Designation: D6576 – 13

Standard Specification for Flexible Cellular Rubber Chemically Blown[1]

This standard is issued under the fixed designation D6576; 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 establishes requirements for chemically blown cellular rubber.

1.2 In the case of conflict between the provisions of this specification and those of detailed specifications or test methods for a particular product, the latter shall take precedence.

1.3 Unless specifically stated otherwise, by agreement between the purchaser and the supplier, all test methods shall be performed in accordance with the test methods specified in this specification.

1.4 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

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.*

1.6 There is no known ISO equivalent to this specification.

NOTE 1—This specification was revised using the updated test methods and specifications in the latest version of Specification D1056.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D297 Test Methods for Rubber Products—Chemical Analysis

D471 Test Method for Rubber Property—Effect of Liquids

D635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

D883 Terminology Relating to Plastics

D1055 Specifications for Flexible Cellular Materials—Latex Foam

D1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 *SAE Standard:*[3]

SAE J 1351-1993 Hot Odor Test for Insulation Materials

2.3 *Military Standards/Specifications:*[4]

MIL STD 105 Sampling Procedures and Tables for Inspection by Attributes

MIL STD 129 Marking for Shipment and Storage

MIL STD 293 Visual Inspection Guide for Cellular Rubber Items

MIL R 6130C Standard Specification for Flexible Cellular Rubber Chemically Blown

2.4 *Federal Standards/Specifications:*[4]

PPP-B576 Box, Wood, Cleated, Veneer, Paper Overlaid

PPP-B591 Box, Fiberboard, Wood-Cleated

PPP-B601 Box, Wood, Cleated Plywood

PPP-B621 Box, Wood, Nailed and Lock-Corner

PPP-B636 Box, Shipping, Fiberboard

3. Terminology

3.1 For definitions of technical terms pertaining to cellular flexible rubber used in this specification, refer to Terminology D883.

3.2 *Definitions:*

3.2.1 *cellular material*—a generic term for materials containing many cells (either open or closed, or both) dispersed throughout the mass.

3.2.2 *closed cell*—a product whose cells are totally enclosed by its walls and hence not interconnecting with other cells.

3.2.3 *open cell*—a product whose cells are not totally enclosed by its walls and open to the surface, either directly or by interconnecting with other cells.

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Materials - Plastics and Elastomers.

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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 Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

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

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

4. Classification

4.1 *Types*—This specification covers two types of cellular rubber designated as follows:

4.1.1 *Type I*—Open cell (sponge rubber).

4.1.2 *Type II*—Closed cell (expanded rubber).

4.2 *Grades*—Both types are divided into three grades designated by the letters A, B, and C added to the roman numeral prefix.

4.2.1 *Grade A*—Oil- and flame-resistant.

4.2.2 *Grade B*—No requirements for oil, flame resistance, or low temperature.

4.2.3 *Grade C*—Low-temperature resistant (oil and flame resistance not required).

4.3 *Conditions*—Each type and class has been divided into three different conditions. Each condition is based on a specific range of firmness as expressed by compression deflection as follows:

4.3.1	Condition—Super soft	a compression deflection range of	>0 to ≤13.8 kPa (>0 to ≤2 psi)
4.3.2	Condition—Soft	a compression deflection range of	>13.8 to ≤34.5 kPa (>2 to ≤5 psi)
4.3.3	Condition—Soft-medium	a compression deflection range of	>34.5 to ≤62.1 kPa (>5 to ≤9 psi)
4.3.4	Condition—Medium	a compression deflection range of	>62.1 to ≤89.6 kPa (>9 to ≤13 psi)
4.3.5	Condition—Medium-firm	a compression deflection range of	>89.6 to ≤117.2 kPa (>13 to ≤17 psi)
4.3.6	Condition—Firm	a compression deflection range of	>117.2 to ≤172.4 kPa (>17 to ≤25 psi)

5. Significance and Use

5.1 This specification is a revision of MIL R 6130C retaining most of the MIL R 6130C material designations and property requirements while conforming to ASTM form and style. It is intended to establish requirements for chemically blown cellular rubber used by government and industry, and is intended as a direct replacement for MIL R 6130C.

