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## Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Bridges<sup>1</sup>

This standard is issued under the fixed designation D 3542; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers the material requirements for preformed polychloroprene elastomeric joint seals for bridges. The seal consists of a multiple-web design composed of polychloroprene and functions only by compression of the seal between the faces of the joint with the seal folding inward at the top to facilitate compression. The seal is installed with a lubricant adhesive and is designed to seal the joint and reject incompressibles.

NOTE 1—This specification may not be applicable for seals whose height is less than 90 % of its nominal width.

1.2 *This standard does not purport to address all of the safety problems, 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.*

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

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension<sup>2</sup>
- D 471 Test Method for Rubber Property—Effect of Liquids<sup>2</sup>
- D 518 Test Method for Rubber Deterioration—Surface Cracking<sup>2</sup>
- D 573 Test Method for Rubber—Deterioration in an Air Oven<sup>2</sup>
- D 575 Test Methods for Rubber Properties in Compression<sup>2</sup>
- D 1149 Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber<sup>2</sup>
- D 2240 Test Method for Rubber Property—Durometer Hardness<sup>2</sup>

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.34 on Preformed Joint Fillers and Sealers.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 09.01.

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products<sup>2</sup>

### 3. Marking and Ordering Information

3.1 Each lot of seal shall be marked with characters of not less than 0.25 in. (6.35 mm) in height on the top of the seal at a maximum of 4 ft (1.22 m) intervals showing the lot number, date of manufacture, and the manufacturing seal designation. The seal shall also have die markings which are registered with the Rubber Manufacturers Association (RMA).

3.2 The purchaser shall specify the anticipated required minimum acceptable joint movement, and either the minimum joint opening, or the nominal width of seal.

### 4. Materials and Manufacture

4.1 The seals shall be preformed, and the material shall be vulcanized elastomeric compound using virgin polychloroprene as the only polymer.

### 5. Physical Requirements

5.1 The materials shall conform to the physical properties prescribed in Table 1.

5.2 In the applicable requirements of Table 1 and the test methods, all deflection shall be based on the nominal width.

### 6. Dimensions and Working Parameters

6.1 The size, shape and dimensional tolerances shall be as outlined in 6.1.1.

6.1.1 Measurements used for laboratory testing shall be taken to the nearest 0.01 in. (0.3 mm) and reported/recorded to the nearest 0.1 in. (3 mm) as the average of three measurements. The measured width shall be greater than or equal to the nominal width. The seal height shall not be less than 90 % of the nominal width unless joint recess dimensions or special design considerations dictate the geometry.

6.2 *Compression Deflection Properties*—The contact pressure expressed in pounds-force per square inch (or pascals) when the seal is compressed to any particular width indicates the stress-strain relationship that exists in the seal. This



**TABLE 1 Physical Requirements for Preformed Elastomeric Joint Seals**

	Requirements	ASTM Test Method
Tensile strength, min, psi (MPa)	2000 (13.8)	D 412
Elongation at break, min, %	250	D 412
Hardness, Type A durometer, points	55 ± 5	D 2240 (modified) <sup>A</sup>
Oven aging, 70 h at 212°F (100°C)		
Tensile strength, max, % loss	20	
Elongation, max, % loss	20	
Hardness, Type A durometer, points change	0 to 10	
Oil swell, ASTM Oil No. 3, 70 h at 212°F:		
70 h at 212°F (100°C)		
Weight change, max, %	45	D 471
Ozone resistance <sup>B</sup>	no cracks	D 1149 <sup>C</sup>
20 % strain, 300 ppm in air, 70 h, at 104°F (40°C) (wiped with toluene to remove surface contamination)		
Low-temperature recovery,		
72 h at 14°F (-14°C), 50 %:		
Deflection, min, %	88	Section 7 <sup>D</sup>
Low-temperature recovery,		
22 h at -20°F (-29°C), 50 %:		
Deflection, min, %	83	Section 7 <sup>D</sup>
High-temperature recovery,		
70 h, at 212°F (100°C), 50 %:		
Deflection, min, %	85	Section 7 <sup>D</sup>
Compression-deflection properties:		
LC min in. (mm)	See 8.3.5	D 575 Method A (modified) <sup>E</sup>
LC max in. (mm)	See 8.3.5	
Movement range, in. (mm)	See 8.3.5	

