DMS - 6130

BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS

EFFECTIVE DATE: JANUARY 2008

6130.1. Description. This Specification establishes the requirements for bituminous type hot-melt adhesive used for the placement of pavement markers. Two types are addressed: standard bituminous marker adhesive consisting of an asphalt base with homogeneously mixed mineral filler; and flexible bituminous marker adhesive consisting of a highly polymer modified asphalt.

Either adhesive must be suitable for bonding ceramic and plastic markers to hydraulic cement concrete, asphaltic concrete, and chip-sealed road surfaces and be applicable when road surface and marker temperatures are in the approximate range of 4–71°C (40–160°F).

The composition of the adhesive must be such that its properties will not deteriorate when heated to and applied at temperatures up to 218°C (425°F) using either air or oil-jacketed melters.

6130.2. Units of Measurements. The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

6130.3. Material Requirements.

A. Adhesive Properties. The adhesive must be smooth and homogeneous, containing no visible particles, and must comply with the requirements in Table 1.

Table 1

Adhesive Properties

Property	Material	Standard Adhesive		Flexible Adhesive	
	Test Method	min	max	min	max
Softening Point, °F	ASTM D 36	200		200	
Penetration, 100 g, 5 s, 25°C (77°F), 0.1 mm	ASTM D 5	10	20	15	25[4]
Flow, 5 hr., 70°C (158°F), mm			5		5[4]
Heat Stability Flow, 5 hr., 70°C (158°F), mm			5		5
Viscosity, 10 rpm, 204°C (400°F), Pa-s			7.5		7.5
Flash Point, C.O.C., °F	ASTM D 92	550		550	
Ductility, 5 cm/min, 77°F, cm	AASHTO T 51	-		15	-
Flexibility, 1 in. mandrel, 90° bend, 10 s	ASTM D 3111			pass	

1. Exception to ASTM D 5329; heat the sample as described in ASTM D 5, Section 7.1.
2. Exception to ASTM D 5329; condition the sample as described in "Test Methods."
3. As modified in "Test Methods"
4. Maximum penetration of 30 is allowed provided the result of the flow test is less than 1 mm.

B. Asphalt Properties. This applies to standard bituminous adhesive only. The filler-free asphalt, obtained from the Extraction and Abson recovery process, as explained in Section 6130.4, must have the properties in Table 2.

Table 2

Filler-Free Asphalt Properties

Property	Minimum	Maximum	Test Method
Penetration, 100 g, 5 s, 25°C, (77 °F), 0.1 mm (in.)	25		ASTM D 5
Viscosity, 135°C (275°F) Pa-s (Poises)	1.2 (12)		ASTM D 2171
Viscosity Ratio, 135°C (275°F)		2.2	ASTM D 1754 and ASTM D 2171

C. Filler Properties. This applies to standard bituminous adhesive only. The filler material, obtained using the filler separation technique described in Section 6130.4, must have the properties in Table 3.

Table 3

Filler Properties

Property	Minimum	Maximum	Test Method
Filler Content, wt. %	50	75	As in Section 6130.4.
Filler Fineness, % passing: 45 µm (No. 325) 75 µm (No. 200) 150 µm (No. 100)	 75 95 100	 -- -- --	ASTM C 430, as modified in Section 6130.4.

6130.4. Test Methods.

A. Heat Stability Flow. To determine the heat stability flow, place 1000 g of adhesive in a loosely-covered quart can, heat to 218°C (425°F) and maintain at this temperature 4 hours before performing the flow test.

B. Extraction and Abson Recovery. Use this procedure to separate and recover the base asphalt from the adhesive. Heat the adhesive just to the point where it will easily flow. Transfer between 125 and 150 g into a 1000-mL (1-qt.) Erlenmeyer flask containing 400 mL (13.5 fl. oz.) of trichloroethylene with a temperature of 52–66°C (125–150°F). Stir this mixture thoroughly to dissolve the asphalt. Decant the solvent-asphalt mixture. Recover the base asphalt from solvent according to Tex-211-F, but begin with the centrifuge step; the primary distillation is not necessary. Repeat the above extraction-recovery method as necessary to obtain the desired quantity of asphalt.

C. Filler Separation Technique. Use this procedure to separate the filler material from the asphalt and determine the filler content of the adhesive. Weigh 10.00 ± 0.01 g of solid adhesive, broken into small pieces, into a centrifuge flask with approximately 100 mL (3.5 fl. oz.) volume such as that specified in ASTM D 1796. Add 50 mL (1.7 fl. oz.) of trichloroethylene to the adhesive. Swirl or stir the mixture with a fine rod, taking care not

to lose any solids. Place the sample flask in a balanced centrifuge and spin using a minimum relative centrifugal force of 150 (as determined in ASTM D 1796, Section 6.) Remove the sample flask and decant the solvent, taking care not to lose any solids. Repeatedly add more solvent, centrifuge, and decant until the solvent becomes clear and the filler appears free of asphalt. Dry the recovered filler at 71 ± 3°C (160 ± 5°F) to remove solvent. Weigh the dried filler. Filter the decanted solvent through a filter paper with a 20–25 µm retention factor to verify there is no loss of filler. Calculate the filler content as a percentage of the original sample weight.

D. Filler Fineness. Use this procedure to determine the filler fineness. Use the same apparatus as described in ASTM C 430, except also use 75µm (No. 200) and 150 µm (No. 100) sieves. Prepare a water solution containing 1 wt. percent of a nonionic, water-soluble surfactant, such as Triton X-100, beforehand. Thoroughly wet the 1 g dry sample in the surfactant solution and allow it to soak for 30 min. Transfer the filler completely into the 45 µm (No. 325) sieve cup. Wash the sample with the water spray, as described in ASTM C 430, Section 5, for 2 min., adding surfactant solution as needed to disperse any clumped particles. Dry and weigh the sample and perform calculations as directed in ASTM C 430. Repeat the procedure using the other two sieve sizes.

6130.5. Acceptance. Bituminous adhesives are pre-qualified in accordance with Tex-538-C. Consult "Bituminous Marker Adhesive" for a list of materials currently pre-qualified under this procedure.

6130.6. Packaging and Labeling. Package the adhesive in self-releasing cardboard containers with essentially flat and parallel top and bottom surfaces such that the packages will stack properly. Each package must have a net weight of either 23 or 27 kg (50 or 60 lb.) and must weigh within 1 kg (2 lb.) of the stated quantity.

Self-releasing cardboard dividers, which will separate each package into sections weighing no more than 7 kg (15 lb.) each, must be part of the packaging.

Each package must display:

- the manufacturer's name,
- net weight,
- lot or batch number, and
- a product name that clearly identifies the material as either standard or flexible bituminous marker adhesive.

6130.7. Archived Versions. Archived versions are available.