Designation: D 1055 – 97

Used in USDOE-NE Standards

Standard Specifications for Flexible Cellular Materials—Latex Foam[1]

This standard is issued under the fixed designation D 1055; 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 These specifications,[2] including test methods, apply to flexible cellular rubber products known as latex foam rubbers but do not apply to sponge and expanded rubbers. The base material used in their manufacture may be natural rubber, reclaimed rubber, synthetic rubber, or rubber-like materials, alone or in combination.

1.2 In case of conflict between the provisions of these general specifications and those of detailed specifications or test methods for a particular product, the latter shall take precedence. Reference to methods for testing cellular rubber products should specifically state the particular test or tests desired.

1.3 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.4 The following precautionary caveat pertains only to the test methods portions, Sections 8, 16, 18, 23, 26, 29, and 31, of these specifications: *This standard may involve hazardous materials, operations, and equipment. 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 395 Test Methods for Rubber Property—Compression Set[3]

D 454 Test Method for Rubber—Deterioration by Heat and Air Pressure[3]

D 572 Test Method for Rubber—Deterioration by Heat and Oxygen[3]

D 573 Test Method for Rubber—Deterioration in an Air Oven[3]

D 1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber[4]

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets[3]

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *flexible cellular rubber*—a cellular organic polymeric material that will not rupture within 60 s when a specimen 200 by 25 by 25 mm is bent around a 25-mm diameter mandrel at a uniform rate to produce 1 lap in 5 s in the form of a helix at a temperature between 18 and 29°C.

3.1.2 *rubber*—the term rubber is used to include both natural and synthetic types.

3.1.3 *skin*—the smooth surface of the latex foam rubber product, formed by contact with the mold or cover plates, is defined as a natural skin.

4. Materials and Manufacture

4.1 *Latex Foam Rubbers*—The structure of latex foam rubbers consists of a network of open or interconnecting cells. Latex foam rubbers are made from rubber latices or liquid rubbers. They are manufactured in sheet, strip, molded, or specific shapes. Latex foam rubbers shall have a vulcanized cellular structure with a porous surface. The cells shall be interconnecting and of a uniform character. Latex foam rubbers may be either cored or solid. Size, shape, and distribution of coring shall be at the producer's option but subject to the approval of the purchaser.

5. Grades of Latex Foam Rubbers

5.1 Latex foam rubbers shall have their grade numbers designated by two letters which identify the kind of latex foam rubber as follows:

RC—Latex foam rubbers, cored, and

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[2] These specifications together with Specification D 1056 replace the former Tentative Methods of Testing Cellular Rubber Products (D 552 – 46a T) and the Tentative Specifications for Cellular Rubber Products (D 798 – 46a T), which were accordingly discontinued in 1949.

[3] *Annual Book of ASTM Standards*, Vol 09.01.

[4] *Annual Book of ASTM Standards*, Vol 09.02.

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

RU—Latex foam rubbers, uncored.

Digits following the letters are used to indicate the degree of firmness, the softer grades being identified with the lower numbers and the firmer grades with the higher numbers (see Table 1).

5.2 *Suffix Letters* may be added singly or in combination after any grade number to indicate additional requirements beyond those specified in Table 1 as basic requirements. The significance of the approved suffix letters is as follows:

SIGNIFICANCE OF SUFFIX LETTERS

Suffix Letters
- C—Weather Resistance[A]
- D—Load Deflection[A]
- E—Oil Resistance[A] Note that there are no requirements for oil resistance in these specifications.
- F1—Low-Temperature Brittleness at – 40°C (–40°F) Required with values as specified in Table 1
- F2—Low-Temperature Brittleness at – 55°C (–67°F)[A]
- G—Tear Resistance[A]
- H—Flex Resistance Test required with values specified in Table 1
- J—Abrasion Resistance[A]
- K—Adhesion Resistance[A]
- L—Water Resistance[A]
- M—Flammability Resistance[A]
- P—Non-Staining[A]
- R—Resilience[A]
- Z—Special Requirements[A]

[A] Test method and values to be arranged between the purchaser and the supplier.

NOTE 1—*Example*: Grade RC 20 F1H denotes soft, cored latex foam rubber made from natural, reclaim synthetic, or a blend with a load deflection value of 89 ± 18 N (20 ± 4 lbf) and requiring in addition to the basic tests a low-temperature test at –40°C (–40°F) and a flexing test.

6. Physical Properties

6.1 The various grades of latex foam rubber shall conform to the requirements as to physical properties prescribed in Table 1, together with any additional requirements indicated.

6.2 When subjected to the static fatigue test the latex foam specimen shall show no cracking at the folded edge.

7. Tolerances on Dimensions

7.1 Tolerances on dimensions of latex foam rubber products are given in Table 2 and Table 3.

8. Workmanship, Finish, and Appearance

8.1 Latex foam rubbers furnished under these specifications shall be manufactured from natural rubber, synthetic rubber, or rubber-like materials, together with added compounding ingredients of such nature and quality that the finished product complies with the specification requirements. In permitting choice in use of those materials by the producer, it is not intended to imply that the different rubber materials are equivalent in respect to all physical properties. Any special characteristics other than those prescribed in these specifications which may be desired for specific applications shall be specified in the products specifications, as they may influence the choice of the type of rubber materials or other ingredients used. All materials and workmanship shall be in accordance with good commercial practice, and the resulting cellular rubber shall be free of defects affecting serviceability.

