



Specifications For Manufactured Materials

Section: EMULSIFIED ASPHALT

Subject: HIGH FLOAT RECYCLING GRADE

1. PRODUCT DESCRIPTION

1.1. Description

The specification for high float recycling grade (HFRG) emulsified asphalt applies to liquid asphaltic materials in the form of homogeneous aqueous emulsions of the anionic type. The HFRG emulsified asphalts are specified by the following grades; HF20R, HF100R, HF700R.

1.2. Composition/Characteristics

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

1.3. Application/Use

The primary use of high float recycling grade emulsions is to recycle deteriorated asphalt pavements to restore the desired properties to the asphalt-aggregate mixture.

1.4. Method of Production

A high float recycling grade emulsion is a dispersion of asphalt cement suspended in water effected through the use of mechanical, 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 HFRG emulsified asphalt, the Province must be advised in writing before any material is supplied.

1.5. 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.

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

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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 recycling grade 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 Terms and Conditions of Tender and SHT SMM 104 - General Provisions for Asphalt Supply Contracts.

2.1.3. **Prequalification Samples**

First time suppliers of products described in the specification are referred to Item 3 of the Terms and Conditions of Tender.

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2.2. Materials Characteristics and Properties

TABLE 1
Requirements of High Float Recycling Grade Emulsified Asphalt

GRADE REQUIREMENTS	HF-20R		HF-100R		HF-700R		ASTM TEST	METHOD
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	
<u>Tests on Emulsion</u>								
Percent Asphalt Residue by Distillation (% by mass)	70	-	70	-	70	-		Note (1)
Oil Portion of Distillate (% by Volume)	-	1.5	-	1.5	-	1.5		Note (2)
Saybolt Viscosity Furol Seconds at 50° C	35	-	35	-	25	-		ASTM D244 ASTM D88
Sieve Test % Retained on 1000 um Sieve	-	0.10	-	0.10	-	0.10		ASTM D244
Coating Test	Pass	-	Pass	-	Pass	-		Note (3)
Storage Stability (24 hrs, % by mass)	-	1.5	-	1.5	-	1.5		ASTM D244
<u>Tests on Residue</u>								
Penetration @ 25° C, 100 g, 5 s	170	220	200	255	240	310		Note (4) Note (5)
Viscosity at 60° C Pa.s	43	63	40	55	31	43		Note (4) Note (5)
Float Test at 60° C, s	1200	-	1200	-	1200	-		ASTM D139 Note (6)
Solubility in Trichloroethylene (%)	97.5	-	97.5	-	97.5	-		ASTM D2042
Thin Film Oven Test	-	3.5	-	3.5	-	3.5		ASTM D1754

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(weight loss, %)

Note (4)

Retained Penetration

45 - 45 - 40 -

ASTM D5

Note (5)

NOTES

- (1) C.G.S.B. CAN 2-16.5-M84 par 6.2.1
- (2) C.G.S.B. CAN 2-16.5-M84 par 6.2.1.3
- (3) Coating Test: ASTM Method D244 except that the mixture of limestone and emulsified asphalt shall be mixed vigorously for five (5) minutes, then allowed to stand for three (3) hours, after which the mixture shall be capable of being mixed an additional five (5) minutes. The mixture shall then be rinsed twice with approximately its own volume of tap water without showing appreciable loss of bituminous film. After the second mixing the aggregate shall be at least ninety (90) percent coated.
- (4) The penetration, apparent viscosity and thin film oven test of the residual after distillation will be evaluated after blending the residual asphalt with a stock 85-100A asphalt cement in the proportions noted in section 3.2.1.

The blending of the 85/100 penetration asphalt cement and the emulsion residue after distillation will be performed using the following procedure:

- (a) Pour predetermined weights of 85/100 pen asphalt cement into a 400 ml glass beaker and heat until temperature of the asphalt cement stabilizes at 135° C. Maintain the temperature at this level until emulsion residue has been added.

The predetermined weights shall be based on a total blended weight of 300 grams and the desired percent emulsion residue in the blend.

- (b) Immediately after distillation of the emulsion is completed, pour the residue into two preheated containers. From one of these containers immediately pour the float test sample and any other samples used for testing the emulsion residue.
- (c) After the emulsion residue has cooled to 110° to 120° C, add predetermined weights of the emulsion residue to the preheated 85-100 pen asphalt cement sample(s).
- (d) Mix the blend for a period of five (5) minutes at a constant temperature of $115 \pm 5^\circ$ C.
- (e) Immediately after mixing has been completed pour the blended material into CGSB CAN-2-16.5-M84 specified containers for penetration testing, thin film oven testing and the designated tubes for apparent viscosity testing.
- (f) The standard conditioning period for penetration and viscosity testing shall be followed.

