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USACE / NAVFAC / AFCESA **UFGS-02745 (July 2003)**

Preparing Activity: USACE **Superseding**
UFGS-02745A (July 1997)
UFGS-02789N (September 1999)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005
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BITUMINOUS SURFACE TREATMENT

07/03

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SECTION 02745

BITUMINOUS SURFACE TREATMENT
07/03

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NOTE: This guide specification covers the requirements for single and double bituminous surface treatment of pavements for airfields, roads, streets, parking areas, and other general applications.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 182	(1984; R 2002) Coating and Stripping of Bitumen-Aggregate Mixtures

ASTM INTERNATIONAL (ASTM)

ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2004) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 29/C 29M	(1997; R 2003) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	(1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D 1139	(2000; R 2004) Aggregate for Single or Multiple Bituminous Surface Treatments
ASTM D 1250	(2004) Petroleum Measurement Tables
ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 2028	(1997; R 2004) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	(2002) Cationic Emulsified Asphalt
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 633	(1997; R 2001) Volume Correction Table for Road Tar
ASTM D 75	(2003) Sampling Aggregates
ASTM D 946	(1982; R 1999) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 977	(2003) Emulsified Asphalt

1.2 MEASUREMENT FOR PAYMENT

****
NOTE: Delete this paragraph when lump-sum bidding is used.
****

The bituminous material and aggregate to be paid for will be the measured quantities used in the accepted work.

1.2.1 Bituminous Material

The amount of bituminous material to be paid for will be measured in [

metric tons tons, (2000 pounds)] [the number of liters gallons of material used in the accepted work, corrected to liters gallons at 15.6 degrees C 60 degrees F in accordance with [ASTM D 633] [ASTM D 1250, using a coefficient of expansion of 0.00045 per degree C 0.00025 per degree F for asphalt emulsion]].

1.2.2 Aggregate

The amount of aggregate paid for will be the number of [metric tons tons (2000 pounds)] [cubic meters cubic yards] of aggregate placed and accepted in the completed work or placed in authorized stockpiles.

1.2.3 Quantity Limits

****
NOTE: Only the appropriate application rates consistent with the gradations of paragraph "Mineral Aggregate" will be retained.
****

The bituminous material and aggregate shall be spread within the quantity limits shown below; bids shall be based on the mean of the values in the tables. The individual quantities of bituminous material and aggregate may be varied to meet specific field conditions at all times during progress of the work, as directed, without adjustments to contract unit prices. Aggregate weights shown are for aggregates having a specific gravity of 2.65. If the specific gravity of the aggregate used is other than 2.65, appropriate adjustments shall be made in number of kilograms pounds required to ensure a constant volume of aggregate per square meter yard of treatment.

QUANTITIES (PER SQUARE METER
[FOR SINGLE SURFACE TREATMENT]

Gradation No.	Bituminous Material (Liter)	Aggregate (Kilograms)
1	1.10-1.70	15-22
2	0.50-1.10	9-15
3	0.30-0.70	6-11

QUANTITIES (PER SQUARE YARD
[FOR SINGLE SURFACE TREATMENT]

Gradation No.	Bituminous Material (Liter)	Aggregate (Kilograms)
1	0.30-0.45	35-50
2	0.15-0.30	20-35
3	0.10-0.20	15-25

QUANTITIES (PER SQUARE YARD
[FOR SINGLE SURFACE TREATMENT]

Gradation No.	Bituminous Material (Liter)	Aggregate (Kilograms)

QUANTITIES (PER SQUARE METER)
[FOR DOUBLE SURFACE TREATMENT]

Gradation No.	Bituminous Material (Liters) First Application	Aggregate (Kilograms) First Spreading	Bituminous Material (Liters) Second Application	Aggregate (Kilograms) Second Application
1	0.70-1.10	12-15	--	--
2	--	--	0.70-1.10	9-11
3	0.50-0.70	9-11	--	--
4	--	--	0.50-0.70	4-6

QUANTITIES (PER SQUARE YARD)
[FOR DOUBLE SURFACE TREATMENT]

Gradation No.	Bituminous Material (Liters) First Application	Aggregate (Kilograms) First Spreading	Bituminous Material (Liters) Second Application	Aggregate (Kilograms) Second Application
1	0.20-0.30	28-34	--	--
2	--	--	0.20-0.30	20-25
3	0.15-0.20	20-25	--	--
4	--	--	0.15-0.20	10-15

1.3 PAYMENT

****
NOTE: Delete this paragraph when lump-sum bidding is used.
****

The quantities of aggregates and bituminous material, determined as specified in paragraph MEASUREMENT FOR PAYMENT, will be paid for at the respective contract unit prices, which payment shall constitute full compensation for all operations necessary to complete the work as specified herein.

