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.

Designation: D8138 – 18

# Standard Specification for Preformed Silicone Joint Sealing System for Bridges[1]

This standard is issued under the fixed designation D8138; 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.

## 1. Scope

1.1 This specification covers the material requirements for preformed silicone joint seals for bridges. The seal consists of a silicone rubber gland preformed to a continuous length. Its design shall prevent any tension from occurring in the seal or bonding point during normal movement. The seal is installed by bonding it to the joint header with a silicone-based adhesive and is designed to seal the joint, preventing liquid intrusion.

1.2 The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *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:*[2]

C639 Test Method for Rheological (Flow) Properties of Elastomeric Sealants

C679 Test Method for Tack-Free Time of Elastomeric Sealants

C793 Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants

D395 Test Methods for Rubber Property—Compression Set

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D573 Test Method for Rubber—Deterioration in an Air Oven

D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D2240 Test Method for Rubber Property—Durometer Hardness

## 3. Materials and Manufacture

3.1 The seals shall be preformed to a continuous length, and the material shall be silicone rubber.

3.2 The adhesive shall be a silicone-based adhesive.

## 4. Physical Requirements

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

4.2 The materials for the adhesive shall conform to the physical properties prescribed in Table 2.

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

## 5. Dimensions and Working Parameters

5.1 The size, shape, and dimensional tolerances shall be as outlined in 5.2.

5.2 Measurements used for physical 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 the measurements. The measured width shall be greater than or equal to the nominal width. Measurements shall be taken at quarter points of the sample.

5.3 The lengths of samples for performance testing purposes shall be 2 ft ± 0.25 in. (601 ± 6 mm) length for the seal and appropriate amount of silicone-based adhesive per manufacturer's recommendation.

## 6. Sampling

6.1 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.

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

[1] This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.32 on Bridges and Structures.

Current edition approved April 1, 2018. Published April 2018. Originally approved in 2018. DOI: 10.1520/D8138-18.

[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.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States

**TABLE 1 Physical Requirements for Preformed Silicone Joint Seal Gland**

| | Requirements | ASTM Test Method |
|---|---|---|
| Resistance to accelerated weathering, 5000 h | No cracking or degradation | C793 – Fluorescent UV accelerated weathering tester (QUV) |
| Tensile strength, min, psi | 1000 | D412 |
| Elongation at break, min, % | 400 | D412 |
| Hardness, type A durometer, points | 55 ± 5 | D2240 |
| Tear strength, min, ppi | 100 | D624 – Die B |
| Compression set, max | | |
| At 212 °F, 70 h, % | 30 | D395 Method B – Specimen 1 or 2 |
| Heat-aged properties, 70 h at 212 °F | | |
| Durometer, max, points lost | 5 | D573 |
| Tensile strength, max, % loss | 10 | |
| Elongation, max, % loss | 10 | |

**TABLE 2 Physical Requirements for Silicone-Based Adhesive**

| | Requirements | ASTM Test Method |
|---|---|---|
| Tensile strength, min, psi | 200 | D412 |
| Elongation at break, min, % | 450 | D412 |
| Sag/flow, max, in. | 3/16 | C639 |
| Tack-free time, max, minutes | 30 | C679 |
| Resistance to UV, 5000 h | No cracking or degradation | C793 |
| Cure through to ¼-in. thickness, max, hours | 24 | at 75 °F / 50 % RH |

## 7. Specimen Preparation

7.1 All tests in Tables 1 and 2 shall be done in accordance with the referenced ASTM test method.

7.2 All performance test specimens cut shall be square to within 2° and smooth, with no roughness visible to the naked eye and cleaned of debris. This process will eliminate irregularities. The 2-ft (601-mm) long test specimens shall be fully installed with the adhesive per manufacturer recommendations on a steel or concrete surface, or both, simulating a bridge joint.

## 8. Test Methods

8.1 Compliance with the requirements of Tables 1 and 2 shall be determined by tests conducted in accordance with the methods specified.

8.2 Performance tests shall be run at a sliding speed of 2.50 in./min in accordance with the manufacturer's suggested minimum and maximum openings.

8.3 The joint seal shall be set at its median opening, which is defined as halfway between the claimed maximum closure and maximum opening. Maximum joint opening shall be a minimum of 50 % higher than the median joint opening. It will be subject to cyclic loading at a 45° skew angle for 200 cycles with movements ± median design × 50 % × 1.414 displacement at room temperature. A typical cyclic load apparatus is shown in Fig. 1.

8.4 The specimen is then cooled for 24 h at –20 °F and, within 20 min of removal from conditioning chamber, subjected to an additional 50 cycles at a 45° skew angle. Any adhesive or cohesive failures in the form of rips, tears, or bond failures will be cause for rejection.

