Designation: D 3569 – 95

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Specification for Joint Sealant, Hot-Applied, Elastomeric, Jet-Fuel-Resistant-Type for Portland Cement Concrete Pavements[1]

This standard is issued under the fixed designation D 3569; 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 an elastomeric-type one component, hot-applied, jet-fuel-resistant concrete joint sealant, resistant to weathering, for use in sealing joints and cracks in Portland cement concrete highway and airfield pavements in critical areas subject to jet fuel spillage.

1.2 *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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Appendix X1.

2. Referenced Documents

2.1 *ASTM Standards:*

D 5167 Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation[2]

D 5249 Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints[2]

D 5329 Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements[2]

3. General Requirements

3.1 The joint sealant, when in place, shall form a resilient and cohesive compound that is resistant to weathering, and shall effectively seal joints in concrete throughout repeated cycles of thermal expansion and contraction, and against the infiltration of moisture, jet-fuel and incompressibles. It shall not flow from the joint or be picked up by vehicle tires. The joint sealant, before placement, shall be stable at the safe heating temperature for up to 6 h. The poured joints shall be free of internal voids due to placement or that develop subsequently in service.

4. Physical Requirements

4.1 *Safe Heating Temperature*—The highest temperature to which the sealing compound can be heated and still conform to all the requirements specified herein. For the purposes of testing as specified hereafter, the pouring temperature for specimen preparation shall be the safe heating temperature, as recommended by the sealant manufacturer. The safe heating temperature shall be shown on all containers and shall be provided to the testing agency before any laboratory tests are begun. The safe heating temperature shall be a minimum of 20°F (11°C) higher than the manufacturer's recommended application temperature. (See Appendix X1).

4.2 *Cone Penetration, Nonimmersed*—At 77 ± 0.2°F (25 ± 0.1°C), 150 g, for 5 s, shall not exceed 130 units.

4.3 *Cone Penetration, Fuel-Immersed*—The penetration shall not exceed that of the nonimmersed penetration.

4.4 *Flow*—There shall be no flow after 72 h at 158 ± 2°F (70 ± 1°C).

4.5 *Bond*—The sealant shall be tested at 0 ± 2°F (−17.8± 1.1°C) for three complete cycles of 50 % extension each. All three specimens shall meet the following requirements for bond:

4.5.1 *Nonimmersed*—No specimen shall develop any crack, separation, or other opening in the sealing compound or between the sealing compound and the concrete blocks.

4.5.2 *Water-Immersed*—No specimen shall develop any crack, separation, or other opening in the sealing compound or between the sealing compound and the concrete blocks.

4.5.3 *Fuel-Immersed*—No specimen shall develop any crack, separation, or other opening in the sealing compound or shall develop any separation between the sealant and the concrete block deeper than 0.25 in. (6.4 mm) when measured perpendicular to the sealant surface and down the interface of the block in the area showing the effect.

4.6 *Resilience*—When tested at 77 ± 0.2°F (25 ± 0.1°C), the recovery shall be a minimum of 60 %.

4.7 *Resilience, Oven-aged*—When conditioned in a forced-draft oven maintained at 158 ± 2°F (70 ± 1°C) for 24 ± 2 h, and tested at 77 ± 0.2°F (25 ± 0.1°C), the recovery shall be a minimum of 60 %.

4.8 *Artificial Weathering*—After 160 h of exposure, the joint sealant shall not flow, show tackiness, the presence of an oil-like film or reversion to a mastic-like substance, form surface blisters, either intact or broken, form internal voids, have surface crazing, cracking, hardening, or loss of rubber-like properties. Evidence of physical change in the surface of

[1] This specification is under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.33 on Formed-In-Place Sealants for Joints and Cracks in Pavements.

Current edition approved Oct. 10, 1995. Published December 1995. Originally published as D 3569 – 85. Last previous edition D 3569 – 85 (1991)ε[1].

[2] *Annual Book of ASTM Standards*, Vol 04.03.

the material by visual and tactile examination shall constitute failure of this test.

4.9 *Tensile Adhesion*—The average of three test specimens shall be a minimum of 500 % elongation.

4.10 *Flexibility*—When conditioned in a forced-draft oven maintained at 158 ± 2°F (70 ± 1°C) for 72 h and bent at 90° over a 0.25-in (6.4-mm) diameter mandrel, the specimen shall have no indication of surface crazing or cracking.