1.4 WAYBILLS AND DELIVERY TICKETS

Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified waybills and delivery tickets for aggregate and bituminous material used in the bituminous surface treatment. The Contractor shall not remove bituminous material from the tank car or storage tank until initial outage and temperature measurements have been

taken; nor shall the car or tank be released until final outage has been taken.

1.5 SUBMITTALS

****

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Waybills and Delivery Tickets

Copies of waybills and delivery tickets shall be submitted during progress of the work.

Cutback Asphalt
Asphalt Cement

Temperature-viscosity relationship of cutback asphalt and asphalt cement.

SD-06 Test Reports

Tests

Copies of test results, within 24 hours after completion of each test.

1.6 SAFETY PRECAUTIONS

[No smoking, or open flames shall be permitted within 8 m 25 feetof heating, distributing, or transferring operations of bituminous materials other than bituminous emulsions.] [When tar is used, a full-face, organic, vapor-type respirator and protective creams shall be used by personnel exposed to fumes. Protective creams shall not substitute for cover clothing.]

1.7 EQUIPMENT, TOOLS, AND MACHINES

Provide equipment dependable and adequate for the purpose intended and properly maintained in satisfactory and safe operating condition at all times. Discontinue the use of equipment which fails to produce satisfactory work and replace with satisfactory equipment. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by an approved calibration laboratory within [12] [_____] months prior to commencing work [and every [_____] months thereafter, by such laboratory from the date of recalibration, during the term of the contract].

1.7.1 Bituminous Distributors

The distributors shall have pneumatic tires of such width and number that the load produced on the base surface does not exceed 11.6 kg per mm 650 pounds per inch of tire width. Distributors shall be designed and equipped to distribute bituminous material uniformly at even heat on various widths of surface at readily determined and controlled rates ranging from 0.20 to 9.1 L/square meter, 0.05 to 2.00 gallons per square yard, with a pressure range of 172 to 517 kPa 25 to 75 psi. The allowable variation from any specified rate shall not exceed 5 percent. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, a thermometer for reading the temperature of tank contents, and a hose attachment suitable for applying bituminous material to areas not accessible with distributor spray bar. The distributor shall be equipped for circulation and agitation of bituminous material during the heating process.

1.7.2 Single-Pass, Surface-Treatment Machines

The machines shall be capable of spraying bituminous material and spreading aggregate in one pass. Bituminous spraying equipment shall conform to the requirements given above for a bituminous distributor. The machine shall be capable of spreading aggregates at controlled amounts per square yard as specified. In addition, the single-pass, surface-treatment machine shall be capable of placing a surface treatment adjacent to an existing surface treatment, forming a joint of the same thickness and uniformity as other portions of the surface treatment. Ridges or blank spaces will not be permitted. Joints in the second application shall be formed at least 300 mm 1 foot from those formed in the first application.

1.7.3 Heating Equipment for Storage Tanks

The equipment shall consist of coils and equipment for producing steam or hot oil and be designed to prevent the introduction of steam or hot oil into the material. An armored thermometer with a range of 35 to 200 degrees C 100 to 400 degrees F shall be affixed to the tank so the temperature of the bituminous material may be determined at all times.

1.7.4 Power Rollers

Power rollers shall be steel-wheeled or pneumatic-tired type, conforming to the following requirements:

a. Steel-wheeled rollers shall have at least one steel drum and weigh a minimum of 4 metric tons 5 tons. Steel wheels of the rollers shall be equipped with adjustable scrapers.

b. Pneumatic-tired rollers shall be self-propelled and have wheels mounted on two axles in such manner that the rear tires will not follow in the tracks of the forward group. Tires shall be uniformly inflated to not less than 414 kPa 60 psi nor more than 552 kPa 80 psi pressure. The pneumatic-tired rollers shall be equipped with boxes or platforms for ballast loading and shall be loaded so that the tire print width of each wheel is not less than the clear distance between tire prints.

1.7.5 Mechanical Spreaders

The spreaders shall be adjustable and capable of spreading aggregate at controlled amounts per square yard, as specified.

1.7.6 Brooms and Blowers

The machines shall be of the power type, capable of cleaning surfaces to be treated.

