
DMS - 6300
WATERPROOFING

EFFECTIVE DATE: MAY 2009

6300.1. Description. This Specification governs the sampling, testing, composition, and quality of the following waterproofing materials:

- Butyl rubber membrane
- Ethylene-propylene-diene-terpolymer sheets (EPDM)
- Mopping asphalt above and below ground
- Asphaltic primer
- Treated cotton fabric
- Self-adhering polyethylene
- Coal tar modified urethane
- Rubberized asphalt with preformed board membrane
- Rubberized asphalt with plastic film
- Asphalt plank
- Asphalt mat
- Asphaltic panels
- Plastic cement
- Cold asphalt base emulsion

6300.2. 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.

6300.3. Sampling and Testing Requirements. Unless otherwise noted, the Department will sample at the job site in accordance with Tex-500-C and the *Material Inspection Guide*, "Bituminous Specialties."

The Department normally bears the costs of sampling and testing; however, the Contractor or suppliers will bear the costs associated with materials failing to conform to the requirements of this Specification. The Director of the Construction Division's Materials and Pavements Section (CST/M&P) will assess the cost at the time of testing.

Deduct amounts due the Department from monthly or final estimates on contracts or from partial or final payments on direct purchases by the Department.

6300.4. Material Requirements.

- A. Butyl Rubber Membrane and EPDM Sheets.** These materials must conform to ASTM 6134.

Furnish butyl rubber membrane and EPDM sheets in rolls of sufficient length and width to cover the area shown on the plans with a minimum amount of splicing.

Adhesive and splicing cement for installation of these products must meet the following requirements.

- Both must be recommended by the membrane manufacturer.
- The adhesive must remain elastic at temperatures to 4.4°C (40°F).
- Splicing cement must be self-vulcanizing butyl rubber compound.
- Butyl gum type adhesive must be black, unvulcanized butyl rubber with a 0.20 mm (8 mil) polyethylene film backing, total thickness 0.76 ± 0.1 mm (30 ± 4 mil).

- B. Asphalt for Mopping Above Ground.** Asphalt for mopping above ground must be homogeneous, free from water and must meet the requirements of ASTM D 449, Type II, with the additional requirements listed in Table 1.

Table 1
Mopping Asphalt Properties

Item	Requirement
Loss on Heating (AASHTO T 179) wt. %	0.5 Max
Percentage of Retained Penetration after Heating (AASHTO T 179) %	80 Min

- C. Asphalt for Mopping Below Ground.** Asphalt for mopping below ground must be homogeneous, free from water and must meet the requirements of ASTM D 449, Type I.
- D. Asphaltic Primer.** Asphaltic primer must be free of water and must meet the requirements of ASTM D 41.
- E. Treated Cotton Fabric.** Treated cotton fabric must meet the requirements of ASTM D 173. The asphalt in the fabric must be one of the types specified in ASTM D 449.

The roll must be capable of being unrolled at ambient temperatures without sticking together or being damaged.

- F. Self-Adhering Polyethylene.** This type of sheeting consists of a minimum 0.1 mm (4 mil) thickness of polyethylene, coated on one side with a layer of adhesive rubberized asphalt with a protective membrane covering the adhesive surface until ready for use.

The composite sheeting must have a tensile strength of 3152 N/mm (18 lb./in.) of width when tested in accordance with ASTM D 5035, Cut Strip Test-1C, and a net thickness of at least 1.5 mm (60 mil), excluding the protective release paper membrane. The material must be black.

Furnish sheeting in rolls of sufficient width and length to satisfy job requirements.

G. Coal Tar Modified Urethane Coating. This material must be free of any lumping, skinning, or separation of pigments or fillers that cannot be easily re-dispersed by stirring and must cure to form a tough, flexible coating without addition of a catalyst.

The coating must be resistant to flow on vertical surfaces such that no flow or sag is evident for a 0.76 mm (30 mil) thickness. Successive coats of the material must adhere to one another and show no tendency to separate.

When tested in accordance with Tex-615-J, the coating must meet the requirements listed in Table 2.

