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Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements[1]

This standard is issued under the fixed designation D 2628; 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 covers the material requirements for preformed polychloroprene elastomeric joint seals for concrete pavements. The seal consists of a multiple web design 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 and is designed to seal the joint and reject incompressibles.

1.2 The values stated in inch-pound units are to be regarded as the standard.

1.3 *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.*

NOTE 1—This specification is a manufacturing and purchasing specification only and does not include requirements or considerations for selection of size, or the installation of the joint seals. However, experience has shown that successful performance of this product depends upon the proper selection of size and cross-sectional design of the joint seal, joint size, and joint spacing for the ambient conditions the pavement will be exposed to, and care in the installation of the joint seals.

2. Referenced Documents

2.1 *ASTM Standards:*

D 395 Test Methods for Rubber Property—Compression Set[2]

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension[2]

D 471 Test Method for Rubber Property—Effect of Liquids[2]

D 518 Test Method for Rubber Deterioration—Surface Cracking[2]

D 573 Test Method for Rubber—Deterioration in an Air Oven[2]

D 575 Test Methods for Rubber Properties in Compression[2]

D 1149 Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber (Flat Specimen)[2]

D 2240 Test Method for Rubber Property—Durometer Hardness[2]

D 3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products[2]

3. Materials and Manufacture

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

4. Physical Requirements

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

4.2 In the applicable requirements of Table 1 and the test methods, all deflections shall be based on the nominal width of the seal.

5. Dimensions and Permissible Variations

5.1 The size, shape and dimensional variations shall be as agreed upon by the purchaser and the producer or supplier.

6. Workmanship

6.1 Seals shall be free of defects in workmanship and materials that may affect its serviceability.

7. Sampling

7.1 A lot shall consist of the quantity for each cross section agreed upon by the purchaser and the producer or 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 A minimum of 9 linear ft (2.8 m) shall constitute one sample for testing purposes.

8. Specimen Preparation

8.1 Cut or buff all test specimens from the sample of preformed seal. Except as otherwise specified in the applicable specifications or test methods, prepare specimens in accordance with the requirements of Practice D 3183.

8.2 Prepare specimens for determining tensile strength and elongation using Die C (Test Methods D 412) when possible. Die D may be used when the flat sections of a seal are too small

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

TABLE 1 Physical Requirements for Preformed Elastomeric Joint Seals

Property	Requirement	ASTM Test Method
Tensile strength, min, psi (MPa)	2000 (13.8)	D 412
Elongaton at break, min, %	250	D 412
Hardness, Type A durometer, points	55 ± 5	D 2240 (modified)[A]
Oven aging, 70 h at 212°F (100°C)		D 573
Tensile strength, loss, max, %	20 max	
Elongation, loss, max, %	20 max	
Hardness, Type A durometer, points change	0 to + 10	
Oil Swell, ASTM Oil 3, 70 h at 212°F (100°C)		D 471
Weight change, max, %	45 max	
Ozone resistance		D 1149
20 % strain, 300 pphm in air, 70 h		(modified)[B]
at 104°F (40°C)	no cracks	
Low-temperature stiffening, 7 days at 14°F (−10°C)		D 2240
Hardness, Type A durometer, points change	0 to + 15	
Low-temperature recovery,[C] 72 h at 14°F (−10°C)		
50 % deflection, min %	88	9.2[D]
Low-temperature recovery,[C] 22 h at − 20°F (−29°C), 50 % deflection, min %	83	9.2[D]
High-temperature recovery,[C] 70 h at 212°F (100°C), 50 % deflection, min %	85	9.2[D]
Compression-deflection, at 80 % of nominal width, min, lbf/in. (N/m)	3.5 (613)	9.3[D]

[A] The term "modified" in the table relates to the specimen preparation. The use of 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 by the purchaser and seller prior to testing. The hardness test shall be made with the durometer in a durometer stand as recommended in Test Method D 2240.

[B] Test in accordance with Procedure A of Test Method D 518.

[C] Cracking, splitting, or sticking of a specimen during a recovery test shall mean that the specimen has failed the test.

[D] The reference sections are those of this specification.

for Die C. However, the requirements of Table 1 shall apply regardless of the die used. Carefully perform buffing and keep to a minimum.

8.3 Specimens for low temperature and high temperature recovery tests and for compression-deflection tests shall consist of 5-in. (127-mm) lengths of the preformed seal. Lightly dust low-temperature recovery and compression-deflection specimens with talc on all internal and external surfaces. Lightly dust specimens for high-temperature recovery with talc on the external surfaces only but otherwise test in the as-received condition.

8.4 Prepare specimens for ozone resistance in accordance with Procedure A of Test Method D 518 and wipe with toluene before testing to remove surface contamination.

9. Test Methods

9.1 Determine compliance with the requirements of Table 1 by conducting tests in accordance with the methods specified.

9.2 *Recovery Tests*:

9.2.1 Determine the low-temperature and high-temperature recovery test values using specimens prepared in accordance with Section 8. Use two specimens for each test and run the test on both specimens at the same time as a pair.

