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USACE / NAVFAC / AFCEA UFGS-02967 (August 2004)  
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Preparing Activity: USACE Superseding  
UFGS-02967A (April 2001)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UML dated 22 December 2004

Latest change indicated by CHG tags

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SECTION 02967

HEATER SCARIFYING OF BITUMINOUS PAVEMENTS  
08/04

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NOTE: This guide specification covers the requirements for heater scarifier procedures for bituminous pavements in connection with surface treatments or asphalt overlays.

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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PART 1 GENERAL

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NOTE: Experience and data indicate that scarifying is feasible only on existing asphalt concrete pavements which are structurally sound but in need of surface leveling or sealing, for example, pavements disturbed for utility trenches or other openings or where patches have settled and surface deterioration exists. This specification covers the use of heater scarifiers for the maintenance of bituminous pavements. Heater scarifying is to be used in conjunction with surface treatments and asphalt overlays; therefore, a surface treatment or asphalt overlay section should be included in the project specifications.

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## 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.

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 1250 (2004) Petroleum Measurement Tables  
ASTM D 140 (2001) Sampling Bituminous Materials  
ASTM D 2170 (2001a) Kinematic Viscosity of Asphalts  
(Bitumens)  
ASTM D 2397 (2002) Cationic Emulsified Asphalt  
ASTM D 244 (2000) Emulsified Asphalts  
ASTM D 92 (2002b) Flash and Fire Points by Cleveland  
Open Cup Tester  
ASTM D 977 (2003) Emulsified Asphalt

## 1.2 MEASUREMENT AND PAYMENT

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NOTE: When other methods of measurement are desired  
or are necessary, this paragraph will be modified  
accordingly.  
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### 1.2.1 Methods of Measurement

Quantities of [bituminous material] [recycling agent] applied and area of pavement treated in the accepted work shall be determined by the following methods.

#### 1.2.1.1 Bituminous Material and Recycling Agent

The quantity of [bituminous material] [recycling agent] to be paid for shall be the number of liters gallons used in the accepted work as determined by the Contracting Officer, corrected to liters at 15.6 degrees

C (60 degrees F) gallons at 60 degrees F in accordance with ASTM D 1250 and using a coefficient of expansion of 0.00045 per degree C (0.00025 per degree F) 0.00025 per degree F for asphalt emulsion.

#### 1.2.1.2 Treated Pavement

The quantity of pavement treated with [bituminous material] [recycling agent] shall be the number of square meters square yards completed and accepted as determined by the Contracting Officer. The number of square meters square yards of treated pavement shall be determined by measuring the length and width of the specified work area. Measurements to determine the number of square meters square yards shall be along the surface of the pavement and shall be to the closest mm inch for width and the closest meter foot for length.

#### 1.2.1.3 Heater Scarifying

The quantity of heater scarifying of bituminous concrete surfaces shall be the number of square meters square yards completed and accepted as determined by the Contracting Officer. The number of square meters square yards of scarified pavement shall be determined by measuring the length and width of the specified work area. Measurements shall be along the surface of the pavement and shall be to the closest mm inch for width and the closest meter foot for length.

#### 1.2.2 Payment

Quantities of heater scarifying, treated pavement and [bituminous material] [recycling agent] will be paid for at respective contract unit prices.

#### 1.3 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-04 Samples

Materials[; G][; G, [\_\_\_\_\_]]

Samples of proper size for approval, not less than [\_\_\_\_\_] days before commencing the work. Additional samples of materials shall be furnished as required during construction.

#### SD-06 Test Reports

##### Testing

Before delivery of materials, certified copies of the test reports establishing compliance with specifications detailed herein and in referenced publications. Test results on materials shall be provided by the Contractor prior to and during construction.

### 1.4 WEATHER LIMITATIONS

Heater scarifying procedures shall be performed only when the existing pavement is dry and the pavement surface temperature is above 15 degrees C. 60 degrees F.

### 1.5 EQUIPMENT, TOOLS, AND MACHINES

Equipment, tools, and machines used in the performance of the work shall be maintained in a satisfactory working condition at all times. Equipment used shall conform to applicable governing regulations for local air pollution controls.

#### 1.5.1 Heater Scarifier

The heater scarifier shall be a self-propelled machine having, in combination, the means of heating and scarifying the existing asphaltic concrete surface and spreading the scarified material in a uniform layer. The heating, scarifying, and spreading widths of the machine shall be equal. The machine shall be capable of producing a minimum thickness of 19 mm 3/4 inch of uncompacted reclaimed mix without damaging the asphalt binder or violating pollution standards of the area. The machine shall be capable of working at a rate of speed that allows heating and scarifying the pavement to meet the specified requirements.

### 1.5.2 Bituminous Distributor

The bituminous distributor shall be mounted on pneumatic tires of such size and number to prevent rutting, shoving, or other damage to the base, surface, or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous or recycling material in a uniform coverage at the specified temperature at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent. The distributor shall be capable of being operated at variable widths. The 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 inaccessible areas and patches. The distributor shall be equipped for circulation and agitation of the bituminous material during the heating process.

