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USACE / NAVFAC / AFCEA UFGS-02788 (August 2004)  
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Preparing Activity: NAVFAC Superseding  
UFGS-02788N (September 1999)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005

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### SECTION 02788

#### COAL TAR SEAL COAT WITH UNVULCANIZED RUBBER 08/04

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NOTE: This guide specification covers the requirements for rubberized coal tar seal coats.

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.

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NOTE: Rubberized coal tar seal coats are applicable to bituminous pavements subjected to occasional and light fuel spillage. Where extensive fueling operations are conducted only portland cement concrete pavements should be used. Coal tar seal coats also lower the skid resistance of pavement areas and should not be used on roads, streets, taxiways, or runways.

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## PART 1 GENERAL

### 1.1 REFERENCES

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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.

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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.

ASTM INTERNATIONAL (ASTM)

ASTM C 136	(2004) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 75	(2003) Sampling Aggregates

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS R-P-355	(Rev E) Pitch, Coal Tar Emulsion (Coating for Bituminous Pavements)
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1.2 SUBMITTALS

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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-05 Design Data

Coal tar seal coat mix

SD-06 Test Reports

Coal tar seal materials tests

Submit, showing results of tests specified for various materials.

Coal tar pitch emulsion tests

Aggregate gradation tests

SD-07 Certificates

Construction equipment list

1.3 DELIVERY AND STORAGE

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NOTE: If freezing temperatures are anticipated, the project specifications should specify winter grade emulsion fortified with antifreeze according to FS R-P-355.  
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Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling. Store aggregates and protect from contamination and segregation. [Store rubberized coal tar pitch emulsion in a manner which will prevent freezing.]

1.4 WEATHER LIMITATIONS

Apply the seal coat only in dry weather and when air and pavement temperatures are 10 degrees C 50 degrees F and rising. Do not apply seal coat if rain is probable or predicted for the next 8 hours. Do not apply when temperature and humidity conditions are such that rubberized coal tar pitch emulsion could not dry thoroughly before a minimum pavement temperature of 7.2 degrees C 45 degrees F occurs.

1.5 QUALITY ASSURANCE

1.5.1 Required Data

Submit a coal tar seal coat mix design for each type included in work, with test reports, a minimum of 30 days prior to mixing and placing of material. Mix design shall indicate definite percentage of each sieve fraction of aggregate, water content, and percentage of rubberized coal tar emulsion.

## 1.6 EQUIPMENT

### 1.6.1 Required List

Submit a list of construction equipment to the Contracting Officer for approval 30 days prior to bringing the equipment on the job site. The Government reserves the right to order discontinuance of use of any equipment which, in the opinion of the Contracting Officer, fails to produce satisfactory work.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Emulsion

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**NOTE: If freezing temperatures are anticipated, the project specifications should specify winter grade emulsion fortified with antifreeze according to FS R-P-355.**  
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Rubberized coal tar pitch emulsion shall consist of coal tar pitch emulsion and unvulcanized rubber. Coal tar pitch emulsion shall conform to FS R-P-355. The unvulcanized rubber shall be of a type that is resistant to petroleum distillates. Blend not less than 3 percent by weight of rubber with the coal tar pitch prior to emulsification. Rubberized coal tar pitch emulsion shall be homogeneous and shall show no separation or coagulation of components which cannot be overcome by moderate stirring. Upon curing, the rubberized coal tar pitch emulsion shall provide a continuous, unbroken, adherent film resistant to petroleum distillates. [Do not expose the emulsion to freezing temperatures during storage, mixing, and application.]

#### 2.1.2 Mineral Aggregate

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**NOTE: The gradation given may be varied to conform with recommendations of suppliers of rubberized coal tar pitch emulsion. Adjustment in gradation may be necessary after the project is commenced.**  
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Provide mineral aggregate of either crushed gravel or crushed stone and free from dirt, organic matter, clay balls, adherent films of clay, dust, or other objectionable matter. Aggregates shall be nonplastic. When tested in accordance with ASTM C 136, grading of aggregate shall conform to the following:

<u>Sieve Designation</u> <u>(Square Opening)</u>	<u>Percentage by</u> <u>Weight Passing</u>
1.18 mm	100
850 micrometers	85-100
600 micrometers	15-85
425 micrometers	2-15
150 micrometers	0-5

<u>Sieve Designation</u> <u>(Square Opening)</u>	<u>Percentage by</u> <u>Weight Passing</u>
No. 16	100
No. 20	85-100
No. 30	15-85
No. 40	2-15
No. 100	0-5

#### 2.1.3 Water

Potable.

