

902-R-674 ASPHALT EMULSIONS

(Revised 09-20-18)

The Standard Specifications are revised as follows:

SECTION 305, BEGIN LINE 139, DELETE AND INSERT AS FOLLOWS:

When the widening is not open to traffic prior to placing an overlay, liquid membrane compounds shall not be used and an alternative curing option shall be used. ~~AE-T~~ Tack coat in accordance with 406 may be used as a curing option.

SECTION 405, BEGIN LINE 9, DELETE AND INSERT AS FOLLOWS:

405.02 Asphalt Materials

The type and grade of asphalt material shall be in accordance with the following:

Asphalt Emulsion, ~~AE-PMP~~ AE-PL.....902.01(b)

SECTION 405, BEGIN LINE 37, DELETE AND INSERT AS FOLLOWS:

405.07 Application of Asphalt Material

~~AE-PMP~~ AE-PL shall be uniformly applied at the rate of 0.50 to 0.75 gal./sg yd placed in a single application. When placing material on a rubblized base, a carpet drag shall be utilized behind the distributor.

SECTION 411, BEGIN LINE 12, DELETE AND INSERT AS FOLLOWS:

411.02 Materials

Materials shall be in accordance with the following:

Asphalt Emulsion.....~~As Defined~~* 902.01(b)1
 Coarse Aggregates – Class B or Higher **904
 Fine Aggregates ***904
 Portland Cement, Type I.....901.01(b)
 Water.....913.01

* ~~Polymer Modified Asphalt Emulsion shall be a quick set, CSS 1h emulsion in accordance with AASHTO M 208 except the cement mixing test is waived. The polymer material shall be milled or blended into the asphalt or blended into the emulsifier solution prior to the emulsification process. The minimum polymer solids content will be 3.0% based on the residual of the emulsion. Mix set additives shall be added as required to provide control of the quick set properties. Additional requirements shall be in accordance with the following:~~

Characteristics	Test Method	Requirement
Residue by Distillation, % (see Note 1)	AASHTO T 59	62+
Softening Point, °F (°C)	AASHTO T 53	140+ (60+)
Viscosity @140°F (60°C)	AASHTO T 202	8000+
Elastic Recovery @ 77°F (25°C), %	AASHTO T 301	60
Note 1: The distillation temperature for this test shall be 350°F (175°C)		

SECTION 414, BEGIN LINE 16, DELETE AND INSERT AS FOLLOWS:

414.02 Materials

Materials shall be in accordance with the following:

Asphalt Emulsion	414.02(a)902.01(b)2
Asphalt Materials	
PG Binder, PG 64-22, PG 76-22	902.01(a)
PG Binder Grade	414.02(b)
Coarse Aggregates, Class A or Higher	904.03 and 414.02(c)
Fine Aggregates	904.02
Mineral Filler	904.02(f)

(a) Asphalt Emulsion Blank

The requirements for asphalt emulsion shall be in accordance with the following:

CHARACTERISTIC		TEST METHOD	MIN.	MAX.
Tests on Emulsion				
Viscosity, Saybolt Furol @ 77°F (25°C), s		AASHTO T 59	20	100
Storage Stability Test, 24 h, % (Note 1)		AASHTO T 59		1
Sieve Test, %		AASHTO T 59		0.05
Residue by Distillation, % (Note 2)		AASHTO T 59	63	
Oil Distillate by Distillation, %		AASHTO T 59		2
Demulsibility, %	w/35 mL, 0.02 N CaCl ₂ or	AASHTO T 59	60	
	w/35 mL, 0.8% DSS	AASHTO T 59		
Tests on Residue from Distillation				
Penetration (0.1 mm) at 25°C, 100g, 5 s		AASHTO T 49	90	150
Elastic Recovery @ 39°F (4°C), %		AASHTO T 301	58	
Notes: 1. After 24 h, the emulsion shall be a homogeneous color				
2. Except maximum temperature of 400 ± 10°F				
3. Organic solvent shall be from the list of Approved Solvents				

SECTION 902, BEGIN LINE 79, DELETE AND INSERT AS FOLLOWS:

(b) Asphalt Emulsions

Asphalt emulsions *shall be supplied by an approved supplier in accordance with ITM 593 and* shall be composed of an intimate homogeneous suspension of a base asphalt, an emulsifying agent, and water. Asphalt emulsions may contain additives to improve handling and performance characteristics. Failure of an emulsion to perform satisfactorily in the field shall be cause for rejection, even though it passes laboratory tests. The grade used shall be in accordance with the table for asphalt emulsions as shown herein. A ~~type A~~ certification for the asphalt emulsion shall be furnished in accordance with ITM 804.

