

State: Pennsylvania	Materials: Re: Pub. 408, Section 702 - Asphalt Materials
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Pennsylvania		Table 1: Requirements for Anionic Emulsified Asphalts					
Property	Test Method AASHTO (T), ASTM (D), or Other	Rapid-Setting		Medium-Setting	Slow-Setting		
		RS-1	RS-2	MS-2	SS-1	SS-1h	
EMULSIONS:							
Viscosity, Saybolt Furol seconds	25 °C (77° F)	T 59	20-100	-	100 min.	20-100	20-100
	50 °C (122° F)		-	150-400	-	-	-
Settlement, 5 days, %	-		-	-	-	-	
Storage Stability Test, 24 hours, % (1)	1.0 max.		1.0 max.	1.0 max.	1.0 max.	1.0 max.	
Sieve Test, % (1)	0.10 max. (2)		0.10 max. (2)	0.10 max. (2)	0.10 max. (2)	0.10 max. (2)	
Particle Charge	-		-	Negative	Negative	Negative	
Demulsibility, % (3)	60 min.		60 min.	-	-	-	
Cement Mixing Test, %	-		-	-	2.0 max	2.0 max.	
Coating Ability and Water Resistance (4)	Dry Aggregate		-	-	Good	-	-
	After Spraying		-	-	-	-	-
	Wet Aggregate		-	-	Fair	-	-
	After Spraying		-	-	-	-	-
Residue, %	55 min.		63 min.	65 min.	57 min.	57 min.	
Oil Distillate, volume of emulsion, %	-		-	-	-	-	
DISTILLATION RESIDUE:							
Penetration, 25 °C (77 °F), tenths of mm	T 49	100-200	100-200	100-200	100-200	40-90	
Ductility, 25 °C (77 °F), cm	T 51	40 min.	40 min.	40 min.	40 min.	40 min.	
Solubility in trichloroethylene, %	T 44	97.5 min.	97.5 min.	97.5 min.	97.5 min.	97.5 min.	
NOTES:	<ol style="list-style-type: none"> 1. This test requirement on representative samples is waived if successful application of the material has been achieved in the field. 2. Requirement is 0.30 max for samples taken at the point of use. 3. Use 35 mL of 0.02 N CaCl₂ solution. 4. See Appendix A, Section 2.0 for coating test procedures. 						



Table 2: Requirements for Cationic Emulsified Asphalts

Property	Test Method AASHTO (T), ASTM (D), or Other	Rapid-Setting		Medium-Setting		Slow-Setting		
		CRS-1	CRS-2	CMS-2	CMS-2s	CSS-1	CSS-1h	
EMULSIONS:								
Viscosity, Saybolt Furol seconds	25 °C (77 °F)	-	-	-	-	20-100	20-100	
	50 °C (122 °F)	20-100	150-400	50-450	50-1500	-	-	
Settlement, 5 days, %	T 59	-	-	-	-	-	-	
Storage Stability Test, 24 hours, % (1)		1.0 max.	1.0 max.	1.0 max.	1.0 max.	1.0 max.	1.0 max.	
Sieve Test, % (1)		0.10 max.	0.10 max.	0.10 max.	-	0.10 max.	0.10 max.	
Particle Charge		Positive	Positive	Positive	Positive	Positive	Positive	
Demulsibility, % (2)		40 min.	-	-	-	-	-	
Cement Mixing Test, %		-	-	-	-	2.0 max.	2.0 max.	
Coating Ability and Water Resistance (3)		Dry Aggregate	-	-	Good	Good	-	-
		After Spraying	-	-	-	-	-	-
		Wet Aggregate	-	-	Fair	Fair	-	-
		After Spraying	-	-	-	-	-	-
Residue, %	60 min.	65 min.	65 min.	62 min.	57 min.	57 min.		
Oil Distillate, volume of emulsion, %		3 max.	12 max.	2-8	-	-		
pH	-	-	-	-	-	-		
DISTILLATION RESIDUE:								
Penetration, 25 °C (77 °F), tenths of mm	T 49	100-250	100-250	100-250	200 min.	100-250	40-90	
Ductility, 25 °C (77 °F), cm	T 51	40 min.	40 min.	40 min.	-	40 min.	40 min.	
Solubility in trichloroethylene, %	T 44	97.5 min.	97.5 min.	97.5 min.	97.5 min.	97.5 min.	97.5 min.	
NOTES:	<ol style="list-style-type: none"> 1. This test requirement on representative samples is waived if successful application of the material has been achieved in the field. 2. Use 35 ml of 0.8% sodium dioctyl sulfosuccinate solution. 3. See Appendix A, Section 2.0 for coating test procedures. 							



