

SECTION 213 – ENGINEERING FABRICS

213-1 PAVEMENT FABRIC MATERIAL.

213-1.1 General. ~~Pavement fabric shall be treated by heat or other processes approved by the Engineer causing the fibers on one side only to become bonded together, forming a glazed, delamination free surface. The treated side of each roll shall be marked for easy identification. The pavement~~ Pavement fabric material shall be nonwoven, needlepunched polyester or polypropylene materials conforming to Table 213-1.1 (A).

TABLE 213-1.1 (A)

| Property | ASTM Test No. | Requirements |
|---|------------------------------|--|
| Weight, $\frac{g}{m^2}$ ($\frac{oz.}{yd^2}$) $\frac{oz.}{yd^2}$ ($\frac{g}{m^2}$) | D1776-D5261 | 119 to 170 (3.5 to 5.0) 4.1 to 5.5 (139 to 187) |
| Grab Tensile Strength 25 mm (1 inch) <u>1 inch (25 mm) grip, N (lbs.) lbf (N)</u> | D 4632 | 400 (90) <u>101 (449) min.</u> |
| Elongation at Break, % | D 4632 | 40 min., 100 max. |
| Fabric Thickness, μm (Mils) <u>Mils (μm)</u> | D 1777 D 5199 | 760 to 1270 (30 to 50) 30 to 50 (760 to 1270) |
| Asphalt Retention, $\frac{g}{m^2}$ ($\frac{oz.}{ft^2}$) $\frac{oz.}{ft^2}$ ($\frac{g}{m^2}$) | See Note 1 D 6140 | 1060 (3.50) 2.90 (886)min. |
| Grab Tensile Strength After Asphalt Saturation 25 mm (1 inch) <u>1 inch (25 mm) Grip, N (lbs.) lbf (N)</u> | D 4632 | 890 (200) 200 (890) min. |
| Elongation at Break, % After Asphalt Saturation | D 4632 | 40 min., 70 max |
| Mullen Burst, psi | D 3786 | 180 |

~~1. Test Per 213 1.5.~~

Pavement fabric material shall be treated by heat or other processes approved by the Engineer causing the fibers on one side only to become bonded together, forming a glazed, delamination-free surface.

Pavement fabric shall be accompanied with a test certificate from an approved testing laboratory with the actual identification test results. The number and frequency of testing shall conform to 213 1.3. Additional testing may be required by the Engineer.

The fabric shall be protected from exposure to ultraviolet rays and stored in accordance with 213 1.4.

213-1.2 Identification. Pavement fabric material ~~Fabric~~ shall be furnished shipped in rolls wrapped with a protective covering that protects to protect them against ultra violet radiation, abrasion, dust, dirt, mud, debris, and other deleterious forces and substances. Each roll in the shipment shall be marked or tagged to identify the manufacturer, type, length, width, date and place of manufacture, and production identification number. The Pavement fabric material shall be free from defects or flaws. Each roll of fabric in the shipment shall be marked or tagged to identify the manufacturer, type, length, width, date and place of manufacture, and production identification number.

213-1.3 Sampling and Test Compliance. ~~A laboratory shall be maintained at or near the point of manufacture to ensure quality control in accordance with ASTM and other applicable testing procedures. The laboratory shall be approved by the Engineer, and shall maintain records of its quality control results.~~

~~A manufacturer's certificate~~ Certificate of Compliance conforming to 4-1.5 shall accompany the each shipment and be delivered submitted to the Engineer prior to installation. The certificate shall include name of or the manufacturer, chemical composition, product description, lot number, and test results, and signature of an authorized official.

