



Designation: D5973 – 97 (Reapproved 2017)

# Standard Specification for Elastomeric Strip Seals with Steel Locking Edge Rails Used in Expansion Joint Sealing<sup>1</sup>

This standard is issued under the fixed designation D5973; 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 elastomeric strip seals and the corresponding steel locking edge rail used in expansion joint sealing. The scope of this specification is limited to preformed non-reinforced strip seals that mechanically lock into structural steel locking lugs. The sealing element can consist of a single layer strip or have multiple webs depending on individual project requirements. The structural steel locking edge rail shall be anchored into the structure in accordance with the purchaser's specific details. While the scope of this specification is limited to the materials used in fabrication of strip sealing systems, it is recommended that a practical means of testing the watertightness aspects of the individual systems either in the field or at a testing laboratory be developed. When used on highway bridges, limits on maximum joint opening and minimum steel thicknesses need to be addressed.

1.2 The values stated in the inch-pound system shall be considered as standard.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- [A36/A36M Specification for Carbon Structural Steel](#)
- [A572/A572M Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel](#)
- [A588/A588M Specification for High-Strength Low-Alloy](#)

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

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[Structural Steel, up to 50 ksi \[345 MPa\] Minimum Yield Point, with Atmospheric Corrosion Resistance](#)

[D395 Test Methods for Rubber Property—Compression Set](#)

[D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension](#)

[D471 Test Method for Rubber Property—Effect of Liquids](#)

[D518 Test Method for Rubber Deterioration—Surface Cracking \(Withdrawn 2007\)<sup>3</sup>](#)

[D573 Test Method for Rubber—Deterioration in an Air Oven](#)

[D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment](#)

[D2240 Test Method for Rubber Property—Durometer Hardness](#)

[D2628 Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements](#)

[D4070 Specification for Adhesive Lubricant for Installation of Preformed Elastomeric Bridge Compression Seals in Concrete Structures](#)

### 2.2 Other Document:<sup>4</sup>

[FHWA Technical Advisory T 5140.22 Uncoated Weathering Steel in Structures](#)

## 3. Terminology

### 3.1 Acronyms:

- 3.1.1 *AICS*, *n*—American Institute of Steel Construction
- 3.1.2 *AWS*, *n*—American Welding Society
- 3.1.3 *FHWA*, *n*—Federal Highways Administration
- 3.1.4 *RMA*, *n*—Rubber Manufacturers Association

## 4. Materials and Manufacture

4.1 The seals shall be preformed and manufactured from an elastomeric compound.

4.2 The locking edge rail shall be manufactured from structural steel.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from the Federal Highway Administration, Bridge Division, 400 7th Street SW, Washington, DC 20590, [www.fhwa.dot.gov](http://www.fhwa.dot.gov).

4.3 The adhesive-lubricant used to install the preformed seal into the steel locking edge rail shall be a one-part moisture curing polyurethane compound. The watertightness of the seal shall not depend on the adhesive.

## 5. Physical Properties

5.1 The elastomeric seals shall conform to the physical properties prescribed in [Table 1](#).

5.2 The structural steel locking edge rail shall conform to Specifications [A588/A588M](#),<sup>5</sup> [A36/A36M](#), [A572/A572M](#), or as specified by the purchaser.

5.3 The adhesive-lubricant shall conform to Specification [D4070](#).

## 6. Dimensions and Tolerances

6.1 The size, shape, and dimensional tolerances shall be as agreed upon by the purchaser and the producer or supplier. These tolerances shall be in compliance with the RMA and steel industry standards. The producer or supplier shall provide the purchaser with acceptable tolerances on the seals and steel in the area where the seal fits into the steel locking edge rail, with the understanding that watertightness is not compromised.

## 7. Workmanship

7.1 The lug on the elastomeric strip seal shall be relatively free from dust, dirt, or other foreign materials. This shall be accomplished by wiping the lug that comes in contact with the steel locking edge rail with a solvent, such as acetone. The

<sup>5</sup> The specifier should be aware of FHWA Technical Advisory T 5140.22 when specifying A588 Steel.

