
USACE / NAVFAC / AFCEA UFGS-02744N (September 1999)

Preparing Activity: NAVFAC Replacing without revision
NFGS of same number and date

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 22 December 2004

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09/99

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SECTION 02744N

BITUMINOUS TACK COAT 09/99

NOTE: This guide specification covers the
requirements for bituminous tack coat.

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.

NOTE: Emulsified asphalt grades listed are suitable
for normal tack coat applications. The following
considerations should be included in the evaluation
of alternate grades to be specified for the project:

1. Local practice as well as availability and cost
of various grades within the area.
2. The advantage of the SS grade over the RS grades
is that they can be diluted with water while
dilution of the RS grades is more difficult.
Dilution of the emulsified asphalt with water
normally provides good coverage and economy,
adequate bond, with less chance of leaving surplus
asphalt. Where a rapid-setting emulsion is
required, consider use of RS-1 and CRS-1.
3. Anionic emulsions such as SS-1 provide better
adhesion to basic aggregates such as limestone,
while cationic emulsions such as CSS-1 are better
with acidic aggregates such as silicates. For the

majority of applications, the two types will perform equally as well as a tack coat.

4. In warmer climates, consider the use of "h" grade emulsions with a harder base asphalt and lower penetration such as SS-1h and CSS-1h.

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 102 (1983; R 2000) Spot Test of Asphaltic Materials

ASTM INTERNATIONAL (ASTM)

ASTM D 140 (2001) Sampling Bituminous Materials

ASTM D 2397 (2002) Cationic Emulsified Asphalt

ASTM D 977 (2003) Emulsified Asphalt

1.2 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.

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-06 Test Reports

NOTE: When certified laboratory test would be adequate to ensure the quality of bituminous materials, use paragraph entitled "Test Reports" and delete paragraph "Field Sampling and Testing." Where contamination is possible, retain paragraph entitled "Field Sampling and Testing."

Certified test reports: For emulsified asphalt

1.3 DELIVERY AND STORAGE

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.4 WEATHER LIMITATIONS

Apply the tack coat only when the surface is dry. Apply the tack coat only when the ambient temperature is 10 degrees C 50 degrees F or above and when the temperature has not been below 1.7 degrees C 35 degrees F for 12 hours immediately prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.1 MATERIALS

Bituminous material for the tack coat shall be emulsified asphalt.

2.1.1 Emulsified Asphalt

NOTE: Emulsified asphalt grades listed are suitable

for normal tack coat applications. The following considerations should be included in the evaluation of alternate grades to be specified for the project:

1. The advantage of the SS grade over the RS grades is that they can be diluted with water while dilution of the RS grades is more difficult. Dilution of the emulsified asphalt with water normally provides good coverage and economy, adequate bond, with less chance of leaving surplus asphalt. Where a rapid-setting emulsion is required, consider use of RS-1 and CRS-1.

2. Anionic emulsions such as SS-1 provide better adhesion to basic aggregates such as limestone, while cationic emulsions such as CSS-1 are better with acidic aggregates such as silicates. For the majority of applications, the two types will perform equally as well as a tack coat.

3. In warmer climates, consider the use of "h" grade emulsions with a harder base asphalt and lower penetration such as SS-1h and CSS-1h.

NOTE: Emulsified asphalt mixing grades such as SS-1, SS-1h, CSS-1, and CSS-1h perform best when diluted with equal parts of water and applied at the rate of 0.23-0.68 liter of diluted emulsion per square meter 0.05-0.15 gallon of diluted emulsion per square yard.

[ASTM D 977, Type SS-1 [or SS-1h]] [ASTM D 2397, Type CSS-1 [or CSS-1h]]. Dilute the emulsified asphalt with equal parts of water. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T 102 using standard naphtha.

2.2 CONSTRUCTION EQUIPMENT

Provide equipment dependable and adequate for the purpose intended and properly maintained in satisfactory and safe operating condition. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a 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].

2.2.1 Bituminous Distributor

The bituminous distributor shall be designed and equipped to distribute the bituminous material uniformly at even heat on variable widths of surface at readily determined and controlled rates from 0.23 to 9.05 liters per square meter 0.05 to 2.0 gallons per square yard, with a pressure range of 172.4 to 517.1 kPa 25 to 75 pounds per square inch and with an allowable variation not to exceed 5 percent from any specified rate. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gages, volume-measuring

devices, adequate heaters for heating the materials to the proper application temperature, a thermometer for reading the temperature of the tank contents, and a hose and spray nozzle attachment suitable for applying bituminous material to spots unavoidably missed by the distributor and to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

2.2.2 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Steam heaters shall consist of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. An armored thermometer with a temperature range from 4.4 to 204.4 degrees C 40 to 400 degrees F shall be fixed to the tank so that the temperature of the bituminous material may be determined at all times.

2.2.3 Brooms and Blowers

Brooms and blowers shall be of the power type suitable for cleaning the surfaces for application of the bituminous material.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the tack coat, remove loose material, dirt, clay, and other objectionable material from the surface to be treated by a power broom or blower supplemented with hand brooms. After the cleaning operation and prior to the application of the tack coat, inspect the area to be paved to determine the fitness of the area to receive the bituminous material.

3.2 APPLICATION OF BITUMINOUS MATERIAL

NOTE: Emulsified asphalt mixing grades such as SS-1, SS-1h, CSS-1, and CSS-1h perform best when diluted with equal parts of water and applied at the rate of 0.23-0.68 liter of diluted emulsion per square meter 0.05-0.15 gallon of diluted emulsion per square yard.

Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate of not less than 0.23 [_____] liter nor more than 0.68 [_____] liter of diluted emulsion per square meter not less than [0.05] [_____] gallon nor more than [0.15] [_____] gallon of diluted emulsion per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.2.1 Application Temperature for Emulsified Asphalt

Between 23.9 and 54.4 degrees C 75 and 130 degrees F.

3.3 FIELD SAMPLING AND TESTING

NOTE: When certified laboratory tests would be
adequate to ensure the quality of bituminous
materials, use paragraph entitled "Test Reports" and
delete paragraph "Field Sampling and Testing." Where
the possibility of contamination exists, retain
paragraph entitled "Field Sampling and Testing."

3.3.1 Sampling Bituminous Materials

Furnish samples of bituminous materials for testing. Test in accordance with ASTM D 140.

3.3.2 Bituminous Material Tests

Perform spot test for asphalt in accordance with AASHTO T 102 on each shipment.

3.4 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --