



Specifications For Manufactured Materials

Section: EMULSIFIED ASPHALT

Subject: HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

1. PRODUCT DESCRIPTION

1.1 Description

The specification for high float polymer modified (HFPM) emulsified asphalt applies to polymers dispersed in liquid asphaltic materials in the form of an aqueous emulsion of the anionic high float type. HFPM emulsified asphalts are specified by the following grades; HF-100P, HF-150P.

1.2 Composition/Characteristics

High float polymer modified emulsified asphalt shall consist of paving grade asphalts and polymers dispersed in an aqueous phase and may contain a petroleum distillate. The residual bitumen has non-Newtonian flow characteristics and exhibits resistance to flow regardless of penetration of the residual bitumen.

1.3 Application/Use

The primary use for the polymer modified emulsified asphalt is for graded aggregate seal coating operations.

1.4 Method of Production

HFPM emulsified asphalt is a dispersion of asphalt cement and polymers suspended in water effected 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 HFPM emulsified asphalt, the Province must be advised in writing before any material is supplied.

1.5 Definitions

Polymer: refers to a very large molecule made by chemically reacting many small molecules to form long chains or clusters. Polymers can be broken into two general categories: elastomers and plastomers.

Section:

EMULSIFIED ASPHALT

Subject:

HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

Elastomers: resist permanent deformation by stretching and recovering their shape quickly when the deforming force is removed.

Plastomers: form a tough, rigid three dimensional network resistant to deformation.

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.

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

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

All grades of high float polymer modified emulsified asphalt described herein shall be free of contamination and shall be homogeneous and uniform in character throughout.

2.1.2 Delivery

The specified material shall be delivered in accordance with the Department's SMM 104 General Provisions for Asphalt Supply Contracts.

2.1.3 Prequalification Samples

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

Section:
EMULSIFIED ASPHALT

Subject:
HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

2.2 Materials Characteristics and Properties

TABLE 1

Requirements of Polymer Modified High Float Emulsified Asphalt

GRADE REQUIREMENTS	HF-100P		HF-150P		ASTM TEST METHOD
	Min.	Max.	Min.	Max.	

Tests on Emulsion

Percent Asphalt Residue by Distillation	62	-	62	-	D244 and Note (1)
Oil Distillate (% by Volume)	0.5	4	0.5	4	D244 and Note (2)
Saybolt Viscosity Furol Seconds at 50° C	35	150	35	150	D244
Sieve Test % Retained on 1000 um Sieve	-	0.1	-	0.1	D244
Coating Test	Note 9	Note 9	Note 9	Note 9	D244 and Note (9)
Storage Stability	-	1.5	-	1.5	D244
Demulsibility 50 ml 0.1 N CaCl ₂ (%)	75	-	75	-	D244
Workability at -10° C	-	-	-	-	Note (3)

Tests on Residue

Penetration @ 25° C, 100 g, 5 s	Note 10	Note 10	Note 10	Note 10	Notes (4) and (10)
Viscosity at 60° C Pa.s	Note 10	Note 10	Note 10	Note 10	Notes (5) and (10)
Float Test at 60° C, s	1200	-	1200	-	Note (6)
Solubility in Trichloroethylene (%)	97.5	-	97.5	-	D2042
Ash Content, % by Weight of Residue (12)	-	1.0	-	1.0	D2415 and Note (11)
Elastic Recovery, 10° C, (%)	55	-	55	-	Note (7)
Force Ductility at 800% Elongation, 5 cm/min at 4° C, kg	0.50	-	0.25	-	Note (8)

Section:

EMULSIFIED ASPHALT

Subject:

HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

NOTES

(1) Distillation process:

Follow ASTM D244 with the following modifications to section D244-14.5:

