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Specification for Preformed Open-Cell Sponge Rubber Pail and Drum Gaskets¹

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1. Scope

1.1 This specification covers preformed open-cell sponge rubber gaskets of the following classes for use in new or reconditioned pails or drums.

1.1.1 *Class A*—Non-Oil Resistant.

1.1.2 *Class B*—Oil Resistant.

1.2 The values stated in SI units are to be regarded as the standard.

1.3 The following safety hazards caveat pertains only to the test methods sections of the 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.*

NOTE 1—*ISO Equivalency Statement:* This proposed specification was found to be *not equivalent*.

2. Referenced Documents

2.1 ASTM Standards:

D 395 Test Methods for Rubber Property—Compression Set²

D 471 Test Method for Rubber Property—Effect of Liquids²

D 573 Test Method for Rubber—Deterioration in an Air Oven²

D 575 Test Methods for Rubber Properties in Compression²

D 1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber³

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets²

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products²

¹ This specification is under the jurisdiction of ASTM Committee F-03 on Gaskets and is the direct responsibility of Subcommittee F03.60 on Specifications for Gasket Materials.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 08.01.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *cellular material*—a generic term for materials containing many open cells dispersed throughout the mass.

3.1.2 *flexible cellular material*—a flexible, cellular material that will not rupture within 60 s when a specimen 200 by 25 by 25 mm (8 by 1 by 1 in.) is bent around a 25 mm (1 in.) diameter mandrel at a uniform rate of one lap in 5 s in the form of a helix at a temperature between 18 and 29°C (65 and 85°F).

3.1.3 *rubber*—a material that is capable of recovering from large deformations quickly and forcibly.

3.1.4 *natural skin*—a relatively dense layer at the surface of a cellular material. Normally, this natural skin is formed by contact with the mold during manufacture. Parts made by cutting from open-cell (sponge rubber) sheets usually have natural skin on two faces and open cells at the cut edges.

3.1.5 *sponge rubber*—cellular rubber consisting of predominantly open cells made from a solid rubber compound.

4. Classification

4.1 *Classes*—Cellular rubbers are divided into two classes, which are designated by the letters A and B added to the number prefix.

4.1.1 *Class A*—Cellular rubbers made from natural rubber, reclaimed rubber, synthetic rubber, or rubber-like materials, alone or in combination, where specific resistance to the action of petroleum-base oils is not required.

4.1.2 *Class B*—Cellular rubbers made from synthetic rubber or rubber-like materials, alone or in combination, having specific requirements for oil resistance.

4.2 *Grades*—Each class is divided into three different grades. Each grade is based on a specific range of firmness as expressed by a 25 % compression. Grades are designated by digit, the softer grades being identified with the lower numbers and the harder grades being identified with the higher numbers.

4.2.1 *Grade 1*—A compression deflection range from 15 to 50 kPa (2 to 7 psi).

4.2.2 *Grade 2*—A compression deflection range from 50 to 85 kPa (7 to 12 psi).

4.2.3 *Grade 3*—A compression deflection range from 85 to 120 kPa (12 to 17 psi).

5. Materials and Manufacture

5.1 Sponge rubber gaskets are made by incorporating a blowing agent into the compound, such as sodium bicarbonate, that gives off a gas which expands the mass during the vulcanization process.

5.2 Sponge rubber gaskets are manufactured to specified dimensions. Unless otherwise specified, gasket sponge rubber shall have a natural skin on both the top and bottom surfaces. Fabric surface impressions are not objectionable.