6. Materials and Manufacture

6.1 *Materials*—The materials shall be homogeneous. Except for the following production allowances:

6.1.1 Tears and edge cracks that do not interfere with specified product yield.

6.1.2 Depression and pock marks not exceeding 1 in.

6.1.3 Splices and butt splices.

6.1.4 Laminating sheets to achieve thickness.

6.2 The material shall not include the following:

6.2.1 Cemented, bonded, shredded, or reprocessed cellular rubber.

6.2.2 Grade A cellular rubber shall not contain natural rubber.

6.3 *Form*—Chemically blown cellular rubber shall be furnished as sheets, rolls, or molded shapes as specified, and shall have a uniform cell structure, with thin skin or rind surfaces. Cut or split sheets void of skin or rind surfaces are permitted to be furnished only for Type II material when specified.

6.4 *Skin or Rind*—The surface formed by contact with the mold shall be considered a skin or rind. It shall be of the same compound, and vulcanized integrally with the cellular structure. Type I shall have skin or rind. It is acceptable for Type II to have or not have skin or rind.

6.5 *Cut or Split Sheets (Type II Only)*—When two or more sheets are derived from one thick sheet, the cut or split sheets shall not be required to possess a skin or rind on either major surface.

6.6 *Surfacing*—Cellular rubber shall be backed or surfaced with fabric, adhesive, or other materials, when and as specified in the contract or order or by applicable drawings.

7. Physical Properties

7.1 The various types and grades of cellular rubber shall conform to the physical properties listed in Table 1 together with any additional requirements indicated by suffix letters in the grade designations as described in Section 4 and Table 2.

8. Tolerances on Dimensions

8.1 Tolerances on dimensions of flexible cellular rubber materials are given in Table 3.

8.2 *Molded Shapes*—Tolerance requirements for molded shapes shall be as specified in drawings, contracts, or by the procuring activity.

8.3 *Sheets and Rolls*—Unless otherwise specified, the tolerance requirements for thickness, lengths and width of sheets shall be as specified in Table 3.

9. Test Methods

9.1 Unless specifically stated otherwise, all test methods shall be in accordance with the test methods specified in Sections 10 – 18.

9.2 *Precision and Bias*—See Section 19.

10. Test Conditions

10.1 *Standard Conditions*—Unless otherwise specified herein, conduct the test method at 23 ± 2°C (73.4 ± 3.6°F) and a relative humidity of 50 ± 10 %.

10.2 *Specimen Conditioning*—Unless otherwise specified, condition all test specimens at standard conditions for at least 22 h prior to testing.

11. Compression Deflection

11.1 Test in accordance with Sections 17 to 22 of Specification D1056.

12. Low-Temperature Flex Resistance

12.1 Test in accordance with Sections 57 to 61 of Specification D1056. Exposure temperatures shall be in accordance with Table 4.

13. Accelerated Aging

13.1 Test in accordance with Sections 35 to 41 of Specification D1056.

14. Recovery

14.1 *Specimen Size*—Round test specimen shall be cut 41.3 ± 1 mm (1.625 ± 0.04 in.) in diameter. Specimens taken from

TABLE 1 Physical Properties[A]