<sup>A</sup> The term “modified” in the table relates to the specimen preparation. The use of the joint seal as the specimen source requires that more plies than specified in either of the modified test procedures be used. Such specimen modification shall be agreed upon between the purchaser and the supplier prior to testing. The hardness test shall be made with the durometer in a durometer stand as recommended in Test Method D 2240.

<sup>B</sup> Sample prepared in accordance with Method A of Test Method D 518.

<sup>C</sup> Cracking, splitting, or sticking of a specimen during a recovery test shall mean that the specimen has failed the test.

<sup>D</sup> The reference section and subsections are those of this specification. The values found in 6.2.2, 6.2.3, and 6.2.4 shall be within the range specified by the purchaser in 3.2.

<sup>E</sup> Speed of testing shall be 0.5 ± 0.05 in. (13 ± 1.3 mm), min at room temperature of 73 ± 4°F (23 ± 2.2°C). The sheets of sandpaper are not used.

relationship is dependent on both the properties of the elastomer and the cross-sectional configuration of the seal. Therefore, for a predetermined allowable pressure, a definitive relationship will exist and the working limits of the seal may be defined.

6.2.1 The working limits (minimum and maximum degrees of compression) of the seal shall be determined on the basis of the minimum and maximum limits of compressibility (LC min and LC max), and the movement range as specified herein. Seals with nominal width differing from that specified are acceptable, providing the compressed width at LC max is less than the minimum anticipated joint opening, and the movement range requirement is met.

6.2.2 The minimum limit of compressibility (LC min) is defined as the compressed width (expressed in terms of percent of nominal width) corresponding to a contact pressure of 3 psi (20.68 kPa). The LC min shall be determined in accordance with 9.3. For the purpose of calculating movement range, a value at 85 % of nominal width shall be used for LC min when the measured value of LC min exceeds 85 %.

NOTE 2—If the seal generates a pressure of 3 psi at 90 % of nominal width, LC min equals 85 %. However, if the seal generates 3 psi at 70 % of nominal width, the LC min equals 70 %.

6.2.3 The maximum limit of compressibility (LC max) is defined as the compressed width (expressed in terms of percent of nominal width) corresponding to a contact pressure of 35 psi (241.32 kPa). The LC max shall be determined in accordance with 9.3. LC max has been designated at 35 psi (241.32 kPa) in order to mitigate the tendencies toward pressure decay of the

seal during use. A reading of 35 psi is considered an absolute maximum pressure which should not be exceeded.

6.2.4 The movement range of the seal is defined as the numerical difference between the LC min and the LC max expressed in inches (mm). For the purpose of calculating the movement range, a value at 85 % shall be used for LC min when the measured value of LC min exceeds 85 %. For purposes of acceptance testing, the calculated movement range of the seal shall not be less than the specified value.

## 7. Sampling

7.1 A lot shall consist of the quantity for each cross section agreed upon between the purchaser and the supplier.

7.2 Samples shall be taken at random from each shipment of material. If the shipment consists of more than one lot, each lot shall be sampled.

7.3 The minimum lengths of samples for testing purposes shall be as prescribed by the purchaser or as prescribed in Table 2.

## 8. Specimen Preparation

8.1 All test specimens shall be cut, buffed, or both from the sample of preformed seal. Care should be taken not to overheat

**TABLE 2 Minimum Lengths of Seal Samples**

Seal Size, in. (mm)	Length of Sample, in. (m)
Less than 2 (51)	96 (2.44)
2 (51) to less than 3 (76)	72 (1.83)
3 (76) and larger	60 (1.52)