



Specifications For Manufactured Materials

Section: EMULSIFIED ASPHALT

Subject : HIGH FLOAT HIGH RESIDUE MIXING GRADES

1. PRODUCT DESCRIPTION

1.1. Description

The specification for High Float High Residue (HF-high residue) mixing grade emulsified asphalt applies to liquid asphaltic materials in the form of homogeneous anionic inverted emulsion.

1.2. Composition/Characteristics

HF-high residue is an inverted emulsion. High float inverted emulsified asphalt shall consist of water particles dispersed in a liquid asphalt.

Water cannot be added to the HF-high residue product for dilution purposes or for any other purposes.

The residual bitumen has non-Newtonian flow characteristics and exhibits resistance to flow regardless of penetration of the residual bitumen.

1.3. Method of Production

Inverted emulsified asphalt is a dispersion of finely divided particles of water suspended in an asphalt cement through the use of mechanical energy, thermal energy and the use of emulsifiers to maintain the dispersion.

If the supplier elects to incorporate non-traditional material components such as crude oil, waste products or by-products of other industrial and manufacturing processes in the HF-high residue emulsified asphalt, the Province must be advised in writing before any material is supplied.

1.4. Definitions

Asphalt Cement: A dark brown to black solid or semi-solid cementitious material which gradually liquifies when heated. One type of bitumen that is obtained as residue in refining crude oil.

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Bitumen: Any mixture of hydrocarbons of natural or pyrogenous origin or both which is completely soluble in carbon disulphide.

Inverted Emulsified Asphalt: A mixture of asphalt cement with or without petroleum solvent and water containing an emulsifying agent, which maintains the water particles in suspension. The asphalt cement is the continuous phase and the water particles are the discontinuous phase.

Residual Bitumen: The residual material which remains after the distillation of an emulsified asphalt as described by the test methods referenced in this specification.

2. **PRODUCT SPECIFICATION**

2.1. **General Requirements**

2.1.1. **Uniformity**

The HF-high residue mixing grade emulsified asphalt described herein shall be free of contamination and shall be homogeneous and uniform in character.

2.1.2. **Delivery**

The specified material shall be delivered in accordance with the Department's SMM 104 General Provisions for Asphalt Supply Contracts. The temperature of the HF-high residue at the time of unloading shall be between 70° C and 90° C.

2.1.3. **Prequalification Samples**

First time suppliers of products described in the specification shall comply with the prequalification requirements described in SMM 104.

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2.2. Material Characteristics and Properties

TABLE 1

Requirements of High Float High Residue Mixing Grade

GRADE	HF-high residue		Test Method	Note
	Min	Max		
Property				Note 1
Residue by Distillation (% by mass)	88		ASTM D244	
Oil Portion of Distillation (% by volume)	1	4	ASTM D244	
Viscosity (SF) @ 50° C. (s)	50		ASTM D244	
Sieve Test, Retained on 1000 um sieve, (% by mass)		0.1	ASTM D244	
Storage Stability Test, 24 h. (% by mass)		1.5	ASTM D244	

Tests on Residue

Apparent Viscosity at 60° C. (Pa.s)	25	250	ASTM D4957	Note 2
Float Test @ 60° C. (s)	1200		ASTM D244	
Solubility in Trichloroethylene (% by weight)	97.5		ASTM D244	
Penetration @ 25° C 100 g, 5 s, (0.1 mm)	750		ASTM D5	Note 3
Complex flow Index		0.85	ASTM D2493	Note 4

Note 1: Reference to ASTM Test Procedures shall be from the most recently approved version of the test procedure available at the time of supply contract award.

Note 2: Apparent Viscosity:

Use the Modified Kopper Vacuum tube number 100 at a vacuum of 300 mm Hg and a shear rate of 3.0 Sec⁻¹.

Note 3: Penetration

Perform the test using the 50 g weight and use the following formula to convert the penetration at 50 g to a penetration value equivalent to 100 g:

$$\text{Pen 100g} = (\text{Pen (50 g)} \times 1.75) + 15$$

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Note 4: The Complex flow Index is the slope of the line presenting log shear stress to log shear rate.

3. QUALITY ASSURANCE

3.1 Samples

Samples will be in accordance with STP 102 Sampling Asphalt Materials.

