Designation: ~~D6297 – 13~~ D6297 – 20

Standard Specification for Asphaltic Plug Joints for Bridges[1]

This standard is issued under the fixed designation D6297; 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, testing, and application requirements for a ~~field molded~~ field-molded asphaltic plug joint (APJ) used in expansion joint sealing on asphalt concrete overlay and portland cement concrete decks. The scope of this specification is limited to ~~field molded~~ field-molded APJ. This molded element can consist of ~~multilayer,~~multilayer or single layer, or both, application systems depending upon individual manufacturing requirements. The details of this specification are limited to the materials used in the application of APJ. It is recommended that a practical means of testing the watertightness aspects of the individual systems, either in the field or at the testing laboratory, be developed. When used on highway bridges, limits on maximum joint movements shall be specifically identified for each type of APJ. APJs should not be used for movement applications exceeding ~~± 25~~ ±25 mm from the installation width.

1.2 The values stated in SI units are to be regarded as ~~the standard. The values given in parentheses are provided for information only.~~standard. No other units of measurement are included in this standard.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the 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~~ safety, health, and ~~health~~environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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]

A36/A36M Specification for Carbon Structural Steel
~~D5~~D5/D5M Test Method for Penetration of Bituminous Materials
D8 Terminology Relating to Materials for Roads and Pavements
~~D36~~D36/D36M Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
D113 Test Method for Ductility of Asphalt Materials
D217 Test Methods for Cone Penetration of Lubricating Grease
D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
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 Asphalt Pavements and Portland Cement Concrete Pavements

3. Terminology

3.1 For definitions of general terms, refer to Terminology D8.

3.2 *Acronyms:*

[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 ~~July 1, 2013~~July 1, 2020. Published ~~August 2013~~July 2020. Originally approved in 1998. Last previous edition approved in ~~2007~~2013 as ~~D6297 – 01 (2007).~~D6297 – 13. DOI: ~~10.1520/D6297-13.~~10.1520/D6297-20.

[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.

3.2.1 *APJ*—~~Asphaltic Plug Joint.~~asphaltic plug joint

3.2.2 *AB*—~~Asphaltic Binder.~~asphaltic binder

4. Significance and Use

4.1 This specification describes test methods and procedures for determining specification conformance for asphaltic plug joints for bridges.

NOTE 1—The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of Specification D3666 are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Specification D3666 alone does not completely ensure reliable results. Reliable results depend on many factors; following the suggestions of Specification D3666 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.

5. Material

5.1 The AB shall be a thermoplastic polymeric-modified asphalt conforming to the physical properties in Table 1.

5.2 Type of aggregate shall be one of the following: granite, basalt, gabbro, porphyry, or gritstones. The specified aggregate shall be crushed, washed, and dried. Specific size and gradations of aggregate shall be agreed upon by the purchaser and APJ manufacturer. The aggregate shall be preweighed and packaged to avoid confusion on the ~~jobsite.~~ job site. It shall be noted that specific sizes of aggregate may be proprietary to certain manufacturers.

5.3 The ~~closed cell~~ closed-cell foam expansion joint filler shall be nongassing and capable of withstanding the elevated installation temperature ~~(199°C)~~(199 °C) of the AB and meet Specification D5249.

5.4 The steel bridging plate shall conform to Specification A36/A36M for mild steel.

6. Physical Properties

6.1 The thermoplastic ~~polymeric-modified~~ polymeric-modified asphalt samples shall be melted for sample preparation in accordance to Practice D5167.

6.2 The thermoplastic ~~polymeric-modified~~ polymeric-modified asphalt shall conform to the physical properties prescribed in Table 1.

TABLE 1 Physical Properties

	~~ASTM~~ASTM Standards	Required Physical ~~Properties~~ Properties
~~Softening point, min~~	~~D36~~	~~83°C~~
Softening point, min	D36/D36M	83 °C
~~Tensile adhesion, min~~	~~D5329~~	~~700 %~~
Tensile adhesion with 12.5 ± 0.2 mm opening between the blocks, min	D5329	700 %
~~Ductility, min at 25°C(77°F)~~	~~D113~~	~~400 mm~~
Ductility, min at 25 °C	D113	400 mm
Penetration	D5329	
~~Max at 25°C (77°F) 150 g, 5 s~~		~~75 units~~
Max at 25 °C, 150 g, 5 s		75 1/10 mm units
~~Low temperature penetration~~	~~9.1~~	
Low temperature penetration	subsection 10.1	
~~Min at –18°C (0°F) 200 g, 60 s~~		~~10 units~~
Min at –18 °C, 200 g, 60 s		10 1/10 mm units
~~Flow, max 5 h at 60°C (140°F)~~	~~D5329~~	~~3.0 mm~~
Flow, max 5 h at 60 °C	D5329	3.0 mm
~~Resiliency, min - max at 25°C (77°F)~~	~~D5329~~	~~40 - 70 %~~
Resiliency, min–max at 25 °C	D5329	40–70 %
Asphalt compatibility	D5329	Pass
~~Recommended application heating~~		~~182°C - 199°C~~
Recommended application heating Temperature range		182 °C–199 °C
~~Bond 3 Cycles at –7°C (+20°F),~~	~~D5329~~	~~Pass~~
Bond 3 cycles at –7 °C	D5329	Pass
~~100 % Elongation~~		
100 % elongation with 12.5 ± 0.2 mm opening between the blocks		
~~Flexibility, at –23°C (–10°F)~~	~~9.2~~	~~Pass~~
Flexibility at –23 °C, 10 s, 90° bend	subsection 10.2	Pass

7. Dimensions and Tolerances

7.1 The size, shape, and dimensional tolerance shall be agreed upon by the purchaser and the producer or supplier. These tolerances shall be in compliance with the field construction specifications. The standard minimum blockout dimensions are 50 × mm by 500 mm; however, it should be noted that values fluctuate depending on existing field conditions.