~~A unit shall be is 500 m² (600 square yards) 600 yd² (500 m²) or one roll, whichever is less. A lot shall be is the number of units produced by a single machine on a single shift without interruption but shall not to exceed 1,000 units. The number of units tested within a lot shall be equal to, but not less than, the cube root of the units in that lot (fractions of a number to be rounded to the next higher whole number). Unless a greater number of tests are required by these or other applicable specifications, a A minimum of eight 8 tests shall be performed in each of the principal directions of each unit tested. The average of test values may be less than specified. In the event of any test failure, the entire lot will be considered as rejected.~~

213-1.4 Storage and Handling. ~~Pavement fabric material~~ Fabric shall be stored on clean, dry surfaces, free of foreign substances such as grease, oil, paint, epoxy, cement, or any other substances substance which would that could have a deleterious effect on the fabric. When stored in outside areas, pavement fabric material shall be kept 0.3 m (1 foot) 1 foot (300 mm) minimum above ground level. Pavement fabric material shall be protected from exposure to ultraviolet rays. The Contractor shall not remove the keep the fabric in its protective covering until it is ready for just prior to installation. Open rolls shall be covered by a waterproof cover covering. No hooks, tongs or other sharp tools or instruments shall be used when in handling any fabric. Unloading of fabric material or handled shall be performed in one of the following ways:

- a) by placing slings under the rolls; or
- b) by using a pole inserted through a hollow core, provided the pole extends 0.3 m (1 foot) 1 foot (300 mm) minimum beyond each end of the core, and lifting and handling devices are attached to only that portion of the pole located outside the ends of the core; or
- c) by hand.

213-1.5 Test Method for Asphalt Retention of Paving Engineering Fabrics.

213-1.5.1 General. ~~This method covers a procedure for determining the asphalt retention and area change for paving grade engineering fabrics and is applicable to engineering fabrics that are utilized in an asphalt saturated interlayer.~~

213-1.5.2 Definition. ~~Asphalt retention is the weight of asphalt cement retained by a paving engineering fabric per unit area of specimen after submersion in asphalt cement.~~

213-1.5.3 Summary of Method. ~~Specimens of engineering fabrics are selected at random from an individual piece of fabric. The test specimens are individually weighed prior to being submerged in a specified asphalt cement and maintained at a specified oven temperature for a stated time. After the submerged test, the specimens are hung to drain in the oven for an additional period of time at the same oven temperature. Upon completion of specimen submersion in asphalt and drainage, the individual specimens are weighed and asphalt retention is determined.~~

213-1.5.4 Uses and Significance. ~~Asphalt retention is a test procedure that is recommended for paving grade engineering fabrics. The use of this test method is to establish an index value by providing~~

standard criteria and a basis for uniform reporting. The results obtained may vary, depending on which asphalt cement is used for the test.

~~**213-1.5.5 — Apparatus and Asphalt Cement.** Scale or balance, with a capacity and sensitivity sufficient to weight the full piece or cut units to within ± 0.1 percent of their gross weight. The accuracy of the scale should be certified by a recognized authority. Cutting die or cutting template, measuring 102 mm by 254 mm (4 inches by 10 inches) with a tolerance of ± 1.5 mm (1/16 inch) in each linear dimension. Mechanical convection oven, capable of maintaining the required test temperature within $\pm 2^{\circ}\text{C}$ (4°F). Asphalt cement shall be viscosity grade AR4000. Specimen hanging rack shall consist of a wire grid structured over the pan. The grid shall consist of five wires attached to the 325 mm (13 inch) long sides of the pan on 70 mm (2.75 inch) centers. The five wires shall be vertical from the edge of the pan to a height of 280 mm (11.0 inches), and level across the top to form a rectangular cage. The five wires shall be braced with additional wires welded longitudinally at the top outside corners of the rectangular cage and at the mid point of each side. The ends (300 mm (12 inch) sides of the pan shall remain open for access to the samples.~~

~~**213-1.5.6 — Sampling, Selection, and Number of Specimens.** Take for the laboratory sample, a sample extending the width of the fabric and approximately 1 meter (39 inches) along the length from each roll in the lot sample. The first 1 m (3 feet) along the length of the roll shall be cut off and discarded prior to taking the laboratory samples. Test five specimens in the cross machine direction and five specimens in the machine direction from each sample. A sample should be taken for every 50 rolls or fraction thereof.~~

