Designation: D2852 – 16

Standard Specification for Styrene-Rubber (SR) Plastic Drain Pipe and Fittings[1]

This standard is issued under the fixed designation D2852; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers requirements and test methods for materials, dimensions, workmanship, impact resistance, load-deflection properties, dimensional stability, and joint tightness of plain-end or bell-end styrene-rubber (SR) plastic drain pipe and fittings in sizes 2 through 6 in.

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 The following safety hazards caveat pertains only to the test methods portion, Section 8, of this specification: *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]

D256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

D648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position (Withdrawn 2016)[3]

D1600 Terminology for Abbreviated Terms Relating to 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)

D3122 Specification for Solvent Cements for Styrene-Rubber (SR) Plastic Pipe and Fittings

F412 Terminology Relating to Plastic Piping Systems

2.2 *Federal Standard:*

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)[4]

2.3 *Military Standard:*

MIL-STD-129 Marking for Shipment and Storage[4]

3. Terminology

3.1 *Defintions*—Definitions are in accordance with Terminology F412, and abbreviations are in accordance with Terminology D1600, unless otherwise specified. The abbreviation for styrene-rubber plastics is SR.

4. Significance and Use

4.1 The requirements for this specification are intended to provide pipe and fittings suitable for nonpressure underground drainage of sewage and certain other liquid wastes, in applications outside the building limits, where dimensional stability, resistance to aging, and strong eight joints are required. The plastic drain pipe and fittings described in this specification are intended for use in the following applications:

4.1.1 House connections to septic tanks.

4.1.2 Footing drains (foundation drains).

4.1.3 Storm drainage.

4.2 The pipe should be installed in accordance with Practice D2321.

5. Materials and Manufacture

5.1 *Materials*—The pipe and fittings shall be made of styrene-rubber (SR) plastics meeting the following requirements:

[1] This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.65 on Land Drainage.

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

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

5.1.1 The SR plastics compound shall contain at least 50 % styrene plastics, combined with rubbers to a minimum rubber content of 5 %, and compounding materials such as antioxidants and lubricants, and may contain up to 15 % acrylonitrile combined in the styrene plastics or rubbers, or both. The rubbers shall be of the polybutadiene or butadiene-styrene type, or both, with a maximum styrene content of 25 % or nitrile type. The combined styrene plastics and rubber content shall be not less than 90 %. No fillers may be used.

5.1.2 The SR plastic compound shall meet the following minimum requirements when tested in accordance with Section 8:

Tensile strength at rupture,	3800 psi (26.2 MPa)
Elongation at rupture, %,	15
Modulus of elasticity in tension,	300 000 psi (2068 MPa)
Izod impact strength, notched	0.8 ft·lbf/in. (42.5 J/m)
Deflection temperature at 264 psi (1.82 MPa),° F (°C)	149 (65)

5.1.3 *Rework Material*—Clean rework material, generated from the manufacturer's own pipe or fittings production, may be used by the same manufacturer, provided that the pipe and fittings produced meet all of the requirements of this specification.

6. Workmanship, Finish, and Appearance

6.1 *Workmanship*—The pipe shall be homogeneous throughout and essentially uniform in color, opacity, density, and other properties. The inside and outside surfaces shall be semimatte or glossy in appearance and free of chalking, sticky, or tacky material. The pipe walls shall be free of cracks, holes, blisters, voids, foreign inclusion, or other defects that are visible to the naked eye and that may affect the wall integrity. Holes deliberately placed in perforated pipe are acceptable. The surfaces shall be free of excessive bloom. Bloom or chalking may develop in pipe exposed to direct rays of the sun (ultraviolet radiant energy) for extended periods and consequently these requirements do not apply to pipe after extended exposure to direct rays of the sun.

6.2 *Pipe Dimensions:*

6.2.1 *Pipe Diameters*—The outside and inside diameters of the pipe shall be within the tolerances given in Table 1 when tested in accordance with 8.6.1.

6.2.2 *Wall Thickness*—Pipe wall thickness shall meet the requirements of Table 1 when measured in accordance with 8.6.2.