## 9. Certification and Acceptance

9.1 The acceptance of the preformed silicone joint seal shall be based upon one of the following procedures, as specified by the purchaser:

9.1.1 A certification of conformance to the specification requirement. This shall consist of a notarized copy of the manufacturer's test report, or a notarized statement by the supplier accompanied by a copy of the results, certifying that the material has been sampled, tested, passed joint cycling test, and inspected in accordance with the provisions of the specification. Each certification so furnished shall be signed by an authorized agent of the manufacturer or supplier.

9.1.2 A notarized certification of test results by an independent testing agent or notarized statement that the material has been sampled, tested, passed joint cycling test, and inspected in accordance with the provisions of the specification. Each certification so furnished shall be signed by an authorized agent of the testing agency.

9.1.3 Testing by the purchaser of any or all properties should be in accordance with the provisions of the specification.

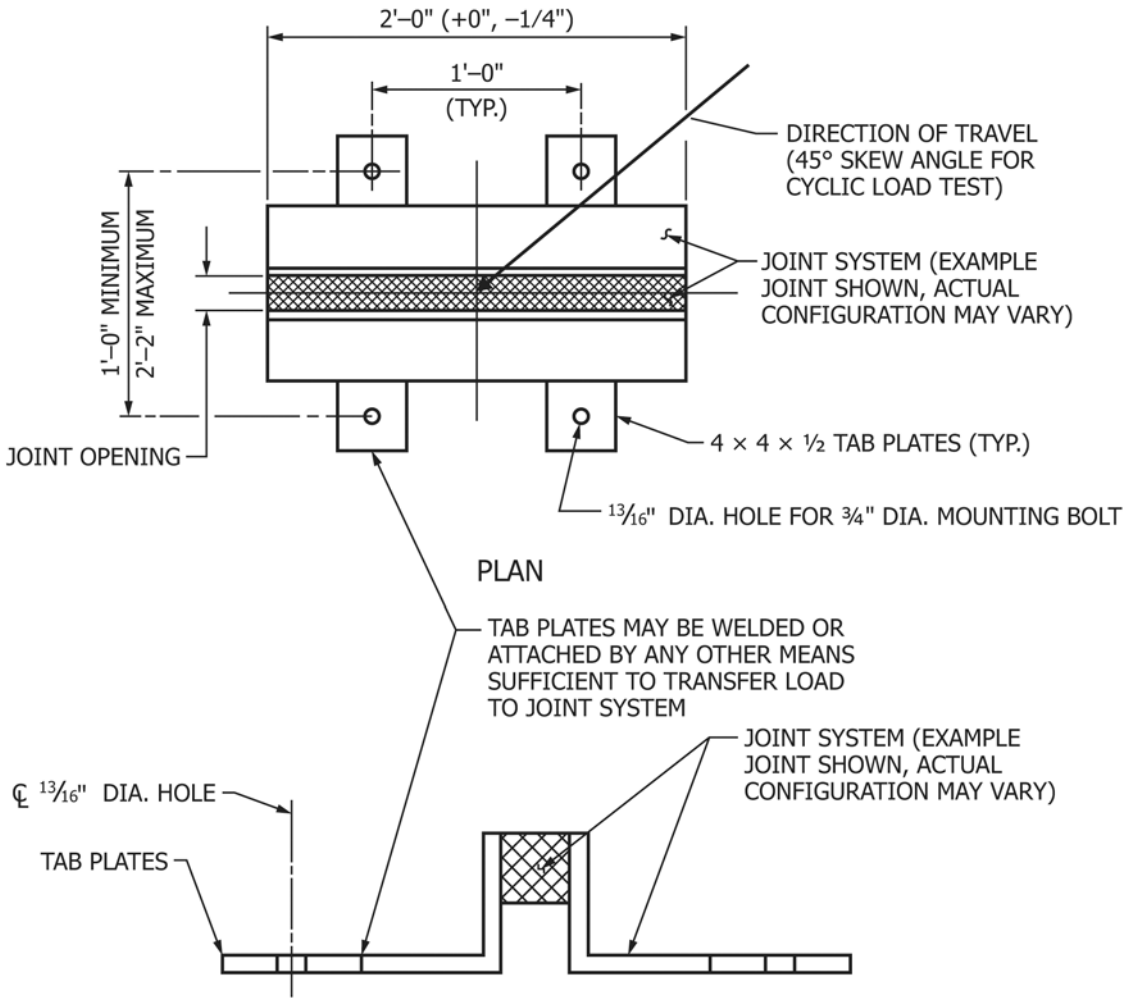


**FIG. 1 Typical Performance Testing Apparatus for Cyclic Load Test**

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; http://www.copyright.com/*