



Standard Specification for Acrylonitrile-Butadiene- Styrene (ABS) Sewer Pipe and Fittings¹

This standard is issued under the fixed designation D 2751; 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 Department of Defense.

1. Scope

1.1 This specification covers acrylonitrile-butadienestyrene (ABS) sewer pipe, produced by single extrusion or simultaneous multiple coextrusion. This specification also covers fittings. Included are requirements and test methods for materials, dimensions, workmanship, chemical resistance, water resistance, and joint tightness. A form of marking to indicate compliance with this specification is also included.

1.2 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 the specification.

1.3 The following precautionary 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:

- D 618 Practice for Conditioning Plastics for Testing
- D 1600 Terminology for Abbreviated Terms Relating to Plastics
- D 2122 Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings
- D 2235 Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
- D 2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- D 2444 Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

D 3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

D 3965 Specification for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Compounds for Pipe and Fittings

F 412 Terminology Relating to Plastic Piping Systems

F 477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

2.2 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)²

2.3 Military Standard:

MIL-STD-129 Marking for Shipment and Storage²

3. Terminology

3.1 *Definitions*:—Definitions are in accordance with Terminology F 412, and abbreviations are in accordance with Terminology D 1600, unless otherwise specified. The abbreviation for acrylonitrile-butadiene-styrene plastic is ABS.

3.1.1 *acrylonitrile-butadiene-styrene (ABS) pipe and fitting plastics*—plastics containing polymers or blends of polymers, or both, in which the minimum butadiene content is 6 %, the minimum acrylonitrile content is 15 %, the minimum styrene or substituted styrene content, or both, is 15 %, and the maximum content of all other monomers is not more than 5 %, plus lubricants, stabilizers, and colorants.

4. Significance and Use

4.1 The requirements of this specification are intended to provide pipe and fittings suitable for nonpressure drainage of sewage, surface water, and certain other liquid wastes, in applications outside the building limits.

NOTE 1—Industrial waste disposal lines should be installed only with the specific approval of the cognizant building code authority, since chemicals not commonly found in drains and sewers and temperatures in excess of 80°C (180°F) may be encountered.

5. Pipe Classification

5.1 Pipe is produced by single extrusion or simultaneous multiple coextrusion. Pipe produced by simultaneous multiple coextrusion shall be classified as “Coex.”

¹ This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.62 on Sewer. Current edition approved May 1, 2005. Published May 2005. Originally approved in 1968. Last previous edition approved in 1996 as D 2751 – 96a.

² Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

NOTE 2—Fittings described in this specification are intended for use with both classes of pipe.

6. Materials

6.1 *General*—The pipe and fittings shall be made of virgin ABS plastic which shall meet the minimum cell classifications of 0-0-3-2-3, 2-0-2-1-2, or 1-0-2-2-3 as defined in Specification D 3965.

6.2 *Rework Material*—The manufacturer shall use only his own clean pipe or fitting rework material; the pipe and fittings produced shall meet all the requirements of this specification.

7. Requirements Requirements

7.1 *Workmanship*—The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

7.2 *Dimensions*—Pipe and fitting dimensions shall meet the requirements of Table 1, Table 2, or Table 3 (Fig. 1) as appropriate, when measured in accordance with Test Method D 2122.

7.2.1 For pipe produced by simultaneous multiple coextrusion, that is, pipe containing two or more concentric layers, the outer layer shall be at least 0.50 mm (0.020 in.) thick.

7.2.2 For pipe produced by simultaneous multiple coextrusion, 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 at any point, nor shall separation of bond occur, between layers, during testing performed under the requirements of this specification.

7.2.3 *Fittings Wall Thickness*—In the case of belled pipe, the thickness of the belled section shall be considered satisfactory if the bell was formed from a pipe meeting the requirements of Table 1.

7.3 *Flattening*—There shall be no evidence of splitting, cracking, or breaking when pipe is tested in accordance with 8.3.

7.4 *Impact Strength*—The impact strength of the pipe shall not be less than the values given in Table 4 when tested in accordance with 8.4.

TABLE 1 Diameters, Tolerances, and Minimum Wall Thicknesses for ABS Sewer Pipe, mm (in.)

Nominal Size, in.	Average Outside Diameter	Wall Thickness, min		
		SDR ^A 23.5	SDR 35	SDR 42
3	82.55 ± 0.20	...	2.54 ^B	...
	(3.250 ± 0.008)	...	(0.100)	...
4	107.06 ± 0.23	4.57	3.18 ^B	...
	(4.215 ± 0.009)	(0.180)	(0.125)	...
6	159.38 ± 0.28	6.73	4.57	...
	(6.275 ± 0.011)	(0.265)	(0.180)	...
8	213.36 ± 0.46	...	...	5.08
	(8.400 ± 0.018)	...	...	(0.200)
10	266.7 ± 0.46	...	...	6.35
	(10.500 ± 0.018)	...	...	(0.250)
12	317.5 ± 0.46	...	...	7.62
	(12.500 ± 0.018)	...	...	(0.300)

^A SDR is average outside diameter divided by minimum wall.

