

*Emulsion Task Force (ETF)*  
**Updating AASHTO's Emulsion  
Specifications**

2014 RMWPPP Meeting  
October 8, 2014

# Introduction

- ETF created a special working group (SWG) to provide overall coordination and quality assurance of products delivered.
- SWG Members:
  - Brian Cox, Flint Hills Resources
  - Bob Jerman, MeadWestVaco
  - Arlis Kadrmas, BASF
  - Gayle King, GHK
  - Chris Lubbers, Kraton
  - Mike Voth, Federal Lands-FHWA



# AASHTO Specs Needing Update

- *Current* AASHTO Emulsified Asphalt Specifications-
  - AASHTO M 140 Emulsified Asphalt
  - AASHTO M 208 Cationic Emulsified Asphalt
  - AASHTO M 316 Polymer-Modified Cationic Asphalt



# Concerns & Issues

- The three specifications (M 140, M 208, M 316) are not consistent
- Some test methods in the specs were either duplicative, not commonly used, and/or no longer relevant
- Desire to make the 3 specifications compatible with the new chip seal and micro surfacing specifications

# Concerns & Issues

- Desire to match current state of practice
- Desire to provide more uniformity
- “one size fits all” specification (provide more grade options)

The effort is a **stopgap** measure to provide coverage until a performance grading system for emulsified asphalt is developed and adopted.

# Proposed Changes – M 140

**Table 1**—Requirements for Emulsified Asphalt<sup>a</sup>

Type Grade	Rapid-Setting													
	RS-1h		RS-1		RS-1s		RS-2h		RS-2		RS-2s		HFRS-2	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Test on emulsified asphalt:														
Viscosity, Saybolt Furol at 25°C (77°F), s <sup>b</sup>	20	100	20	100	20	100								
Viscosity, Saybolt Furol at 50°C (122°F), s <sup>b</sup>							75	400	75	400	75	400	75	400
Storage stability test, 24 h, % <sup>b,c</sup>		1		1		1		1		1		1		1
Demulsibility, 35 mL, 0.02 N CaCl <sub>2</sub> , % <sup>b</sup>	60		60		60		60		60		60		50	
Sieve test, % <sup>b,c</sup>		0.10		0.10		0.10		0.10		0.10		0.10		0.10
Distillation:														
Residue, %	55		55		55		65		65		65		65	
Tests on residue from distillation:														
Penetration, 25°C (77°F), 100 g, 5 s, dmm	<b>40</b>	<b>90</b>	<b>90</b>	<b>150</b>	<b>150</b>	<b>250</b>	<b>40</b>	<b>90</b>	<b>90</b>	<b>150</b>	<b>150</b>	<b>250</b>	100	250
Ductility, 25°C (77°F), 5 cm/min, cm	40		40		40		40		40		40		40	
Ash content, %		1		1		1		1		1		1		1
Float test, 60°C (140°F) s														1200

<sup>a</sup> Refer to R 5 for typical applications.

<sup>b</sup> This test requirement and associated specification limit is waived for emulsified asphalt products following dilution.

<sup>c</sup> This test requirement on representative samples may be waived if successful application of the material has been achieved in the field.



Death Valley N.P.

# Climate Differences



Bryce Canyon N.P.

# Proposed Changes – M 140

- M 140 was re-written as a “category A” standard.
- It is written to be consistent and logical with M 208 & M 316.
- Targets and ranges for viscosity, percent residue, and penetration were updated to match current state of practice.



# Proposed Changes – M 208

**Table 1**—Requirements for Cationic Emulsified Asphalt<sup>a</sup>

Type Grade	Rapid-Setting											
	CRS-1h		CRS-1		CRS-1s		CRS-2h		CRS-2		CRS-2s	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Test on emulsified asphalt:												
Viscosity, Saybolt Furol at 50°C (122°F), s <sup>b</sup>	20	100	20	100	20	100	100	400	100	400	100	400
Storage stability test, 24 h, % <sup>b,c</sup>		1		1		1		1		1		1
Demulsibility, 35 mL, 0.8 %												
Sodium dioctyl sulfosuccinate, % <sup>b</sup>	40		40		40		40		40		40	
Particle charge test <sup>b</sup>	Positive		Positive		Positive		Positive		Positive		Positive	
Sieve test, % <sup>b,c</sup>		0.10		0.10		0.10		0.10		0.10		0.10
Distillation:												
Oil distillate, by volume of emulsified asphalt, %		3		3		3		3		3		3
Residue, %	60		60		60		65		65		65	
Tests on residue from distillation:												
Penetration, 25°C (77°F), 100 g, 5 s, dmm	<b>40</b>	<b>90</b>	<b>90</b>	<b>150</b>	<b>150</b>	<b>250</b>	<b>40</b>	<b>90</b>	<b>90</b>	<b>150</b>	<b>150</b>	<b>250</b>
Ductility, 25°C (77°F), 5 cm/min, cm	40		40		40		40		40		40	
Ash content, %		1		1		1		1		1		1

<sup>a</sup> Refer to R 5 for typical applications.

<sup>b</sup> This test requirement and associated specification limit is waived for emulsified asphalt products following dilution.

<sup>c</sup> This test requirement on representative samples may be waived if successful application of the material has been achieved in the field.