6.2.3 *Laying Length*—The laying length shall be 10 ft with a tolerance of −0 +½ in., unless otherwise specified. The laying length shall be determined in accordance with 8.6.3.

6.3 *Fitting and Bell-End Dimensions:*

6.3.1 *Socket Diameters*—The inside diameters of the sockets shall comply with the dimensions in Table 2 when determined in accordance with 8.7.1.

6.3.2 *Wall Thickness:*

6.3.2.1 For belled pipe and fittings fabricated from pipe sections, the thickness of the belled section shall be considered satisfactory if the bell was formed from pipe meeting the requirements of Table 1.

6.3.2.2 For molded fittings, the wall thickness of the waterway and socket or bell shall be no less than the respective minimum thickness listed for the equivalent pipe wall in Table 2. For reducing fittings or those with smaller inlets, the minimum wall thickness of each inlet shall be no less than the minimum wall thickness for that size pipe.

6.3.3 *Socket Depth*—The socket depth shall be not less than that shown in Table 2 when measured in accordance with 8.7.3.

6.3.4 *Laying Length*—The laying length shall meet the requirements shown in Table 3. All dimensions are minimum with a negative tolerance of zero.

6.4 *Impact Strength*—The impact strength of the pipe and fittings shall not be less than the values given in Table 4 when tested in accordance with 8.9.

NOTE 1—This test is intended only as a quality control test, not as a simulated service test.

6.5 *Pipe Stiffness*—The pipe stiffness at 5 % deflection shall be not less than the values given in Table 5 when tested in accordance with 8.10. This requirement does not apply to fittings.

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

NOTE 3—The strength and load-carrying capabilities of plastic drain and sewer pipe are measured and reported as Pipe Stiffness, which is determined in accordance with Test Method D2412. The term "crush strength" is not applicable to plastic piping because (*a*) the values obtained can be significantly different, depending on the bedding, loading, or testing technique used; and (*b*) the term derives from rigid pipe and refers to its ultimate strength at rupture.

6.6 *Flattening*—The pipe shall show no evidence of splitting, cracking, or breaking at 20 % deflection when tested in accordance with 8.8.

6.7 *Dimensional Stability*—The average decrease in inside diameter of pipe and fittings shall not exceed 10 % when tested in accordance with 8.11.

TABLE 1 Dimensions and Tolerances for SR Plastic Drain Pipe, in. (mm)

Nominal Size	Average Outside Diameter	Permissible Deviations of the Diameter from Measured Average (Out-of-roundness)	Minimum Average Inside Diameter	Minimum Wall Thickness
2	2.250 ± 0.006 (57.2 ± 0.15)	±0.030 (±0.76)	2.000 (50.8)	0.073 (1.85)
3	3.250 ± 0.008 (82.6 ± 0.20)	±0.040 (±1.02)	2.875 (73.0)	0.100 (2.54)
4	4.215 ± 0.009 (104.8 ± 0.23)	±0.050 (±1.27)	3.875 (98.4)	0.125 (3.18)
5	5.300 ± 0.010 (134.6 ± 0.25)	±0.060 (±1.52)	4.875 (123.8)	0.150 (3.81)
6	6.275 ± 0.011 (159.4 ± 0.28)	±0.070 (±1.78)	5.875 (149.2)	0.180 (4.57)