Property		Type I Basic Requirements (Open Cell)	Type II Basic Requirements (Closed Cell)	Test Method, Section
Compression deflection, kPa (psi), 25 % deflection	super soft	>0 to ≤13.8 (>0 to ≤2)	>0 to ≤13.8 (>0 to ≤2)	11
	soft	>13.8 to ≤34.5 (>2 to ≤5)	>13.8 to ≤34.5 (>2 to ≤5)	
	soft-medium	>34.5 to ≤62.1 (>5 to ≤9)	>34.5 to ≤62.1 (>5 to ≤9)	
	medium	>62.1 to ≤89.6 (>9 to ≤13)	>62.1 to ≤89.6 (>9 to ≤13)	
	medium-firm	> 89.6 to ≤117.2 (>13 to ≤17)	> 89.6 to ≤117.2 (>13 to ≤17)	
	firm	>117.2 to ≤172.4 (>17 to ≤25)	>117.2 to ≤172.4 (>17 to ≤25)	
Low-temperature resistance, flex, 180° bend	Grade A –40°C (–40°F)	pass	pass	12
	Grade B –40°C (–40°F)	pass	pass	
	Grade C –55°C (–67°F)	pass	pass	
Accelerated aging, % retention of original 25 % deflection after 7 days at 158°F	all grades and conditions	±20 %[B]	±30 %[B]	13
Recovery, min, %, after 50 % deflection	all grades and conditions	90	60	14
Flame resistance, max, s	Grade A	30	30	15
	Grade B	not required	not required	
	Grade C	not required	not required	
Shrinkage, max, %, 7 days at 158°F	All grades and conditions	not required	10	16
Water Absorption, max, %	all grades and conditions	not required	10 % max for densities 10 lb/ft^3 and under 5 % max for densities over 10 lb/ft^3	17
Oil aging, % change in volume, IRM Oil 902	Grade A	–15 to +30	–15 to +30	18
	Grade B	not required	not required	
	Grade C	not required	not required	
Color	all grades and conditions	as manufactured unless otherwise specified	as manufactured unless otherwise specified	visual

[A]Unless otherwise specified, the basic requirements listed are for all types, grades, and conditions.
[B]If the super-soft grade after aging still falls within the compression deflection requirement of 0 – 13.8 kPa (0 – 2 psi), it shall be considered acceptable even though the change from original was greater than ±20 % or ±30 %, respectively.

TABLE 2 Optional Requirements Added by Suffix Letters

Property		Type I Optional Requirements (Open Cell)	Type II Optional Requirements (Closed Cell)	Test Method Section
Suffix H: Flexing, max, % set in accordance with Specification D1055	all grades and conditions	10	10	Appendix X1
Suffix O: Odor in accordance with SAE J-1351	all grades and conditions	rating to be determined	rating to be determined	Appendix X1
Suffix W: Density in accordance with Specification D1056	all grades and conditions	density to be determined	density to be determined	
Suffix Y: Sulfur Content, max, % by weight in accordance with Test Methods D297	all grades and conditions	0.60	0.60	Appendix X1

either sheets or molded shapes shall have a minimum thickness of 6.4 mm (0.250 in.) and a maximum thickness of 28.6 mm (1.125 in.). Skin on top face, or bottom face, or both, is allowed. Specimens shall be cut so that opposite edges are parallel. The thickness of the test specimens is permitted to vary, but shall be measured and stated in the report. Measure the thickness of each test specimen to 0.0254 mm (0.001 in.).

14.2 Compress the specimen to 50 % of the original thickness for a period of 46 h ± 30 minutes.

14.3 Remeasure the thickness of each specimen 24 h ± 15 minutes after removal from the compression apparatus.

TABLE 3 Dimensions and Tolerances of Cellular Rubber Products for General Applications