Pennsylvania		Table 3: Requirements for Polymer Modified Asphalt Emulsions (1)							
Property		Test Method AASHTO (T), ASTM (D), or Other	Anionic		Cationic				
			RS-2P (E-2M)	SS-1hP	CRS-1P	CRS-2P (E-3M)	CSS-1hP (E-8CPM)	CQS-1hP	UTFCEM
EMULSIONS:									
Viscosity, Saybolt Furol Seconds, range	25 °C (77 °F)	T 59	-	20-100	-	-	20-100	20-100	20-100
	50 °C (122 °F)		150-400		20-200	150-400	-		-
Settlement, 5 days, %			-		-	-	-		-
Storage Stability Test, 24 hours, %			1.0 max. (2)	1.0 max.		1.0 max. (2)	1.0 max. (2)	1.0 max. (2)	1.0 max. (2)
Sieve Test, %			0.30 max. (2)	0.10 max. (2)	0.10 max.	0.30 max. (2)	0.10 max.	0.10 max. (2)	0.10 max. (2)
Particle Charge Test			Negative		Positive	Positive	Positive	Positive	Positive
Demulsibility, %			-		-	-	-		55 min.
Cement Mixing Test, %				2.0 max.			2.0 max.		
Breaking Index	20 °C (68 °F)	-	-		80 max.	-	-	-	
Residue by Distillation, %		T 59	63 min. (3)	57 min.	65 min. (4)	65 min. (3)	57 min. (5)	62 min. (5)	63 min. (5)
Oil Distillate, volume of emulsion, %			-		5 max.	3 max.	-		-
DISTILLATION RESIDUE:									
Penetration, 25 °C (77 °F), tenths of mm		T 49	100-200	40-90	100-250	100-250	40-90	40-90	60-150
Ductility, 5 cm/minute, cm	4 °C (39.2 °F)	T 51	30 min.		-	30 min.	-		-
	25 °C (77 °F)		-		-	-	-		-
Elastic Recovery, %	4 °C (39.2 °F)	T 301	-		60 min.	-	-		-
	10 °C (50 °F)		50 min.	25 min.	-	50 min.	25 min.	50 min.	58 min.
Solubility in trichloroethylene, %		T 44	-		-	-			97.5 min.
Softening Point, °C		T 53	38 min.		-	38 min.		135 min.	-
Absolute Viscosity, 60 °C (140 °F), Poises		T 202	-		-	-			-
Ash Content, %		T 111	1 max.	1 max.	-	1 max.	1 max.	1 max.	1 max. (6)
NOTES:		<ol style="list-style-type: none"> The asphalt shall be polymer modified <u>prior</u> to emulsification. All modifiers shall be incorporated, before the milling process, at the producer's manufacturing facility. This test requirement on representative samples is waived if successful application of the material has been achieved in the field. AASHTO T 59 modified to maintain a 177 ± 5.5 °C (350 ± 10 °F) maximum temperature for 15 minutes. At 204 °C (400 °F). 							

5. AASHTO T 59 modified to maintain a 176.5 ± 5.5 °C (350 ± 10 °F) maximum temperature for 15 minutes. Use an ASTM 16C thermometer to monitor the temperature of the emulsion. For UTFCEM, distillation on field samples shall show no more than trace amounts of oil.
6. AASHTO T 111 may be substituted for the solubility test.

Pennsylvania		Table 4: Requirements for High Float Emulsified Asphalt						
Property	Test Method AASHTO (T), ASTM (D), or Other	E-10	HFRS-2	HFRS-2PM	HFMS-2	HFMS-2s	HFMS-2h	
EMULSIONS:								
Viscosity, Saybolt Furool seconds	25 °C (77 °F)	T 59	-			100 min.	50 min.	100 min.
	50 °C (122 °F)		50-1500	75-400	75-400	-	-	-
Storage Stability Test, 24 hours, % (1)			1.0 max.	1.0 max.	1.0 max.	1.0 max.	1.0 max.	1.0 max.
Sieve Test, % (1)			-	0.10 max.	0.10 max.	0.10 max. (2)	0.10 max. (2)	0.10 max. (2)
Coating Ability and Water Resistance On Proposed Aggregate (3)	Dry Aggregate		Good			Good	Good	Good
	After Spraying		-			-	-	-
	Wet Aggregate		Fair			Fair	Fair	Fair
	After Spraying		-			-	-	-
Demulsibility, %				50 min.	50 min.			
Residue, %			65 min.			65 min.	65 min.	65 min.
Oil Distillate, volume of emulsion, %		2-7			-	1-7	-	
DISTILLATION RESIDUE:								
Penetration, 25 °C (77 °F), tenths of mm		T 49	-	100-250	100-200	100-200	200 min.	40-90
Ductility, 25 °C (77 °F), cm		T 51	-	40 min.		40 min.	40 min.	40 min.
Elastic Recovery, 25 °C (77 °F) %		T 301	-		60 min.	-	-	-
Solubility in trichloroethylene, %		T 44	97.5 min.			97.5 min.	97.5 min.	97.5 min.
Ash Test, %		T 111		1 max.	1 max.			
Float Test at 60 °C (140 °F), seconds		T 50	1200 min.	1200 min.	1200 min.	1200 min.	1200 min.	1200 min.
NOTES:								
								<ol style="list-style-type: none"> 1. This test requirement on representative samples is waived if successful application of the material has been achieved in the field. 2. Requirement is 0.30 max for samples taken at the point of use. 3. See Appendix A, Section 2.0 for coating test procedures.