#### 2.1.4 Prime Coat

Undiluted rubberized coal tar pitch emulsion.

### 2.2 CONSTRUCTION EQUIPMENT

Use equipment adequate for purpose intended, properly maintained, and in safe operating condition at all times.

#### 2.2.1 Cleaning Equipment

Cleaning equipment shall be capable of removing oil, grease, paint, clay, dust, rubber deposits, and other material from surface and cracks of bituminous pavements.

#### 2.2.2 Mixing Equipment

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**NOTE: For projects involving over 1,672 square meters 2,000 square yards, delete paragraph entitled "Mixing Equipment" and permit only self-contained slurry machines to be used.**  
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Provide pug mill type mixer, or other equipment approved by the Contracting Officer. Equip mixer with chute and controlled gate for feeding seal coat into the spreader box. Examine mixers daily for changes in condition due to accumulation of hardened mixture or excessively worn blades. Do not use any mixer with an accumulation of hardened mixture or excessively worn blades.

#### 2.2.3 Self-Contained Slurry Machines

Slurry machine shall accurately proportion and thoroughly mix aggregate, water, and rubberized coal tar pitch emulsion into a homogeneous mixture. Provide machine capable of rapid discharge of mixed materials into a spreader having suitable controls to allow adjustment for variations in pavement grades and slopes. Provide spreader similar to the spreader box specified. Spreader box may be either an integral part of a self-contained slurry machine or a separate towed unit. Equip slurry machine with a spray bar capable of placing 0.23 liter of water per square meter 0.05 gallon of water per square yard on pavement surface immediately in front of spreader. Mount self-contained slurry unit on a truck or other vehicle capable of producing evenly controlled low rates of speed throughout operation.

#### 2.2.4 Spreader Box

Spreader box shall consist of a frame, squeegee, and baffles. Frame shall be not less than 2.44 meter 8 feet in length. Use squeegee of neoprene rubber belting or similar material, 12.7 mm 1/2 inch thick and 152 to 203 mm 6 to 8 inches deep. Squeegee shall be anchored to an adjustable frame and held vertically across width of box, with approximately 102 mm 4 inches of the lower edge free to provide adequate flexibility. Locate squeegee about three-fourths of the distance back from front of frame and adjust for thickness of application. Line front and sides of box with 6.4 mm 1/4 inch thick belting bolted through slotted holes so that it can be raised or lowered to maintain contact with pavement surface to prevent slurry leakage and assure proper spreading. Provide longitudinal or diagonal baffles within spreader box to distribute slurry full length of the squeegee.

### PART 3 EXECUTION

#### 3.1 CONSTRUCTION

##### 3.1.1 Preparation for Sealing

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**NOTE: Modify as necessary for the project. For pavement which requires repair, such as filling of holes and surface irregularities, major cracks, leveling, rebuilding of broken edges, and similar work, the extent of such work and method of repair should be specified in detail in a separate section of the specifications and the areas should be shown on the plans. Generally, paint which is firmly embedded to the surface does not require removal. Loose paint should be removed using power sweepers.**  
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Scrub areas impregnated with grease, oil, or fuel spillage with detergent and water, and flush surface clean of detergent. [Remove traffic paint on surface to be treated by use of traffic paint removal equipment.] Clean surfaces of dirt, clay, and other objectionable material by means of power brooms or blowers, supplemented with hand brooms. Clean surface cracks and blow out with compressed air 620.5 kPa 90 pounds per square inch at the nozzle, immediately before sweeping or vacuum operations. Repair or replace pavements softened by petroleum derivatives or that have failed due to other causes, at least one week prior to application of seal coat.

