Thickness*—The wall thickness shall meet the requirements of **Table 1**, **Table 2**, **Table 3**, or **Table 4** when measured in accordance with Test Method **D2122**.

8.1.3 *Length*—The pipe shall be in 10 or 20-ft lengths, unless otherwise specified. The tolerance on length shall be $+1/2$, -0 in.

8.2 *Pipe Flattening*—There shall be no evidence of cracking or rupture when deflected 25 % of the initial inside diameter when tested in accordance with Test Method **D2412**.

8.2.1 Test three specimens. When all pass, accept the lot. When one specimen fails, the lot does not meet the requirements of this specification.

8.2.2 Failure shall be a crack or break extending entirely through the pipe wall visible to the unaided eye. Refer to **10.1**. (See **8.2.3**.)

8.2.3 The pipe flattening test is conducted at the time of manufacture.

8.3 *Inspection*—Coextruded composite pipe shall be inspected before installation and pipe that does not meet the requirements of Section **9** shall be rejected and returned to the seller.

8.4 *Solvent Cement*—When solvent cement is used to join coextruded composite pipe, it shall be for use with the material in the outer layer, as marked on the pipe.

8.4.1 *ABS*—Use solvent cement meeting the requirements of Specification **D2235**.

8.4.2 *PVC*—Use solvent cement meeting the requirements of Specification **D2564**.

8.4.3 *CPVC*—Use solvent cement meeting the requirements of Specification **F493**.

8.5 *IPS Schedule 40 Series*—Coextruded composite pipe shall be joined with molded fittings meeting the requirements of Specification **D2661** or **F628**, when the outer layer is ABS, or Specification **D2665** when the outer layer is PVC, or Specification **F493** when the outer layer is CPVC.