# Proposed Changes – M 208

- Editorial changes completed to align the specification language with M 140 & M 316.
- Targets and ranges for percent residue and penetration were updated to match state of practice



# Proposed Changes – M 316

**Table 1**—Requirements for Polymer-Modified Emulsified Asphalt Typically Used for Chip Seal Applications<sup>a</sup>

Type Grade	Rapid-Setting											
	CRS-2hP		CRS-2P		CRS-2sP		CHFRS-2P		HFMS-2P		HFRS-2P	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Based on emulsified asphalt:												
Viscosity, Saybolt Furot at 50°C (122°F), s <sup>b</sup>	100	400	100	400	100	400	100	400	100	450	75	400
Storage stability test, 24 h, % <sup>b,c</sup>		1		1		1		1		1		1
Emulsibility:												
35 mL, 0.8% Sodium dioctyl sulfosuccinate, % <sup>b</sup>	40		40		40		40					
35 mL, 0.02 N CaCl <sub>2</sub> , % <sup>b</sup>											50	
50 mL, 0.10 N CaCl <sub>2</sub> , % <sup>b</sup>									40			
Particle charge test	Positive		Positive		Positive		Positive					
Stieve test, % <sup>b,c</sup>	0.10		0.10		0.10		0.10				0.10	0.10
Distillation:												
Dil distillate, by volume of emulsified asphalt, %											3	3
Residue, %	65		65		65		65		65		65	
Tests on residue from distillation:												
Penetration, 25°C (77°F), 100 g, 5 s, dmm	<b>40</b>	<b>90</b>	<b>90</b>	<b>150</b>	<b>150</b>	<b>250</b>	100	175	100	200	100	200
Elastic Recovery, 10°C (50°F), Straight Sided, 5 cm/min, 20 cm elongation, 5 min hold, %	<b>50</b>		<b>60</b>		<b>60</b>		60		60		60	
Float test, 60°C (140°F), s							1800		1200		1200	
Ash content, %		1		1		1		1		1		1

<sup>a</sup> Refer to R 5 for typical applications.

<sup>b</sup> This test requirement and associated specification limit is waived for emulsified asphalt products following dilution.

<sup>c</sup> This test requirement on representative samples may be waived if successful application of the material has been achieved in the field.

# Proposed Changes – M 316

**Table 2**—Requirements for Polymer-Modified Emulsified Asphalt Typically Used for Micro Surfacing<sup>a</sup>

Type Grade	Quick-Setting			
	CQS-1hP		CQS-1P	
	Min	Max	Min	Max
Test on emulsified asphalt:				
Viscosity, Saybolt Furol at 25°C (77°F), s <sup>b</sup>	20	100	20	100
Particle charge test <sup>b</sup>	Positive		Positive	
Sieve test, % <sup>b,c</sup>	0.10		0.10	
Distillation:				
Residue, %	62		62	
Tests on residue from distillation:				
Penetration, 25°C (77°F), 100 g, 5 s, dmm	40	90	90	200
Elastic Recovery, 10°C (50°F), Straight Sided, 5 cm/min, 20 cm elongation, 5 min hold, %	50		60	
Softening point, °F	135		128	
Ash content, %	1		1	



<sup>a</sup> Refer to R 5 for typical applications.

<sup>b</sup> This test requirement and associated specification limit is waived for emulsified asphalt products following dilution.

<sup>c</sup> This test requirement on representative samples may be waived if successful application of the material has been achieved in the field.

# Proposed Changes – M 316

**Table 3**—Requirements for Polymer-Modified Emulsified Asphalt Typically Used for Tack Coat Applications<sup>a</sup>

Type Grade	Rapid-Setting		Slow-Setting			
	CRS-1P <sup>d</sup>		SS-1hP		CSS-1hP	
	Min	Max	Min	Max	Min	Max
Test on emulsified asphalt:						
Viscosity, Saybolt Furol at 25°C (77°F), s <sup>b</sup>	20	100	20	100	20	100
Storage stability test, 24 h, % <sup>b, c</sup>		1		1		1
Particle charge test <sup>b</sup>	Positive		Positive			
Sieve test, % <sup>b, c</sup>		0.10		0.10		0.10
Cement mixing test, % <sup>b</sup>				2.0		2.0
Demulsibility:						
35 mL, 0.8% Sodium dioctyl sulfosuccinate, % <sup>b</sup>	40					
Residue, %	63		57		57	
Tests on residue from distillation:						
Penetration, 25°C (77°F), 100 g, 5 s, dmm	90	150	40	90	40	90
Elastic Recovery, 10°C (50°F), Straight Sided, 5 cm/min, 20 cm elongation, 5 min hold, %	60		25		25	
Ash content, %		1		1		1

<sup>a</sup> Refer to R 5 for typical applications.

<sup>b</sup> This test requirement and associated specification limit is waived for emulsified asphalt products following dilution.

<sup>c</sup> This test requirement on representative samples may be waived if successful application of the material has been achieved in the field.

<sup>d</sup> This grade is for spray paver applications.

# Proposed Changes – M 316

- Title changed to “Polymer-Modified Emulsified Asphalt” (no longer just for cationics)
- The specification grades are neutral to the type of modifier being used
  - The “P” is used to designate all polymer modifiers regardless of type
- Consistent and logical with M 140 & M 208

# Proposed Changes – M 316

- T 51 (ductility), T 300 (force ductility), and T 302 (polymer content by infrared spectrum) were removed
  - Proposed that the presence of polymer be evaluated by T 301 (elastic recovery)
  - T 51 and T 300 are somewhat duplicative with T 301
- A certificate of compliance is required to certify minimum polymer dosages

# Additional Proposed Global Changes

- Solubility in trichloroethylene (TCE), T 44 was removed and replaced with the ash content test, T 144
  - TCE is toxic and restricted in some areas
- Coating test (as found in T 59) was removed
  - It is believed the state of practice has moved beyond this test. When evaluating cold mixes, most agencies use mix designs with performance parameters included.





# Summary

- Fixed errors
- Provided more consistency
- Updated to address state of practice
- Added additional grades (climate, traffic)
- Eliminated unnecessary testing procedures

Just a stopgap...greater things to come

# Thank You.....Questions?