^B 3 in. is SDR 32.5 and 4 in. is SDR 33.5.

NOTE 3—The tests in 7.3 and 7.4 are not intended for use as simulated service tests and are normally conducted as quality control tests at the time of manufacture, prior to shipment from the point of manufacture.

7.5 *Pipe Stiffness*—Pipe stiffness for the pipe shall comply with Table 5 when measured in accordance with Test Method D 2412 at 5 % deflection.

NOTE 4—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 5—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 D 2412. 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.

7.6 *Solvent Cement*—The cement shall meet the requirements of Specification D 2235.

7.7 *Gaskets*, for elastomeric joints, shall conform to Specification F 477.

7.8 *Joint Tightness*—Joints made with pipe and fittings or with belled-end pipe shall show no signs of leakage when tested in accordance with 8.5.

NOTE 6—Pipe and fittings produced to this specification should be installed in accordance with Practice D 2321.

8. Test Methods

8.1 *Conditioning*—Condition specimens prior to test at 23 ± 2°C (70 to 77°F) and 50 ± 5 % relative humidity for not less than 40 h in accordance with Procedure A of Practice D 618, for those tests where conditioning is required.

8.2 *Test Conditions*—Conduct tests in the standard laboratory atmosphere of 23 ± 2°C (70 to 77°F) and 50 ± 5 % relative humidity unless otherwise specified.

8.3 *Flattening*—Flatten pipe until it is deflected 30 % for SDR 23.5 and 40 % for other SDR’s using Test Method D 2412.

NOTE 7—This test may be run in conjunction with Test Method D 2412.

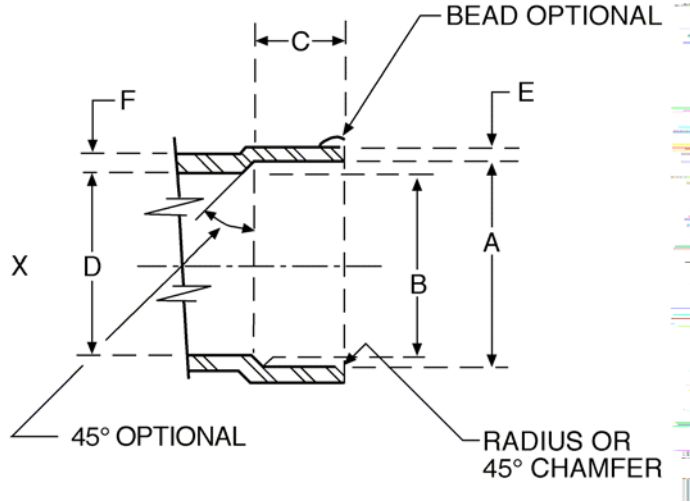
8.4 *Impact Resistance*—Determine the impact resistance of the pipe in accordance with Test Method D 2444, using tup B and holder B. The tup shall weigh 5 kg (12 lb) for diameters to and including 4 in. and 15 kg (30 lb) for larger diameters. Test five specimens at the impact levels given in Table 4; all shall pass. If one fails, test another five specimens; 9 passes out of 10 tested shall be acceptable.

8.5 Joint Tightness:

8.5.1 *Solvent Cement Joints*—Join two pieces of pipe by means of a fitting in accordance with the manufacturer’s recommendations and using solvent cement as described in 7.6. Allow the joint unit to stand for 24 h at room temperature. Subject the unit to an internal water pressure of 170 kPa (25 psi) at room temperature for 24 h, and examine the pipe, fitting, and joints for leakage.

8.5.2 *Elastomeric Joints*—Conduct tests in accordance with Specification D 3212 on testing elastomeric joints.

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



Nominal Size, in.	A	B	C (min)	D (min)	E and F (min) ^A	
					SDR 35	SDR 42
3	83.08 ± 0.20 (3.271 ± 0.008)	82.42 ± 0.20 (3.245 ± 0.008)	38.1 (1 1/2)	73.02 (2 7/8)	2.54 (0.100)	...
4	107.56 ± 0.23 (4.235 ± 0.009)	106.93 ± 0.23 (4.210 ± 0.009)	41.3 (1 5/8)	98.42 (3 7/8)	3.18 (0.125)	...
6	160.15 ± 0.28 (6.305 ± 0.011)	159.26 ± 0.28 (6.270 ± 0.011)	63.5 (2 1/2)	149.22 (5 7/8)	4.57 (0.180)	...
8	214.38 ± 0.33 (8.440 ± 0.013)	213.61 ± 0.33 (8.410 ± 0.013)	101.6 (4)	200.02 (7 7/8)	...	5.08 (0.200)
10	267.72 ± 0.38 (10.540 ± 0.015)	267.72 ± 0.38 (10.540 ± 0.015)	127.0 (5)	250.82 (9 7/8)	...	5.59 (0.220)
12	318.52 ± 0.43 (12.540 ± 0.017)	317.52 ± 0.43 (12.501 ± 0.017)	152.4 (6)	301.62 (11 7/8)	...	6.60 (0.260)