Pennsylvania		Table 5: Requirements for Emulsified Asphalt Tack Coat						
Property	Test Method AASHTO (T), ASTM (D), or Other	Anionic	Cationic	Anionic	Cationic	Anionic	Cationic	
		AE-T	AE-T	Tack	Tack	NTT	CNTT	
EMULSIONS:								
Viscosity, Saybolt Furool seconds	25 °C (77° F)	T 59	100 max.	100 max.	20-100		100 max.	100 max.
	50 °C (122° F)		-					-
Settlement, 5 days, %	-		-					-
Storage Stability Test, 24 hours, %	1.0 max.		1.0 max.	1.0 max. (2)				
Sieve Test, %	0.10 max.		0.10 max.	0.10 max. (3)				
Sieve Test, %				0.30 max. (2) (3)				
Particle Charge	Negative		Positive	Negative	Positive	Negative	Positive	Positive
Demulsibility, %	-		-					-
Cement Mixing Test, %	-		-					-
Coating Ability and Water Resistance	Dry Aggregate		-					-
	After Spraying		-					-
	Wet Aggregate		-					-
	After Spraying		-					-
Residue, %			28-38	28-38	57 min.	57 min.	50 min.	50 min.
Oil Distillate, volume of emulsion, %		2 max. (1)	2 max. (1)	2 max. (1)	2 max. (1)	2 max. (1)	2 max. (1)	
DISTILLATION RESIDUE:								
Penetration, 25 °C (77 °F), tenths of mm	T 49	50-175	50-175	40-90	40-90	10-60	10-60	
Softening Point, °C	T 53					45 min.	45 min.	
Ductility, 25 °C (77 °F), cm	T 51	40 min.	40 min.	40 min.	40 min.			
Solubility in trichloroethylene, %	T 44	97.5 min.	97.5 min.	97.5 min.	97.5 min.			
NOTES:	<ol style="list-style-type: none"> The presence of oil distillate is only permissible in field obtained samples. This test requirement is for samples taken at the point of use. This test requirement on representative samples is waived if successful application of the material has been achieved. 							

Table 6: Requirements for Bituminous Prime Coats and Dust Palliatives

Property		Test Method AASHTO (T), ASTM (D), or Other	AE-P	E-1 Prime	EDP	
EMULSIONS:						
Viscosity, Saybolt Furol seconds	25 °C (77° F)	T 59	75 max.	30 max.	40 max.	
	50 °C (122° F)		-	-	-	
Settlement, 5 days, %			-	-	-	
Storage Stability Test, 24 hours, %			-	1.0 max.	-	
Sieve Test, %			0.10 max.	0.10 max.	0.10 max.	
Particle Charge			-	-	-	
Demulsibility, %			-	-	-	
Cement Mixing Test, %			-	-	-	
Sand Penetration Test			Appendix B	Pass	-	-
Cure Test				Pass	Pass	Pass
Residue, %		T 59	38 min.	38-48 (1)	(2)	
Oil Distillate, volume of emulsion, % (1)			4 max. (1)	8 max. (1)	3 max. (1)	
DISTILLATION RESIDUE:						
Penetration, 25 °C (77 °F), tenths of mm		T 49	-	200 min.	-	
Ductility, 4 °C (39.2 °F), cm		T 51	-	50 min.	-	
Solubility in trichloroethylene, %		T 44	-	-	-	
NOTES:	<p>1. AASHTO T 59-22 (Residue and oil distillate by Distillation) Sections 11-15 with the following modifications:</p> <p><i>Section 13.1:</i> Two (2) ring burners with the dimensions described therein.</p> <p><i>Section 13.4:</i> The 279 mm (11-inch) total immersion thermometer that monitors the temperature of the emulsion, shall be an ASTM 8C.</p> <p><i>Section 14.4:</i> Place one of the ring burners around the still, about 76 mm (3 inches) from the bottom of the still. Place the second ring burner around the still, about 25 mm (1 inch) from the top of the still. Apply heat by lighting both ring burners and adjusting to a low flame. Also apply just enough heat from a Bunsen burner to the connecting tube to prevent condensation in this tube.</p> <p><i>Section 14.5:</i> Move the bottom ring burner approximately level with the bottom of the still when the temperature on the lower thermometer reaches 327 °C (620 °F), while leaving the top burner in its original position. Increase the temperature to 349 ± 5 °C (660 ± 9 °F), maintaining this temperature for 15 minutes. The total distillation should be completed in 60 ± 15 minutes from the first application of heat.</p> <p><i>Section 14.6:</i> When completed with the distillation, leave the still sit for about 10 minutes, or until vapors are no longer present. Weigh the still and accessories as described in Section 14.1. Calculate and report the percentage residue by distillation. Record the volume of oil distillate to the nearest 0.5 ml. Calculate and report the oil distillate as a volume percentage of the total emulsion. Save this oil distillation, if identification is required.</p> <p>2. For use as a dust palliative: 20-40 %. For use as a prime coat: 40-50 %.</p>					