1.7.7 Scales

The scales shall be standard truck scales of the beam type equipped with a weight-recording device. The scales shall be sufficient in size and capacity to accommodate the trucks used in hauling aggregates. The scales shall be tested and approved by an inspector of the State Inspection Bureau charged with scale inspection within the state in which the project is located. If an official of the inspection bureau is not available, the scales shall be tested in accordance with state specifications by the Contractor in the presence of the Contracting Officer. The Contractor shall have the necessary number of standard weights on hand at all times for testing the scales.

1.7.8 Weighhouse

The house shall be weatherproof and shall be constructed in a manner to afford adequate protection for the indicating and recording devices of the scales.

1.8 SAMPLING AND TESTING

The sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing

laboratory, or by the Contractor, subject to approval. Sampling shall be in accordance with ASTM D 75 for aggregates and ASTM D 140 for bituminous material, unless otherwise directed. Perform aggregate gradation tests on each sample in accordance with ASTM C 136. Perform all other aggregate tests on the initial source samples and repeat tests when there is a change of source. Perform sieve analyses daily from material samples. The tests shall include an analysis of each gradation of material. Tests shall be performed in sufficient number to insure that materials meet specified requirements.

1.8.1 Wear Test

The wear test shall be performed in accordance with ASTM C 131 to ensure that aggregates have a percentage of wear not exceeding 40 percent after 500 revolutions. One test shall be performed for every [_____] [metric tons tons] [cubic meters cubic yards] of aggregates in stockpiles or at the source.

1.8.2 Soundness Test

****

NOTE: The magnesium-sulfate soundness test is to be used in excluding aggregates known to be unsatisfactory or for evaluating aggregates from new sources. The maximum allowable percentage of loss will be inserted in the blank and normally should be within the range of 10 to 15 percent. The values used will be based on knowledge of aggregates in the area that have been previously approved or that have a satisfactory service record in bituminous pavement construction for at least 5 years and will assure that aggregates from new sources will be equal to or better than these aggregates.

****

The soundness test shall be performed as specified by ASTM C 88 to ensure that aggregates have a weight loss not greater than [_____] [12] percent when subjected to five cycles of the magnesium sulfate test. One test shall be performed for every [_____] [metric tons tons] [cubic meters cubic yards] of aggregates in stockpiles or at the source.

1.8.3 Stripping Test

Stripping tests shall meet the requirements of AASHTO T 182. Deleterious substances shall not exceed the requirements of ASTM D 1139.

1.9 WEATHER LIMITATIONS

Bituminous surface treatment shall be applied only when the existing surface or base course is dry or contains moisture not in excess of the amount that will permit uniform distribution and the desired adhesion. Bituminous surface treatment shall not be applied when either the atmospheric temperature, in the shade, is below [10] [15.5] degrees C [50] [60] degrees F or the pavement surface to be treated is below 20 degrees C 70 degrees F unless otherwise directed.

1.10 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage.

Unload and store the materials with a minimum of handling. Store aggregates preventing segregation and contamination.

PART 2 PRODUCTS

2.1 MATERIALS

****
NOTE: Delete designations, materials, grades, and aggregate sizes which are not available or desirable for the project. In selecting alternate materials, consider the cost effect of competition between materials along with engineering considerations.
****

Mineral aggregate and bituminous material of the following types, gradations, grades, and consistencies that meet the requirements of stripping, wear, and soundness tests as specified in paragraph SAMPLING AND TESTING shall be used.

2.1.1 Mineral Aggregate

****
NOTE: The desired gradations to be used for the project will be specified. For single surface treatment, select the required gradation from the table for single bituminous surface treatment. For double surface treatment, select the required gradations (either No. 1 and No. 2 or No. 3 and No. 4) from the table for double bituminous surface treatment.
****

The aggregate shall consist of crushed stone, crushed gravel, or crushed slag and shall be of such nature that thorough coating of bituminous material used in the work will not strip off upon contact with water. Moisture content of the aggregate shall be such that the aggregate will be readily coated with the bituminous material. Drying may be required, as directed. Aggregate shall conform to the gradation shown below. Gradation of the aggregates shall be determined by ASTM C 136.