^A 10% variation resulting from core shift or other processes is allowable; however, the average of the two opposite wall thicknesses shall equal or exceed the value shown in the table.

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

	Diameter				
	3 in.	4 in.	6 in.	8 in.	10 in.
C	38.10 (1 1/2)	44.45 (1 3/4)	63.5 (2 1/2)	101.6 (4)	127 (5)
G ₁	...	...	79.38 (3 1/8)	108.0 (4 1/4)	134.94 (5 5/16)
G ₂	...	...	168.28 (6 5/8)	236.54 (9 5/16)	276.22 (10 7/8)
G ₃	...	130.18 (5 1/8)	203.2 (8)	254 (10)	305.3 (12 1/2)
G ₄	82.55 (3 1/4)	127.0 (5)	190.5 (7 1/2)	254 (10)	305.3 (12 1/2)
G ₅	14.29 (9/16)	23.81 (1 5/16)	33.34 (1 5/16)	50.8 (2)	57.15 (2 1/4)
G ₆	34.92 (1 3/8)	44.45 (1 3/4)	...	...	...
G ₇	73.02 (2 7/8)	93.66 (3 11/16)	...	...	...
G ₈	...	57.15 (2 1/4)	79.38 (3 1/8)	108.74 (4 9/32)	134.94 (5 5/16)
G ₉	42.07 (1 21/32)	54.77 (2 5/32)	80.96 (3 3/16)	108.74 (4 9/32)	134.94 (5 5/16)
G ₁₀	...	28.58 (1 1/8)	28.58 (1 1/8)	...	...
G ₁₁	...	15.86 (5/8)	19.05 (3/4)	27.99 (1 1/16)	134.94 (5 5/16)
G ₁₂	17.46 (11/16)	22.22 (7/8)	34.92 (1 3/8)	49.21 (1 15/16)	61.91 (2 7/16)
G ₁₃	...	304.8 (12)	457.2 (18)	...	...
H ₁	...	69.85 (2 3/4)	92.08 (3 5/8)	152.4 (6)	184.15 (7 1/4)
H ₂	152.40 (6)	188.91 (7 7/16)	...	...	...
H ₃	...	101.6 (4)	152.4 (6)	216.69 (8 17/32)	265.11 (10 7/16)
H ₄	...	63.5 (2 1/2)	79.38 (3 1/8)	...	...
H ₅	...	304.8 (12)	457.2 (18)	...	...
N	3.18 (1/8)	3.18 (1/8)	3.18 (1/8)	3.18 (1/8)	3.18 (1/8)

^A The negative tolerance on these dimensions is zero.

