Designation: C 542 – 05

Standard Specification for Lock-Strip Gaskets[1]

This standard is issued under the fixed designation C 542; 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 defines the required properties of lock-strip gaskets where resistance to sunlight, weathering, flame, oxidation, permanent deformation under load, and diminution of gripping pressure are prime essentials.

NOTE 1—The requirement of flame propagation may be waived by the architect or professional engineer when doing so does not conflict with local codes or ordinances.

1.2 This specification applies only to the "locking" compression type of gasket, sometimes referred to as the "zipper" type.

NOTE 2—Structural integrity and weather-tightness of the wall requires the sound design and installation of the entire system of which the gasket is only one component.

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

1.4 *Test Method C 1166, 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.*

1.5 The following precautionary caveat pertains only to the test method portion, Section 7, of this specification: *This standard does not purport to address 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 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]

C 1166 Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories

D 15 Methods of Compound and Sample Preparation for Physical Testing of Rubber Products[3]

D 395 Test Methods for Rubber Property—Compression Set

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension

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

D 624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D 746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

D 1149 Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber

D 2240 Test Method for Rubber Property—Durometer Hardness

2.2 *Other Standard:*

Rubber Handbook, Specifications for Rubber Products [4]

3. Materials and Manufacture

3.1 All materials and workmanship shall be in accordance with good commercial practice.

3.2 Gaskets shall be manufactured from an ozone-resistant compound and shall not be dependent for ozone resistance on surface protection which can be removed by abrasion, detergents, or other means.

3.3 Gaskets shall be free of porosity, surface defects, and dimensional irregularities, particularly in the sealing area.

3.4 Unless otherwise specified, the material shall be black.

3.5 Lubricants used in installation, shall be as recommended by the gasket manufacturer.

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[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.

[3] Discontinued; see 1975 *Annual Book of ASTM Standards*, Part 37. Replaced by Practice D 3182, Test Methods D 3190, and Test Methods D 3192.

[4] Available from Rubber Manufacturers Association, 444 Madison Ave., New York, NY.

4. Physical Properties

4.1 The physical properties of the gasket shall conform to the requirements specified in Table 1.

5. Dimensions and Permissible Variations

5.1 Minimum thickness of material between the locking strip cavity and the panel or rail channel shall be 2.5 mm (0.10 in.).

5.2 All cross-sectioned dimensions shall have an RMA Class 2 tolerance, as specified in Table 2 unless otherwise agreed by the purchaser and seller.

6. Sampling

6.1 When proof of conformance with this specification is required, the samples shall be taken from the finished product whenever possible.

6.2 When the thickness or shape of the finished product makes sampling, as specified in Section 6, impossible, the manufacturer shall, upon request of the purchaser at the time of ordering, furnish a sufficient number of test slabs or blocks prepared in accordance with Methods D 15 for the proper performance of the required tests. The slabs or blocks shall be prepared from the compound of the same source production lot used in the gasket.

7. Test Methods

7.1 *Tensile Strength and Elongation*—Test in accordance with Test Methods D 412. Determine percentage change in tensile strength and elongation after oven aging for 70 h at 100 ± 1°C (212 ± 2°F).

7.2 *Tear Resistance*—Test in accordance with Test Method D 624 using Die C.

7.3 *Hardness*—Test in accordance with Test Method D 2240, using a Type A durometer. If size or shape of the specimen precludes testing of the finished surface, make measurements on a squarely cut end or on a flat sliced or buffed surface. Determine change in hardness after oven aging for 70 h at 100 ± 1°C (212 ± 2°F).

TABLE 2 Cross-Sectional Tolerances Lock-Strip Gaskets
RMA Class 2, Schedule I, Commercial [A]

Dimension, mm (in.)	Tolerance, plus or minus
Over 0 to 2.54 (0 to 0.10) incl.	0.32 (0.013)
Over 2.54 to 4.06 (0.10 to 0.16) incl.	0.40 (0.016)
Over 4.06 to 6.35 (0.16 to 0.25) incl.	0.50 (0.020)
Over 6.35 to 10.16 (0.25 to 0.40) incl.	0.63 (0.025)
Over 10.16 to 16.0 (0.40 to 0.63) incl.	0.80 (0.032)
Over 16.0 to 25.4 (0.63 to 1.00) incl.	1.00 (0.040)
Over 25.4 to40.64 (1.00 to 1.60) incl.	1.25 (0.050)
Over 40.64 to 63.5 (1.60 to 2.50) incl.	1.60 (0.063)

[A] *Rubber Handbook, Specifications for Rubber Products*, Table 12.

7.4 *Compression Set*—Test in accordance with Test Methods D 395, Method B. Hold the sample under test for 22 h at 100 ± 1°C (212 ± 2°F). Buffed specimen, taken from material 1.5 mm (1/16 in.) minimum thickness may be superimposed to a total thickness of 13.0 mm (½ in.).

7.5 *Brittleness Temperature*—Test in accordance with Test Method D 746.