Form	Thickness Dimension, mm (in.)	Thickness Tolerance, mm (in.)±	Length and Width Dimension, mm (in.)	Length and Width Tolerance, mm (in.)±
Sponge Rubber				
Sheet and strip	3.2 (0.125) and under	0.4 (0.016)	152 (6) and under	1.6 (0.063)
	over 3.2 (0.125) to 12.7 (0.50), incl	0.8 (0.032)	over 152 (6) to 457 (18), incl	3.2 (0.125)
	over 12.7 (0.50)	1.2 (0.047)	over 457 (18)	0.5 %
Molded or special shapes	6.4 (0.250) and under	0.8 (0.032)	6.4 (0.250) and under	0.8 (0.032)
	over 6.4 (0.250) to 76.2 (3), incl	1.6 (0.063)	over 6.4 (0.250) to 76 (3), incl	1.6 (0.063)
			over 76 (3) to 457 (18), incl	3.2 (0.125)
			over 457 (18)	0.5 %
Expanded Rubber				
Sheet and strip	12.7 (0.50) and under	1.6 (0.063)	152 (6) and under	6.4 (0.250)
	over 12.7 (0.50)	2.4 (0.094)	over 152 (6) to 305 (12), incl	9.6 (0.375)
			over 305 (12)	3 %
Molded or special shapes	3.2 (0.125) to 12.7 (0.50), incl	1.6 (0.063)	152 (6) and under	6.4 (0.250)
	over 12.7 (0.50) to 38.1 (1.50), incl	2.4 (0.094)	over 152 (6) to 305 (12), incl	9.6 (0.375)
	over 38.1 (1.50) to 76.2 (3), incl	3.2 (0.125)	over 305 (12)	3 %

TABLE 4 Low-Temperature Flex-Resistance Temperatures

Type	Grade	Temperature
I	A and B	–40 ± 1°C (–40 ± 2°F)
I	C	–55 ± 1°C (–67± 2°F)
II	A and B	–40 ± 1°C (–40 ± 2°F)
II	C	–55 ± 1°C (–67± 2°F)

14.4 Calculate the average recovery of three specimens as follows:

$$\text{recovery, } \% = \frac{B}{A} \times 100 \quad (1)$$

where:

A = original thickness, and
B = thickness 24 h ± 15 minutes after removal from apparatus.

14.5 *Precision and Bias:*
14.5.1 See Section 19.

15. Flame Resistance

15.1 Test in accordance with Test Method D635 with the following exceptions:

15.2 Test three specimens and record average propagation time.

15.3 *Specimen Size:* 7.0 ± 1 mm (0.275 ± 0.04 in.) thick by 12.7 ± 1 mm (0.5 ± 0.04 in.) wide by 125 ± 5 mm (4.92 ± 0.2 in.) in length.

15.4 Clamp the specimen on one end with its longitudinal axis horizontal.

15.5 The blue flame shall be 38 ± 2 mm (1.49 ± 0.078 in.) in height.

15.6 Apply the flame for 60 ± 1 s.

15.7 Remove the flame after 60 ± 1 s and record the average propagation time in seconds.

16. Shrinkage

16.1 *Scope*—This test method covers the evaluation of shrinkage of flexible cellular elastomeric materials.

16.2 *Significance and Use*—This test method provides a relatively simple and short-term evaluation of in-use performance with regard to shrinkage.

16.3 *Apparatus*—Air-circulating oven equipped with a control to maintain a temperature of 70 ± 1°C (158 ± 2°F) during the test and having an expanded metal shelf, and a steel rule, graduated in millimetres (inches), capable of measuring to increments of 1.0 mm (0.05 in.).

16.4 *Test Specimen*—Use three specimens approximately 300 by 75 mm (12 by 3 in.) cut from each of the test samples.

16.5 *Procedure*—At each of two points, approximately 250 mm (10 in.) apart on the centerline of each specimen, place a benchmark. Condition the specimen 24 h at a temperature of 23 ± 2°C (73 ± 3.6°F) and measure the distance between the benchmarks to the nearest 1.0 mm (0.05 in.). Place the specimens on an expanded metal shelf in an oven operating at a temperature of 70 ± 1°C (158 ± 2°F). After 7 days ± 2 hours, remove the specimens from the oven, condition for at least 2 h at 23 ± 2°C, and remeasure.

16.6 *Calculation*—Calculate percent shrinkage as follows:

$$\text{change in length, } \% = \frac{L_1 - L_2}{L_1} \times 100 \quad (2)$$

where:

L_1 = original length, and
L_2 = length after oven-aging.