##### 3.1.2 Prime Coat

Following the preparation for sealing and prior to the application of the seal coat, apply prime coat of undiluted rubberized coal tar pitch emulsion without aggregate at the rate of 0.34 to 0.45 liter per square meter 0.075 to 0.10 gallon per square yard. Allow prime coat to cure for a minimum of 6 hours and do not disturb until seal coat is placed.

##### 3.1.3 Preparation of Seal Coat

Prepare the seal coat by mixing rubberized coal tar pitch emulsion with water and mineral aggregate. Add from 0.48 to 0.72 kilogram (oven dry weight) of mineral aggregate for each liter 4 to 6 pounds (oven dry weight) of mineral aggregate for each gallon of undiluted emulsion. Water blended into the mix, for workability, shall not exceed 20 percent by volume of the



rubberized coal tar pitch emulsion used, and shall include the surface moisture content of the mineral aggregates. Mix the materials by mechanical mixer as follows: Place rubberized coal tar pitch emulsion into the mixer followed by required amount of water, and blend to a homogeneous consistency. Add mineral aggregate next at a slow, uniform rate to prevent balling or lumping while mixer is rotating. After all ingredients are in mixer, mix together for not less than 5 minutes and as much longer as necessary to obtain a smooth, creamy, homogeneous mixture. Provide continuous mixing from time rubberized coal tar pitch emulsion is placed into mixer until the seal coat is discharged into spreader box or otherwise applied to pavement. During the entire mixing and placing process, if breaking, segregation, hardening of emulsion, balling, or lumping occurs; discard the entire batch.

#### 3.1.4 Application of Seal Coat

Immediately prior to application of the seal coat, dampen pavement prime coat by fog spraying with water at a rate not exceeding 0.23 liter per square meter 0.05 gallon per square yard. Apply seal coat in two applications using a spreader box supplemented by hand squeegees. Apply the seal coat at a rate of not less than 0.45 liter of undiluted rubberized coal tar emulsion per square meter 0.10 gallon of undiluted rubberized coal tar emulsion per square yard of pavement per application. Water content of seal coat shall be in accordance with job mix formula. Carry sufficient amount of seal coat in spreader box at all times to ensure complete coverage is obtained. No segregation of coal tar emulsion and aggregate, streaking, or excessive buildup at joints will be permitted. Use burlap drags fastened to rear of spreader box to smooth the surface. Allow the first application to cure for a minimum period of 6 hours before applying the second coat. Apply the second coat within 24 hours of the first application.

#### 3.1.5 Curing

Allow seal coat to cure a minimum of 24 hours before it is opened to traffic.

### 3.2 FIELD SAMPLING AND TESTING

#### 3.2.1 Sampling Aggregates

Sample aggregates in accordance with ASTM D 75. Take at least one initial sample from each stockpile. Collect each sample by taking three incremental samples at random to make a composite sample of at least 23 kilograms 50 pounds. Take three random samples from each 18 metric tons 20 tons of material, or a day's run, thereafter, during course of project. Repeat the above sampling when source of material is changed or when otherwise directed.

#### 3.2.2 Sampling Bituminous Material

Sample rubberized coal-tar pitch emulsion in accordance with ASTM D 140. Sample emulsion immediately after delivery to project site and at any time thereafter if source of material is changed. Take additional samples directly from emulsion storage tanks of slurry seal machine when directed.

#### 3.2.3 Sample Identification

Place each sample of aggregate and rubberized coal tar pitch emulsion in a

clean container and securely fasten. Identify each sample with the following information:

Contract No. \_\_\_\_\_  
Sample No. \_\_\_\_\_ Quantity \_\_\_\_\_  
Date of Sample \_\_\_\_\_  
Sample \_\_\_\_\_  
Source \_\_\_\_\_  
Intended use \_\_\_\_\_  
For testing \_\_\_\_\_

#### 3.2.4 Aggregate Testing

Test each sample for gradation in accordance with ASTM C 136.

#### 3.2.5 Bituminous Material Tests

Test each sample of rubberized coal tar emulsion for conformance to FS R-P-355.

### 3.3 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with the seal coat 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 application of the seal coat or for time to prevent picking up.

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