Designation: D6690 – 15

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

This standard is issued under the fixed designation D6690; 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 and crack sealants of the hot applied type intended for use in sealing joints and cracks in Portland Cement Concrete and Asphaltic Concrete Pavements.

1.2 This specification does not purport to cover the properties required of sealants for use in areas of Portland Cement concrete or asphaltic pavement subject to jet fuel or other fuel spillage such as vehicle and/or aircraft refuel and maintenance areas.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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 requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)

D5167 Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation

D5249 Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints

D5329 Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements

2.2 *Federal Specification:*[3]

SS-S-1410C

3. General Requirements

3.1 The 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 application temperature in the field.

4. Classification

4.1 *Type I*—A joint and crack sealant capable of maintaining an effective seal in moderate climates. The material is tested for low temperature performance at –18°C using 50 % extension.

4.2 *Type II*—A joint and crack sealant capable of maintaining an effective seal in most climates. Material is tested for low temperature performance at –29°C using 50 % extension.

4.3 *Type III*—A joint and crack sealant capable of maintaining an effective seal in most climates. Material is tested for low temperature performance at –29°C using 50 % extension. Special tests are included (formerly Federal Spec SS-S-1401C).

4.4 *Type IV*—A joint and crack sealant capable of maintaining an effective seal in climates experiencing very cold temperatures. Material is tested for low temperature performance at –29°C using 200 % extension.

NOTE 1—It is the responsibility of the user agency to determine which type is most applicable to their conditions.

[1] This specification is under the jurisdiction of ASTM Committee D04 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.

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[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.

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

5. Physical Requirements

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

5.2 The sealant shall conform to the requirements prescribed in Table 1.

6. Sampling and Heating

6.1 *Sampling:*

6.1.1 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.

6.1.2 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.

6.1.3 Obtain the sealant portion for testing from the selected manufacturer's original sealed container in accordance with Practice D5167. The sample portion added to and heated in the melter shall weigh 800 ± 50 g for Types I, II, IV, and 1600 ± 50 g for Type III. Both pots of the melter described in Practice D5167 shall be used for Type III.

6.2 *Heating*—Heat the material in accordance with Practice D5167.

6.2.1 The oil bath in the melter shall be heated to a temperature between the sealant's maximum heating temperature and 42°C above the sealant's maximum heating temperature. (Never allow the oil temperature to exceed 288°C). Add the sealant to the melter according to the instructions in Practice D5167. 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 maximum heating temperature within the required 1 hour of time, as stated in Practice D5167. Immediately upon reaching the maximum heating temperature, for Types I, II and IV pour all specimens for testing directly including penetration, resilience, bond, softening point and compatibility. Type III shall be heated for 3 h from the time of first addition to the melter before pouring all specimens.

7. Test Methods

7.1 *Specimen Conditioning*—Condition the penetration, resilience, bond to concrete, softening point and compatibility specimens at standard laboratory conditions for 24 ± 4 h as specified in Test Methods D5329 prior to beginning any testing.

7.2 *Cone Penetration*—Determine cone penetration according to Test Methods D5329 for cone penetration, non-immersed.

7.3 *Softening Point*—Determine the Softening Point according to Test Method D36. USP Glycerin shall be used for the liquid.

7.4 *Bond, Non-Immersed*—Determine the bond according to Test Methods D5329 for bond, non-immersed.

7.4.1 Immediately after conditioning the blocks as in Test Methods D5329, assemble the blocks with spacers as specified in Test Methods D5329 so the opening between the blocks will form a cured sealant block that is 25.0 ± 0.4 mm wide for Type I and 12.5 ± 0.2 mm wide for Type II, Type III, and Type IV.

7.4.2 After pouring material into the block opening, condition the specimen as in 7.1.

7.4.3 Re-compress and re-extend according to Test Methods D5329 for the total number of cycles prescribed in Table 1. The required cycles shall be completed within a 5-day period from the time of pouring for Type II, III, and IV, and a 7-day period for Type I.

TABLE 1

	Type I	Type II	Type III	Type IV
Cone Penetration at 25°C	90 max.	90 max.	90 max.	90-150
Softening Point °C	80 minimum	80 minimum	80 minimum	80 minimum
Bond, non-immersed	Two out of three 25 ± 0.4 mm specimens pass[A] 5 cycles at 50 % ext. at -18°C	Three 12.5 ± 0.2 mm Specimens pass[A] 3 cycles at 50 % ext. at -29°C	Three 12.5 ± 0.2 mm Specimens pass[A] 3 cycles at 50 % ext. at -29°C	Three 12.5 ± 0.2 mm Specimens pass[A] 3 cycles at 200 % ext. at -29°C
Bond, water immersed	--	--	Three 12.7 mm specimens pass[A] 3 cycles at 50 % ext. at -29°C	--
Resilience, %	--	60 min.	60 min.	60 min.
Oven Aged Resilience,%	--	--	60 min.	--
Asphalt Compatibility	Pass[B]	Pass[B]	Pass[B]	Pass[B]

[A] The development at any time during the test procedure of a crack, separation, or other opening that at any point is over 6 mm deep, in the sealant or between the sealant and concrete block shall constitute failure of the test specimen. The depth of the crack, separation or other opening shall be measured perpendicular to the side of the sealant showing the defect.

[B] There shall be no failure in adhesion, formation of an oily exudate at the interface between the sealant and asphaltic concrete or other deleterious effects on the asphaltic concrete or sealant when tested at 60°C.