Oregon Department of Transportation
Standard Specifications For Asphalt Materials
2005

Effective for contracts and purchase orders advertised after February 15, 2005

Revisions – A specification for a product designed for use in hot oil chip seals has been added. There are no other changes to the 2004 version.

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 Notices - Shipping notices shall accompany each shipment and shall contain 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) Net quantity in Mg

(j) Brand, type and amount (% or p.p.m.) of additive such as anti-stripping additive blended with asphalt.

(k) Name and location of the initial and final refinery for manufacture of the product

(l) Signature of shipper or authorized representative

Refinery Test Reports - One copy of the refinery test report shall accompany the shipping notice and shall contain the following data:

(a) Consignee.

(b) Department contract number or purchase order number.

(c) Date of shipment.

(d) Type and grade of material.

(e) Shipping notice number.

(f) Test results and date of testing as follows:

(1) Performance Graded Binder - Flash Point, specific gravity at 15.6°C

(2) Emulsified Asphalt - Percent residue from distillation and penetration of residue. For CMS-2, CMS-2S and HFMS-2 include the percent of oil distillate added

(3) For all asphalt cements, liquid asphalt and emulsified asphalt, provide or make available upon request any other test results run on the tank, batch or lot of material shipped.

(g) Signature of refinery's authorized representative.

Certificate of Compliance - Each refinery test report shall be accompanied by a certificate stating that the materials satisfy specification requirements, that samples tested are representative of the materials shipped and that tests were performed in conformance with the applicable specifications. The certificate shall also state that those additives and only those additives indicated on the shipping notice are contained in the materials shipped. The certificate shall be signed by an authorized representative of the refinery.

Acceptance

Acceptance - Asphalt materials will be conditionally accepted for immediate use upon receipt at the point of delivery of satisfactory refinery test reports, certificates of compliance indicating the material delivered satisfies specification requirements and the Materials Safety Data Sheet (MSDS). Final acceptance will be subject to additional sampling and testing by the Department at point of delivery or use on the project site according to the Department's standard procedure 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 AASHTO M320-03, 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[4]		CRS-2[4]		CMS-2S		CMS-2		CMS-2h		CSS-1		CSS-1h	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
TESTS ON EMULSION:														
Saybolt Viscosity @ 25ºC (77ºF), SFS											20	100	20	100
Saybolt Viscosity @ 50ºC (122ºF), SFS	20	100	150*	400	100*	450	100*	450	100	450				
Settlement % (5 days) [1]		5		5		5		5		5		5		5
Storage Stability, % (1 day) [2]		1		1		1		1		1		1		1
Demulsibility %[3]	40		40											
Coating ability & water resistance: Coating, dry aggregate Coating, after spraying Coating, wet aggregate Coating, after spraying					 Good Fair Fair Fair		 Good Fair Fair Fair		 Good Fair Fair Fair					
Particle charge test	Positive		Positive		Positive		Positive		Positive		Positive[5]		Positive[5]	
Sieve test, % [7]		0.10		0.10		0.10		0.10		0.10		0.10		0.10
Cement mixing test, %												2.0		2.0
Distillation to 260ºC (500ºF): Oil distillate, % (by volume of emulsion) Residue, % (by weight)	 60	3	 65	3	 60	12[6]	 65	8[6]	 65	8[6]	 57	3[6]	 57	3[6]
TESTS ON RESIDUE FROM DISTILLATION:														
Penetration @ 25ºC (77ºF), 100g, 5s, dmm	100[4]	250[4]	100[4]	250[4]	100	250	100	250	40	90	100	250	40	90
Ductility @ 25ºC (77ºF), 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

(1) The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days time; or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.

(2) The 24-hour (1 day) storage stability test may be used instead of the 5-day settlement test.

(3) The demulsibility test shall be made within 30 days from date of shipment.

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

(5) Must meet a pH requirement of 6.7 maximum (AASHTO T 200 pH of Aqueous Solutions with the Glass Electrode) if the Particle Charge Test result is inconclusive.