16.7 *Report*—Report the shrinkage as the average change in length of three specimens between the two benchmarks expressed as a percentage of the length originally measured.

16.8 *Precision and Bias:*
16.8.1 See Section 19.

17. Water Absorption (Type II Only)

17.1 Test in accordance with Sections 43 to 48 of Specification D1056.

18. Oil Aging

18.1 Determine the volume of specimens. Measure the diameter and thickness to the nearest 0.40 mm (0.015 in.).

18.2 *Specimen Size*—Round test specimen shall be cut 41.3 ± 1 mm (1.625 ± 0.04 in.) in diameter. Specimens taken from either sheets or molded shapes have a minimum thickness of 6.4 mm (0.250 in.) and a maximum thickness of 28.6 mm (1.125 in.). Skin on top face, or bottom face, or both, is allowed. Specimens shall be cut so that opposite edges are parallel.

18.3 Immerse in petroleum base reference oil IRM 902 of Test Method D471.

18.4 Immersion for 70 h ± 30 min at 70 ± 1°C (158 ± 2°F).

18.5 At the end of the immersion period, remove the specimen and immediately blot lightly with a paper towel, and measure in accordance with 18.1.

18.6 Report the average of three specimens.

18.7 *Calculation*—Calculate the percent change in volume as follows:

$$\text{change in volume, } \% = \frac{V_1 - V_2}{V_1} \times 100 \quad (3)$$

where:

V_1 = original volume, and
V_2 = volume after immersion in oil.

18.8 *Precision and Bias:*
18.8.1 See Section 19.

19. Precision and Bias[5]

19.1 The precision of this test method is based on an interlaboratory study of Specification D6576–07 conducted in 2012. Nine laboratories tested three examples of three different materials. Every "test result" represents an individual determination. Each laboratory reported duplicate results for each sample tested. Practice E691 was followed for the design and analysis of the data

19.1.1 *Repeatability (r)*—The difference between repetitive results obtained by the same operator in a given laboratory applying the same test method with the same apparatus under constant operating conditions on identical test material within short intervals of time would in the long run, in the normal and correct operation of the test method, exceed the following values only in one case in 20.

19.1.1.1 Repeatability can be interpreted as maximum difference between two results, obtained under repeatability conditions, that is accepted as plausible due to random causes under normal and correct operation of the test method.

19.1.1.2 Repeatability limits are listed in Tables 5-7.

19.1.2 *Reproducibility (R)*—The difference between two single and independent results obtained by different operators applying the same test method in different laboratories using different apparatus on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following values only in one case in 20.

19.1.2.1 Reproducibility can be interpreted as maximum difference between two results, obtained under reproducibility conditions, that is accepted as plausible due to random causes under normal and correct operation of the test method.

19.1.2.2 Reproducibility limits are listed in Tables 5-7.

19.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

19.1.4 Any judgment in accordance with statements 19.1.1 and 19.1.2 would have an approximate 95 % probability of being correct.

19.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method, therefore no statement on bias is being made.

19.3 The precision statement was determined through statistical examination of 622 results, from nine laboratories, on three materials. These three materials were described as follows:

Material A:
Material B:
Material C:

19.3.1 To judge the equivalency of two test results, it is recommended to choose the material closest in characteristics to the test material.

20. Keywords

20.1 cellular; closed-cell; elastomeric; flexible; open cell; rubber

[5] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D20-1261. Contact ASTM Customer Service at service@astm.org.

TABLE 5 Recovery - 50 % Compression - 46 Hours @ Room Temperature - 24 Hour Recover (Similar to Compression Set) (%)

Material	Average[A]	Repeatability Standard Deviation	Reproducibility Standard Deviation	Repeatability Limit	Reproducibility Limit
	$\bar{x}$	s_r	s_R	r	R
Material A-Average	74.503	0.907	1.578	2.540	4.420
Material B-Average	91.467	0.868	1.025	2.430	2.870
Material C-Average	86.449	0.512	1.612	1.435	4.513

[A] The average of the laboratories' calculated averages.