7.6 *Ozone Resistance*—Test in accordance with Test Method D 1149 (Specimen A). Use an ozone concentration of 100 mPa, an exposure time of 40 ± 2°C (104 ± 3.6°F), and a specimen elongation of 20 %.

7.7 *Heat Aging*—Test the effects of heat aging in accordance with Test Method D 573.

7.8 *Flame Propagation*—Test Method C 1166.

7.8.1 This test is designed to differentiate the flame propagation characteristics of candidate materials used in lock-strip gaskets. It is a small-scale test which enables the specifier to exercise engineering prudence in the selection of materials. It should not be used to predict the performance of the tested material in an actual fire situation. It should not be used to predict fuel contribution, rate of flame spread, smoke generation, or the nature of the products of combustion. Test conditions are those most conducive to flame propagation and the method simulates the worst possible exposure condition. The specimen is mounted vertically. The igniting flame is hot; the fuel supply is unlimited; and the flame is not removed from the specimen throughout the test.

TABLE 1 Physical Requirements and Test Methods for Gaskets

Property	Requirements	Test Method
Tensile strength, min[A]	14 MPa (2000 psi)	D 412
Elongation at rupture, min, %	175	D 412
Tear resistance, min	214 N/linear cm (120 lbf/linear in.)	D 624 (Die C)
Hardness, durometer A[A]	75 ± 5	D 2240
Compression set, max, %, 22 h at 100°C (212°F)	35	D 395 (Method B)
Brittleness temperature, min	–40°C (–40°F)	D 746
Ozone resistance, 100 mPa ozone	...	...
100 h at 40°C (104°F), 20 % elongation	no cracks @ 7× magnification	D 1149 (Specimen A)
Heat aging, 70 h at 100°C (212°F)		D 573
Change in hardness, max	0 to + 10 Durometer points	
Loss in tensile strength, max, %	15	
Loss in elongation, max, %	40	
Flame propagation[B]	100 mm (4 in.), max.	C 1166
Lip pressure[C]		
Extruded section, min	7 N/linear cm (4 lbf/linear in.)	as specified (see 7.9)
Corners, min	7 N/linear cm (4 lbf/linear in.)	

[A] If a separate stock is used for the locking strip, it may have a hardness of 80 ± 5 durometer points, and a minimum tensile strength of 12.5 MPa (1800 psi). In all other respects, it must meet these specifications.
[B] This requirement may be waived (see Note 1).
[C] In the case of molded corners with integral sealing devices, the requirement for corner lip pressure may be lowered by the architect or professional engineer.

7.9 *Lip Pressure:*[5]

7.9.1 This test method determines the pressure exerted by the gasket on collateral material positioned within the gasket channel or channels. It simulates actual use conditions and provides a measurement of the force required to open the lips of the gasket channel to that distance representing the thickness of material for which the gasket is designed. In the case of double channel gaskets, this measurement is made with a solid material of the intended thickness in position in the channel opposite to that being tested. Thus these measurements reflect the forces to be encountered during application.

7.9.2 *Apparatus*:

7.9.2.1 The testing machine shall be a power-driven tension-testing machine of the movable cross-head type, equipped with adjustable cross-head speed and a suitable dynamometer and indicating or recording device for measuring the applied force within ±2 %.

7.9.2.2 The grips to be used with the testing machine described in 7.9.2.1 shall be of a type similar to those shown in Fig. 1. They shall exert a uniform pressure across the gripping surface, increasing as the tension increases, so as to prevent uneven slipping.

7.9.2.3 The lip dividers used to separate the lips of the test specimen shall be made of stainless steel as shown in Fig. 2. Their length shall be at least equal to that of the test specimen.

7.9.2.4 The metal spacer to be used when testing double-channel gaskets, as shown in Fig. 1, shall be the same length as the test specimen, the same thickness as the material the gasket is designed to hold, and at least 13 mm (½ in.) wider than the depth of the channel.

7.9.3 *Test Specimen*:

7.9.3.1 The extruded test specimen shall be a piece of the actual gasket at least 25 mm (1 in.) in length. A minimum of four specimens from each lot shall be tested.

7.9.4 *Procedure*:

7.9.4.1 Place the test specimen in the testing machine as shown in Fig. 1, ensuring that the locking strip is in place and that, if it is a double-channel-type gasket, the specified spacer is properly positioned in the channel opposite from that being tested. Provide means of supporting the test assembly so that when tension is applied to the channel lips, the assembly will remain in a horizontal position (Note 3). It is important to ensure that the lip dividers have a secure hold on the gasket lips and that they are also securely held by the grips of the machine. Conduct the test at 23 ± 1°C (73.4 ± 1.8°F).

NOTE 3—When testing single channel gaskets, the spacers obviously cannot be used. However, some means must be provided to hold the test specimen in a horizontal position during testing.

7.9.4.2 Separate the lips of the gasket channel at a uniform rate of 5.1 mm (0.20 in.)/min, until the distance between the lips is equal to the minimum thickness of the material they are designed to hold.

7.9.4.3 When the lips have been separated the specified distance, stop the testing machine and record the amount of force in lbf (or kgf) required to produce this opening.

