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5.7 SUPPLY OF ASPHALT

5.7.1 GENERAL

The work consists of supplying asphalt materials including ordering, scheduling, delivering, supplying storage facilities, handling, storing, sampling, testing and other related work.

For purposes of this specification, the term "Asphalt Supplier" shall mean the party awarded an order by the Contractor for the supply of asphalt.

5.7.2 MATERIALS

5.7.2.1 **General**

The Contractor shall supply the types and grades of asphalt specified in the Contract. Asphalt suppliers' products must be pre-qualified by the Department.

All asphalt binders shall be prepared from petroleum oils. They shall be free from impurities. Solvents used in the manufacture of cut-back asphalts shall be derived from petroleum oils. Emulsifiers used to stabilize asphalt emulsions shall not be harmful to the performance of the asphalt in service.

The Contractor shall ensure that the asphalt supplied meets all requirements for the types and grades specified. The Contractor may be required to use more than one type or grade of asphalt for a particular purpose. Any change in asphalt type or grade must be approved by the Consultant.

The Department reserves the right to discontinue the use of any asphalt product that fails to handle or perform to expectation or satisfaction, regardless of its compliance with the specifications.

5.7.2.2 **Delivery, Handling and Storage**

The Contractor shall supply the Consultant with the asphalt suppliers' weigh-bills and records of all asphalt received and/or returned on a daily basis.

The Contractor shall provide, maintain and reclaim asphalt storage facilities.

Storage facilities for asphalt cement shall be capable of heating the material under effective and positive control at all times and shall contain provision for measuring and sampling.

For Performance Grade Asphalt Cements (PGAC) specified according to the Performance Grade System as developed under the Strategic Highway Research Program (SHRP), the Contractor shall follow the suppliers' specified handling and storage requirements for each grade of PGAC.

No asphalt type or grade shall be diluted or mixed with a different type or grade, or with any other material, without the specific approval of the Consultant.

The Contractor shall prevent contamination of the asphalt, by asphalt of another type or grade, by solvent, or by any other material. Asphalt storage tanks shall be emptied of one type or grade of asphalt, and cleaned as necessary to prevent detrimental contamination of the asphalt, before placing another type or grade of asphalt therein. Asphalt emulsions shall be protected from freezing.

5.7.3 SAMPLING AND TESTING5.7.3.1 **General**

The Contractor shall obtain representative, uncontaminated samples of all asphalt products delivered to the project for quality assurance testing in accordance with ATT-42, Sampling Asphalt and Table 5.7.3. The Consultant may require increases in the minimum frequencies specified for quality assurance sampling. In addition, all asphalt shall be subject to inspection, sampling and testing by the Department or its designated agents. The Contractor shall provide safe, convenient access, acceptable to the Consultant, for inspection and sampling of the asphalt, and shall cooperate in the inspection and sampling process when requested to do so.

The Contractor shall ensure that all asphalt delivery tanks are equipped with sampling valves maintained in good operating condition which are designed and located to enable safe, representative sampling into one litre containers.

5.7.3.2 **Quality Control**

Quality control and quality control testing is the responsibility of the Contractor. Quality control testing shall be carried out by a qualified Supplier's laboratory or a qualified testing laboratory licensed to practice in the Province of Alberta.

5.7.3.2.1 Quality Control Plan - Performance Grade Asphalt Cements

The Contractor shall provide a Quality Control Plan jointly prepared with the asphalt supplier detailing the quality control activities related to the use of the Performance Grade Asphalt Cement. The Plan shall be submitted at least 14 calendar days prior to the use of any PGAC product in the Contract.

Hot mix production shall not commence until the Plan has been accepted, in writing, by the Department. The requirement for the Contractor to provide a Quality Control Plan may be waived if the current Quality Control Plan used by the asphalt supplier has been previously approved in writing by the Department.

As a minimum, the Plan shall provide the following information:

- (i) The type of facility from which the product(s) will be supplied (refinery, terminal) and its location.
- (ii) Name and telephone number of the person responsible for quality control at the facility.
- (iii) The method and frequency for initial testing, specification compliance testing and any other testing employed to either guide the manufacturing process of the PGAC or to ensure the on-going compliance of the product to contract specifications.
- (iv) Specification compliance testing shall be carried out prior to shipping the products from the supplier's facility to the hot mix plant. The Plan shall provide an outline of the procedures to be followed for checking transport vehicles before loading to prevent contamination of shipments. The outline shall include a statement that the transport vehicles inspection report, signed by the responsible inspector, shall be maintained in the Supplier's records and shall be made available to the Department upon request.
- (v) The Plan shall identify the QC laboratory and detail control charting or any such statistical procedures which will be used to track the quality of the product(s). The Plan shall indicate which accreditation programs, proficiency sample testing programs or other correlation programs that the QC laboratory has or is currently participating in. Proof of good standing in such programs is required.