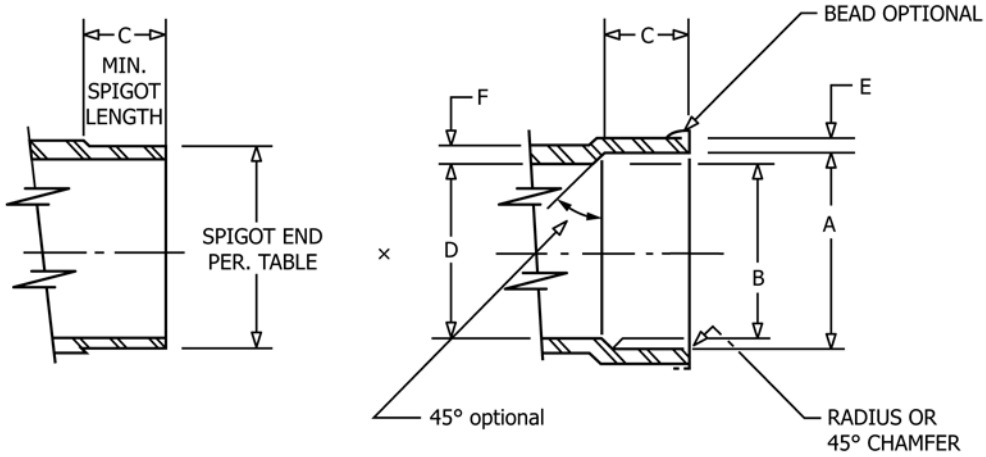

TABLE 2 Fitting Dimensions and Tolerances, in. (mm)

Nominal Size	A	B	C, min	D, min	E and F, min[A]
2	2.264 ± 0.006 (57.5 ± 0.15)	2.245 ± 0.006 (57.0 ± 0.15)	¾ (19.1)	2 (50.8)	0.073 (1.85)
3	3.271 ± 0.008 (83.1 ± 0.20)	3.245 ± 0.008 (82.4 ± 0.20)	1½ (38.1)	2⅞ (73.0)	0.100 (2.54)
4	4.235 ± 0.009 (107.6 ± 0.23)	4.210 ± 0.009 (106.9 ± 0.23)	1¾ (44.5)	3⅞ (98.4)	0.125 (3.18)
5	5.330 ± 0.010 (135.4 ± 0.25)	5.295 ± 0.010 (134.5 ± 0.25)	2 (50.8)	4⅞ (123.8)	0.150 (3.81)
6	6.305 ± 0.011 (160.1 ± 0.28)	6.270 ± 0.011 (159.3 ± 0.28)	2½ (63.5)	5⅞ (149.2)	0.180 (4.57)

[A] *Fitting Wall Thickness*—The wall thickness is a minimum value except that a ±10 % variation resulting from core shift is allowable. In such a case, the average of two opposite wall thicknesses shall equal or exceed the value shown in the table.

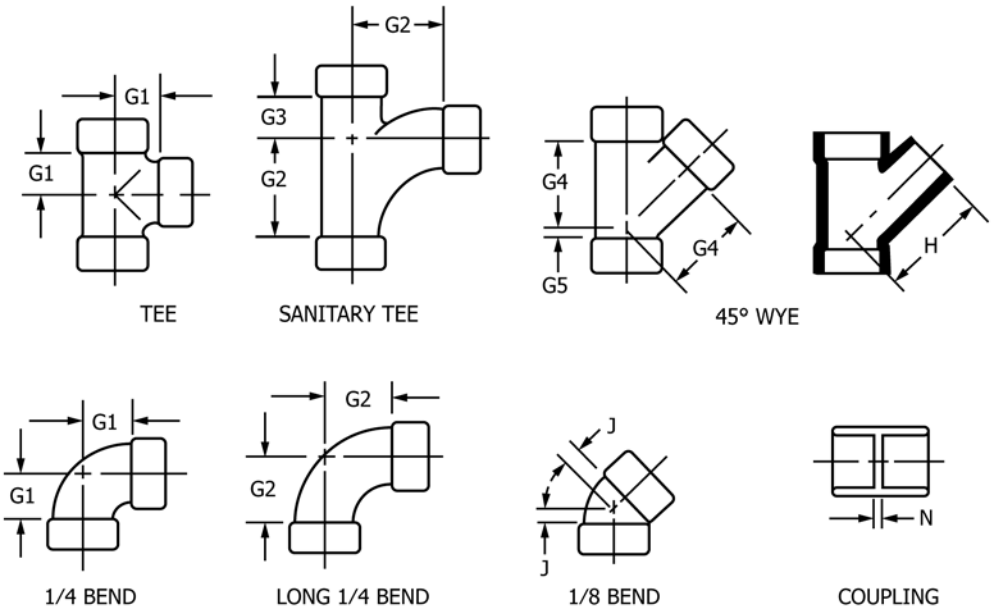

TABLE 3 Fitting Minimum Laying Length Dimensions, in. (mm)