9.2.2 Deflect the specimens between parallel plates to 50 % of the nominal width of the seal using the compression device described in Method B of Test Methods D 395. Prior to compression, place the specimen in a horizontal position such that the plane through both edges of the top surface of the joint seal is perpendicular to the compression plates. As the specimen is being compressed, the top surface of the joint seal should fold inward toward the center of the specimen.

9.2.3 Place a clamp assembly containing the compressed specimens in a refrigerated box capable of maintaining a temperature of 14± 2°F (−10 ± 1°C) for 72 h (Note 2). Then unclamp the assembly and remove the upper compression plate, or carefully remove the specimens from the assembly and transfer them to a wooden surface in the refrigerated box. Allow the specimens to recover for 1 h at 14 ± 2°F (−10 ± 1°C). Measure the recovered width in the center of the 5-in. (127-mm) length at the top longitudinal edge of the specimen. Measurements may be made with either a dial caliper or a platform mounted dial gage graduated in thousandths of an inch (0.02 mm). The platform mounted gage shall have a ¼-in. (6.35-mm) diameter pressor foot with a force of 0.18± 0.02 lbf (0.80 ± 0.09 N). Take measurements with the platform-mounted gage with the presser foot centered on the top longitudinal edge of the seal. Calculate the recovery as follows:

$$\text{Recovery, \%} = \text{recovered width} \times 100/\text{nominal width} \quad (1)$$

Report the least value of recovery to the nearest whole percent.

NOTE 2—The use of a desiccant such as calcium chloride in the refrigerated box should be used to minimize frosting. The desiccant should be changed or reactivated as frequently as necessary to keep it effective.

9.2.4 Place a clamp assembly containing the compressed specimens in a refrigerated box (Note 2) capable of maintaining a temperature of − 20 ± 2°F (−29 ± 1°C) for 22 h. Then unclamp the assembly and remove the upper compression plate or carefully remove the specimens from the assembly and transfer them to a wooden surface in the refrigerated box. Allow the specimens to recover for 1 h at − 20 ± 2°F (−29 ± 1°C). Measure the recovered width and calculate the recovery as in 9.2.3.

9.2.5 Place a clamp assembly containing the compressed specimens in an oven capable of maintaining a temperature of 212 ± 2°F (100 ± 1°C) for 70 h. Do not preheat the clamp assembly. Then unclamp the assembly and carefully remove the specimens from the assembly and transfer them to a wooden surface. Allow the specimens to recover for 1 h at 73 ± 4°F (23 ± 2°C). Measure the recovered width and calculate

the recovery as in 9.2.3.

9.3 *Compression-Deflection Test*:

9.3.1 Determine the compression-deflection value using specimens prepared in accordance with Section 8. Measure the length of each specimen at the top, center and bottom using a rule graduated in sixteenths of an inch (or millimetres). Average the three measurements and record the length of the specimen to the nearest 1⁄16 in. (1 mm). Run compression - deflection tests on two specimens.

9.3.2 Place the specimen on its side in such a manner that a plane through both edges of the top surface of the seal is perpendicular to the platens of the compression testing machine and ensuring that the top of the seal folds inward during deflection. Test in accordance with Method A of Test Methods D 575 except do not use the sheets of sandpaper.

9.3.3 Deflect the specimen to 80 % of nominal width and record the force in pounds-force (or newtons) on the compression portion of the third cycle.

9.3.4 Calculate the compression-deflection value at 80 % of nominal width by dividing the force recorded by the length of the specimen. Report the lowest value of compression-deflection to the nearest 1⁄10 lbf/linear in. (N/m).

10. Precision and Bias

10.1 Precision and bias statements are under development.

11. Certification and Acceptance

11.1 The acceptance of the preformed elastomeric seal shall be based upon one of the following procedures, as specified by the purchaser.

11.1.1 A certification of conformance to the specification requirements. This shall consist of a copy of the producer's test report; or a statement by the supplier accompanied by a copy of the test results, certifying that the material has been sampled, tested, and inspected in accordance with the provisions of this specification. Each certification so furnished shall be signed by an authorized agent of the producer or supplier.

11.1.2 A certification of test results by an independent testing agent and a statement that the material has been sampled, tested, and inspected in accordance with the provisions of this specification. Each certification so furnished shall be signed by an authorized agent of the testing agency.

11.1.3 Testing by the purchaser of any or all properties in accordance with the provisions of the specification.

12. Product Marking

12.1 The seals shall be marked with the lot number, the name or suitable trademark of the producer, or shall be identifiable as to its manufacture by die markings. The top surface of the seal shall be marked at 1-ft intervals in a manner sufficiently clear and durable to enable making length determinations of the seal after installation in the pavement joints.

12.2 Containers in which the seals are packaged for shipment shall be clearly marked with the name of the producer, the size of the seal, the lot number, and the date of manufacture.