8. Procedure

8.1 The AB shall be heated to a temperature as specified by the manufacturer. The melter must be supplied with a continuous agitation system and calibrated thermometers.

8.2 The specified aggregate shall be heated to the manufacturer's prescribed temperature in a manufacturer's recommended mixer. The temperature of the specified aggregate shall be controlled by a digital temperature sensor.

8.3 The AB shall be blended with the heated aggregate at a ratio of aggregate to AB as specified by the manufacturer. The blend tolerance shall be ±5 % by weight. The minimum aggregate content shall be 68 % by weight.

8.4 Alternately, the AB and specified aggregate can be ~~pre-measured~~premeasured and ~~pre-packaged,~~prepackaged, heated ~~on site~~ on-site in a manufacturer's recommended mixing unit.

8.5 The specified aggregate shall be coated completely with binder prior to placement in the blockout.

8.6 The ~~closed cell,~~ closed-cell foam expansion joint filler shall be placed into the expansion gap at a depth of not greater than the width of the gap. Where the gap is greater than 25 mm, the minimum depth shall be 25 mm. The joint opening shall then be filled with AB until it runs into the corresponding blockout to ensure a ~~water-tight~~watertight joint below the bridging plate.

8.7 The bridging plate shall be mild steel or aluminum a minimum of ~~6-mm~~6 mm thick and ~~200-mm~~200 mm wide, cut in minimum ~~1.2-m~~1.2 m lengths, centered over the entire length of the expansion joint gap when specified. When specified, the bridging plate shall have ~~pre-drilled~~predrilled holes at ~~300-mm~~300 mm on center for the locating pins.

8.8 The blended heated AB and heated specified aggregate shall be placed in a prepared blockout in accordance with the manufacturer's recommended installation procedures.

8.9 When specified, the locating spikes used to position the bridging ~~plate,~~plate shall be galvanized 16 d column nails or larger.

8.10 The blended heated AB and heated coated specified aggregate shall be compacted longitudinal and transverse to the joint using a roller or plate compactor, which delivers a minimum centrifugal force of 15 kN.

8.11 Where an antiskid/antitracking surface is required, the surface of the APJ shall be heated prior to broadcasting the antiskid material in accordance with the ~~manufacturers~~manufacturer's written instructions.

9. Sampling

9.1 Samples of the thermoplastic ~~polymeric modified~~ polymeric-modified asphalt shall be taken at random prior to the shipment of material. If the shipment consists of more than one batch, a sample from each batch shall be taken.

9.2 A minimum of 1.4 kg of the thermoplastic ~~polymeric modified~~ polymeric-modified asphalt taken from the manufacturer's facility shall constitute one sample for testing purposes.

9.3 Samples of the specified aggregate shall be taken at random from each shipment of material. If the shipment consists of more than one batch, a sample from each batch shall be taken.

9.4 A minimum of 23 kg of the specified aggregate shall constitute one sample for size and gradation analysis.

9.5 A minimum of 300 mm of the ~~closed cell,~~ closed-cell foam expansion joint filler ~~constitute~~constitutes one sample for testing purposes.

10. Test Methods

10.1 ~~*Low Temperature*~~ *Low-Temperature Cone Penetration,* ~~*Non-immersed:*~~*Non-Immersed:*

10.1.1 *Apparatus:*

10.1.1.1 *Penetrometer/Cone*—Conduct this test using the apparatus described in Test Method ~~D5~~D5/D5M, except as specified herein. Use a penetration cone in place of the standard penetration needle. The cone shall conform to the requirements given in Test Methods D217, except the interior construction may be modified as desired. The total moving weight of the cone and attachments shall be ~~150.0~~200.0 ± 0.1 g.

10.1.1.2 *Cold Chamber*—The cold chamber shall be capable of maintaining the required cold test temperature within ~~±1.1°C.~~±1.1 °C.

10.1.2 *Specimen Preparation*—Pour a portion of the AB prepared in accordance with Practice D5167 into three ~~177-mL~~177 mL tins measuring approximately ~~69-mm~~69 mm diameter and 44 mm in depth and fill flush to the rim of each tin. Allow the test specimens to cure under the standard conditions as specified in its respective material specification.

10.1.3 *Procedure*—Place the three test specimens and three cones in cold chamber at ~~18~~–18 ± ~~0°C~~1 °C for no less ~~the 4h.~~than 4 h. Remove one sample and ~~core~~cone from the cold chamber and, using the apparatus described in ~~9.1.1~~10.1.1, immediately ~~make~~