AGGREGATE GRADATION
SINGLE BITUMINOUS SURFACE TREATMENT
(PERCENT BY WEIGHT PASSING)

Sieve Designation	No. 1	No. 2	No. 3
25.0 mm	100	--	--
19.0 mm	90-100	100	--
12.5 mm	20-55	90-100	100
9.5 mm	0-15	40-70	85-100
4.75 mm	0-5	0-15	10-30
2.36 mm	--	0-5	0-10
1.18 mm	--	--	0-5

AGGREGATE GRADATION
SINGLE BITUMINOUS SURFACE TREATMENT
(PERCENT BY WEIGHT PASSING)

Sieve Designation	No. 1	No. 2	No. 3
1 inch	100	--	--
3/4 inch	90-100	100	--
1/2 inch	20-55	90-100	100
3/8 inch	0-15	40-70	85-100
No. 4	0-5	0-15	10-30
No. 8	--	0-5	0-10
No. 16	--	--	0-5

AGGREGATE GRADATION
DOUBLE BITUMINOUS SURFACE TREATMENT
(PERCENT BY WEIGHT PASSING)

Sieve Designation	No. 1	No. 2	No. 3	No. 4
25.0 mm	100	--	--	--
19.0 mm	90-100	--	100	--
12.5 mm	20-55	100	90-100	--
9.5 mm	0-15	85-100	40-70	100
4.75 mm	0-5	10-30	0-15	85-100
2.36 mm	--	0-10	0-5	10-40
1.18 mm	--	0-5	--	0-10
0.30 mm	--	--	--	0-5

AGGREGATE GRADATION
DOUBLE BITUMINOUS SURFACE TREATMENT
(PERCENT BY WEIGHT PASSING)

Sieve Designation	No. 1	No. 2	No. 3	No. 4
1 inch	100	--	--	--
3/4 inch	90-100	--	100	--
1/2 inch	20-55	100	90-100	--
3/8 inch	0-15	85-100	40-70	100
No. 4	0-5	10-30	0-15	85-100
No. 8	--	0-10	0-5	10-40
No. 16	--	0-5	--	0-10
No. 50	--	--	--	0-5

2.1.1.1 Crushed Stone

Crushed stone shall consist of clean, sound, durable particles, free of soft or disintegrated pieces, dust, or foreign matter.

2.1.1.2 Crushed Gravel

Crushed gravel shall consist of clean, sound, durable particles, free of soft or disintegrated pieces or foreign matter. At least 90 percent by weight of the particles shall have at least two fractured faces.

2.1.1.3 Crushed Slag

Crushed slag shall be an air-cooled blast-furnace product having a dry weight of not less than 1120 kg per cubic meter, 70 pcf, and shall consist of angular particles uniform in density and quality and free of dust and foreign matter. The weight of a cubic meter foot of slag aggregate shall be determined by ASTM C 29/C 29M.

2.1.2 Bituminous Materials

****
NOTE: In some states and localities, the use of cutback asphalt is prohibited or curtailed by local air pollution regulations. In areas where cutback asphalt is restricted by air pollution regulations, asphalt cement or emulsified asphalt should be used. Tar should generally be used only where the surface course of the pavement is of tar concrete. Tar grades are listed in order of preference for most normal applications. RC-800 is most commonly recommended for surface treatments. Where cooler temperatures are anticipated, use of RC-250 may be desirable. The type of cutback or emulsion to be used will depend on local conditions and temperature; and these factors must be carefully considered in making the selection for surface treatments. Where cooler temperatures are anticipated, preference should be given to the use of 200-300 grade asphalt cement.
****

2.1.2.1 Cutback Asphalt

Rapid curing cutback asphalt shall conform to ASTM D 2028, Designation [RC-250] [RC-800] [RC-3000].

2.1.2.2 Emulsified Asphalt

Rapid-setting emulsified asphalt shall conform to ASTM D 977, Grade RS-1 or RS-2 or ASTM D 2397, Grade CRS-1 or CRS-2.

2.1.2.3 Asphalt Cement

Asphalt cement shall conform to ASTM D 946, Penetration Grade [120-150] [200-300] or ASTM D 3381, Viscosity Grade [AC-2.5] [AC-5] [AC-10] [AC-20] [AR2000].

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Immediately before applying the first course of bituminous material, the surface shall be cleaned of loose material with power brooms or power blowers. Care shall be taken to remove all dirt, clay, and other loose or foreign matter. Flush the surface with water, when necessary to achieve a clean surface, only when directed by the Contracting Officer; allow the surface to dry after flushing.

3.2 APPLICATION OF FIRST COURSE

3.2.1 Bituminous Material

****
NOTE: Application temperatures will vary with the grade of asphalt or tar used. Recommended materials and application temperatures may be found in paragraph APPLICATION TEMPERATURE OF MATERIALS, below and in Asphalt Institute Publications: Asphalt Surface Treatments - Specifications (publication No. ES-11) and Asphalt Surface Treatments - Construction Techniques (publication No. ES-12).
****

Bituminous material shall be applied by means of a bituminous distributor at the temperature specified in paragraph APPLICATION TEMPERATURE OF MATERIALS,below or as directed. The bituminous material shall be applied within the limits specified in paragraph QUANTITY LIMITS in PART 1. Bituminous material shall be applied in such a manner that uniform distribution is obtained over all surfaces treated. Unless the distributor is equipped to obtain a satisfactory result at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application so that flow through the sprays may be started and stopped on the paper in order that all sprays will operate at full force on the surface treated. Immediately after application, the building paper shall be removed and destroyed. Areas inaccessible to the distributor shall be properly treated with bituminous material using the hose attachment. Protect adjacent buildings, structures, and trees to prevent their being spattered or marred.

