



Designation: **D5505 – 06 D5505 – 14**

## Standard Practice for Classifying Emulsified Recycling Agents<sup>1</sup>

This standard is issued under the fixed designation D5505; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice identifies emulsified petroleum products that may be used as recycling agents in recycled mixes. These materials are classified by viscosity or by low temperature penetration after aging.

1.2 This practice addresses emulsified materials designed specifically for use in recycling. The use of emulsified materials for recycling shall not be limited to this practice. For instance, the emulsified asphalts specified in Specifications [D977](#) and [D2397](#) may be used.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.3 This practice addresses emulsified materials designed specifically for use in recycling. The use of emulsified materials for recycling shall not be limited to this practice. For instance, the emulsions specified in Specifications [D977](#) and [D2397](#) may be used.

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D5](#) Test Method for Penetration of Bituminous Materials

[D70](#) Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)

[D140](#) Practice for Sampling Bituminous Materials

[D244](#) Test Methods and Practices for Emulsified Asphalts

[D977](#) Specification for Emulsified Asphalt

[D1754](#) Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)

[D2007](#) Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method

[D2042](#) Test Method for Solubility of Asphalt Materials in Trichloroethylene

[D2170](#) Test Method for Kinematic Viscosity of Asphalts (Bitumens)

[D2397](#) Specification for Cationic Emulsified Asphalt

[D2872](#) Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)

[D4124](#) Test Method for Separation of Asphalt into Four Fractions

[D6930](#) Test Method for Settlement and Storage Stability of Emulsified Asphalts

[D6933](#) Test Method for Oversized Particles in Emulsified Asphalts (Sieve Test)

[D6937](#) Test Method for Determining Density of Emulsified Asphalt

[D6997](#) Test Method for Distillation of Emulsified Asphalt

[D7402](#) Practice for Identifying Cationic Emulsified Asphalts

[D7496](#) Test Method for Viscosity of Emulsified Asphalt by Saybolt Furol Viscometer

[D7553](#) Test Method for Solubility of Asphalt Materials in N-Propyl Bromide

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee [D04](#) on Road and Paving Materials and is the direct responsibility of Subcommittee [D04.41](#) on Emulsified Asphalt Specifications.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](#), or contact ASTM Customer Service at [service@astm.org](#). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### 3. Significance and Use

3.1 Recycling of deteriorated asphalt pavements is being used as a routine method of maintenance and rehabilitation. Utilization of existing materials as the major component of this procedure may yield benefits in quality, economy, and preservation of natural resources. Recycling takes many forms; hot, cold, in-situ, central plant and surface. This practice may be used for various recycling methods.

3.2 This practice describes emulsified recycling (ER) agents as belonging to three groups; ER-1, ER-2, and ER-3 as shown in [Table 1](#). The range of recycling methods demands several emulsified recycling agents. The groups should provide adequate freedom of selection for most recycling methods.

3.2.1 ER-1 is a material whose main function is to rejuvenate aged asphalt. The material is a petroleum derivative, and highly compatible with asphalts. It is classified by viscosity.

3.2.2 ER-2 and ER-3 are materials that combine rejuvenators and asphalt components in one emulsified asphalt. These soft residues are classified by low temperature penetration after aging. They are typically used in recycling where there is an increased demand for asphalt as when new aggregates are added, or where immediate cohesiveness is desired.

**TABLE 1 Specifications for Emulsified Recycling Agents**

Tests	Test Method	ER-1		ER-2		ER-3	
		min	max	min	max	min	max
On emulsion							
Viscosity, 50°C, SFS	<a href="#">D244</a>		100	20	450	20	450
Sieve, %	<a href="#">D6933</a>		0.1		0.1		0.1
Storage stability, 24 h, %	<a href="#">D6930</a>		1.5		1.5		1.5
Residue, by distillation, %	<a href="#">D6997</a>	65		65		65	
Dilution			report <sup>A</sup>				
Specific gravity	<a href="#">D70</a>		report		report		report
Compatibility <sup>B</sup>	varies		report		report		report
On residue from distillation							
Kinematic Viscosity, 60°C, mm <sup>2</sup> /s	<a href="#">D2170</a>	50	200				
Saturates, %	<a href="#">D2007</a>		30		30		30
Solubility in Tri-chloroethylene	<a href="#">D2042</a>	97.5		97.5		97.5	
On residue from distillation after RTFO <sup>C</sup>							
Penetration, 4°C, 50 g, 5 s	<a href="#">D5</a>			75	200	5	75
RTFO, weight change, %	<a href="#">D2872</a>		4		4		4

**TABLE 1 Specifications for Emulsified Recycling Agents**

Tests	Test Method	ER-1		ER-2		ER-3	
		min	max	min	max	min	max
Viscosity, 50°C, SFS	<a href="#">D7496</a>		100	20	450	20	450
Sieve, %	<a href="#">D6933</a>		0.1		0.1		0.1
Storage stability, 24 h, %	<a href="#">D6930</a>		1.5		1.5		1.5
Residue, by distillation, %	<a href="#">D6997</a>	65		65		65	
Dilution			report <sup>A</sup>				
Specific gravity	<a href="#">D6937</a>		report		report		report
Compatibility <sup>B</sup>	<a href="#">D7402</a>		report		report		report
Tests on residue from distillation							
Kinematic Viscosity, 60°C, mm <sup>2</sup> /s	<a href="#">D2170</a>	50	200				
Saturates, %	<a href="#">D4124</a>		30		30		30
Solubility, %	<a href="#">D2042</a> or <a href="#">D7553</a>	97.5		97.5		97.5	
Tests on residue from distillation and RTFO <sup>C</sup>							
Penetration, 4°C, 50 g, 5 s	<a href="#">D5</a>			75	200	5	75
RTFO, mass change, %	<a href="#">D2872</a>		4		4		4

<sup>A</sup> ER-1 shall be certified for dilution with potable water.

<sup>B</sup> This specification allows a variety of emulsions, including high float and cationic emulsions, emulsified asphalts. The engineer should take the steps necessary to keep incompatible materials from co-mingling in tanks or other vessels. It would be prudent to have the chemical nature (float test for high float emulsions, particle charge test for cationic emulsions, or other tests as necessary) charge nature certified by the supplier.

<sup>C</sup> RTFO shall be the standard referee method. When approved by the engineer, the Thin Film Oven Test (Test Method [D1754](#)) may be substituted for compliance testing.