TABLE 1 Physical Requirements of Open-Cell Sponge Rubber Pail and Drum Gaskets

Class/ Grade Number	Compression at 25 % Deflection (Limits), kPa (psi)	Requirements		
		Oil Immersion 22 h at 70°C (158°F), Change in Volume in ASTM Oil IRM 903 (Limits), %	Heat Aged 7 Days at 70°C (158°F), Change in Original Compression Values (Limits), %	Compression Set, 22 h at 70°C (158°F) 50 % Deflection, Max %
Class A, Non-Oil Resistant				
A1	15–50 (2–7)	—	±20	15
A2	50–85 (7–12)	—	±20	15
A3	85–120 (12–17)	—	±20	15
Class B, Oil-Resistant, Medium Swell				
B1	15–50 (2–7)	+10 to +60	±20	50
B2	50–85 (7–12)	+10 to +60	±20	50
B3	85–120 (12–17)	+10 to +60	±20	50

TABLE 2 Tolerances on Dimensions for Open-Cell Sponge Rubber Pail or Drum Gaskets

Thickness				
mm	(in.)	Tolerance ±	mm	(in.)
4.8	(0.188)		1.5	(0.062)
6.4	(0.250)		1.5	(0.062)
7.9	(0.313)		1.5	(0.062)
9.5	(0.375)		1.5	(0.062)
11.1	(0.438)		1.5	(0.062)
12.7	(0.500)		1.5	(0.062)
Width				
mm	(in.)	Tolerance ±	mm	(in.)
4.8	(0.188)		1.5	(0.062)
6.4	(0.250)		1.5	(0.062)
7.9	(0.313)		1.5	(0.062)
9.5	(0.375)		1.5	(0.062)
11.1	(0.438)		1.5	(0.062)
12.7	(0.500)		1.5	(0.062)
Length				
mm	(in.)	Tolerance ±	mm	(in.)
4.8	(0.188)		1.5	(0.062)
6.4	(0.250)		1.5	(0.062)
7.9	(0.313)		1.5	(0.062)
9.5	(0.375)		1.5	(0.062)
11.1	(0.438)		1.5	(0.062)
12.7	(0.500)		1.5	(0.062)

Dimension mm (in.)

As Required—Circular open-cell sponge rubber pail and drum gaskets are manufactured to fit specified pail or drum flanges by cutting to the specified length and sealing the cut ends together.

6. Physical Properties

6.1 The various grades of cellular rubber shall conform to the requirements as to physical properties in Table 1 and Table 2.

6.2 *Color*—Unless otherwise specified, the color of cellular rubber gaskets shall be tan or black.

7. Tolerances on Dimensions

7.1 Tolerances on dimensions of cellular rubber gaskets shall be as specified in Table 2.

7.2 *Measurements of Test Specimens*—Thickness and width shall be measured using a dial-type gage⁴, having a maximum stem and circular foot mass of 25 g and a circular foot 31.8 mm (1.250 in.) in diameter.

8. Workmanship, Finish and Appearance

8.1 Cellular rubber gaskets under this specification 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 the use of 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 that may be desired for specific applications other than those prescribed in this specification, shall be stated in the product specifications as they may influence the choice of the type of rubber material or other ingredients used. All materials and workmanship shall be in accordance with good commercial practice, and the resulting cellular rubbers shall be free from defects affecting serviceability.

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.

9.2 When the finished product does not lend itself to testing or to the taking of test specimens because of complicated shape or other reasons, standard test slabs shall be prepared. When differences due to the difficulty in obtaining suitable test specimens from the finished part arise, manufacturer and purchaser may agree on acceptable deviations. Agreement on acceptable deviations can be achieved by comparing results of standard test specimens and those obtained on actual parts.

10. General Test Methods

10.1 Except as otherwise specified in these test methods for open cell rubber, the following test methods shall be complied with as required and are hereby made a part of this specification.

10.1.1 *General Physical Test Requirements*—Practices D 3182 and D 3183.

10.1.2 *Compression Deflection Test*—Specification D 1056 and Section 12 of this specification.

10.1.3 *Oil Immersion*—Test Method D 471 and Section 13 of this specification.

10.1.4 *Heat Aging Test*—Test Method D 573, with modifications as described in Section 14 of this specification.

10.1.5 *Compression Set*—Test Methods D 395 as described in Section 15 of this specification.

10.2 In case of conflict between provisions of the above test methods and the procedures herein specifically described for open cell rubber, the latter shall take precedence.

⁴ A gauge similar to Federal Products Co. No. 57 B-1Y7692 is satisfactory for this purpose.