3.2.2 Spreading of Aggregate

Immediately following application of bituminous material, aggregate shall be spread uniformly over the surface within the limits of the quantities specified in paragraph QUANTITY LIMITS in PART 1. Spreading shall be done with mechanical spreaders. Aggregate shall be spread evenly by hand on all areas missed by the mechanical spreader. Equipment spreading aggregate shall be operated backwards, so that the bituminous material will be covered ahead of the truck wheels. When hand spreading is employed on inaccessible areas, aggregate shall be spread directly from trucks. Additional aggregate shall be spread by hand over areas having insufficient cover, and spreading shall continue during these operations when necessary.

3.2.3 Brooming and Rolling

The surface shall be rolled with a pneumatic-tired and a steel-wheeled roller after sufficient aggregate is spread. Rolling shall continue until no more aggregate can be worked into the treated surface. The use of the steel-wheeled roller will be discontinued, or a lighter weight steel wheel roller substituted, as directed, if the roller being used causes excessive crushing and shattering of the aggregate. If the aggregate is not distributed properly, the surface shall be broomed as soon as possible after the first coverage by the roller, but not until the surface has set sufficiently to prevent excessive marking. Brooming, rolling, and supplemental spreading of aggregate shall continue until the surface is cured and rolled sufficiently to key and set the aggregate. In places not accessible to rollers, the aggregate shall be compacted with pneumatic tampers. Aggregate that becomes contaminated with foreign matter shall be

removed, replaced with clean aggregate, and rerolled, as directed. The Contractor shall maintain and protect the treated areas by use of barricades for a period not to exceed 30 days.

3.3 APPLICATION OF SECOND COURSE

3.3.1 Bituminous Treatment

The bituminous material for the second course shall follow within 48 hours after construction of the first course, weather permitting. Excess aggregate shall be removed prior to the second application of bituminous material. If the treated surface is excessively moistened by rain, the surface shall be allowed to dry for such time as deemed necessary. The second application of bituminous material shall be applied in the manner specified in paragraph APPLICATION OF FIRST COURSE, including temperature and QUANTITY LIMITS.

3.3.2 Aggregate

Immediately following the second application of bitumen, aggregate conforming to the gradation and limits specified in paragraph QUANTITY LIMITS shall be spread uniformly over the bituminous material. Aggregate shall be spread and processed in the manner specified for the first course.

3.3.3 Brooming and Rolling Second Course

The surface shall be rolled and broomed in the manner specified for the first course until a thoroughly bonded, smooth, even-textured surface is produced. Surplus aggregate shall be swept off the surface and removed prior to final acceptance.

3.4 APPLICATION TEMPERATURE OF MATERIALS

3.4.1 Cutback Asphalt

As necessary to provide an application viscosity between 0.00004 and 0.00012 square meter per second 40 and 120 centistokes, kinematic or 20 and 60 seconds, Saybolt Furol.

3.4.2 Emulsified Asphalt

Within the following ranges:

RS-1: 21.1-60 degrees C 70-140 degrees F.

RS-2, CRS-1 and CSR-2: 51.7-85 degrees C 125-185 degrees F.

3.4.3 Asphalt Cement

As necessary to provide an application viscosity between 0.00004 and 0.00012 square meter per second 40 and 120 centistokes, kinematic or 20 and 60 seconds, Saybolt Furol.

3.5 TRIAL APPLICATION

****
NOTE: This paragraph will be deleted if project size does not warrant trial application.
****

Preliminary to providing a complete surface treatment, treat [three] [_____] lengths of at least 30.5 m 100 feet each for the full width of the distributor bar. Use the appropriate typical application rates specified herein for one surface treatment trial. Make other surface treatment trials using various amounts of materials as may be deemed necessary.

3.6 PROTECTION

Keep all traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces. Protect the treated areas from traffic for at least 24 hours after final application of bituminous material and aggregate, or for such time as necessary to prevent picking up. Immediately prior to opening to traffic, roll the entire treated area with a self-propelled pneumatic-tired roller.

-- End of Section --