Size	G1	G2	G3	G4	G5	H	J	N
2	1⁵⁄₃₂ (29.4)	1¾ (31.8)	¹⁵⁄₁₆ (23.8)	2¾ (57.2)	½ (12.7)	3⅞ (98.4)	⁹⁄₁₆ (14.3)	³⁄₃₂ (2.4)
3	1²¹⁄₃₂ (42.1)	2⅞ (73.0)	1⅜ (34.9)	3¼ (82.6)	⁹⁄₁₆ (14.3)	6 (152.4)	¹¹⁄₁₆ (17.5)	⅛ (3.2)
4	2⁵⁄₃₂ (54.8)	3¹¹⁄₁₆ (93.7)	1¾ (93.7)	5 (127.0)	¹⁵⁄₁₆ (23.8)	7⁷⁄₁₆ (188.9)	⅞ (22.2)	⅛ (3.2)
5	2¹¹⁄₁₆ (68.3)	—	—	—	—	—	—	⅛ (3.2)
6	3³⁄₁₆ (81.0)	—	—	7⅞ (200.0)	1⁵⁄₁₆ (33.3)	—	1⅜ (34.9)	⅛ (3.2)

6.8 *Solvent Cement*—Solvent cements shall meet the requirements of Specification D3122.

6.9 *Joint Tightness*—Joints made with pipe and fittings shall not leak when tested in accordance with 8.12.

7. Retest and Rejection

7.1 If the results of any test(s) do not meet the requirements of this specification, the test(s) may be conducted again in accordance with an agreement between the purchaser and the

TABLE 4 Minimum Impact Strength Requirements of Pipe and Fittings at 73°F (23°C)

Nominal Size, in.	Minimum Impact	
	ft·lbf	m·kg
2	10	1.4
3	10	1.4
4	15	2.1
5	15	2.1
6	15	2.1

TABLE 5 Minimum Pipe Stiffness for Pipe

Nominal Size, in.	Minimum Pipe Stiffness at 5 % Deflection	
	Original and Water Immersion Specimens	
	psi	MPa
2	50	0.35
3	42	0.29
4	38	0.26
5	37	0.26
6	34	0.23

seller. There shall be no agreement to lower the minimum requirement of the specification by such means as omitting tests that are a part of the specification, substituting or modifying a test method, or by changing the specification limits. In retesting, the product requirements of this specification shall be met and the test methods designated in the specification shall be followed. If, upon retest, failure occurs, the quantity of product represented by the test(s) does not meet the requirements of this specification.

8. Test Methods

8.1 *Conditioning*—Condition the specimens prior to test at 73.4 ± 3.6°F (23 ± 2°C) and 50 ± 10 % relative humidity for not less than 40 h in accordance with Procedure A of Practice D618, for those tests where conditioning is required and in all cases of disagreement.

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

8.3 *Deflection Temperature*—Determine the deflection temperature in accordance with Test Method D648. Injection mold two ¼ by ½ by 5-in. (6.4 by 12.7 by 127-mm) test specimens under conditions specified by the manufacturer. The test shall be made only at a stress of 264 psi (1.82 MPa). An inert immersion medium shall be used. The heating rate shall be 2 ± 0.2°C/min.

8.4 *Material Impact Resistance*—Determine the Izod impact resistance in accordance with Method A of Test Methods D256. Injection mold ten ⅛ by ½ by 2½-in. test specimens under conditions specified by the manufacturer. The notch shall be produced by a machining operation using a single-tooth milling cutter.

8.5 *Tensile Properties*—Determine the tensile strength, elongation at rupture, and modulus of elasticity in accordance with Test Method D638. Injection mold five Type I test specimens approximately ⅛ in. (3.2 mm) thick under conditions specified by the manufacturer. The speed of testing shall be 0.20 to 0.25 in. (5 to 6 mm)/min.

8.6 *Pipe Dimensions:*

8.6.1 *Pipe Diameters:*

8.6.1.1 Measure the average outside diameter of the pipe in accordance with Test Method D2122. Use either a tapered-sleeve gage or a vernier circumferential wrap tape accurate to ±0.001 in. (±0.02 mm).

