
Standard Practice for Emulsified Asphalt Content of Full-Depth Reclamation Mixture Design

AASHTO Designation: PP 101-20¹

**Technical Subcommittee: 5b, Bridge and Pavement
Preservation**

Release: Group 1 (April)



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1. SCOPE

- 1.1. This standard practice for mix design evaluation is used to determine the amount and composition of emulsified asphalt and other additives when using full-depth reclamation (FDR) of asphalt mixtures. The mix design is based on strength and other performance properties.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards:*

- [M 85](#), Portland Cement
- [M 216](#), Quicklime and Hydrated Lime for Soil Stabilization
- [MP 45](#), Materials for Full-Depth Reclamation Mixtures with Emulsified Asphalt
- [T 11](#), Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- [T 27](#), Sieve Analysis of Fine and Coarse Aggregates
- [T 89](#), Determining the Liquid Limit of Soils
- [T 90](#), Determining the Plastic Limit and Plasticity Index of Soils
- [T 166](#), Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- [T 176](#), Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- [T 180](#), Moisture–Density Relations of Soil Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
- [T 209](#), Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures
- [T 269](#), Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
- [T 283](#), Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
- [T 312](#), Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
- [T 331](#), Bulk Specific Gravity (G_{mb}) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method

2.2. *ASTM Standards:*

- [D3549/D3549M](#), Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens

- [D6857](#), Standard Test Method for Maximum Specific Gravity and Density of Asphalt Mixtures Using Automatic Vacuum Sealing Method

2.3. *Other References:*

- LTPP Seasonal Asphalt Concrete Pavement Temperature Models, LTPPBind 3.0/3.1
- *Basic Asphalt Recycling Manual*, Asphalt Recycling and Reclaiming Association and FHWA-HIF-14-001, Annapolis, MD.

3. TERMINOLOGY

- 3.1. *full-depth reclamation (FDR)*—on-site rehabilitation technique in which the full thickness of the asphalt pavement and a predetermined portion of the underlying materials (base, subbase, subgrade, or some combination of the three) is uniformly pulverized and blended with a stabilizing agent, with or without a combination of additives, generating and reusing 100 percent of the reclaimed material, with the resulting pavement serving as a base layer overlaid with a wearing surface.
- Note 1**—Typical stabilizing agents for FDR include emulsified asphalt, foamed asphalt, Portland cement, and lime. Typical additives include lime, Portland cement and aggregate.
- 3.2. *Type 1 FDR*—mixtures containing less than 8 percent passing No. 200 (0.075-mm) sieve of the combined material.
- 3.3. *Type 2 FDR*—mixtures containing greater than or equal to 8 percent passing No. 200 (0.075-mm) sieve of the combined material.
- 3.4. *reclaimed asphalt pavement (RAP)*—removed, processed, or removed and processed pavement materials containing asphalt binder and aggregate.

4. SIGNIFICANCE AND USE

- 4.1. The procedure described in this standard practice is used to produce FDR that satisfies mix design requirements.
- 4.2. Specifying an emulsified asphalt alone for FDR may not be satisfactory in producing a good-performing mixture. This method has successfully been vetted and is the baseline design procedure employed on numerous projects.

5. OBTAINING AND PREPARING MATERIALS

- 5.1. *Sampling Existing Pavement for FDR:*
- 5.1.1. Obtain samples by coring, test pits, or milling. Obtain existing asphalt pavement, and underlying materials to the planned recycling depth, from the areas to be recycled. The material provided must be representative of the material to be recycled.
- Where visual differences in the pavement surface are noted or where construction or maintenance records indicate differences, obtain additional materials to evaluate the difference. If these additional materials show significant visual differences, perform a separate mix design or verify the mix properties from additional samples.
- Note 2**—Obtain samples using a pattern that results in a representative sample of the pavement to be recycled including at or near lane lines, within and between wheel paths, at the pavement edge, and within shoulders if shoulders are to be recycled.