

**Oregon Department of Transportation  
Standard Specifications For Asphalt Materials  
2006**

**Effective for contracts and purchase orders advertised after January 1, 2006**

**Revisions** – Modified information required on documents to accompany shipments  
Deleted optional pH requirement and settlement test for Cationic Emulsified Asphalt  
Deleted wording under Storage Stability for Polymer-Modified Chip Seal Emulsions  
Referred to AASHTO R-14 for Hot-Mix Recycling Agents specification

**Scope**

**Materials Covered** - These specifications cover asphalt cements, emulsified asphalt, and recycling agents used on highway construction contracts or maintenance purchase orders.

**Temperatures**

**Loading Temperatures** - The temperature of the asphalt cement when loaded into tank cars or trucks for shipment shall not exceed the Flash Point specified for the grade.

**Documentation**

**Shipping Document** – A Bill of Lading shall accompany each shipment and shall include the following information:

- (a) Consignee
- (b) Department contract number or purchase order number
- (c) Date of Shipment
- (d) Type and grade of material
- (e) Car initial or number of truck transport
- (f) Delivery point or destination
- (g) Quantity loaded
- (h) Loading temperature
- (i) Flash Point and Specific Gravity for PG Grades
- (j) Net quantity in Mg (Tons)
- (k) Brand, type and amount (% or p.p.m.) of additive such as anti-stripping additive blended with asphalt.
- (l) Name and location of the asphalt supplier
- (m) Signature of shipper or authorized representative

**Additional Information** - For CMS-2, CMS-2S and HFMS-2 provide the percent of oil distillate added to the emulsion

**Certification of Compliance** – A statement certifying that the product in the shipment complies with applicable Oregon DOT specifications shall be on or accompany the bill of lading. The certification shall be signed by an authorized representative of the asphalt supplier.

### **Acceptance**

**Acceptance** - Asphalt materials will be conditionally accepted for immediate use upon receipt at the point of delivery of a satisfactory certification of compliance and the Materials Safety Data Sheet (MSDS). Final acceptance will be determined by testing at the Department's Central Materials Laboratory of samples obtained at the point of delivery or use on the project site according to the Department's standard procedures for sampling and testing. The Engineer will determine the extent of such additional sampling and testing

## **PERFORMANCE GRADED (PG) BINDER**

**General Requirements:** The asphalt cement furnished under this specification shall be petroleum asphalt prepared by the refining of crude petroleum and, when necessary, by the addition of modifiers designed to provide the asphalt characteristics specified. It shall be homogeneous and free from water, and it shall not have been distilled at a temperature high enough to injure by burning or high enough to produce flecks of carbonaceous matter. It shall meet the requirements of Table 1 of AASHTO M320-05, Standard Specification for Performance Graded Asphalt Binder, at the time of use when tested according to the methods specified.

## CATIONIC EMULSIFIED ASPHALT

**General Requirement:** The cationic emulsified asphalt furnished under this specification shall be an emulsion of asphalt cement, water and emulsifying agent. The emulsified asphalt shall be homogeneous. It shall show no separation of asphalt after thorough mixing within 30 days after delivery. It shall meet the following requirements when tested within 30 days of sampling according to AASHTO Method T 59.

GRADE	RAPID SETTING				MEDIUM SETTING						SLOW SETTING			
	CRS-1 <sup>(2)</sup>		CRS-2 <sup>(2)</sup>		CMS-2S		CMS-2		CMS-2h		CSS-1		CSS-1h	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
<b>TESTS ON EMULSION:</b>														
Saybolt Viscosity @ 25°C (77°F), SFS											20	100	20	100
Saybolt Viscosity @ 50°C (122°F), SFS	20	100	150*	400	100*	450	100*	450	100	450				
Storage Stability, % (1 day)		1		1		1		1		1		1		1
Demulsibility % <sup>(1)</sup>	40		40											
Coating ability & water resistance:					Good		Good		Good					
Coating, dry aggregate					Fair		Fair		Fair					
Coating, after spraying					Fair		Fair		Fair					
Coating, wet aggregate					Fair		Fair		Fair					
Coating, after spraying					Fair		Fair		Fair					
Particle charge test	Positive		Positive		Positive		Positive		Positive		Positive		Positive	
Sieve test, % <sup>(4)</sup>		0.10		0.10		0.10		0.10		0.10		0.10		0.10
Cement mixing test, %									2.0				2.0	
Distillation to 260°C (500°F):														
Oil distillate, % (by volume of emulsion)		3		3		12 <sup>(3)</sup>		8 <sup>(3)</sup>		8 <sup>(3)</sup>		3 <sup>(3)</sup>		3 <sup>(3)</sup>
Residue, % (by weight)	60		65		60		65		65		57		57	
<b>TESTS ON RESIDUE FROM DISTILLATION:</b>														
Penetration @ 25°C (77°F), 100g, 5s, dmm	100 <sup>(2)</sup>	250 <sup>(2)</sup>	100 <sup>(2)</sup>	250 <sup>(2)</sup>	100	250	100	250	40	90	100	250	40	90
Ductility @ 25°C (77°F), cm	40		40		40		40		40		40		40	
Solubility in Trichloroethylene, %	97.5		97.5		97.5		97.5		97.5		97.5		97.5	

\* Modification of AASHTO M 208

<sup>(1)</sup> The demulsibility test shall be performed within 30 days from date of shipment.