8.6.1.2 Measure the average inside diameter of the pipe in accordance with Test Method D2122.

8.6.2 *Wall Thickness*—Measure the wall thickness in accordance with Test Method D2122. Make sufficient readings, a minimum of six, to ensure that the minimum thickness has been determined. Use a cylindrical anvil tubing micrometer accurate to ±0.001 in. (±0.02 mm).

8.6.3 *Length*—Determine the over-all length of the pipe in accordance with Test Method D2122 using a steel tape with at least 1/16-in. (1-mm) graduations. For belled or coupled pipe, determine the laying length by measuring the bell or coupling socket depth with a steel rule with at least 1/16-in. graduations and subtracting this dimension from the overall length.

8.7 *Fitting and Bell-End Socket Dimensions:*

8.7.1 *Socket Diameters*—Measure the inside diameters of the sockets at the socket entrance and bottom, using an inside micrometer accurate to ±0.001 in. (±0.02 mm) or a telescoping pin gage in conjunction with an outside micrometer accurate to ±0.001 in. Determine the average inside diameters at the entrance and the bottom of the socket by taking sufficient readings at each position. Calculate the average inside diameter at each position by taking the mean of the minimum and maximum values.

8.7.2 *Wall Thickness*—Measure the wall thickness in accordance with Test Method D2122. Make sufficent readings, a minimum of six, to ensure that the minimum thickness has been determined. Use a cylindrical anvil tubing micrometer accurate to ±0.001 in. (±0.02 mm).

8.7.3 *Socket Depth*—Measure the socket depth using a steel rule with at least 1/16-in. (1-mm) graduations. Make sufficient readings to ensure that the minimum depth has been determined.

8.8 *Flattening*—Flatten three specimens of pipe, 6 in. long, between parallel plates in a suitable press, until the distance between the plates is 80 % of the original outside diameter of the pipe. The rate of loading shall be uniform and such that the compression is completed within 2 to 5 min. Remove the load and examine the specimens for evidence of splitting, cracking, or breaking. Reversal of curvature of the surface in contact with the parallel plate before 20 % deflection is reached shall also be deemed failure.

NOTE 4—This test may be run in conjunction with 8.10.

8.9 *Impact Strength*—Determine the impact strength of pipe and fittings in accordance with Method D2444. Tup B at 10-lb (4.5-kg) weight shall be used, and dropped on the specimen from the selected height equivalent to the minimum impact requirements given in Table 4 for that size pipe or fitting. Test six specimens. If two or more specimens fail to meet the