(6) As required under Oregon Administrative Rules, Chapter 340, Division 232-0120 - Department of Environmental Quality.

(7) 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
TESTS ON EMULSION:						
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	
TESTS ON RESIDUE FROM DISTILLATION:						
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
TESTS ON EMULSION:		
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 : [1]		
Oil Distillate, % (by volume of emulsion)		7.0
Residue, % (by weight)	65[4]	
TESTS ON RESIDUE FROM DISTILLATION:		
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[2]: Elastic recovery, % [3]	25	

[1] AASHTO T 59 with modifications to include a 204° ± 6°C maximum temperature to be held for 15 minutes.

[2] AASHTO T 240, Rolling Thin Film Oven Test.

[3] ODOT TM 429, Elastic Recovery - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

[4] 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 experimental chip seal projects and normal 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
TESTS ON EMULSION:										
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) After thorough mixing shall be smooth and homogeneous throughout and shall show no material separation after setting undisturbed for 24 hours.		1.0		1.0				1.0		1.0
Demulsibility, %	30		40				40		60	
Distillation: Oil distillate, % (by volume of emulsion) Residue, % (by weight)	 65[1]	 3.0	 65[2]	 3.0			 65[1]	 2.0	 65[1]	 3.0
Breaking Index @ 25°C (77°F) [3]										80
TESTS ON RESIDUE FROM:	**DISTILLATION**								**DISTILLATION**	
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, % [4]	97.5		97.5				97.5			
Elastic Recovery, % [5] **or**	30		45				58		45	
Torsional Recovery	18[7]		18[6]				18[7]		18[6]	

[1] AASHTO T 59 with modifications to include a 204 ± 5ºC (400 ± 10ºF) maximum temperature to be held for 15 minutes.

[2] AASHTO T 59 with modifications to include 300 grams emulsion and a 177 ± 5ºC (350 ± 10ºF) maximum temperature to be held for 15 minutes.

[3] ODOT TM 431, Breaking Index - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

[4] AASHTO T 44, Solubility of Bituminous Materials. May be waived if polymer modification interferes with test accuracy.

[5] ODOT TM 429, Elastic Recovery – method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

[6] ODOT TM 428 Method A, Torsional Recovery - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

[7] ODOT TM 428 Method B, Torsional Recovery - method of testing on file at ODOT Materials Laboratory in Salem, Oregon.

COLD-IN-PLACE RECYCLING AGENTS [1]

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
TESTS ON EMULSION:				
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	
TESTS ON RESIDUE:				
Penetration @ 25°C , 100g, 5s, dmm	100	250	200	350
Float test @ 60°C , sec			1200	
Solubility in Trichloroethylene, %	97.5		97.5	

[1] 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. 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 following requirements at the time of use when tested according to the following. For asphalt containing an anti-stripping additive, requirements will be extended five percent for all characteristics except Solubility in Trichloroethylene.

GRADE	TEST METHOD	RA 1	RA 5	RA 25	RA 75	RA 250	RA 500
TESTS ON ORIGINAL ASPHALT:							
Kinematic viscosity @ 60°C, cSt	AASHTO T 201	50-150	200-800	1000-4000	5000-10000	15000-35000	40000-60000
Flashpoint, COC, °C , min	AASHTO T 48	218	218	218	218	218	218 (425)
Saturates, wt %, max	ASTM D 2007	30	30	30	30	30	30
TESTS ON RESIDUE FROM RTFO:	AASHTO T 240						
Viscosity Ratio, max	AASHTO T 201	3.0	3.0	3.0	3.0	3.0	3.0
Weight change, ±, %	AASHTO T 240	4.0	4.0	4.0	4.0	4.0	4.0

"HOT OIL" CHIP SEAL ASPHALT

The following materials specification is for an asphalt product manufactured specifically for use in hot asphalt chip seals. It contains 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	