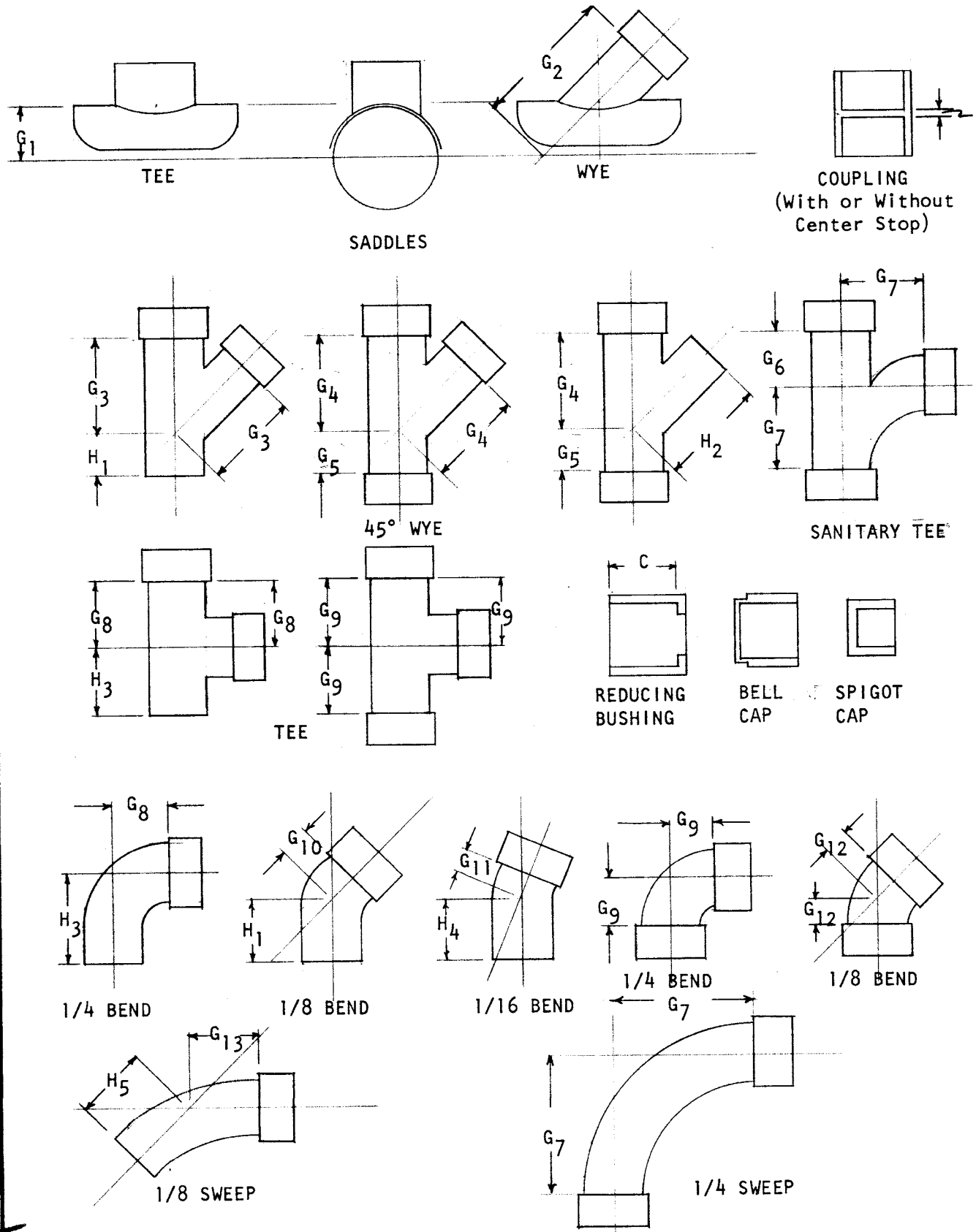


FIG. 1 Fitting Minimum Laying Length Dimensions, mm (in.) (see also Table 3)

TABLE 4 Minimum Impact Strength Requirements at 23°C (73°F)

Nominal Pipe Size, in.	Impact Level, J (ft-lbf)		
	SDR 23.5	SDR 35	SDR 42
3	...	54 (40)	...
4	136 (100)	61 (45)	...
6	183 (135)	122 (90)	...
8	...	...	217 (160)
10	...	...	285 (210)
12	...	...	305 (225)

TABLE 5 Minimum Pipe Stiffness at 5 % Deflection

Nominal Pipe Size, in.	Pipe Stiffness, min, kPa (psi)		
	SDR 23.5	SDR 35	SDR 42
3	...	345 (50)	...
4	1030 (150)	310 (45)	...
6	1030 (150)	310 (45)	...
8	...	...	140 (20)
10	...	...	140 (20)
12	...	...	140 (20)

9. Inspection

9.1 Inspection of the material shall be made as agreed upon by the purchaser and the manufacturer as a part of the purchase contract.

10. Retest and Rejection

10.1 If the results of any test(s) do not meet the requirements of this specification, the test(s) shall be conducted again only by agreement between the purchaser and seller. Under such agreement, minimum requirements shall not be lowered, changed, or modified, nor shall specification limits be changed. If upon retest, failure occurs, the quantity of product represented by the test(s) does not meet the requirements of this specification.

11. Certification

11.1 When specified in the purchase order or contract, a manufacturer'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. Each certification so furnished shall be signed by an authorized agent of the manufacturer.

12. Marking

12.1 Pipe in compliance with this specification shall be clearly marked as follows at intervals of 1.5 m (5 ft) or less:

12.1.1 Manufacturer's name or trademark and code,

12.1.2 Nominal pipe size,

12.1.3 The legend "ABS Sewer Pipe,"

12.1.4 This designation, "ASTM D 2751," and

12.1.5 Pipe SDR number.

12.1.6 Pipe produced by simultaneous multiple coextrusion shall be marked "Coex" in accordance with 5.1.

12.2 Fittings in compliance with this specification shall be clearly marked as follows:

12.2.1 Manufacturer's name or trademark,

12.2.2 Nominal size,

12.2.3 The material designation "ABS," and

12.2.4 This designation, "ASTM D 2751."

13. Quality Assurance

13.1 When the product is marked with this designation, D 2751, 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. *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 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 packing 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 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.

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