~~AE-90 is a medium breaking, low penetration, high-asphalt content type, intended for hot and cold plant mixing, road mixing, and seal coats or as otherwise specified.~~

~~AE-90S is a rapid setting, anionic type emulsion for seal coat applications.~~

~~AE-150 is a medium breaking, moderately soft penetration type, intended for use in surface treating, tack coats, and coating open and dense graded aggregate, or as otherwise specified.~~

~~AE 150L is a medium breaking, relatively low viscosity type. It may be specified in lieu of AE T or AE 150 when a softer asphalt or greater aggregate penetration is desired. AE 150L is suitable for sand seals.~~

~~AE PL is a medium slow breaking, low viscosity, low asphalt content type, intended for use as a prime or as dust palliative.~~

~~AE T is a medium breaking, comparatively low penetration type, intended for tack coats, seed mulching, or as otherwise specified.~~

~~HFRS 2 is a quick breaking, high viscosity, high float, relatively high asphalt content type, intended for seal coats.~~

~~RS 2 is a quick breaking, high viscosity, relatively high asphalt content type, intended for seal coats.~~

~~AE PMP is a polymerized modified asphalt emulsion intended for use as a prime coat material.~~

~~AE PMT is a polymerized modified asphalt emulsion intended for use as a tack coat material.~~

~~SS 1h is a slow setting, hard penetration type, intended for tack coats and base seal.~~

~~AE F is a medium setting, hard penetration, diluted emulsion intended for fog sealing.~~

~~AE NT is a fast setting, hard penetration type, intended for tack coats and base seal.~~

The requirements for asphalt emulsions ~~shall be in accordance with the following are as follows:~~

RS-2, HFRS-2, and SS-1h shall be in accordance with AASHTO M 140 except the cement-mixing test is waived.

CRS-2P shall be in accordance with AASHTO M 316. The distillation temperature shall be 350°F.

CSS-1h shall be in accordance with AASHTO M 208.

1. Asphalt Emulsion Warranted Micro-Surfacing

The Polymer Modified Asphalt Emulsion shall be a quick-set, CSS-1h emulsion in accordance with AASHTO M 208 except the cement-mixing test is waived. The polymer material shall be milled or blended into the asphalt or blended into the emulsifier solution prior to the emulsification process. The minimum polymer solids content will be 3.0% based on the residual of the emulsion. Mix set additives shall be added as required

to provide control of the quick-set properties. Additional requirements shall be in accordance with the following:

CHARACTERISTICS	TEST METHOD	REQUIREMENT
Residue by Distillation, % (Note 1)	AASHTO T 59	62+
Softening Point, °F (°C)	AASHTO T 53	140+ (60+)
Viscosity @140°F (60°C)	AASHTO T 202	8000+
Elastic Recovery @ 77°F (25°C), %	AASHTO T 301	60
Note 1: The distillation temperature for this test shall be 350°F (175°C).		

2. Asphalt Emulsion Ultrathin Bonded Wearing Course

CHARACTERISTICS		TEST METHOD	MIN.	MAX.
Viscosity, Saybolt Furol @ 77°F (25 °C), s		AASHTO T 59	20	100
Storage Stability Test, 24 h, % (Note 1)		AASHTO T 59		1
Sieve Test, %		AASHTO T 59		0.05
Residue by Distillation, % (Note 2)		AASHTO T 59	63	
Oil Distillate by volume of emulsified asphalt, %		AASHTO T 59		2
Demulsibility, %	w/35 mL, 0.02 N CaCl ₂ or	AASHTO T 59	60	
	w/35 mL, 0.8% DSS	AASHTO T 59		
Tests on Residue from Distillation				
Penetration (0.1 mm) at 77°F (25°C), 100g, 5 s		AASHTO T 49	90	150
Elastic Recovery @ 39 °F (4 °C), %		AASHTO T 301	58	
Notes: 1. After 24 h, the emulsion shall be a homogeneous color. 2. Except maximum temperature of 400 ± 10°F (205 ± 5°C). 3. Organic solvent shall be from the list of Approved Solvents.				

3. Asphalt Emulsion Recycling

CHARACTERISTICS (Note 1)	TEST METHOD	MIN.	MAX.
Viscosity, Saybolt Furol, @ 77°F (25°C), SFS	AASHTO T 59	20	100
Sieve Test, No. 20, retained on sieve, %	AASHTO T 59		0.10
Storage Stability Test, 24 hr, %	AASHTO T 59		1
Residue by Distillation, % (Note 2)	AASHTO T 59	64	
Oil Distillate by volume of emulsified asphalt, %	AASHTO T 59		1
Penetration, 77°F (25°C), 100 g, 5 s, dmm	AASHTO T 49	50	200
Note 1: The asphalt emulsion shall be selected for the project by the asphalt emulsion supplier based on the Contractor's mixture design. The penetration of the supplied asphalt emulsion shall be within ± 25 dmm of the penetration of the design asphalt emulsion. The asphalt emulsion shall be received on the job site at a temperature no greater than 120°F (50°C).			
Note 2: Modified AASHTO T 59 – distillation temperature of 350 ± 9°F (175 ± 5°C) with a 20 minute hold.			