4.11 *Solubility*—(A change in weight.) The change in weight shall not exceed ±2 % and there shall be no cracking, swelling, or softening of the specimens to a mastic-like consistency.

5. Sampling and Heating

5.1 *Sampling*:

5.1.1 Samples may be taken at the plant or warehouse prior to delivery or at the time of delivery, at the option of the purchaser. If sampling is done prior to shipment, the inspector representing the purchaser shall have free access to the material to be sampled. The inspector shall be afforded all reasonable facilities for inspection and sampling that shall be conducted so as not to interfere unnecessarily with the operation of the works.

5.1.2 Samples shall consist of one of the manufacturer's original sealed containers selected at random from the lot or batch of finished material. A batch or lot shall be considered as all finished material that was manufactured simultaneously or continuously as a unit between the time of compounding and the time of packaging or placing in shipping containers.

5.1.3 The sealant portion for testing shall be obtained from the selected manufacturer's original sealed container in accordance with Practice D 5167. The sample portion for testing which is added to and heated in the melter shall weigh a minimum of 2500 g.

5.2 *Heating*—Heat the material in accordance with Practice D 5167.

5.2.1 *Initial Melting*—Heat the oil bath in the melter to the safe heating temperature of the sealant being tested. Add the sample according to instructions in Practice D 5167. After the sample has been added, the oil bath temperature may be increased to not more than 20°F (11°C) higher than the sealant safe heating temperature, to raise the sealant temperature to the safe heating temperature within the required 1 h time as stated in Practice D 5167.

5.2.2 *Extended Heating*—Continue heating the sample at the safe heating temperature until 6 h have elapsed after adding the first segment to the melter. Test specimens for evaluation are then immediately poured from the material that has been heated for 6 h.

6. Test Methods

6.1 *Specimen Curing*—All specimens shall be cured at standard laboratory atmospheric conditions specified in Test Method D 5329 for 72 ± 2 h prior to beginning any testing.

6.2 *Cone Penetration, Nonimmersed*—Use Test Method D 5329.

6.3 *Cone Penetration, Fuel-Immersed*—Use Test Method D 5329.

6.4 *Flow*—Use Test Method D 5329.

6.4.1 Test the specimen at 158 ± 2°F (70 ± 1°C) for 72 h.

6.5 *Bond, Nonimmersed*—Use Test Method D 5329.

6.5.1 After final scrubbing and blotting specified in Test Method D 5329, the blocks shall be placed on their 1 in. by 2 in. (25.4 by 50.8 mm) faces and allowed to dry at standard laboratory conditions for 24 ± 2 h prior to pouring bond test specimens. There shall be no free moisture on any of the block surfaces when bond specimens are prepared. If necessary, blotting may be done with an oil-free, clean, soft absorbent cloth or paper.

6.5.2 Immediately after conditioning, assemble the blocks with spacers specified in Test Method D 5329 to enclose an opening between the blocks in which the sealant will be poured which is 0.500 ± 0.005 in. (12.7 ± 0.13 mm) in width.

6.5.3 After trimming and required curing, condition the specimens at 0 ± 2°F (−17.8 ± 1°C) for not less than 4 h and then immediately begin extending the specimens 0.25 in. (6.4 mm) at a rate of 0.125 in. (3.2 mm) per h. This results in a 50 % extension.

6.5.4 Recompress and re-extend the specimens for two additional cycles for a total of three cycles. The three required cycles shall be completed within a five day period.

6.6 *Bond, Water-Immersed*—Use Test Method D 5329.

6.7 *Bond, Fuel-Immersed*—Use Test Method D 5329.

6.8 *Resilience*—Use Test Method D 5329.

6.9 *Resilience, Oven Aged*—Use Test Method D 5329.

6.9.1 At the completion of the 72 ± 2 h curing period at standard laboratory conditions, place the specimen in a forced draft oven maintained at 158 ± 2°F (70 ± 1°C) for 24 ± 2 h. Remove the specimen from the oven and test as specified in Test Method D 5329.

6.10 *Artificial Weathering*—Use Test Method D 5329.

6.11 *Tensile Adhesion*—Use Test Method D 5329.

6.11.1 Test specimens are to be assembled with concrete blocks and spacers to enclose an opening between the blocks in which the sealant will be poured which is 0.500 ± 0.005 in. (12.7 ± 0.13 mm) in width.