3.2. Testing

3.2.1. **Sample Preparation**

Sample preparation of the HF-high residue mixing grade emulsified asphalt shall be in accordance with ASTM D244 Standard Test Methods and Practices for Emulsified Asphalts.

3.2.2. **Pay Reduction Tests**

The Province has the option to do any one or more of the tests listed in Table 1 on any of the samples obtained by it. Pay reductions will be based on results of the tests performed.

If a test result is found to fall outside of the specification limits, a second test will be done on another portion of the same sample and the results averaged to assess the pay adjustment.

Should the duplicate test results differ by more than the tolerances for repeatability stated in 3.2.4 of this specification, then the average of the two test values shall not be used and instead the test result numerically nearest the specification limit shall govern.

3.2.3. **Time Limits**

Loads on which no tests are performed or where tests have not been made within four weeks of the sampling date, will be accepted without pay adjustment.

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3.2.4. Interpretation of Results

The criteria for judging the acceptability of test results for each property specified herein should be the tolerances for repeatability specified in the most recent ASTM Standard Test Method for that property. For the following property, testing within a lab or between two labs shall meet the following requirements.

Repeatability

Property	Unit of measure	Within a lab (Same operator)	Range of measurement
Oil Portion of distillate	% by volume	0.5	0.0-4.0

3.3. Acceptance and Rejection

Pay Reductions on HF-high residue emulsified asphalt which do not meet specification will be calculated as outlined in the attached form - FORM FOR DETERMINING THE PAY REDUCTION ADJUSTMENT FOR HF-high residue EMULSIFIED ASPHALT THAT DOES NOT MEET SPECIFICATION.

4. MEASUREMENT

Measurement of HF-high residue emulsified asphalt will be in accordance with SMM 104.

5. DELIVERY

Delivery of HF-high residue emulsified asphalt will be in accordance with SMM104.

6. PAYMENT

Payment for HF-high residue emulsified asphalt will be in accordance with SMM104 and the following:

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SMM 103.3.2.1.

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FORM FOR DETERMINING THE PAY REDUCTION ADJUSTMENT FOR HF-HIGH RESIDUE EMULSIFIED ASPHALT THAT DOES NOT MEET SPECIFICATION

MANUFACTURER _____ LAB ADMITTANCE NO. _____

PRODUCT TYPE _____ CONTROL SECTION _____

DELIVERY SLIP NO. _____ DEPARTMENT CONTRACT NO. _____

DATE SAMPLED _____ MAINTENANCE TANK LOCATION _____

DATE TESTED _____ PROJECT MANAGER _____

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TEST	SPECIFICATION LIMITS		TEST RESULTS	NO. OF UNITS OUTSIDE SPEC LIMITS	MULTIPLIER FACTOR	NO. OF ADJUSTMENT POINTS
	MIN	MAX				
Residue by Distillation (% by mass)					110	
Oil Portion of Distillation (% by volume)					200	
Viscosity (SF) @ 50° C, (s)					35	
Sieve Test, Retained on 1000 um sieve, (% by mass)					400	
Storage Stability Test, 24 h, (% by mass)					75	
Apparent Viscosity at 60° C, (Pa.s)					Note 1	
Float Test @ 60° C, (s)					1	
Solubility in Trichloroethylene (% by weight)					65	
Penetration @ 25° C 100 g, 5 s, (0.1 mm)					7	
Complex flow Index						
				TOTAL ADJUSTMENT POINTS		

Note 1:

If test result < minimum specified value, Multiplier is 50

If test result > maximum specified value, Multiplier is 10

$$\text{PAY ADJUSTMENT POINTS} = \left(\frac{\text{TOTAL ADJUSTMENT POINTS}}{100} \right)^{2.3}$$

If Pay Adjustment Points < 2, Pay Factor is 1.

If Pay Adjustment Points > 2, Pay Factor is:

$$1 - \frac{\text{PAY ADJUSTMENT POINTS}}{100}$$

Payment = (Price/Kilogram)(Total Weight)(Pay Factor); except that, if the calculated pay adjustment points exceed 2, the pay reduction will be \$200.00 or the calculated pay reduction, whichever is greater.