~~**213-1.5.7 — Conditioning.** Condition the specimens by bring them to approximate moisture equilibrium in the standard atmosphere for testing (65 ± 5 percent RH). Equilibrium is considered to have been reached when the increase in weight of the specimen in successive weightings made at intervals of not less than 2 hours does not exceed 0.1 percent of the weight of the specimen. Paving engineering fabrics not significantly affected by minor variations in atmospheric conditions may be tested in prevailing room atmospheres.~~

~~**213-1.5.8 — Preparation of Test Specimens.** For nonwoven fabrics, prepare the specimens as described in ASTM D 4632.~~

~~**213-1.5.9 — Procedure.** Five machine direction and five cross machine direction specimens measuring 102 mm by 245 mm (4 inches by 10 inches) shall be selected at random from the individual test sample. The individual test specimens shall be conditioned, and then individually weighed to the nearest. The weight of each specimen shall be multiplied by 0.8 to approximate the weight of the 120 by 203 mm (4 inch by 8 inch) area of fabric.~~

~~Four notches, cut approximately 13 mm (1/2 in) into the fabric, shall be cut 25 mm (1 in) from each end of each specimen so that a 102 mm x 203 mm (4 in x 8 in) area is delineated.~~

~~The individual test specimens shall then be submerged in the specified asphalt cement maintained at a temperature of $135^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($275^{\circ}\text{F} \pm 4^{\circ}\text{F}$) in a mechanical convection oven. Only the center 203 mm (8 inches) between the notches need be submerged. Clamps may be placed on the 25 mm (1 inch) of fabric outside the notches on each end to facilitate handling the specimen.~~

~~After the required submersion, the asphalt cement coated saturated test specimens shall be removed and hung to drain (long axis vertical) in the oven at $135^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($275^{\circ}\text{F} \pm 4^{\circ}\text{F}$) the specimens shall be~~

~~hung for 35 minutes from one end and then 25 minutes from the other end to obtain a uniform saturation of the fabric.~~

~~The asphalt cement coated saturated specimens shall be allowed to cool and then be trimmed of any excess asphalt cement such as edge drippings. This is accomplished by cutting 25 mm (1 inch) off each end, at the notches, with the remaining specimen being approximately 100 mm (4.0 inches) wide and 200 mm (8.0 inches) long.~~

~~The trimmed asphalt cement coated saturated specimens shall then be weighed to the nearest 30.1 gram and the area determined by measuring the trimmed asphalt cement coated saturated specimens, as defined by the notches cut earlier.~~

213-1.5.10 — Calculation. ~~Calculate the average of the asphalt retention observed for all acceptable specimens. The asphalt retention for individual specimens shall be calculated as the weight in grams (ounces) of asphalt cement retained, divided by the area of the specimen in square meters (square feet).~~

SECTION 302-ROADWAY SURFACING

302-7 PAVEMENT FABRIC.

302-7.1 General. Pavement fabric material shall conform to 213-1.

302-7.2 Placement.

302-7.2.1 Pavement Preparation General. The existing surface of the distressed pavement surface shall be prepared as required by shown on the Plans or Specifications specified in the Special Provisions prior to placement of the tack coat and pavement fabric. The entire surface to be covered shall be free of water, foreign matter, vegetation, and dust before application of the tack coat. The fabric shall then be covered with an overlay of asphalt concrete. The temperature of the underlying asphalt concrete shall not exceed 150⁰F (66⁰C) when the fabric is placed.

After placement, pavement fabric material shall be overlaid with asphalt concrete pavement or covered with a chip seal. Pavement fabric shall not be placed in areas where the asphalt concrete overlay is less than 1-1/2 inches (38 mm) thick.

302-7.2.2 Tack Coat.

302-7.2.2.1 General. The tack Tack coat shall be AR4000 PG 64-10 or PG 70-10 paving asphalt as specified in the Special Provisions. Tack coat shall be applied uniformly prior to placing fabric. The entire surface to be covered shall be free of water, foreign matter, vegetation, or dust before application of the tack coat.