- Wash the stills after use with petroleum solvent, rinse twice with 1,1,1-trichloroethane or similar solvent and allow to dry thoroughly before reuse.
- Drop the ring burner to the bottom of the still when temperature reaches 170° C on the lower thermometer.
- The rate of distillation will affect the consistency of the final residue. Total distillation time, including conditioning at 205° C, shall be 60 ± 10 minutes. Maintain the final temperature at 205 ± 5° C accurately for 20 minutes. This 20 minute period shall commence when the residue temperature reaches 200° C.
- At the termination of the distillation process, weigh the still, place the still on the hot plate while you take off the cover. Stir the contents in the still with a preheated spatula for 10 seconds (about 30 times).
- Residue in the still should be poured, for various testing, within 2 minutes of the burner being turned off to prevent oil vapour from re-condensing into the residual asphalt.
- Pour the residue into the preheated 180 ml (6 oz.) penetration container until it is approximately half full. Pour residue into a preheated 50 ml beaker with a pouring spout and set aside as required for softening point, viscosity, float, elastic recovery and solubility/ash content tests. Pour remaining residue into the penetration container. Do not pour residual asphalt through a sieve. (Note: These containers shall be preheated on a hot plate set so that its surface temperature is 205 ± 10 °C). Since Polymer High Float residue is poured at lower temperatures than regular High Float residue; it is advisable to pour the Float Thimble as soon as possible to prevent any jelling structure development in the beaker.
- The residue poured into the 50 mm beaker has to be maintained at 205°C until the required amounts for the viscosity, softening point, float and elastic recovery tests are poured into their respective device.
- Use a preheated spatula or utility knife to cut off polymer-asphalt strings between pouring.
- All residues shall be conditioned and tested as required immediately after distillation. Cooling and re-heating at a later time for testing shall not be permitted.

Section:

EMULSIFIED ASPHALT

Subject:

HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

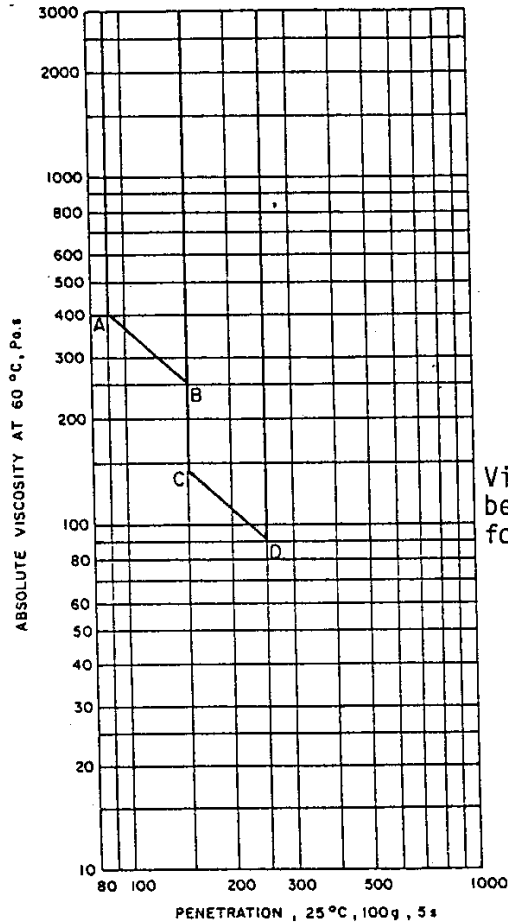
- (2) CAN2-16.5-M84 Section 6.2.1.3
- (3) CAN2-16.5-M84 Section 6.2.3
- (4) CAN2-16.5-M84 Section 6.2.4
- (5) CAN2-16.5-M84 Section 6.2.5
- (6) CAN2-16.5-M84 Section 6.2.6
- (7) Elastic Recovery at 10° C expressed in percent shall be determined using Saskatchewan Highways and Transportation Standard Test Procedure STP 203-18 Elastic Recovery by Ductilometer.
- (8) Force Ductility shall be determined using Saskatchewan Highways and Transportation Standard Test Procedure 203-19 Force Ductility Test.
- (9) Coating Test: ASTM Method D244 except that the mixture of limestone and emulsified asphalt shall be capable of being mixed vigorously for five (5) minutes, at the end of which period the stone shall be thoroughly and uniformly coated. The mixture shall then be completely immersed in tap water and the water poured off. The stone shall then not be less than ninety (90) percent coated.
- (10) Viscosity at 60° C and Penetration at 25° C shall fall within the area described in Figure 1.
For the Apparent Viscosity Test Follow ASTM D4957 with the following modifications:
 - Immediately after the residue is poured into the 50 ml beaker, charge the viscometer.
 - Due to the thickness and viscosity of the residue at times it is necessary to wait (15-20 seconds) to see if the amount poured is sufficient to fill up to the mark. If it isn't, it is topped up.
 - Place the charged viscometer into an oven maintained at 195°C for a period of 10 ± 2 minutes.
 - Remove the viscometer filling tube and the capillary tube from the oven and proceed to perform the apparent viscosity test as per ASTM D4957.
- (11) The ash content shall be determined when the manufacturer indicates that the polymer additive is not soluble in trichloroethylene.

Section:
EMULSIFIED ASPHALT

Subject:
HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

FIGURE 1

Penetration and Viscosity Requirements for Polymer Modified High Float Emulsified Asphalts



Viscosity value shall be reported as 0.5 s^{-1} for HF-100P and HF-150P.

