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An American National Standard

Standard Specification for Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements[1]

This standard is issued under the fixed designation D 3405; 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 joint sealants of the hot-poured type intended for use in sealing joints and cracks in portland cement concrete and asphaltic concrete pavements.

1.2 This standard does not purport to cover the properties required of sealants for use in areas of portland cement concrete pavement subject to jet fuel or other fuel spillage, such as aircraft refueling and maintenance areas.

1.3 The values stated in inch-pound units are the standard.

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 shall be composed of a mixture of materials that will form a resilient and adhesive compound capable of effectively sealing joints and cracks in concrete and asphaltic pavements against the infiltration of moisture and foreign material throughout repeated cycles of expansion and contraction with temperature changes, and that will not, at ambient temperatures, flow from the joint or be picked up by vehicle tires. The material shall be capable of being brought to a uniform pouring consistency suitable for completely filling the joints without inclusion of large air holes or discontinuities and without damage to the material. It shall remain relatively unchanged in application characteristics for at least 6 h at the recommended pouring temperature in the field (see Appendix X1).

4. Physical Requirements

4.1 *Safe Heating Temperature*—The safe heating temperature is the highest temperature to which the sealant can be heated and still conform to all the requirements specified herein. For purposes of testing as specified hereinafter, the pouring temperature shall be the same as safe heating temperature. The safe heating temperature shall be set forth by the manufacturer and shall be shown on all containers and shall be provided to the testing agency before any laboratory tests are begun.

4.2 *Cone Penetration, Non-Immersed*—at 77°F (25°C), 150 g, 5 s shall not exceed 90.

4.3 *Flow*—at 140°F (60°C) shall not exceed 3.0 mm when tested for 5 h.

4.4 *Bond, Non-Immersed*—The sealant shall be tested at − 20°F (−29°C) for three complete cycles. The development at any time during the test procedure of a crack, separation, or other opening that at any point is over ¼ in. (6.4 mm) deep, in the sealant or between the sealer and concrete block, shall constitute failure of the test specimen. The depth of the crack, separation, or opening shall be measured perpendicular to the side of the sealant showing the defect. All three specimens must meet this requirement for bond.

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

4.6 *Asphalt Compatibility*—There shall be no failure in adhesion, formation of an oily exudate at the interface between the sealant and the asphaltic concrete, or softening or other deleterious effects on the asphaltic concrete or sealant when tested at 140°F (60°C).

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 which 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

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

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 Obtain the sealant portion for testing from the selected manufacturer's original sealed container in accordance with Practice D 5167. The sample portion added to and heated in the melter shall weigh 800 ± 50 g.

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

5.2.1 The oil bath in the melter shall be heated to a temperature between the sealant's safe heating temperature and 75°F (41.7°C) above the sealant's safe heating temperature. (Never allow the oil temperature to exceed 550°F (288°C).) Add the sealant to the melter according to the instructions in Practice D 5167. After the sample has been added to the melter, regulate the oil temperature within the listed temperature limits while raising the sealant's temperature to manufacturer's recommended safe heating temperature within the required 1 h of time, as stated in Practice D 5167. Immediately after reaching the recommended safe heating temperature, pour samples for testing.

6. Test Methods

6.1 *Specimen Curing*— Cure all specimens at standard laboratory conditions for 24 ± 4 h as specified in Test Method D 5329 prior to beginning any testing.

6.2 *Cone Penetration, Non-Immersed*—Use Test Method D 5329 for cone penetration, non-immersed.

6.3 *Flow*—Use Test Method D 5329 for flow.

6.3.1 Test the specimen at 140 ± 2°F (60 ± 1°C) for 5 h.

6.4 *Bond, Non-Immersed*—Use Test Method D 5329 for bond, non-immersed.

6.4.1 After final scrubbing and blotting specified in Test Method D 5329, air dry the blocks standing on their 1 by 2 in. ends at standard laboratory conditions for 1 h ± 10 min prior to pouring bond test specimens.

6.4.2 Immediately after conditioning, assemble the blocks with spacers specified in Test Method D 5329 so the opening between the blocks forms a cured sealant block that is 0.500 ± 0.005 in. wide.

6.4.3 After conditioning, trim off the excess material and condition the specimens at −20 ± 2°F (−29 ± 1°C) for not less than 4 h, then immediately extend ¼ in. at 0.125 in./ h. This results in a 50 % extension.

6.4.4 Recompress and re-extend for two additional cycles for a total of three cycles as described in Test Method D 5329. The three required cycles shall be completed within a 5 day period.

6.5 *Resilience*—Use Test Method D 5329 for resilience.

6.6 *Asphalt Compatibility*—Use Test Method D 5329 for asphalt compatibility.

7. Packaging and Marking

7.1 The sealing compound shall be delivered in the manufacturer's original containers. Each container shall be legibly marked with the name of the manufacturer, the trade name of the sealant, the manufacturer's batch number or lot, the pouring temperature, and the safe heating temperature.

8. Keywords

8.1 hot-applied; joint sealant

APPENDIX

(Nonmandatory Information)

X1. PRECAUTIONS ON USE AND APPLICATION OF JOINT SEALANTS, HOT-APPLIED FOR CONCRETE AND ASPHALT PAVEMENTS

X1.1 Some, if not all, of 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. Care should be exercised to secure equipment for heating and application that is suitable for the purpose and approved by the manufacturer of the material. The material should be heated in a kettle or melter constructed as a double boiler, with the space between the inner and outer shells filled with oil or other heat-transfer medium. Thermostatic control for the heat transfer medium shall be provided and shall have sufficient sensitivity to maintain sealant temperature within the manufacturer's specified application temperature range. Temperature indicating devices shall have intervals no greater than 5°F (2.8°C) and shall be calibrated as required to assure accuracy. The melter shall have a continuous sealant agitation and mixing system to provide uniform viscosity and temperature of material being applied. If equipped with an application system to deliver sealant to the pavement, the melter shall incorporate a recirculation pump or other means of maintaining sealant temperature in the delivery system. Sealant that has been damaged due to overheating, reheating or prolonged heating may experience poor adhesion, softening or bleeding, difficult application, or jelling in the melter. As a means of ascertaining whether or not the material covered by this specification is being or has been damaged in the field as a result of overheating, reheating, or prolonged heating, flow panel specimens may be prepared periodically by drawing off sealant directly from the melter-applicator during sealing operations and then tested for flow according to the methods of testing materials covered by this specification. Flow in excess of 3.0 mm would indicate damage to material caused by improper heating procedures.

X1.2 Pavement joints in new construction for application of material covered by this specification should be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The sidewalls of the joint space to be sealed should then be