The tack Tack coat shall be sprayed with a an asphalt truck-mounted sprayer distributor at the rate of 1.13 ± 0.09 L/m² (0.25 ± 0.02 gallon per square yard) 0.25 ± 0.02 gallon per square yard (1.13 ± 0.09 L/m²) or as directed by the Engineer. On a new asphalt concrete leveling course, the rate shall be 0.91 ± 0.09 L/m² (0.2 ± 0.02 gallon per square yard) 0.2 ± 0.02 gallon per square yard (0.91 ± 0.09 L/m²). The application rate may be adjusted as directed by the Engineer. Hand spraying shall be kept to a minimum.

The width of the sprayer application shall be no more than 150 mm (6 inches) 6 inches (150 mm) and no less than 50 mm (2 inches) 2 inches (50 mm) wider than the fabric width.

The temperature of the tack coat shall not exceed 163⁰C (325⁰F) 325⁰F (163⁰C) when the fabric is placed.

302-7.2.2.2 Calibration of Truck-Mounted Sprayer Units. The Contractor shall calibrate each sprayer unit used in the Work prior to the start of spreading the tack coat. Spreading shall not proceed until the calibration has been accepted by the Engineer.

302-7.2.2.3 Testing Apparatus. Testing apparatus shall consist of the following:

- a) Portable measuring scale accurate to within ± 2 grams.
- b) Test units shall be a 12-inch x 12-inch (300 mm x 300 mm) square of 1/8 inch (3 mm) or 1/4 inch (6 mm) thick hardboard or plywood.

307-7.2.2.4 Calibration Procedure. The calibration procedure shall be as follows:

- a) Pre-weigh hardboard or plywood square (minimum of 1, maximum of 3) and write the weight on the underside. The number of test units to be used shall be determined by the Engineer.
- b) Locate the truck mounted sprayer unit at the starting point of tack coat placement.

- c) The operator sets the application to that rate specified in 302-7.2.2.1 or as specified in the Special Provisions.
- d) Place test units on the pavement directly in front of the truck mounted sprayer unit. If 1 unit is used, place it in the center of the truck mounted sprayer unit. If 3 units are used, place 1 unit in center of the sprayer unit and 1 unit outside of each wheel path.
- e) Retrieve test units after the truck mounted sprayer unit has passed over them and re-weigh.

307-7.2.2.5 Calculation of the Application Rate. The application rate shall be calculated as follows:

- a) Subtract the original weight, recorded on the underside of the test unit, from the weight of the test unit including the tack coat.
- b) The difference is the weight of the tack coat on the test unit.
- c) Multiply by 9 to calculate the number of grams applied per square yard.
- d) Divide the number of grams per square yard by 3861.03 grams per gallon at 60⁰F.
- e) The tack coat application rate shall be expressed in gallons per square yard.
- f) Retest as necessary until the specified application rate is confirmed.

307-7.2.3 Laydown Placing Fabric. ~~Pavement fabric shall not be placed in areas where the asphalt concrete overlay in less than 38 mm (1 1/2 inches) thick.~~

If manual laydown methods are used, ~~the pavement fabric material~~ shall be unrolled, stretched, aligned, and placed in increments of approximately ~~9 m (30 feet)~~ 15 feet (4 m).

Adjacent borders of the fabric ~~material~~ shall be lapped ~~50 to 100 mm (2 to 4 inches)~~ 2 to 4 inches (50 to 100 mm). The preceding roll shall lap ~~50 to 100 mm (2 to 4 inches)~~ 2 to 4 inches (50 to 100 mm) over the following roll in the direction of paving at ends of rolls or at any break. If the lap exceeds ~~100 mm (4 inches)~~ 4 inches (100 mm), a tack coat shall be placed to bond the ~~2 two~~ layers of fabric ~~material~~ together and both ~~the tack coat and pavement fabric material~~ shall lap by the same amount.