Grade of HF Emulsified Asphalt	HF-100P	HF-150P
	A, B	C, D

Viscosity shall be within the graphic regions above the line designated by specified letters, and between penetration limits contained in vertical lines extending upwards from those points.

Section:

EMULSIFIED ASPHALT

Subject:

HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

3. QUALITY ASSURANCE

3.1 Samples

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

3.2 Testing

3.2.1 Sample Preparation

Sample preparation for all high float polymer modified emulsified asphalts shall be in accordance with ASTM D244 Standard Test Methods and Practices for Emulsified Asphalts and with the following qualifications:

- a) Once the sample has reached the specified temperature of $50 + 3^{\circ} \text{C}$, it shall be removed from the heat source within 24 hours, mixed and individual test samples poured; and
- b) Mixing shall be by hand stirring until the sample is homogeneous in character, taking care to ensure that air is not being entrained into the emulsion during mixing.

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. 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.

3.2.4 Interpretation of Results

The criteria for judging the acceptability of test results for each property specified herein shall be the tolerances for repeatability specified in the most recent ASTM

Section:
EMULSIFIED ASPHALT

Subject:
HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

Standard Test Method for that property. For the following properties, 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	0.0-0.7
Penetration on 0.1 mm Residue (25° C, 100 g, 5 s)	0.1 mm	15	80-200
		35	200-500

3.3 Acceptance and Rejection

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

4. MEASUREMENT

Measurement of HFPM emulsified asphalt will be in accordance with SMM104.

5. DELIVERY

Delivery of HFPM emulsified asphalt will be in accordance with SMM104.

Specifications For Manufactured Materials

SMM 103-3.3

Section:

EMULSIFIED ASPHALT

Subject:

HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

6. PAYMENT

Payment for HFPM emulsified asphalt will be in accordance SMM104 and the following:

FORM FOR DETERMINING THE PAY REDUCTION FOR HFPM 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 _____

Specifications For Manufactured Materials

SMM 103-3.3

Section:
EMULSIFIED ASPHALT

Subject:
HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

ADJUSTMENT TEST	SPECIFICATION LIMITS		TEST RESULTS	NO. UNITS OUTSIDE SPEC LIMITS	MULT. FACTOR	NO. OF POINTS
	MIN	MAX				
Residue by Distillation(% by mass)	_____	_____	_____	_____	110	_____
Oil Portion of Distillation (% by volume)	_____	_____	_____	_____	200	_____
Viscosity (SF) @ 50° C, (s)	_____	_____	_____	_____	(Note 1)	_____
Sieve Test,Retained on 1000µm Sieve (% by mass)	_____	_____	_____	_____	400	_____
Coating Test (%)	_____	_____	_____	_____	15	_____
Storage Stability Test, 24h(% by mass)	_____	_____	_____	_____	75	_____
Demulsibility, 50 ml, 5.55 g/l, CaCl ₂ , (% by mass)	_____	_____	_____	_____	30	_____
Penetration @ 25° C, 100 g, 5 s ,(0.1mm)	_____	_____	_____	_____	(Note 2)	_____
Apparent Viscosity @ 60° C, (Pa.s)	_____	_____	_____	_____	(Note 3)	_____
Float Test @ 60° C, (s)	_____	_____	_____	_____	(Note 4)	_____
Solubility in Trichloroethylene (% by weight)	_____	_____	_____	_____	65	_____
Ash Content (% by weight when applicable)	_____	_____	_____	_____	270	_____
Elastic Recovery, 10° C, (%)	_____	_____	_____	_____	25	_____
Forced Ductility @ 800% Elongation 5 cm/min 4° C, (kg)	_____	_____	_____	_____	(Note 5)	_____
TOTAL ADJUSTMENT POINTS						_____

Note 1: If test result < minimum Specified Value, Multiplier Factor is 35
If test result > maximum Specified Value, Multiplier Factor is 10

Note 2: HF100P, Multiplier Factor is 9
HF150P, Multiplier Factor is 9

Note 3: HF 100P, Multiplier Factor is 5
HF 150P, Multiplier Factor is 10

Note 4: HF 100P, Multiplier Factor is 1.5
HF 150P, Multiplier Factor is 1.5

Note 5: HF100P, Multiplier Factor is 1500
HF150P, Multiplier Factor is 3000

Specifications For Manufactured Materials

SMM 103-3.3

Section:

EMULSIFIED ASPHALT

Subject:

HIGH FLOAT POLYMER MODIFIED
EMULSIFIED ASPHALT

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

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.