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- (5) C.G.S.B. CAN 2-16.5-M84 par. 6.2.4 (Penetration)
C.G.S.B. CAN 2-16.5-M84 par. 6.2.5 (Apparent Viscosity)

For apparent viscosity determination the following Cannon-Manning Tube No. are recommended:

Cannon-Manning Grade	Tube No.
HF-20R	12
HF-100R	11
HF-700R	11

- (6) C.G.S.B. CAN 2-16.5-M84 par. 6.2.6

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 for all high float recycling grade emulsified asphalts shall be in accordance with ASTM D44 - Standard Test Method for Emulsified Asphalt with the following qualifications:

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

For the individual test samples that require blending with stock 85/100 penetration asphalt cement the following blend ratios will be used:

- HF-20R - 75% stock 85/100 penetration asphalt cement and 25% emulsion residue after distillation.

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(b) HF-100R - 80% stock 85/100 penetration asphalt cement and 20% emulsion residue after distillation.

(c) HF-700R - 85% stock 85/100 penetration asphalt cement and 15% emulsion residue after distillation.

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 samples obtained by it. Pay reductions will be based on results of the test 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 test 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 standard method for that property. For the following properties, testing within a lab or between two labs shall meet the following requirements.

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<u>Property</u>	<u>Unit of Measure</u>	Repeatability <u>Within a Lab (same operator)</u>	<u>Range of Measurement</u>
Oil Portion of Distillate	% by volume	0.5	0.0 - 7.0
Penetration on 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 recycling grade emulsified asphalt which do not meet specification will be calculated as outlined in the attached form - FORM FOR DETERMINING THE PERCENTAGE ADJUSTMENT FOR HIGH FLOAT RECYCLING GRADE EMULSIFIED ASPHALTS.

4. MEASUREMENT

Measurement of HFRG emulsified asphalt will be in accordance with SMM104 -General Provisions for Asphalt Supply Contracts.

5. PAYMENT

Payment for HFRG emulsified asphalt will be in accordance with the Terms and Conditions of Tender and SMM104 - General Provisions for Asphalt Supply Contracts.

FORM FOR DETERMINING THE PAY REDUCTION FOR HFRG EMULSIFIED ASPHALT THAT DOES NOT MEET SPECIFICATION

MANUFACTURER: _____

LAB ADMITTANCE NO.: _____

PRODUCT TYPE: _____

CONTROL SECTION: _____

DELIVERY SLIP NO: _____

SHT CONTRACT NO: _____

DATE SAMPLED: _____

MAINTENANCE TANK LOCATION: _____

DATE TESTED: _____

RES. ENG/AMS: _____

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SPECIFICATION	LIMITS		NO. OF UNITS			NO. OF MULTIPLIER	
	MIN	MAX	TEST RESULTS	OUTSIDE SPEC LIMITS		FACTOR	POINTS
ADJUSTMENT TEST							
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	___	___
Coating Test (%)	___	___	___	___	15	___	___
Storage Stability Test, 24 h (% by mass)	___	___	___	___	75	___	___
Demulsibility, 50 ml, 5.55 g/l, CaCl ₂ , (% by mass)	___	___	___	___	30	___	___
Penetration @ 25° C, 100 g, 5 s (0.1 mm)	___	___	___	___	9	___	___
Apparant Viscosity @ 60° C, (Pa.s)	___	___	___	___	100	___	___
Float Test @ 60° C, (s)	___	___	___	___	1.5	___	___
Solubility in Trichlorethylene (% by weight)	___	___	___	___	65	___	___
Thin Film Oven Test (weight loss %)	___	___	___	___	65	___	___
Penetration (% of original)	___	___	___	___	65	___	___
TOTAL ADJUSTMENT POINTS						___	___

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$$\text{PAY ADJUSTMENT} = \frac{\text{Total Adjustment Points}}{\text{POINTS}} \times \frac{2.3}{100} = \frac{\quad}{100} \times \frac{2.3}{100}$$

If Pay Adjustment Points \leq 2, Pay Factor is 1

If Pay Adjustment Points $>$ 2, Pay Factor is $1 - \frac{\text{Pay Adjustment Points}}{100}$

Payment = (Price/Kg) (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.

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APPROVAL SHEET

New ___ Revision X Date of Previous Document 92-04-22
Effective Date: 99-03-15

Description of Revision (Reason for Revision):

Update Lab Admittance No. and Correction of Pay Adjustment Factors

Review/Implementation Process:

Reviewed by the Testing Standards Engineer

Other Manuals/Policies Affected:

Nil

Follow Up/Training Required:

Nil

Comments/Concerns/Implications (Budget/Environment/Stakeholders):

Nil

Prepared and Recommended by: Abdul Qayyum 99-03-15
Testing Standards Engineer Date

Recommended by: _____
Director, Standards Engineer Date

Recommended by: _____
Executive Director, Eng. Services Date

Approved by: _____
Asst. Deputy Minister, Operations Date

Electronic File Updated _____

Update Mailed _____