Characteristic ^{(1) (2)}	AASHTO Test Method	RS- 2	HFS- 2	AE- 90	AE- 90S	AE- T	AE- NT	AE- F	SS- 4h	AE- 150	AE- 150L	AE- PL	AE- PMT⁽⁶⁾	AE- PMP⁽⁶⁾
Test on Emulsion														
Viscosity, Saybolt Furol at 77°F (25°C), min.	T 59			50			15		20	50				20+
Viscosity, Saybolt Furol at 77°F (25°C), max.	T 59					400	100	100	100		100	115	100	
Viscosity, Saybolt Furol at 120°F (50°C), min.	T 59	75	75	50	50					75				
Viscosity, Saybolt Furol at 120°F (50°C), max.	T 59	400	400							300				
Demulsibility w/35 mL, 0.02N CaCl ₂ , % min.	T 59	50	50		30									
Demulsibility w/50 mL, 0.10N CaCl ₂ , % min.	T 59			75		75							25+	25+
Oil Distillate by volume of emulsified asphalt, % ^(3,2)	T 59	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	7.0	7.0	3.0	3.0	3.0
Residue by Distillation, % min.	T 59	65	65	65	65 ⁽⁵⁾	54	50	27	57	65	60	30		
Residue by Distillation, % max.	T 59					62		35			65			
Sieve Test, % max.	T 59	0.10	0.10	0.10	0.10	0.10	0.30	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Penetrating Ability, mm, min.	902.02(w)											6		
Stone Coating Test, %	902.02(t)3a			90						90	90			
Settlement, % max.	T 59	5	5	5			5							
Storage Stability, % max.	T 59				1									
Asphalt Content by Distillation at 204°C, % min.													54	45
Asphalt Content by Distillation at 204°C, % max.													62	
Tests on Residue														
Penetration (0.1 mm) at 77°F (25°C), 100g, 5 s, min. ^(4,3)	T 49	100	100	100	90	50							50	300+
Penetration (0.1 mm) at 77°F (25°C), 100g, 5 s, max. ^(4,3)	T 49	200	200	200	150	200	40	90	90				200	
Penetration (0.1 mm) at 77°F (25°C), 50g, 5 s, min. ^(4,3)	T 49									100	100			
Penetration (0.1 mm) at 77°F (25°C), 50g, 5 s, max. ^(4,3)	T 49									300	300			
Ductility at 25°C, mm, min.	T 51	400	400	400		400			400					
Solubility in Org. Sol., % min.	T 44T 111	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Ash Content, % max.														
Float Test at 140°F (60°C), s, min. ^(4,3)	T 50		1200	1200	1200	1200				1200	1200			
Force Ratio	T 300				0.3									
Elastic Recovery, at 39°F (4°C)	T 301				58									
Polymer Content by Infrared													1.5+	1.5+
Notes: ⁽¹⁾ Broken samples or samples more than 104 days old will not be tested. ⁽²⁾ Combined percentage of the residue and oil distillate by distillation shall be at least 70% (note the different units — ml for oil and % for residue). ^(3,2) Oil distillate shall be in accordance with ASTM D 396, table 1, grade no. 1. ^(4,3) The Engineer may waive the test. ^(5,4) Maximum temperature to be held for 15 minutes at 200 350 ± 9°F (175 ± 5°C). ⁽⁶⁾ Asphalt shall be polymerized prior to emulsification.														

SECTION 902, BEGIN LINE 252, DELETE AND INSERT AS FOLLOWS:

(t) Testing Asphalt EmulsionsAASHTO T 59

The following exceptions to T 59 shall apply:

1. For the Residue by Distillation test, the specified aluminum alloy still shall be the referee still.
 2. When tests on the residue are not required, the % of residue for emulsion grades RS-2, ~~AE-60~~, and AE-90, ~~and AE-T~~ only, may be determined by the Residue by Evaporation test of AASHTO T 59. The % of residue shall be determined by the Residue of Distillation test in all cases of failure or dispute.
 3. The stone coating test shall be performed as follows on a mixture of 465 ± 1 g of reference stone and 35.0 ± 0.1 g of asphalt emulsion:
 - a. For AE-90 the mixture of stone and asphalt shall be mixed vigorously for 5 minutes. At the end of the mixing period, the mix shall be rinsed by running sufficient tap water at the side of the container to completely immerse the mix. The tap water shall then be poured off and the rinsing step repeated as necessary until the rinse water pours off essentially clear. The stone shall remain a minimum of 90% coated.
 - b. For AE-150 ~~and AE-150L~~, the mixture of stone and asphalt shall be mixed vigorously for 5 minutes and then allowed to stand for 3 h. At the end of this time, the mixture shall again be mixed vigorously for 5 minutes. At the end of the mixing period, the mix shall be rinsed by running sufficient tap water at the side of the container to completely immerse the mix. The tap water shall then be poured off and the rinsing step repeated as necessary until the rinse water pours off essentially clear. The stone shall remain a minimum of 90% coated ~~for AE-150 and AE-150L~~.
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