8.2 Due to manufacturing conditions, material may have to be altered or repaired. This repaired or altered material will be

TABLE 1 Physical Requirements of Latex Foam Rubbers

Grade Number	Basic Requirements: Indentation Value on 325 cm² (50 in.²), 25 % Deflection (Limits)		Basic Requirements: Air Oven Aged 22 h at 100°C (212°F) Change from Original Load-Deflection or Indentation Value (Limits), %	Basic Requirements: Constant Deflection Compression Set 22 h at 70°C (158°F), 50 % Deflection, max, %		Requirements Added by Suffix Letters: Suffix F Low Temperature Test, Change from Original Deflection, max, %	Requirements Added by Suffix Letters: Suffix H Flexing Test Compression Set, max, %	
	N	lbf		C_h[A]	C_d[A]		C_h[A]	C_d[A]
Latex Foam Rubbers (Cored)								
RC 5	22±13	5±3	±20	10	20	75	5	10
RC 10	44±13	10±3	±20	10	20	75	5	10
RC 15	67±18	15±4	±20	10	20	75	5	10
RC 20	89±18	20±4	±20	10	20	75	5	10
RC 25	111±22	25±5	±20	10	20	75	5	10
RC 30	133±27	30±6	±20	10	20	75	5	10
RC 40	178±31	40±7	±20	10	20	75	5	10
RC 50	222±36	50±8	±20	10	20	75	5	10
RC 60	267±40	60±9	±20	10	20	75	5	10
RC 70	311±53	70±12	±20	10	20	75	5	10
RC 90	400±62	90±14	±20	10	20	75	5	10
Latex Foam Rubbers (Uncored)								
RU 11	49±18	11±4	±20	10	20	75	5	10
RU 20	89±22	20±5	±20	10	20	75	5	10
RU 35	156±44	35±10	±20	10	20	75	5	10
RU 55	245±44	55±10	±20	10	20	75	5	10
RU 80	356±67	80±15	±20	10	20	75	5	10
RU 150	667±245	150±55	±20	10	20	75	5	10

[A] As defined in Section 19.

TABLE 2 Tolerances on Dimensions of Latex Foam Rubber Products for General Applications

Dimension	Tolerance		Dimension	Tolerance	
	+	−		+	−
Thickness, mm			Thickness, in.		
Cored			Cored		
0 to 76, incl	3	2	0 to 3, incl	⅛	1/16
76 to 127, incl	5	3	3 to 5, incl	3/16	⅛
127 and over	6	5	5 and over	¼	3/16
Uncored			Uncored		
Up to and including 12.7	2	2	Up to and including ½	1/16	1/16
From 12.7 to 25.4, incl	3	2	From ½ to 1, incl	⅛	1/16
Over 25.4	3	5	Over 1	⅛	3/16
Length and Width, mm			Length and Width, in.		
Cored			Cored		
0 to 152, incl	5	2	0 to 6, incl	3/16	1/16
152 to 305, incl	10	3	6 to 12, incl	½	⅛
305 to 610, incl	13	6	12 to 24, incl	½	¼
610 to 914, incl	16	10	24 to 36, incl	⅝	⅜
914 to 1219, incl	19	13	36 to 48, incl	¾	½
1219 to 1524, incl	22	16	48 to 60, incl	⅞	⅝
1524 to 1829, incl	25	19	60 to 72, incl	1	¾
1829 and over	29	22	72 and over	1⅛	⅞
Uncored			Uncored		
0 to 152, incl	8	2	0 to 6, incl	5/16	1/16
152 to 305, incl	13	3	6 to 12, incl	½	⅛
305 to 610, incl	18	6	12 to 24, incl	11/16	¼
610 to 914, incl	22	10	24 to 36, incl	⅞	⅜
914 to 1219, incl	29	13	36 to 48, incl	1 1/16	½
1219 to 1524, incl	35	16	48 to 60, incl	1¼	⅝
1524 to 1829, incl	38	19	60 to 72, incl	1⅜	¾
1829 and over	41	22	72 and over	1½	⅞

TABLE 3 Tolerances for Special Applications of Latex Foam Rubbers, Such as Automotive Topper Pads, Spring Coverings, etc.

Dimension	Tolerance		Dimension	Tolerance	
	+	−		+	−
Thickness, mm			Thickness, in.		
Cored			Cored		
0 to 76, incl	5	2	0 to 3, incl	3/16	1/16
76 to 127, incl	6	3	3 to 5, incl	¼	⅛
127 and over	8	5	5 and over	5/16	3/16
Uncored			Uncored		
Up to and including 12.7	2	2	Up to and including ½	1/16	1/16
From 12.7 to 25.4, incl	3	2	From ½ to 1, incl	⅛	1/16
Over 25.4	3	3	Over 1	⅛	⅛
Length and Width, mm			Length and Width, in.		
Cored and Uncored			Cored and Uncored		
0 to 152, incl	8	2	0 to 6, incl	5/16	1/16
152 to 305, incl	13	3	6 to 12, incl	½	⅛
305 to 610, incl	18	6	12 to 24, incl	11/16	¼
610 to 914, incl	22	10	24 to 36, incl	⅞	⅜
914 to 1219, incl	29	13	36 to 48, incl	1⅛	½
1219 to 1524, incl	35	16	48 to 60, incl	1⅜	⅝
1524 to 1829, incl	38	19	60 to 72, incl	1½	¾
1829 and over	41	22	72 and over	1⅝	⅞

acceptable under these specifications provided the material used in such repairs or alterations shall be the same composition and quality as the original product and provided such alterations do not affect the serviceability, size, and shape beyond tolerances as provided herein.

8.3 Unless otherwise specified, the color of latex foam rubbers shall be optional with the manufacturer.

9. Sampling

9.1 When possible, the completed manufactured product shall be used for the tests specified. Representative samples of the lot being examined shall be selected at random as required.