[5] Supporting data are available from ASTM Headquarters. Request RR: C24-1009.

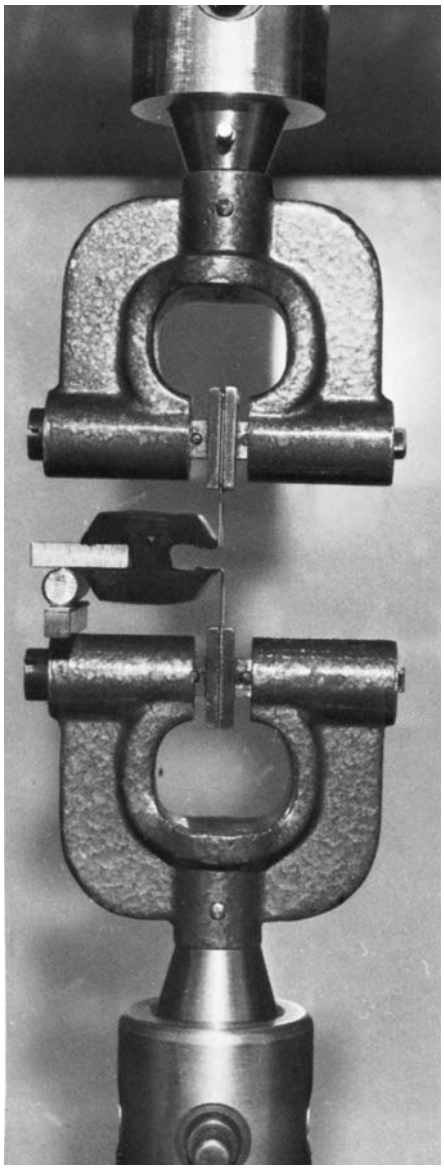


FIG. 1 Tension Tester for Lip Pressure

7.9.4.4 Repeat 7.9.4.1-7.9.4.3 until all of the extruded channels of a minimum of four specimens of each type have been tested.

7.9.4.5 Calculate the lip pressure of each channel tested as follows:

$$\text{Lip pressure, N/linear cm (lbf/linear in.)} = F/L \quad (1)$$

where:

F = force required to open the lips the specified distance, N (lbf), and

L = length of test specimen in cm (in.), to the nearest 0.2 cm (0.1 in.).

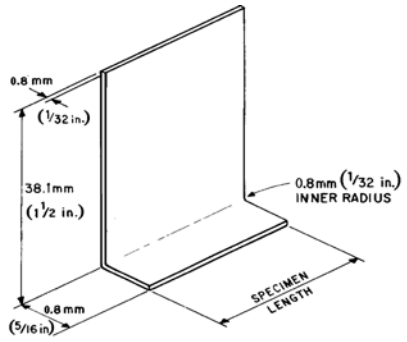
7.9.5 *Report*—The following test information shall be reported:

7.9.5.1 Date of test,

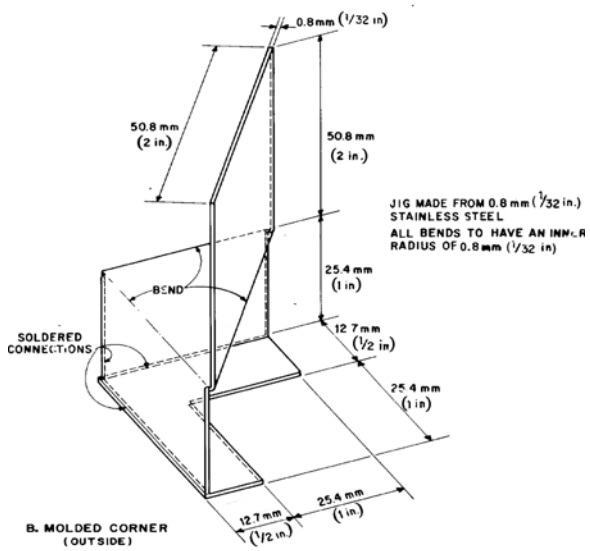
7.9.5.2 Type of testing machine used,

7.9.5.3 Description or numbers of the lot or lots tested,

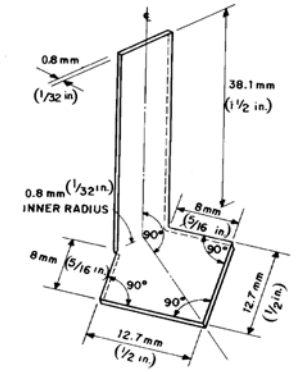
7.9.5.4 The width of the filler strip to the nearest 0.025 mm (0.001 in.), and



A. EXTRUDED SECTION



B. MOLDED CORNER
(OUTSIDE)



C. MOLDED CORNER (INSIDE)

FIG. 2 Lip Dividers

7.9.5.5 Lip pressure for each gasket channel tested.

8. Keywords

8.1 compression; elastomer; elastomeric; gasket; locking; lock-strip; preformed; seal; strip; zipper