TABLE 6 Oil Aging (IRM902 - 70 hours @ 70C) % Change in Volume

Material	Average[A]	Repeatability Standard Deviation	Reproducibility Standard Deviation	Repeatability Limit	Reproducibility Limit
	$\bar{x}$	s_r	s_R	r	R
Material A-Average	8.540	0.994	5.174	2.782	14.487
Material B-Average	6.798	0.555	3.440	1.555	9.631
Material C-Average	9.882	0.504	4.060	1.410	11.369

[A]The average of the laboratories' calculated averages.

TABLE 7 Shrinkage (7 days @ 70C) % Change in Length and Width

Material	Average[A]	Repeatability Standard Deviation	Reproducibility Standard Deviation	Repeatability Limit	Reproducibility Limit
	$\bar{x}$	s_r	s_R	r	R
Material A-Average	2.436	0.293	0.490	0.820	1.372
Material B-Average	3.221	0.251	0.587	0.703	1.644
Material C-Average	4.218	0.224	0.525	0.628	1.470

[A]The average of the laboratories' calculated averages.

APPENDIXES

(Nonmandatory Information)

X1.

X1.1 Apparent Density

X1.1.1 Test in accordance with Specification D1056. Record on the report which test method was used.

X1.2 Free Sulfur Content

X1.2.1 Test in accordance with Test Methods D297.

X1.3 Flexing

X1.3.1 Test in accordance with Sections 24–26 of Specifications D1055.

X1.3.2 Run the test in triplicate. Record the average.

X1.3.3 *Specimen Size*—Approximately 50 by 50 by 25 mm (2 by 2 by 1 in.) thick.

X1.3.4 Each specimen shall undergo 250 000 cycles of flexing. The amplitude of compression and decompression shall be 50 % of the original thickness of each specimen.

X1.3.5 Calculate compression set in accordance with Section 19 of Specifications D1055.

X1.4 Odor

X1.4.1 Test in accordance with Test Method SAE J 1351.

X1.4.2 When specified, treat material to minimize the odor (see X2.5.2.1 (*5*))

X2. MANDATORY GOVERNMENT REQUIREMENTS

X2.1 Marking

X2.1.1 *Identification Marking*—Each piece of cellular rubber shall be marked, if size permits, in a permanent and legible manner using marking material which will not harm the rubber. The marking shall include the following:

X2.1.1.1 ASTM designation D6576.

X2.1.1.2 Type.

X2.1.1.3 Grade.

X2.1.1.4 Condition.

X2.1.1.5 NSN (when applicable).

X2.1.1.6 Manufacturer's part number (when applicable).

X2.1.1.7 Contract or order number.

X2.1.1.8 Manufacturer's name or trademark.

X2.1.1.9 Quarter and calendar year of cure.

X2.1.2 *Sheets*—Marking on sheet material shall be applied to one side only in rows spaced not more than 12.7 cm (5 in.) apart in constantly recurring characters not less than 9.53 mm (0.375 in.) in height extending either lengthwise or crosswise over the sheet.

X2.2 Age Controls

X2.2.1 Cellular rubber covered by this specification shall not be delivered to any government activity when it is more than 4 quarters old (see X2.1.1).

X2.3 Quality Assurance Provisions

X2.3.1 *Responsibility for Inspection*—Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein.

Except as otherwise specified in the contract, the contractor my use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to the prescribed requirements

X2.3.2 *Classification of Inspections*—The examination and testing of the cellular rubber shall be classified as quality conformance inspection (see X2.3.3).

X2.3.3 *Quality Conformance:*

X2.3.3.1 *Lot Formation*—Unless otherwise specified, a lot shall consist of all the material of the same type, grade, and condition, manufactured at one time, forming part of one contract or order and submitted for acceptance at the same time and place.

