Designation: D 6297 – 98

Standard Specification for Asphaltic Plug Joints for Bridges[1]

This standard is issued under the fixed designation D 6297; 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 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 APJ. This molded element can consist of 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 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.

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

2. Referenced Documents

2.1 *ASTM Standards:*

A 36/A 36M Specification for Carbon Structural Steel[2]

B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate[3]

D 5 Test Method for Penetration of Bituminous Materials[4]

D 36 Test Method for Software Point of Bitumen[5]

D 113 Test Method for Ductility of Bituminous Materials[4]

D 217 Test Methods for Cone Penetration of Lubricating Grease[4]

D 3405 Specification for Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements[4]

D 3407 Test Methods for Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements[4]

D 5167 Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation[4]

D 5249 Specification for Backer Material for Use with Cold and Hot-Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints[4]

D 5329 Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt and Portland Cement Concrete Pavements[4]

3. Terminology

3.1 *Acronyms:*

3.1.1 *APJ*—Asphaltic Plug Joint.

3.1.2 *AB*—Asphaltic Binder.

4. Material

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

4.2 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. It shall be noted that specific sizes of aggregate may be proprietary to certain manufacturers.

4.3 The closed cell foam expansion joint filler shall be nongassing and capable of withstanding the elevated installation temperature (199 °C) of the AB and meet Specification D 5249.

4.4 The steel bridging plate shall conform to Specification A 36/A 36M for mild steel or Specification B 209 for aluminum.

5. Physical Properties

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

6. Dimensions and Tolerances

6.1 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 × 500 mm; however, it should be noted that values fluctuate depending on existing field conditions.

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[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.

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[2] *Annual Book of ASTM Standards*, Vol 01.04.

[3] *Annual Book of ASTM Standards*, Vol 02.02.

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

[5] *Annual Book of ASTM Standards*, Vol 04.04.

	ASTM Standards	Required Physical Properties
Softening point, min	D 36	83°C
Tensile adhesion, min	D 5329	700 %
Ductility, min at 25°C(77°F)	D 113	400 mm
Penetration	D 3407	
Max at 25°C (77°F) 150 g, 5 s		7.5 mm
Low temperature penetration	9.1	
Min at −18°C (0°F) 200 g, 60 s		1.0 mm
Flow, max 5 h at 60°C (140°F)	D 3407	3.0 mm
Resiliency, min - max at 25°C (77°F)	D 3407	40 - 70 %
Asphalt compatibility	D 3407	Pass
Recommended installation		
Temperature range		182°C - 199°C
Safe heating temperature range		199°C - 216°C
Bond 3 Cycles at −7°C (+20°F), 100 % Elong	D 3405	Pass
Flexibility, at −23°C (−10°F)	D 5329	Pass

7. Procedure

7.1 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.

7.2 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.

7.3 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.

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

7.5 The 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 joint below the bridging plate.

7.6 The bridging plate shall be mild steel or aluminum a minimum of 6-mm thick and 200-mm wide, cut in minimum 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 holes at 300-mm on center for the locating pins.

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

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

7.9 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.

7.10 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 written instructions.

8. Sampling

8.1 A batch shall consist of a maximum 19 100 kg, of the thermoplastic polymeric modified asphalt. Samples of the batch 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.

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

8.3 A batch shall consist of a maximum 20 000 kg of the specified aggregate. Samples of the batch 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.

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

8.5 A lot shall consist of a maximum of 305 m for the closed cell foam expansion joint filler.

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

9. Test Methods

Low Temperature Cone Penetration, Nonimmersed

9.1 *Apparatus*:

9.1.1 *Penetrometer/Cone*—Conduct this test using the apparatus described in Test Method D 5, 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 D 217, except the interior construction may be modified as desired. The total moving weight of the cone and attachments shall be 150.0±0.1 g.

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

9.2 *Specimen Preparation*—Pour a portion of the AB prepared in accordance with Practice D 5167 into three 177-mL tins measuring approximately 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.

9.3 *Procedure*—Place the three test specimens and three cones in cold chamber at 18°C ± 0°C for no less the 4h. Remove one sample and core from the cold chamber and using the apparatus described in 9.1.1, immediately make a determination at a location on 120° radii, and halfway between the center and outside of the test specimen. Take care to ensure the cone point is placed on a point in the test specimen that is representative of the material itself and is free of dust, water, bubbles or other foreign material. Follow the above procedure for the second and third samples.

9.4 *Report*—Average the three results and record the value as the penetration of the speciment in millimeter units.

10. Precision and Bias

10.1 The precision of the procedure in Test Method D 5 for determining penetration as modified in 9.1 is being determined.

11. Keywords

11.1 asphaltic plug; bridging plate; closed cell foam; expansion joint; polymeric; thermoplastic