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Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material[1]

This standard is issued under the fixed designation C509; 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 applies to those elastomeric cellular materials of a firm grade that are manufactured in preformed shapes for use as gaskets and for use as sealing materials, in the form of compression seals or gaskets, or both, for glazing other building joint applications.

NOTE 1—For softer cellular elastomeric materials used in secondary sealing applications, refer to Specification D1056.

1.2 *Test Method C1166, as referenced in this specification, should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.*

1.3 The following precautionary caveat pertains only to the test method portion, Section 11, 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.*

1.4 The committee with jurisdiction over this standard is not aware of any comparable standards published by other organizations.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C717 Terminology of Building Seals and Sealants
C1083 Test Method for Water Absorption of Cellular Elastomeric Gaskets and Sealing Materials
C1166 Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories
D395 Test Methods for Rubber Property—Compression Set
D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
D746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
D865 Test Method for Rubber—Deterioration by Heating in Air (Test Tube Enclosure)
D925 Test Methods for Rubber Property—Staining of Surfaces (Contact, Migration, and Diffusion)
D1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment

3. Terminology

3.1 *Definitions*—Refer to Terminology C717 for the following terms used in this specification: cellular material, elastomeric, gasket glazing, seal, and sealing material.

[1] This specification is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.73 on Compression Seal and Lock Strip Gaskets.

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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.

4. Materials and Manufacture

4.1 Elastomeric cellular materials furnished to this specification shall be manufactured from natural rubber, synthetic rubber, rubber-like materials, or mixtures of these, with added compounding ingredients of such nature and quality that, with proper curing, the finished product will comply with this specification.

4.2 The cured compounds shall be suitable for use where resistance to sunlight, weathering, oxidation, and permanent deformation under load are of prime importance.

4.3 The manufacturing process shall be such to ensure a homogeneous cellular material free of defects that may affect serviceability.

4.4 Although under this specification the manufacturer is permitted to choose constituent materials, there is no implication that the several compounds are equivalent in all physical properties. Any special characteristics other than those required by this specification, which may be needed for specific applications, shall be specified by the purchaser, since such characteristics may influence the choice of base materials and other ingredients.

5. Physical Properties

5.1 The material shall conform to the requirements prescribed in Table 1.

6. Dimensional Tolerances

6.1 Permissible variation in cross-sectional dimensions shall be as specified in Table 2 unless otherwise agreed upon between the purchaser and the supplier.

7. Workmanship, Finish, and Appearance

7.1 The elastomeric cellular materials shall be manufactured and processed in a careful and workmanlike manner in accordance with the best commercial practices.

7.2 The surfaces of the finished material shall be reasonably smooth and free of excessive talc or bloom.

7.3 Unless otherwise specified, the material shall be black. When colored material is desired, it is recommended that other tests, agreed upon between the purchaser and the supplier, be conducted to ensure color stability.

8. Number of Tests and Retests

8.1 Any material that fails in one or more of the test requirements may be retested by making two additional tests for the requirements in which failure occurs. Failure in one such retest shall be cause for final rejection.

8.2 Rejected material shall be disposed of as directed by the supplier.

9. Significance and Use

9.1 *Flame Propagation:*

9.1.1 This specification has two options:

TABLE 1 Physical Requirements of Cellular Elastomeric Materials

Property	Limit	ASTM Test Method[A]
Compression-deflection, 25 % deflection limits:		
kPa (psi)	91 to 168 (13 to 24)	D1056
Compression set, 22 h @ 70°C (158°F) max, %	30	D395, Method B
Heat aging[B] , 70 h @ 100°C (212°F), change in compression-deflection values:		
kPa (psi)	0 to + 70 (0 to + 10)	D865 and D1056
Dimensional stability, change, max %, after heat aging, 70 h @ 100°C (212°F)	4	11.4
Ozone resistance[C] at 40 % elongation, 100 h @ 40°C (104°F):		
Type I 100 mPa ozone	no cracks @ 7× magnification	D1149
Type II 300 mPa ozone	no cracks @ 7× magnification	D1149
Low-temperature brittleness @ – 40°C (–40°F)	pass	see Appendix X1
Water absorption, max, % weight	5.0	C1083
Flame propagation:		
Option I	101.6 mm (4 in.) max	C1166
Option II	no limit	
Nonstaining[D]	no migratory stain	D925

[A] See Section 11.
[B] After heat aging, surfaces of the specimen shall be neither hard nor brittle. A152.4-mm (6-in.) length of the finished extrusion shall exhibit no surface cracks when bent on itself 180°.
[C] The specimen shall exhibit no surface cracks when in the extended condition.
[D] This requirement may be waived, subject to agreement between the purchaser and the supplier.

