



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Airport Safety and Standards
Airport Engineering Division

800 Independence Ave., SW.
Washington, DC 20591

August 10, 2005

Dear Industry Representative:

Federal Aviation Administration (FAA) Draft Engineering Brief 68, *Four-Component Coal Tar Sealer Rejuvenator*, is being circulated to interested industry associations and individuals to obtain comments and recommendations of actions to be taken. Please review this draft (enclosed) and submit comments as appropriate.

This draft engineering brief provides information and guidance for the use of a four-component coal tar based material as a fuel resistant pavement sealer and pavement rejuvenator. The draft contains detailed material formulation requirements. Please note that Engineering Brief No. 44 *Coal-Tar Sealer/Rejuvenator* is active and will not be cancelled as a result of this review.

Comments received by September 30, will be considered for inclusion in the final action to be taken.

The document may be obtained in Microsoft Word DOC format and Adobe Acrobat PDF format from the FAA Airports Internet site at <http://www.faa.gov/arp/engineering/briefs/index>

Sincerely,

A handwritten signature in black ink that reads "Rick Marinelli". The signature is written in a cursive, flowing style.

Rick Marinelli, P.E.
Manager, Airport Engineering Division

Enclosure

DRAFT ENGINEERING BRIEF NO. 68 Four Component Coal-Tar Sealer Rejuvenator

I. PURPOSE

This engineering brief provides information and guidance for the use of a four-component coal tar based material as a fuel resistant pavement sealer and pavement rejuvenator

II. BACKGROUND

Asphalt hardening in pavements is an oxidation process that is a function of exposure to air on the surface and within the pavement. This hardening contributes to the loss of fines and aggregate from the surface, a pavement distress commonly referred to as weathering and raveling. If circulation of air through the void spaces in a pavement can be interrupted, the rate of hardening of the asphalt will be reduced and the life of the pavement may be extended. Materials that meet the requirements of this brief have demonstrated an ability to delay weathering and raveling. Part of the material penetrates into the asphalt and lowers the viscosity while the other portion remains on the surface and protects the pavement against fuel spill damage and the intrusion of air and water.

The material in this brief also meets the requirements of Engineering Brief No. 44 Coal-Tar Sealer/Rejuvenator, issued November 2, 1989. When Engineering Brief No. 44 was issued, the Federal Aviation Administration (FAA) was aware of one manufacturer that produced material meeting the requirements of the specification contained in the brief. Since that time, comparable coal tar based mixtures have been introduced and used on airport pavements with generally satisfactory results. However, the consistent performance of the original material is such that the specifying of the following detailed material formulation by airport sponsors and engineers is acceptable.

WARNING: THERE IS A PATENT ON ONE FORMULATION OF THE SEALER REJUVENATOR THAT WILL MEET THE REQUIREMENTS OF THIS ENGINEERING BRIEF. THIS ENGINEERING BRIEF AND THE SPECIFICATION ATTACHED TO THIS ENGINEERING BRIEF DO NOT CONSTITUTE A LICENSE TO PRACTICE THE PATENT.

III. APPLICATION

This material can be considered for use on all bituminous pavement surfaces at an airport. There may be a temporary reduction in the frictional characteristics of surfaces tested with this material. It is recommended that project-specific skid resistance testing be included whenever this material is applied to runway pavements and pavements where traffic exceeds airplane taxiing speed.

Draft—Not Suitable for project use at this time.

IV. DESCRIPTION

Attached is a specification for a four-component coal-tar penetrating sealer/rejuvenator.

SPECIFICATION

Four Component Coal-Tar Sealer Rejuvenator

1.0 **GENERAL.** This item consists of an application of a four-component coal-tar sealer/rejuvenator, applied to a previously prepared bituminous surface, in accordance with these specifications, as shown on the plans or as directed by the Engineer.

The purpose of this sealer/rejuvenator material is to provide a fuel resistant surface and to rejuvenate oxidized or otherwise aged asphalt binder without causing damage to the surface and without causing an unacceptable reduction in the friction characteristics of the pavement.

WARNING: THERE IS A PATENT ON ONE FORMULATION OF THE SEALER REJUVENATOR AND THIS SPECIFICATION DOES NOT CONSTITUTE A LICENSE TO PRACTICE THE PATENT.

2.0 **MATERIALS...**The sealer/rejuvenator must consist of only the following materials, proportioned within the ranges indicated.