<sup>(2)</sup> When CRS-1h or CRS-2h is specified, the penetration range is changed from 100-250 dmm to 40-90 dmm.

<sup>(3)</sup> Required under Oregon Administrative Rules, Chapter 340, Division 232-0120 - Department of Environmental Quality.

<sup>(4)</sup> This test requirement on representative samples is waived, if successful application of the material has been achieved in the field. (per AASHTO M-140)

## ANIONIC EMULSIFIED ASPHALT

**General Requirement:** The anionic emulsified asphalt furnished under this specification shall be an emulsion of asphalt cement, water and emulsifying agent. The emulsified asphalt shall be homogeneous. It shall show no separation of asphalt after thorough mixing within 30 days after delivery. It shall meet the following requirements when tested within 30 days of sampling according to AASHTO Method T 59 as modified.

GRADE	HFRS-2		HFMS-2		HFMS-2S	
	Min	Max	Min	Max	Min	Max
<b>TESTS ON EMULSION:</b>						
Saybolt Viscosity @ 25°C , SFS			100		50	
Saybolt Viscosity @ 50°C , SFS	50*	400				
Sieve Test, %		0.10		0.10		0.10
Storage Stability, % (1 day)		1		1		1
Demulsibility, %	30*					
Distillation to 260°C :						
Oil Distillate, % (by volume of emulsion)		7*		7*	1	7
Residue, % (by weight)	63		65		65	
<b>TESTS ON RESIDUE FROM DISTILLATION:</b>						
Penetration @ 25°C , 100g, 5s, dmm	90*	200	100	300*	200	
Ductility @ 25°C , cm	40		40			
Float Test @ 60°C , seconds	1200		1200		1200	

\* Modification of AASHTO M 140

## POLYMER-MODIFIED ANIONIC EMULSIFIED ASPHALT

**General Requirements:** This specification has been designed to yield a set of distinguishing characteristics for a polymer-modified emulsion. The binder is not a conventional asphalt cement. The asphalt must be polymerized before emulsification. It shall show no separation of asphalt after thorough mixing within 14 days after delivery. It shall meet the following requirements when tested within 14 days of sampling according to AASHTO Method T 59 as modified.

GRADE	HFMS-2SP	
	Min	Max
<b>TESTS ON EMULSION:</b>		
Saybolt Viscosity @ 50°C , SFS	50	
Sieve Test, %		0.10
Storage Stability: The material after setting undisturbed for 24 hours shall show no white, milky separation, but shall be smooth and homogeneous throughout		
Distillation to 204°C : <sup>(1)</sup>		
Oil Distillate, % (by volume of emulsion)		7.0
Residue, % (by weight)	65 <sup>(4)</sup>	
<b>TESTS ON RESIDUE FROM DISTILLATION:</b>		
Penetration @ 25°C , 100g, 5s, dmm	300	
Float Test @ 60°C , sec	1200	
Solubility in Trichloroethylene, %	97.5	
Test on Residue from Rolling Thin Film Oven <sup>(2)</sup> :		
Elastic recovery, % <sup>(3)</sup>	25	

<sup>(1)</sup> AASHTO T 59 with modifications to include a 204° ± 6°C maximum temperature to be held for 15 minutes.

<sup>(2)</sup> AASHTO T 240, Rolling Thin Film Oven Test.

<sup>(3)</sup> ODOT TM 429, Elastic Recovery - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

<sup>(4)</sup> The combined percentage of the residue portion and the oil portion from the residue by distillation test shall be 70.0% minimum.

## POLYMER-MODIFIED EMULSIFIED ASPHALT FOR CHIP SEALS

**General Requirements:** This specification has been designed to yield a set of distinguishing characteristics for a polymer-modified emulsion. It is for use in chip seal projects where early chip retention and resistance to chip loss is an important objective. The binder is not a conventional asphalt cement. The asphalt must be polymerized before shipment. It shall show no separation of asphalt after thorough mixing within 14 days after delivery. It shall meet the following requirements when tested within 14 days of sampling according to AASHTO Method T 59 as modified.