~~The Pavement fabric material~~ shall be placed with the treated side up and shall be seated with brooms or pneumatic rolling equipment after placing. Turning of the paving machine and other vehicles shall be gradual and kept to a minimum to avoid damage.

Pavement fabric ~~material~~ shall not be placed more than ~~180 m (800 feet)~~ 800 feet (180 m) in advance of paving operations or chip sealing unless ~~allowed~~ otherwise approved by the Engineer. No more pavement fabric ~~material~~ shall be placed than can be covered that day.

If the ~~pavement fabric material~~ is placed within ~~15 m (50 feet)~~ 50 feet (15 m) of the ~~tack coat spray unit tack coat spray bar,~~ the first ~~9 m (30 feet)~~ 15 feet (4 m) of each roll shall be placed by hand, if directed by the Engineer, to allow inspection of the tack coat application.

Pavement fabric material ~~Fabric~~ shall be placed with no wrinkles that lap. The test for lapping shall be made as follows:

- a) By gathering together the pavement fabric material in a wrinkle.
- b) The two sides of the wrinkle shall be pressed together from pavement surface to a fold point with equal amounts of pavement fabric material on both sides of the fold point down to the pavement surface.
- c) If the height of the doubled portion of the extra pavement fabric material exceeds ~~13 mm (1/2 inch)~~ 1/2 inch (13 mm), the pavement fabric material shall be cleanly cut to remove the wrinkle.
- d) The cut shall be made on the side of the wrinkle away from the paving operation.
- e) The opposite or longer side shall be lapped over the shorter and the re-laid wrinkle area shall be pressed and smoothed into place against the pavement surface.

- f) Any lap in excess of ~~50 mm (2 inches)~~ 2 inches (50 mm) shall be cleanly cut away, and then overlapped in the same manner as for smaller laps.
- g) A minimum ~~13 mm (1/2 inch)~~ 1/2 inch (13 mm) overlap shall be provided in all cases when a wrinkle area is re-laid.

Pavement fabric material shall not be reduced more than ~~50 mm (2 inches)~~ 2 inches (50 mm) on each side after being placed on the tack coat. If the overall width is reduced more than ~~100 mm (4 inches)~~ 4 inches (100 mm), then the operation shall be stopped and the temperature of ~~of on~~ the tack coat immediately prior to placement of the pavement fabric material or the type of pavement fabric material shall be changed.

Care shall be taken to avoid tracking tack coat onto the pavement fabric material or distorting the fabric during seating of the fabric material with rolling equipment. If necessary, exposed tack coat shall be covered lightly with sand.

A small quantity of asphalt concrete, to be determined by the Engineer, may be spread over the fabric material immediately in advance of placing asphalt concrete overlay surfacing in order to prevent pavement fabric material from being picked up by construction equipment.

Public traffic ~~will~~ shall not be allowed to drive over ~~on the~~ bare pavement fabric material. However, public traffic may be allowed to cross the fabric material under traffic control. The Contractor may ~~be required to~~ place a small quantity of asphalt concrete over the fabric material to protect it from damage if so directed by the Engineer.

~~Full compensation for advance spreading of asphalt concrete over the fabric shall be considered as included in the Contract Unit Price paid for asphalt concrete and no additional compensation will be allowed therefore.~~

302-7.3 Measurement and Payment. Pavement fabric material will be measured ~~and paid for~~ by the ~~square meter (square yard)~~ square yard (square meter) for the actual pavement area covered.

~~The Contract Unit Price paid per square meter (square yard) for pavement fabric shall include full compensation for furnishing and placing pavement fabric, including the tack coat.~~

302-7.4 Payment. Payment for pavement fabric shall be made at the Contract Unit Price per square yard (square meter). The Contract Unit Price for pavement fabric shall include cleaning of the existing pavement, tack coat, calibration of the truck mounted sprayer unit, and furnishing and placing pavement fabric material.

Payment for advance spreading of asphalt concrete over the fabric shall be considered as included in the Contract Unit Price for asphalt concrete.