



## SECTION 10 ASPHALT EMULSION PRIME (AEP)

### 10.1 Scope

This performance guide covers the use of asphalt emulsion for prime applications. This guide has been prepared for the purpose of assistance and guidance in preparing an untreated base for an asphalt surface. The information and guidelines on materials, design, and construction requirements should be used to achieve satisfactory results in Asphalt Emulsion Prime (AEP) treatments.

### 10.2 Description

#### 10.2.1 Definitions

Asphalt emulsion priming consists of an application of low viscosity asphalt emulsion to an absorbent surface or granular base, in preparation for an asphalt surface course.

#### 10.2.2 Functions of AEP Treatments

AEP is designed to:

- Penetrate rapidly into the absorbent surface and bind the granular material together.
- Partially waterproof the treated areas to make them resistant to water erosion.
- Continue to provide protection from wind, water, and traffic erosion for an extended period of time.
- Provide a bond between the base and the next course.

### 10.3 Applicable Documents

The following standards are to be an integral part of this performance guide and reference should be made to them.

#### 10.3.1 ASTM Standards

- D140 Practice for Sampling Bituminous Materials
- D244 Test Methods for Emulsified Asphalts
- D977 Specification for Emulsified Asphalt
- D2397 Specification for Cationic Emulsified Asphalt
- D2995 Practice for Determining Application Rate of Bituminous Distributors

### 10.4 Asphalt Emulsion

The emulsion used for prime conforms to ASTM D977 for SS-1 and SS-1h and to ASTM D2397 for CSS-1 or CSS-1h. Other emulsion grades may be used for AEP pro-

vided the same results are obtained and the emulsion is recommended by the emulsion manufacturer for AEP.



#### **10.4.1 Dilution**

If the emulsion is used in diluted form, the water used for dilution of the AEP shall be clean, potable, free of sediments and soluble salts. A small amount of surfactant or the same emulsifier used for the preparation of the emulsion could be added to the water to dilute the AEP to obtain additional stability of the emulsion. When the emulsion is diluted, the final product should be a fluid, homogeneous mixture. The water should always be slowly added to the emulsion. (Not the emulsion to the water.) It is also recommended to add warm water or water at the temperature of the emulsion to prevent breaking of the emulsion. A test dilution should be made to be certain that the water to be used is compatible with the emulsion. These diluted emulsions should not be stored for any length of time.

The emulsion manufacturer should determine the best method and materials for dilution.

### **10.5 Equipment**

Successful prime treatments depend to a large extent on the equipment used, its condition, and the way it is handled. This is why specifications generally require that the equipment be in good mechanical condition, properly adjusted and free from wear which would impair the quality of the work. But, whether required or not, it is always good practice to make a careful inspection before operations begin to be sure all pieces are clean, calibrated, and in top operating form. Such equipment shall at all times be operated by skilled and experienced operators.

#### **10.5.1 Pressure Distribution**

The emulsion distributor is the most important piece of equipment on a prime treatment project. Its purpose is to uniformly apply AEP to a surface at a specified rate and to maintain this application rate regardless of changes in grade or direction of movement. Calibration and adjustment of the asphalt distributor are described in ASTM D2995.

#### **10.5.2 Grader/Scarifier**

If surface preparation is needed, any approved road grader can be used. It must be capable of scarifying and shaping the top 50 to 150 mm (2 to 6 in.) of soil or aggregate.

#### **10.5.3 Water Sprinkler**

Pre-wetting water may be applied in any spraying equipment that results in an even, controllable application of water over the entire surface to be treated.

#### **10.5.4 Compaction Equipment**

The compacting equipment shall be of the standard steel wheel, pneumatic tire, or vibratory steel wheel types.

## 10.6 Construction



### 10.6.1 Preparation of Area to be Treated

AEP can be applied in some situations without any preparation. However, the beneficial effects will be reduced by an extremely dry material, the presence of highly compacted areas, potholes, and high spots. To optimize the performance of AEP, the following steps should be employed:

#### 10.6.1.1 Grading

Using a road grader, an angled dozer, or shovels and rakes, remove, mix and replace the top 50 to 150 mm (2 to 6 in.) of material. Insure that the surface is free from local high spots and potholes, and that the material is evenly mixed and distributed to avoid segregated pockets of coarse or fine gradation. In the case where planing and cross-section is not required, the top surface should be scarified for 12.5 to 25 mm (1/2 to 1 in.).

#### 10.6.1.2 Watering

Water should be applied 2 to 12 hours before priming. The material at the time of priming should be damp, but not saturated with water. To obtain better penetration of the AEP a small amount of surfactant, or the same emulsifier used for the preparation of the emulsion, could be added to the pre-wet water.

### 10.6.2 Application

AEP is normally used at a 1 + 1 dilution. Dilution will give somewhat deeper penetration. Table 1 provides suggested application rates are based on the diluted AEP.

#### NOTE

In very dense material it may be necessary to make two applications or to dilute the emulsion further and make multiple applications at even lower rates. This is done to prevent runoff and puddling of the emulsion.

### 10.6.3 Compaction

After priming, compaction should be used to consolidate the loosened base material and help prevent formation of ruts and potholes.

### 10.6.4 Application of Sand Cover

The application of a light, 2.2 to 3.3 kg/m<sup>2</sup> (4 to 6 lb/yd<sup>2</sup>), clean sand cover is often applied to allow traffic for some interim use period prior to the application of another surface.

### 10.6.5 Performance Criteria

Within the present state of the art, no formal performance criteria exist.

## 10.7 Precautions and Protection of Work



- AEP shall not be applied when the ambient temperature is below 10° C (50° F), or when rain is imminent.
- AEP may be harmful to growing plants, since like any other oil, it seals pores and interferes with intake of carbon dioxide. Reasonable care should be taken to prevent overspray on crops. Also, since the product is black, reasonable care should be taken to prevent spraying on buildings, fences, and other areas where dark stains are undesirable.
- Traffic should be kept off the treated surfaces until the product has penetrated and the surface is no longer tacky. There should be no pickup of the treated materials on shoes or tires.
- If puddles develop in low spots, clean sand or soil should be applied to blot them.
- Water containing surfactant or emulsifier should be used only for dilution of the emulsion and pre-wet water.

**Table 10-1 Application Rates for AEP**

Surface Material	% Passing 0.075 mm (No. 200)	Emulsion L/m <sup>2</sup> (gal/yd <sup>2</sup> )
Loose sand	0 to 10	4.5 to 6.8 (1.0 to 1.5)
Crushed gravel	0 to 10	2.3 to 3.2 (0.5 to 0.7)
Sandy gravel	10 to 20	2.7 to 5.4 (0.6 to 1.2)
Silty gravel	20 to 50	2.3 to 4.5 (0.5 to 1.0)