COMPONENT MATERIALS	MINIMUM	MAXIMUM
1. Refined Coal-tar (Grade RT-12)	30%	50%
2. Light aromatic solvent naphtha or coal tar solvent naphtha	30%	40%
3. Blend of tar oils as described below meeting requirements of Table 1	15%	40%
4. Elastomer	0.01%	13%

Coal-tar pitch must conform to the requirements of ASTM D 490, Grade RT-12 .

The light aromatic solvent naphtha must be a solvent having an API (American Petroleum Institute) Gravity @ 60 degrees F of 11-30, Specific Gravity 60/60 degrees F of 0.876-0.993, Distillation Range degrees F of 310-450 IBP (initial boiling point) to 350-550 DP (dry point), and a Flash point degrees F TCC (tag closed cup) of 110-250. The coal-tar solvent naphtha must have a Specific Gravity 60/60 degrees F of 0.94-0.99, distillation range degrees F of 250-385 IBP and Flash point degrees F TCC of 92-108.

The coal-tar oils must be a composition for rejuvenating asphalt paving comprising a mixture of di-, tri- and tetracyclic aromatic compounds and their alkyl homologs containing lower alkyl groups together with phenolic and hydroxy derivatives, said mixture being derived from the distillation of coal tar, said

mixture having a specific gravity at 25/25 degrees C of at least 1.06, a maximum Brookfield viscosity at 25 degrees C of 60 cps., and an IBP of at least 180 degrees C and a continuous boiling range to at least 300 degrees C and conform to the requirements of Table 1.

A compatible elastomer must be used.

When all component materials are combined, the combined material must meet the requirement of Table 2.

TABLE 1. BLEND OF COAL-TAR OILS PROPERTIES AND DISTILLATION REQUIREMENTS	
Specific Gravity @ 25/25 degrees C	1.06 minimum (min.)
Water % by weight	2.0% maximum (max.)
Brookfield Viscosity @ 25 degrees C	60 cps. max.
Soluble in Carbon Disulfide by weight	95% min.
Flash Point C.O.C. min.	82 degrees C (180 degrees F) min.
ASTM D-86 Distillation	
Initial Boiling Point (IBP)	160 degrees C (320 degrees F)
180 degrees C (356 degrees F)	0-2%
190 degrees C (374 degrees F)	0-3%
200 degrees C (392 degrees F)	0-4%
210 degrees C (410 degrees F)	0-5%
220 degrees C (428 degrees F)	0-6%
230 degrees C (446 degrees F)	0-8%
240 degrees C (464 degrees F)	0-12%
250 degrees C (482 degrees F)	0-20%
260 degrees C (500 degrees F)	5-30%
270 degrees C (518 degrees F)	10-40%
280 degrees C (536 degrees F)	15-50%
290 degrees C (554 degrees F)	20-60%
300 degrees C (572 degrees F)	25-60%

TABLE 2. COMBINED MATERIAL PROPERTY REQUIREMENTS.		
<u>Test Property</u>	<u>Test Method</u>	<u>Requirements</u>
Specific Gravity @ 25/25 degrees C (77/77 degrees F)	ASTM D 70	1.04 min.
Viscosity Engler 50 cc @ 50 degrees C (122 degrees F)	ASTM D 1665	4.5 max.
Water % by volume	ASTM D 95	2.0 max.
<u>Distillation % by weight</u>	ASTM D 20	
170 degrees C (338 degrees F)		20 max.
270 degrees C (518 degrees F)		25-45
300 degrees C (57 degrees 2 F)		30-55
Flash Point	PMCC (PENSKY- MARTENS CLOSED CUP)	125 degrees F min. (51.7 C)
Softening Point of residue from distillation test	ASTM D 36	40-55 degrees C (104-131 degrees F)

2.1 Verification of Materials. The materials listed in paragraph 2.0 must be verified by the contractor by submitting a sample of the combined product to the Engineer along with the results of an independent material testing lab that confirm full compliance with each individual component property requirement, and a statement from the manufacturer that the sample tests by the independent lab and the sample provided to the Engineer are an accurate representation of the materials to be used on the project.

2.2 The Contractor must supply independent test results of the sealer/rejuvenator, showing a minimum 40% reduction in viscosity of treated pavement when compared to an untreated control section after 3 years. The binder extracted (ASTM D 2172) from samples of the upper 3/8 inch of the surface of the treated pavement must show this decrease in viscosity when compared to the binder extracted from untreated control section pavement as measured by ASTM D 2171. The RT-12 and the solvent naphtha components will not be considered as binder for the purposes of this test.