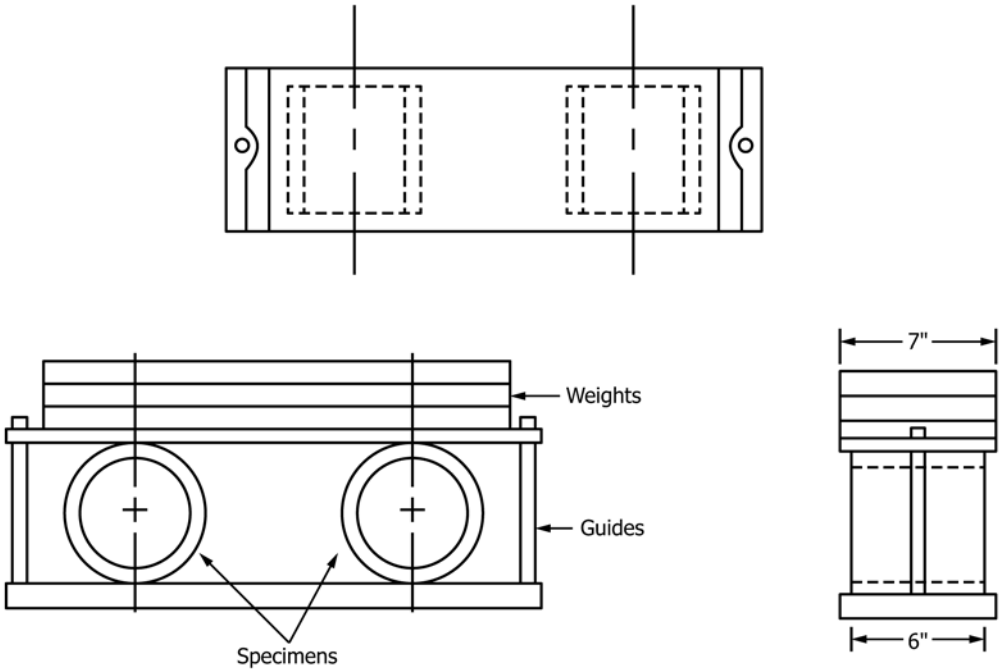

FIG. 1 Apparatus for Dimensional Stability Test

requirements, the pipe or fitting fails to pass this requirement. Test couplings and other in-line fittings assembled to pipe.

8.10 *Pipe Stiffness*—Determine the pipe stiffness at 5 % deflection in accordance with Test Method D2412.

8.11 *Dimensional Stability*—Cut two 6 ± ⅛-in. long test specimens cleanly from the pipe. Mark and measure a diameter on the inside on the nearest 0.001 in. (0.02 mm). Place the specimens on a flat rigid base with the measured diameter in a vertical position, and place the assembly in a circulating air oven. Load the pair of test specimens symmetrically as shown in Fig. 1 to produce the total load for the indicated diameter as shown in Table 6. Turn on the heat in the oven and raise the temperature to 122 ± 5.4°F (50 ± 3°C). Hold the temperature there for 48 ± 1 h. Remove the load from the specimens and then remove the specimens from the oven. After cooling for 1 h, remeasure the inside diameters and calculate the average change in percent of the initial diameter.

8.12 *Joint Tightness*—Join two pieces of pipe by means of a fitting in accordance with the manufacturer's recommendations and using solvent cement as described in 6.8. Allow the unit to stand for 24 h at room temperature. Subject the unit to an internal pressure of 25 psi (0.17 MPa) for 24 h with water as the medium. The assembly shall show no leakage.

TABLE 6 Loads for Dimensional Stability Test

Nominal Size, in.	Total Load	
	lb	kg
2	55	25
3	55	25
4	55	25
5	65	29.5
6	65	29.5

9. Certification

9.1 When specified in the purchase order or contract, a producer's or supplier's certification shall be furnished to the purchaser that the material was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements. When specified in the purchase order or contract, a report of the test results shall be furnished.

10. Product Marking

10.1 *Quality of Marking*—The marking shall be applied to the fittings and pipe in such a manner that it remains legible (easily read) after installation.

10.2 *Content of Marking:*

10.2.1 Pipe shall be marked with the following:

10.2.1.1 Manufacturer's name or trademark.

10.2.1.2 The designation, "ASTM D2852."

10.2.1.3 Material designation "SR."

10.2.1.4 The nominal pipe size (for example, 2 in.).

10.2.1.5 Marking on pipe shall be spaced at intervals of not more than 2 ft (600 mm).

10.2.2 Fittings shall be marked with the following:

10.2.2.1 Manufacturer's name or trademark.

10.2.2.2 The designation, "ASTM D2852."

10.2.2.3 Material designation "SR.''

10.2.2.4 The nominal pipe size (for example, 2 in.).

10.2.2.5 Alternatively, fittings may be marked with three dots in a triangular spacing instead of the specification number.

11. Quality Assurance

11.1 When the product is marked with this designation, D2852, 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.

SUPPLEMENTARY REQUIREMENTS

GOVERNMENT/MILITARY PROCUREMENT

These requirements apply only to federal/military procurement, not domestic sales or transfers.

S1.1 *Responsibility for Inspection*—Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection 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 disapproved by the purchaser. 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.

S1.2 *Packaging and Marking for U.S. Government Procurement*:

S1.2.1 *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 packing shall comply with Uniform Freight Classification rules or National Motor Freight Classification rules.

S1.2.2 *Marking*—Marking for shipment shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

NOTE S1.2—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.

SUMMARY OF CHANGES

Committee F17 has identified the location of selected changes to this standard since the last issue (D2852 – 95(2008)) that may impact the use of this standard.

(1) 8.1-revised the tolerance on relative humidity from ± 5% to ± 10%.