GRADE	HFRS-P1		CRS-2P		HFRS-P2		RS-LTP	
	Min	Max	Min	Max	Min	Max	Min	Max
<b>TESTS ON EMULSION:</b>								
Saybolt Viscosity @ 50°C (122°F), SFS	100		100	400	100		100	
Sieve Test, %		0.10		0.10		0.10		0.10
Storage Stability, % (1 day)		1.0		1.0		1.0		1.0
Demulsibility, %	30		40		40		60	
Distillation:								
Oil distillate, % (by volume of emulsion)		3.0		3.0		2.0		3.0
Residue, % (by weight)	65 <sup>(1)</sup>		65 <sup>(2)</sup>		65 <sup>(1)</sup>		65 <sup>(1)</sup>	
Breaking Index @ 25°C (77°F) <sup>(3)</sup>								80
<b>TESTS ON RESIDUE FROM:</b>	<b>DISTILLATION</b>				<b>DISTILLATION</b>			
Penetration @ 25°C (77°F), 100g, 5s, dmm	90	200	90	200	90	200	150	300
Float Test @ 60°C (140°F), seconds	1200				1200			
Solubility in Trichloroethylene, % <sup>(4)</sup>	97.5		97.5		97.5			
Elastic Recovery, % <sup>(5)</sup> <b>or</b>	30		45		58		45	
Torsional Recovery	18 <sup>(7)</sup>		18 <sup>(6)</sup>		18 <sup>(7)</sup>		18 <sup>(6)</sup>	

<sup>(1)</sup> AASHTO T 59 with modifications to include a 204 ± 5°C (400 ± 10°F) maximum temperature to be held for 15 minutes.

<sup>(2)</sup> AASHTO T 59 with modifications to include 300 grams emulsion and a 177 ± 5°C (350 ± 10°F) maximum temperature to be held for 15 minutes.

<sup>(3)</sup> ODOT TM 431, Breaking Index - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

<sup>(4)</sup> AASHTO T 44, Solubility of Bituminous Materials. May be waived if polymer modification interferes with test accuracy.

<sup>(5)</sup> ODOT TM 429, Elastic Recovery – method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

<sup>(6)</sup> ODOT TM 428 Method A, Torsional Recovery - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

<sup>(7)</sup> ODOT TM 428 Method B, Torsional Recovery - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

## COLD-IN-PLACE RECYCLING AGENTS <sup>(1)</sup>

**General Requirement:** The emulsified asphalt furnished under this specification shall be an emulsion of asphalt cement, water and emulsifying agent. The emulsified asphalt shall be homogeneous. It shall show no separation of asphalt after thorough mixing within 30 days after delivery. It shall meet the following requirements when tested within 30 days of sampling according to AASHTO Method T 59 as modified.

GRADE	CMS-2RA		HFMS-2RA	
	Min	Max	Min	Max
<b>TESTS ON EMULSION:</b>				
Saybolt Viscosity @ 50°C , SFS	50	450	50	
Sieve Test, %		0.1		0.1
Storage Stability, % (1 day)		1		1
Distillation to 260°C :				
Oil distillate, % (by volume of emulsion)	5	15		7
Residue, % (by weight)	60		65	
Particle Charge	Positive		Negative	
<b>TESTS ON RESIDUE:</b>				
Penetration @ 25°C , 100g, 5s, dmm	100	250	200	350
Float test @ 60°C , sec			1200	
Solubility in Trichloroethylene, %	97.5		97.5	

<sup>(1)</sup>Source: Guide Specifications for Partial Depth Cold-In-Place Recycling Agents, Pacific Coast User-Producer Conference, May 1989

## HOT-MIX RECYCLING AGENTS

**General Requirement:** The asphalt cement furnished under this specification shall be petroleum asphalt prepared by the refining of crude petroleum. Recycling Agents RA 1, RA 5, RA 25, RA 75, RA 250 and RA 500 shall meet the requirements of AASHTO R-14 except that Section 5.2 and the note below Table 1 do not apply.

## “HOT OIL” CHIP SEAL ASPHALT

The following materials specification is for AC15-5TR, an asphalt product manufactured specifically for use in hot asphalt chip seals. AC15-5TR must contain 5% scrap tire rubber. It has been used by several Oregon counties and for some ODOT maintenance chip seals. Currently, no ODOT specification exists for the construction of hot asphalt chip seals.

AC15-5TR	Test Method	Min	Max
Viscosity @ 60C, P	ODOT TM430	1500	
Kinematic Viscosity @ 135C, cSt	AASHTO T201		2000
Penetration @ 25C, 100g, 5 sec, dmm	AASHTO T49	90	140
Elastic Recovery, %	ODOT TM429	55	
Force Ductility Ratio @ 4C, 5cm/min, cm	ODOT TM 427	0.30	
Cleveland Open Cup Flash Point (C)	AASHTO T48	260	