3.0 TEST SECTION REQUIREMENTS.

3.1 Test Section. Prior to full production, the Contractor must place a series of one square yard test sections at rates between 0.05 and 0.10 gallons per square yard in integrals of 0.01 gallons per square yard as necessary and as determined by the Engineer to develop the proper application rate. The area to be tested will be approved by the Engineer and will be located on the existing pavement. Test sections must be constructed in accordance with the weather limitations, equipment, surface preparation, and application temperature requirements under paragraph CONSTRUCTION METHODS. The Contractor must examine the test sections 24 hours after placement and recommend to the Engineer the application rate to be used for the remainder of the project. A test section will be required for each different type and category of pavement surface. The Engineer will have the final decision, including approvals, of the application rate for each pavement type.

3.2 24-Hour Penetration. The Engineer or Owner must examine the test sections 24 hours after treatment to determine if all of the sealer/rejuvenator has penetrated into the surface. Application rates that have not allowed full penetration into the pavement surface after 24 hours will not be permitted to be used for full production.

4.0 CONSTRUCTION METHODS.

4.1 Weather Limitations. The sealer/rejuvenator must be applied only when the existing surface is dry and the air temperature is at least 50 degrees F and rising or higher.

4.2.. Equipment. The Contractor must furnish all equipment and hardware necessary for the performance of the work. The product must be delivered in dedicated tankers and/or containers with filters. The distributor must be designed and equipped as follows:

- (a) Heating capability for rapid heating of the sealer/rejuvenator to the proper application temperature;
- (b) A positive displacement pump capable of pumping low viscosity material and providing a pre-selected constant pressure of 20-60 psi to deliver the specified rates of application;
- (c) A full circulation spray bar and applicator which maintains proper nozzles which provide the specified rate of application;
- (d) A hooded spray bar and applicator which maintains proper nozzle height;
- (e) A positive shut-off for the spray bar;

- (f) A hand spray, with hose, equipped with a positive shut-off at the spray gun;
- (g) A thermometer installed in the distributor tank to measure the temperature of the sealer/rejuvenator at the time of application;
- (h) A tachometer calibrated to a minimum of tenths of miles per hour;
- (i) A chart listing the capacity of the tank, in gallons, must be carried in each unit. This chart must show gallons for each one (1) inch of depth. A chart showing speed/pressure application rates will also be included;
- (j) The distributor must be equipped with filters which must be fully functional during both the loading and unloading of the product.

4.3 Surface Preparation. Unless otherwise shown on the plans, prior to placing the sealer/rejuvenator, the Contractor, utilizing a power broom or approved equal, must clean the surfaces of the pavement to be treated and assure that it is free of all debris, dust, dirt or other loose matter. The pavement surface must be properly cleaned by the Contractor to the satisfaction of the Engineer or Owner.

4.4 Application Rate. The sealer/rejuvenator must be uniformly applied with a bituminous distributor at the approved application rate determined from the test section. The application rate must not be varied without the approval of the Engineer or Owner. The temperature of the material at application must be between 70F and 120F.

4.5 Protection. Following the application, the surface must be allowed to cure without being disturbed until the sealer has thoroughly dried. Suitable precautions must be taken by the Contractor during this period, including actions necessary to blot up excess materials. All materials used for blotting purposes must be thoroughly removed from the site by the Contractor to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

5.0 MEASUREMENT. The sealer/rejuvenator will be measured by the [gallon(liter)]

[square yard{square meter}].

BASIS OF PAYMENT

6.0 PAYMENT. Payment will be made at the contract unit price per [gallon(liter)] [square yard(square meter)] for the coal-tar

TESTING AND MATERIALS REQUIREMENTS

ASTM D 20 Distillation of Road Tars

ASTM D 36 Softening Point of Bitumen (Ring-and-Ball Apparatus)

ASTM D 70 Specific Gravity and Density of Semi-Solid Bituminous Materials (Pycnometer Method)

ASTM D 86 Distillation of Petroleum Products at Atmospheric Pressure

ASTM D 95 Water in Petroleum Products and Bituminous Materials by Distillation

ASTM D 490 Road Tar

ASTM D 1665 Engler Specific Viscosity of Tar Products

ASTM D 2171 Viscosity of Asphalts by Vacuum Capillary Viscometer

ASTM D 2172 Quantitative Extraction of Bitumen From Bituminous Paving Mixtures

End of Specification