**TABLE 1 Physical Properties for Preformed Elastomeric Strip Seals**

Property	Requirement	ASTM Test Method
Tensile strength, min psi (MPa)	2000 (13.8)	<a href="#">D412</a>
Elongation at break, min %	250	<a href="#">D412</a>
Hardness, Type A durometer, points	60 ± 5	<a href="#">D2240</a> <sup>A</sup> (modified)
Oven aging, 70 h at 212 °F (100 °C)		<a href="#">D573</a>
Tensile strength, loss, max %	20	
Elongation, loss max %	20	
Hardness, Type A durometer, points change	0 to +10	
Oil swell, IRM 903		<a href="#">D471</a>
70 h at 212 °F (100 °C)		
weight change, max %	45	
Ozone resistance		<a href="#">D1149</a> <sup>B</sup>
20 % strain, 300 pphm in air, 70 h at 104 °F (40 °C)	No Cracks	
Low temperature stiffening		<a href="#">D2240</a>
7 days at +14 °F (–10 °C)		
Hardness, Type A durometer, points change	0 to +15	
Compression set, 70 h at 212 °F (100 °C), max %	35	<a href="#">D395</a> Method B

<sup>A</sup> The term “modified” in the table relates to the specimen preparation. The use of the strip 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 producer or supplier prior to testing. The hardness test shall be made with the durometer in a durometer stand as recommended in Test Method [D2240](#).

<sup>B</sup> Test in accordance with Method A of Test Method [D518](#) and ozone concentration is expressed in pphm. Such specimen preparation should be agreed upon by the purchaser and producer or supplier prior to testing.

standard factory unwashed finish is acceptable for all other parts of the seal. Small dimples or surface imperfections are acceptable provided they are less than 0.125 in. (3.18 mm) in diameter and less than 5 % the depth of the cross-sectional thickness. Talc residue is acceptable except in areas to be bonded.

7.2 The steel locking edge rail shall be free of defects which are detrimental to the performance of the system. A defect is defined as fractures, tears, cracks, or other imperfections which are greater than 5 % of the thickness of the steel at their location. The steel cavity in contact with the elastomeric seal shall be free from dirt or other debris.

## 8. Sampling

8.1 A lot shall consist of the quantity of elastomeric seal agreed upon by the purchaser and the producer or supplier.

8.2 Samples of the elastomeric seal shall be taken at random from each shipment of material. If the shipment consists of more than one lot, a sample from each lot shall be taken.

8.3 A minimum of 4 linear ft (1.2 m) of elastomeric seal shall constitute one sample for testing purposes.

## 9. Specimens Preparation

9.1 Preformed elastomeric seal specimens shall be prepared in accordance with the prescribed methods in Specification [D2628](#).

## 10. Test Methods

10.1 Determine compliance with the requirements of [Table 1](#) by conducting tests on the preformed elastomeric seals in accordance with the methods specified.

## 11. Certification and Acceptance

11.1 The acceptance of the preformed elastomeric seal and steel rails 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 certificate 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.

11.2 If no procedures are specified, the provisions of [11.1.1](#) shall apply.

## 12. Marking

12.1 The seals and steel rails shall be marked with the lot number, the name or suitable trademark of the producer, and shall be identifiable as to its manufacturer by die markings or

other means. These markings shall be in a location visible after installation of the system.

12.2 Containers in which the seals and adhesive-lubricant 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.

### **13. Fabrication**

13.1 Fabrication of strip seal expansion joint systems shall be performed by facilities or personnel, or both, meeting one of the following requirements:

13.1.1 AISC Category I Certification,

13.1.2 All welding to be performed by AWS certified welders in accordance with AWS D1.1 or D1.5,

13.1.3 Shop prequalification from the specific design authority or specifying agency.

13.2 The use of steel edge rails less than 12 ft (3.7 m) in length shall be avoided where possible. Use of shorter lengths in the curb area is acceptable. Splicing of the steel edge rails in the field must meet one of the requirements in 13.1.

13.3 Preformed elastomeric strip seals shall be one continuous piece with the exception of miter connections that must be vulcanized.

### **14. Keywords**

14.1 adhesive-lubricant; elastomeric; expansion joint; joint sealing; locking edge rails; preformed elastomer; strip seals; vulcanized elastomer

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