Table 2
Coal Tar Modified Urethane Coating Properties

Item	Requirement
Brookfield Viscosity, 25°C (77°F) Pa-s (Poise)	50 (500) Max
Peel Strength, N/m (lb./in.)	1751 (10) Min
Wet Strength, Pa (psi)	1034 (150) Min

H. Rubberized Asphalt with Pre-Formed Board Membrane. This waterproofing membrane consists of a multi-layer preformed board and a 1.5 mm (0.060 in.) minimum thickness of rubberized asphalt with protective release paper.

Supply a cold applied asphaltic primer or mastic with the membrane. For sealing joints, also include a 152 mm (6 in.) wide reinforced adhesive gusset tape of nominal 1.6-mm (1/16-in.) thick elastomeric membrane similar to the waterproofing membrane.

The rubberized asphalt with preformed board membrane must be self-adhering when the release paper is removed and must meet the requirements listed in Table 3.

Table 3
Rubberized Asphalt with Pre-Formed Board Membrane Properties

Item	Requirement
Water Absorption (ASTM D 1751) wt %	0.25 Max
Puncture Resistance (ASTM E 154) N (lb.)	178 (40) Min
Pliability of Rubberized Asphalt (ASTM D 146) 180° bend over 6.4 mm (1/4 in.) mandrel at -18°C (0°F)	Unaffected

I. Rubberized Asphalt with Plastic Film. This material consists of preformed rubberized asphalt and plastic film with primer and cold applied rubberized asphalt mastic and asphaltic panel protection.

Rubberized asphalt with plastic film must meet the requirements listed in Table 4 (ref. ASTM D 1228, [Discontinued]).

Table 4
Rubberized Asphalt with Preformed Board Membrane Properties

Item	Requirement
Thickness, mm (in.)	1.5 (0.060) Min
Permeability (ASTM E 96, Method B)	0.1 Max
Water Absorption (ASTM D 1228) % by weight	0.25 Max
Pliability (ASTM D 146)	
<ul style="list-style-type: none"> • cure 7 days dry, 7 days @ 49°C (120°F) • 7 days water immersion 	Unaffected Unaffected
Puncture Resistance (ASTM E 154) N (lb.)	178 (40) Min

The manufacturer must furnish certification that materials meet specification requirements.

Submit a sample for testing, when required by the Engineer, minimum size 305 × 610 mm (12 × 24 in.) from each production run of membrane to be supplied.

J. Asphalt Plank. Asphalt plank must meet the requirements of ASTM D 517, Type I, except that the allowable dimensions are in accordance with Table 5.

Table 5
Asphalt Plank Standard Dimensions

Thickness	Width	Length
12.7 mm (1/2 in.)	305 mm (12 in.)	1.22 m (48 in.)
25.4 mm (1 in.)	203 mm (8 in.)	1.83 m (72 in.)
25.4 mm (1 in.)	254 mm (10 in.)	1.52 m (60 in.)

The following exceptions to the standard dimensions are allowed.

- Shorter lengths of 25.4-mm (1-in.) thick plank may be acceptable to a minimum of 0.91 m (36 in.)
- Protective course asphalt planking must have a minimum 25.4 mm (1 in.) thickness and may consist of one or more layers.

K. Asphalt Mat. Asphalt mat consists of a core of blended air blown asphalt, organic fibers and mineral fillers, a covering of asphalt-saturated felts and an exterior coating of weather-resistant oxidized asphalt.

Asphalt mat must be:

- uniform in thickness and free from imperfections that may affect serviceability and
- 12.7 mm (1/2 in.) or 25.4 mm (1 in.) thick.

The mat must be 25.4 mm (1 in.) thick when used as protective course.

Furnished asphalt mat in widths of 1.2 m (4 ft.) and lengths not less than 2.4 m (8 ft.), except for end pieces cut to the length required.

Dust the mat surfaces with mica, talc, or similar materials to prevent sticking or damage to them during shipment or handling.