### 1.5.3 Cleaning Equipment

Power brooms and power blowers shall be suitable for cleaning the surface and cracks in the existing pavement prior to treatment.

## 1.6 SAMPLING AND TESTING

### 1.6.1 Sampling

All samples of [bituminous material] [recycling agent], unless otherwise specified, shall be taken in accordance with the requirements of ASTM D 140. All materials will be subject to approval before use.

### 1.6.2 Testing

Testing [will be the Government's responsibility] [shall be the responsibility of the Contractor and shall be performed by an approved commercial testing laboratory or by Contractor's testing laboratory, subject to the approval of the Contracting Officer]. The materials shall be tested to establish compliance with the specified requirements.

## PART 2 PRODUCTS

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NOTE: Designer will specify either bituminous material or recycling agent to be used for treating the scarified surface, and will delete the inapplicable paragraph and renumber all subsequent paragraphs accordingly. When bituminous material is to be used, grade SS-1 or CSS-1 asphalt emulsion should be specified in moderate or cold climates and grade SS-1h or CSS-1h should be specified in hotter climates such as the southern or southwestern areas of the United States.  
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### 2.1 BITUMINOUS MATERIAL

Bituminous material shall be an emulsified asphalt, Grade [\_\_\_\_], conforming to [ASTM D 977] [ASTM D 2397]. The asphalt from which emulsion is made shall have a negative spot when tested in accordance with AASHTO T 102.

## 2.2 RECYCLING AGENTS

Recycling agents shall be composed of a petroleum base oil uniformly emulsified with water and shall conform to the requirements of the table below. The recycling agent shall have a proven record of satisfactory service for at least two years prior to use in this contract.

RECYCLING AGENT		
Property	Requirement	Test Method
Residue, percent	55 minimum	ASTM D 244 (1)
Viscosity at 60 degrees C, sq mm/sec (2)	80-500	ASTM D 2170
Flash Point (3) Cleveland Open Cup (COC), degrees C	350 minimum	ASTM D 92

RECYCLING AGENT		
Property	Requirement	Test Method
Residue, percent	55 minimum	ASTM D 244 (1)
Viscosity at 140 degrees F, centistokes (2)	80-500	ASTM D 2170
Flash Point (3) Cleveland Open Cup (COC), degrees F	350 minimum	ASTM D 92

(1) Modify ASTM D 244 evaporation test for percent residue by heating 50-gram samples to 148 degrees C 300 degrees F until foaming ceases; then cool immediately and calculate results.

(2) Viscosity on the residue obtained from evaporation test.

(3) Flash point on residue from evaporation test.

## PART 3 EXECUTION

### 3.1 PREPARATION OF SURFACE

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NOTE: If the surface to be treated contains utility accesses, drainage systems, etc., which require repairs, the method of repairs and extent of work involved should be shown on plans and described in a separate section of the specifications.  
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All potholes, defective base areas, utility cuts, and large cracks shall be repaired. Manhole covers, valve boxes, and like structures shall be adjusted to the desired grade prior to pavement surface repair operations.

### 3.2 SCARIFYING OPERATION

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NOTE: The amount of heat applied to the pavement shall be controlled so that the heated pavement is not checked, charred, or otherwise damaged. The scarified pavement shall not be heated while in a loosened, scarified condition. Experience has indicated that loose material on the surface tends to insulate the pavement, and thus less heat is absorbed by the pavement. Excess heat will burn the asphalt binder; however, sufficient heat should be applied to hold the temperature of the scarified material to a minimum of 90 degrees C (200 degrees F) prior to the application of an overlay.

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A heater scarifier shall be used to scarify the existing bituminous surface as shown. The temperature at which the work is performed, the nature and condition of the equipment, and the manner of performing the work shall result in no pavement damage during the heating and scarifying operation. Heating shall be accomplished with a unit or units that uniformly heat the pavement to the depth to be scarified. The scarifier unit shall uniformly spread the scarified material. Depth of scarification shall be at least 19 mm. 3/4 inch. The pavement shall not be heated while in a loosened, scarified condition.

### 3.3 APPLICATION OF BITUMINOUS EMULSION AND RECYCLING AGENTS

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NOTE: It is recommended that the bituminous material or recycling agent be added after the heating process.

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The [bituminous emulsion] [recycling agent] shall be uniformly applied with a bituminous distributor or other approved equipment at a temperature between 23 and 54 degrees C 75 and 130 degrees F and shall be applied in quantities of not less than 0.20, nor more than 1.40 L/square meter not less than 0.05, nor more than 0.30 gallon/square yard. The exact quantities, which may be varied to suit field conditions, will be determined by the Contracting Officer. The [emulsion] [recycling material] shall be applied while the scarified material is hot.

### 3.4 COMPLETION OF PAVEMENT

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NOTE: Specifier will insert in the blanks the type of overlay or surface treatment to be used in conjunction with the heater scarifying procedures.

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After application of [bituminous emulsion] [recycling agents] pavement construction shall be completed in accordance with Section [\_\_\_\_].

-- End of Section --