X2.3.3.2 *Prior Approval*—Whenever a manufacturer has delivered an acceptable product meeting all the requirements of this specification, the procuring activity may, at its discretion, waive the inspections so identified for a period of time not to exceed two years. This option applies only to the products of the same type, grade, and condition.

X2.3.3.3 *Sampling and Inspection Procedures:*

(1) Visual—The sample unit for visual inspection shall be one sheet or molded part as applicable. Samples shall be randomly selected from each lot in accordance with Inspection Level I of MIL STD 105. Each sample unit shall be inspected as specified in Table X2.1. Odor examination shall be conducted at this time and be included as part of the defect scoring. The acceptable quality level (AQL) shall be 2.5 major and 6.5 total defects per 100 units.

(2) Dimensional—The sample unit shall be one sheet or molded part as applicable. The sample shall be selected in accordance with Inspection Level S-3 of MIL STD 105, and may be randomly selected from other samples visually inspected. The sample shall be inspected in accordance with Table X2.2. The AQL shall be 1.5 % defective.

(3) Physical Properties—Sufficient cellular rubber shall be selected from each lot to complete the testing specified in Table X2.3. Failure of the product to pass any requirement in Table X2.3 shall be cause to reject the lot represented by the material.

NOTE X2.1—All test results shall be reported as the average value. All results shall be shown on the report.

NOTE X2.2—These inspections may be waived by the procuring activity in accordance with the provisions of X2.3.3.2.

(*4*) *Packaging Inspection*—Shipping containers, just prior to closure shall be randomly selected from each lot in accordance with Inspection Level I of MIL STD 105. The sample unit shall be one shipping container. The lot size shall be the number of shipping containers. The AQL shall be 4.0 % defective. Samples shall comply with the requirements of X2.4 and Table X2.4. In addition, shipping containers fully prepared for delivery shall be examined for closure defects.

TABLE X2.1 Visual Inspection

Examination	Defect	Major	Minor
Appearance	not uniform in texture, finish, or firmness	X	
	dirt, foreign material, imbedded particles		X
	production defects not corrected (see 6.1)	X	
Construction	Any defects classified as major or minor as specified in MIL STD 293		X
	skin or rind not as specified		X
Odor	objectionable		X

TABLE X2.2 Dimensional Inspection

Examination	Defect
Sheets and molded parts	any dimension that varies more than the molded parts plus or minus tolerances specified in Section 8

TABLE X2.3 Physical Properties

Property	Requirement Section	Test Section	Number of Specimens	Results Reported to: (Units)
Basic Test Methods				
Compression deflection	Table 1	11	3	0.1 kPa (psi)
Low-temperature resistance	Table 1	12	3	pass/fail
Accelerated aging	Table 1	13	3	1 %
Recovery	Table 1	14	3	1 %
Flame resistance	Table 1	15	3	1 s
Shrinkage	Table 1	16	3	1 %
Water absorption (Type II only)	Table 1	17	3	1 %
Oil aging	Table 1	18	2	1 %
Odor	Table 1	20	1	use rating chart
Nonmandatory Test Methods				
Flexing	—	X1.3	3	%
Free sulfur	—	X1.2	3	%
Apparent density	—	X1.1	3	0.001 (kg/m^3)

X2.4 Packaging

X2.4.1 *Preservation Packaging*—Packaging shall be Level A or Commercial as specified (see X2.5.2).

X2.4.1.1 *Level A*—The rubber sheets shall be separated with paper or other suitable separator sheets which will not adhere to or damage the rubber. The molded shapes shall be wrapped, boxed, or otherwise protected against deformation and abrasion.