TABLE 2 Standards for Cross-Sectional Tolerance

NOTE 1—Dimensional tolerances for outside diameters, inside diameters, wall thickness, width, height, and general cross-sectional dimensions of extrusions

Rubber Manufacturers Association[A]					
RMA Class		1	RMA Class		1
Drawing Designation		BEC 1	Drawing Designation		BEC 1
Dimensions (in inches)			Dimensions (in Millimeters)		
Above	Up To		Above	Up To	
0	0.25	±0.016	0	6.4	±0.4
0.25	0.50	0.025	6.4	12.7	0.63
0.50	1.00	0.050	12.7	25.4	1.25
1.00	1.60	0.080	25.4	40.6	2.0
1.60 & over multiply by		0.060	40.6 & over multiply by		0.06

[A]Adapted from Rubber Manufacturers Association Handbook, Table 36, Fifth Ed., 1992

9.1.1.1 *Option I*—Flame propagation test is required.

9.1.1.2 *Option II*—Flame propagation test is not required.

9.1.2 In case no option is specified, Option I will apply.

9.2 This specification has two classifications as related to ozone resistance. These are Type I and Type II, with the latter having the greater resistance to ozone. The type should be specified when making reference to this specification but in the event that the type is not specified, Type II shall apply.

NOTE 2—Type II is included in this specification for use where greater ozone resistance is required.

10. Sampling

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

10.2 When the finished product does not lend itself to testing or to the taking of test specimens because of complicated shape, small size, metal or fabric inserts, or other reasons, standard test strips shall be prepared. The standard extruded specimens for testing, except where a specific specimen size is defined by a particular test method, shall be 6.4 mm (¼ in.) thick by 31.8 mm (1¼ in.) wide in rectangular cross section. The test pieces for flame propagation tests shall be as specified in 11.8. All test pieces shall be made from the same compound and shall have the same apparent density and state of cure as the product they represent.

10.3 The tests for dimensional stability, ozone resistance, water absorption, and nonstaining may be made on samples from the material to be shipped or on samples representative of it. Tests for compression deflection, compression set, heat aging, flame propagation, and low-temperature brittleness may be made on standard samples previously prepared in accordance with 10.2.

11. Test Methods

11.1 *Compression-Deflection*—Specification D1056. Base calculations of compression-deflection on the original thickness of the specimens.

11.2 *Compression Set*—Test Methods D395, Method B.

11.3 *Compression Deflection After Heat Aging:*

11.3.1 A 152.4-mm (6-in.) length of the finished extrusion shall be heat aged along with the specimen for Specification D1056 and shall pass the requirements of Table 1, Footnote B.

11.3.2 Test for compression-deflection by first aging the specimen (a piece of appropriate size for the compression-deflection test, instead of the dumbbell-shaped tension specimen) in accordance with Test Method D865, then measuring the compression-deflection value in accordance with Specification D1056.

11.3.3 The specimen for heat aging shall be large enough to allow the taking of the appropriate number and size of specimens as defined by Specification D1056. The cutting of specimens for Specification D1056 shall be done after the heat aging has been performed.

11.4 *Dimensional Stability After Heat Aging*—Determine the dimensional stability by subjecting a 152.4-mm (6-in.) length of the extruded shape to heat aging for 70 h at 100°C (212°F) in accordance with Test Method D865. After aging, the changes in length and breadth dimensions of the specimen shall not exceed ~~4 %.~~4 %.

11.5 *Ozone Resistance*—Test Method D1149. The concentration of ozone shall be 100 mPa for Type I and 300 mPa for Type II. The time of test shall be 100 h at 40 ± 2°C (104 ± 3.6°F) with a specimen as defined by 10.2 with a length of 152.4 mm (6 in.) and with a specimen elongation of 40 %.

11.6 ~~*Low - Temperature*~~*Low-Temperature Brittleness*—See Appendix X1.