- L. Asphaltic Panels.** These are five-layer composite panels, each including a core of blended asphalt binder and inorganic mineral filler, top and bottom reinforcing covers of asphalt-saturated felt, a top cover of fiberglass mat with asphalt weather coating, and a bond breaking film or coating. The total thickness of the panel must be either 9.5 or 12.7 ± 1.6 mm (3/8 or $1/2 \pm 1/16$ in.)

The asphaltic panel must be free from defects affecting its serviceability and appearance, have straight edges and square corners, and meet the requirements listed in Table 6.

Table 6
Asphalt Panel Properties

Item	Requirement
Weight 9.5 mm ([3/8 in.] thickness), Pa (lb./sq. ft.)	124 (2.60) Min
Weight 12.7 mm ([1/2 in.] thickness), Pa (lb./sq. ft.)	168 (3.50) Min
Water Absorption (ASTM D 545), wt. %	1.0 Max
Thickness of Asphalt Weather coating, mm (in.)	0.51 (0.020) Min
Asphalt-Saturated Felt Liner Weight, Pa (lb./sq. ft.)	7.2 (0.15) Max
Core Composition (ASTM D 545):	
◆ Asphalt content, wt. %	50–60
◆ Inorganic Mineral Filler Content, wt. %	25 Min
Resistance to Decay (ASTM E 154)	No Effect
Flexibility (see Sub Article 6300.4.M)	No Cracking or Breaking
Brittleness at $-1-6^{\circ}\text{C}$ ($30-43^{\circ}\text{F}$) (ASTM D 994)	No Cracking or Breaking
Heat Distortion (ASTM D 994) mm (in.)	7.94 (0.3125) Max

Supply asphaltic panels with the dimensions shown on the plans within tolerances of ± 3.2 mm (1/8 in.) width and ± 6.35 mm (1/4 in.) length, but larger than 0.91 m (3 ft.) wide or 1.8 m (6 ft.) long.

The Department will perform the following inspections on samples from each lot that arrives on the jobsite:

- examination for appearance, straightness of edges, squareness of corners, and general condition,
- measurement of width and length, and
- determination of thickness by averaging measurements made at four locations using a micrometer having flat bearing surfaces at both contact points of not less than 6.35 mm (1/4 in.) diameter.

M. Flexibility Test.

1. Prepare three specimens of 76×305 mm (3×12 in.)
2. Condition the specimens for at least 2 hr. at $25 \pm 2^{\circ}\text{C}$ ($77 \pm 5^{\circ}\text{F}$).

3. Place a specimen with its long dimension perpendicular to and centered over the axis of a horizontal cylinder with a diameter of 483 ± 25 mm (19 ± 1 in.)
4. Clamp one end of the specimen to the cylinder.
5. Grasp the other end of the sample and bend around the cylinder at a uniform rate to complete the bend in 60 ± 10 sec. so that the specimen is in full contact with the surface of the cylinder.
6. Examine for any cracking or breaking of the sample.
7. Test the other two specimens in the same manner.

N. Plastic Cement. Plastic cement must meet the requirements of ASTM D 4586.

O. Cold Asphalt-Base Emulsion. Cold asphalt-base emulsion consists of a nonvolatile organic base asphalt mixed with mineral fillers, asbestos fiber, or other suitable materials to form a quick setting mastic material capable of being applied and bonded to asphalt plank surfaces at temperatures of 10°C (50°F) or above.

The cold asphalt base emulsion must meet the property requirements listed in Table 7.

Table 7
Cold Asphalt-Base Emulsion Properties

Item	Requirement
Density (ASTM D 2939) kg/m^3 (lb./gal.)	1006 (8.4) Min
Residue by evaporation (ASTM D 2939), 24 hr., 105°C (221°F), wt. %	50 Min
Water Content (ASTM D 244), wt. %	50 Max
Final Set (ASTM D 2939), hr.	24 Max
Flexibility (ASTM D 2939), 25°C (77°F), 12.7 mm (1/2 in.) Mandrel, 180°	No Cracks
Water Resistance (ASTM D 2939)	No blisters, re-emulsification or loss of adhesive

6300.5. Archived Versions. Archived versions are available.