TABLE X2.4 Packaging Inspection

Examine	Defect
Packaging (as applicable) sheets	paper separator sheets omitted
Molded shapes	not wrapped, boxed, or otherwise protected against abrasion and deformation; unit package not as specified; packaging material not as specified
Packing	not in accordance with contract requirements; arrangements or number of units per shipping container not in accordance with contract requirements; container not as specified or required methods or materials; any nonconforming component, component missing, damaged, or otherwise defective affecting serviceability; inadequate application of components, such as, incomplete closures of case liners, container flaps, loose or inadequate strapping, bulged or distorted containers
Count	less than specified or indicated quantity
Weight	gross weight exceeds specified requirements
Markings	interior or exterior markings (as applicable) omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements; precautionary markings missing or not as specified

X2.4.1.2 *Commercial*—Packaging shall be in accordance with the manufacturer's commercial practice.

X2.4.2 *Packing*—Packing shall be Level A, B, or Commercial, as specified (see X2.5.2). Containers shall contain identical amounts of material, be of uniform size, and be designed to enclose the contents in a snug, tight-fitting manner. The gross weight of boxes shall not exceed 90.7 kg (200 lb)

X2.4.2.1 *Level A*—The rubber shall be packed in snug-fitting, overseas, exterior-type, boxes conforming to PPP-B576, PPP-B591, PPP-B601, PPP-B621, or PPP-B636. Boxes shall be strapped in accordance with the appendix of the applicable box specification.

X2.4.2.2 *Level B*—Unless otherwise specified, the rubber shall be packed in snug-fitting domestic-type boxes conforming to PPP-B576, PPP-B591, PPP-B601, PPP-B621, or PPP-B636.

X2.4.2.3 *Commercial*—The rubber shall be packed in a manner to ensure carrier acceptance and safe delivery at destination. Containers shall be in accordance with Uniform Freight Classification Rules or regulations of other carriers applicable to the mode of transportation.

X2.4.3 *Marking of Shipments*—In addition to any special markings required by the contract or order, unit packages and shipping containers shall be marked in accordance with MIL STD 129.

X2.5 Additional Information

X2.5.1 *Intended Use:*

X2.5.1.1 *Type I (Open Cell)*—Chemically blown cellular rubber is intended for use in miscellaneous applications requiring a material capable of absorbing shock and damping vibrations. It is not recommended for applications involving tensile loading or where the cellular chemically blown rubber will come in continuous contact with the human skin.

X2.5.1.2 *Type II (Closed Cell)*—Type II material is intended for flotation gear (skin or rind form only) expansion joint fillers, gaskets, and shock pads where water-repellent qualities are desired. It is not recommended for applications where extreme high temperatures are encountered, or where the expansion of the material at high altitudes will be a disadvantage.

X2.5.1.3 *Grade*—The intended use for grades of Type I (open cell) and for Type II (closed cell) are as follows:

(1) Grade A—Grade A cellular rubber is intended for use where resistance to oil and flame is required.

(2) Grade B—Grade B cellular rubber is intended for use where resistance to oil is not required.

(3) Grade C—Grade C cellular rubber is intended for use where lower-temperature resistance, but not oil resistance, is required.

X2.5.2 *Ordering Data:*

X2.5.2.1 *Procurement Requirements*—Procurement documents should specify the following:

(1) Title, number, and date or this specification designation.

(2) Quantity required.

(3) Detail dimensioned drawings or specifications describing the shape, surfacing of the part, dimensions, and tolerances.

(4) Type, grade, and condition of material required (see Section 4).

(5) Any special characteristics required (color, odor minimized, special surfacing, and so forth).

(6) Levels of packaging, packing required (see X2.4).

(7) Special markings (see X2.4.3).

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue (D6576 – 07) that may impact the use of this standard. (November 15, 2013)

(1) Added precision and bias statement (Section 19).
(2) Corrected SI values in 4.3 and Table 1.
(3) Added flame tolerances to 15.5.
(4) Modified number of specimens and added average for oil aging and shrinkage.
(5) Removed all references to Test Methods D3575.