6.12 *Flexibility*—Use Test Method D 5329.

6.13 *Solubility*—Use Test Method D 5329.

7. Packaging and Package Marking

7.1 The joint sealant shall be packaged in 5-gal (18.9-L) sealed containers, or as otherwise specified by the user. Each container shall be clearly marked with the name and address of the manufacturer, the trade name of the sealant, specification designation, the manufacturer's batch or lot number, recommended application temperature, safe heating temperature, and application instructions, unless otherwise specified in the contract or purchase order.

8. Keywords

8.1 hot-applied sealant; jet-fuel resistant; joint sealant; Portland cement concrete pavement

APPENDIX

(Nonmandatory Information)

X1. HAZARDS FOR USE AND APPLICATION OF JOINT SEALANT, HOT-APPLIED, ELASTOMERIC, JET-FUEL-RESISTANT-TYPE FOR PORTLAND CEMENT CONCRETE PAVEMENTS

X1.1 *Temperature Control*—Some, if not all the known materials conforming to this specification may be damaged by heating to too high a temperature, reheating, or by heating for too long a time. Take care to secure equipment for heating and application that is suitable for the purpose and approved by the manufacturer of the sealant. Direct heating shall not be used. The sealant should be heated in a kettle or melter constructed as a double-boiler, with a space between the inner and outer shells filled with a high flash heat transfer oil. Positive temperature control, mechanical agitation, and circulating pump should be provided.

X1.2 *Pavement Joints in New Construction*—Before sealant is applied into new construction pavement joints, the joints should be dry, clean of all scale, dirt, dust, curing compound, and other foreign material. The sidewalls of the joint space should be thoroughly sandblasted and blown clean of loose sand by high pressure air of 100 psi (689 kPa) minimum. Compressors should be equipped with an adequate oil and water trap to ensure that compressed air is not contaminated. The joints should then be sealed by use of a double-boiler melter or applicator, as described in X1.1. If the joints are cleaned by jet water-blasting, the jet water-blast machine shall be capable of discharging water at a rate of 8500 to 10 000 psi (58.6 to 68.9 MPa) pressure and 20 to 22 gal of water/min (75.7 to 83.3 L of water/min). Joints shall be thoroughly dry before installation of backer rod and then sealed using a melter or applicator as described in X1.1.

X1.3 *Pavement Joints to be Resealed*—When sealant covered by this specification is used for maintenance and resealing of joints that have previously contained either similar or dissimilar sealant, it is recommended that the joints be thoroughly cleaned with a plow, router, concrete saw, or other suitable tool or tools designed for the purpose of neatly cleaning pavement joints without spalling the joint edges. Loose material should be blown free of the joint. The joint sidewalls should be thoroughly sandblasted and blown free of loose sand with high pressure air of 100 psi (689 kPa) minimum. Compressors should be with an adequate oil and water trap to ensure that compressed air is not contaminated. The joints should then be sealed using a melter or applicator as described in X1.1. If joints are cleaned by jet water-blasting, the jet water-blast machine will be capable of discharging water 8500 to 10 000 psi (58.6 to 68.9 MPa) pressure and 20 to 22 gal of water/min (75.7 to 83.3 L of water/min). Joints should be thoroughly dry before installation of backer rod or bondbreaker. Joints should be sealed with a melter or applicator as described in X1.1.

X1.4 *Backer Rod or Bondbreaker*—The use of backer rod or bondbreaker in the joint to be sealed is recommended to control the depth of the sealant, and to achieve the desired joint shape factor. Backup material and bondbreakers should be compatible with the sealant. Due to elevated temperatures of sealants at application temperature, exercise care in the selection of suitable back-up materials. Backer material should meet requirements of Specification D 5249.

X1.5 *Workmanship*—Practice care in applying the sealant to avoid overfilling of the joint space. Joints should be filled in a neat workmanlike manner to within 0.125 to 0.25 in. (3.2 to 6.4 mm) below flush with the pavement surface.

X1.6 **Caution**—As this material may contain polyvinyl chloride and coal-tar derivatives, special care must be taken when using this material. The manufacturer shall state necessary precautions clearly on the container and shall supply the applicator with a U. S. Department of Labor Material and Safety Data Sheet (OSHA Form 20[3]), so that proper safe handling and application techniques may be used.

[3] Available from Superintendent of Documents, U. S. Government Printing Office, Washington DC 20402.