- (vi) The Plan shall detail the methods to be used to identify and provide for the exclusion of materials which do not conform to specifications, prior to incorporating them into the hot mix.

5.7.3.3 Quality Assurance

The Contractor shall deliver all quality assurance samples to the Consultant on the day they were sampled. The Consultant will test the quality assurance samples and will accept or reject asphalt material based on these test results.

**TABLE 5.7.3
SAMPLING FREQUENCY FOR QUALITY ASSURANCE**

PRODUCT	MINIMUM FREQUENCY (1)(FOR EACH ASPHALT TYPE)
Asphalt Cement - Penetration (A) & (B) grades	One per five Lots
Asphalt Cement - Performance Grade	One per three Lots
Liquid Asphalt (ASBC)	One per day
Prime, Tack, Curing Seal, and Fog Coat	One for each 100 tonnes
Seal Coats, Slurry Seals	One per day

Notes:

- (1) Minimum of one sample for each asphalt type or as listed below, whichever is greater.

5.7.4 ACCEPTANCE

Asphalt products supplied and incorporated into the Work will be considered for acceptance provided the specified quality assurance samples have been provided to the Consultant within the time frame specified and where both the Work and the asphalt product meet specifications.

In the event quality assurance test results are not available to the Consultant at the time he prepares the monthly progress payment estimates, the Consultant may request payment for asphalt material which has not been accepted. However, should the Contractor fail to supply the required samples or the asphalt material fails to meet the specification requirements, the Consultant may deduct such payments from the subsequent monthly progress payment estimates.

5.7.5 MEASUREMENT AND PAYMENT

Where the Contract contains bid items for the supply of asphalt, measurement will be based on the suppliers' weigh bills however, the Consultant may check quantities delivered by weighing the delivery vehicles before and after unloading. Where the Contract does not otherwise require the installation of a weigh scale for weighing materials, the Consultant will determine quantities by measuring the liquid level in the tank truck or storage tank, at his discretion. When asphalt quantities are determined by this method, the Contractor shall calibrate the distributor trucks and storage tanks.

If there is a variance between quantities measured by the Consultant and the suppliers' weigh-bills, the Consultant will determine the quantity on which payment will be based.

Where the Contract contains bid items for the supply of asphalt, payment for accepted asphalt material will be made at the applicable unit price bid per tonne.

Where the Contract does not contain bid items for the supply of asphalt, accepted asphalt material will not be paid for separately. Payment will be considered included in the unit price bid for the Contract item for which the asphalt

material is used.

Payment will be full compensation for supplying asphalt material to the project; storing the material; sampling and quality control.

TEST CHARACTERISTICS	A.S.T.M. TEST METHODS	PREMIUM GRADES OF ASPHALT CEMENTS						REGULAR GRADES OF ASPHALT CEMENTS								
		150-200(A)			200-300(A)			300-400(A)			200-300(B)			300-400(B)		
Absolute Viscosity, 60°C, Pa.s Penetration, 25°C, 100 g, 5 s, dmm	D2171 D5	The viscosity and penetration values must fall within the area bounded by A - B - C - D - A, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by C - D - E - F - C, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by E - F - G - H - E, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by C - J - K - F - C, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by F - K - L - G - F, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:		
		<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>
		A	155	150	C	50	200	E	45	300	C	50	200	F	26.5	300
		B	78	150	D	92	200	F	26.5	300	J	30	200	K	17.5	300
		C	50	200	E	45	300	G	17	400	K	17.5	300	L	12	400
		D	92	200	F	26.5	300	H	27	400	F	26.5	300	G	17	400
Kinematic Viscosity, 135°C, mm ² /s Penetration, 25°C, 100g, 5s, dmm	D2170 D5	The viscosity and penetration values must fall within the area bounded by A - B - C - D - A, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by C - D - E - F - C, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by E - F - G - H - E, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by C - J - K - F - C, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by F - K - L - G - F, plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:		
		<u>Pt.</u>	<u>kin. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Kin. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Kin. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Kin. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Kin. Visc.</u>	<u>Pen.</u>
		A	360	150	C	205	200	E	205	300	C	205	200	F	150	300
		B	255	150	D	285	200	F	150	300	J	165	200	K	125	300
		C	205	200	E	205	300	G	120	400	K	125	300	L	102.5	400
		D	285	200	F	150	300	H	165	400	F	150	300	G	120	400
Flash Point, Cleveland Open Cup, °C minimum	D92	205			175			175			175			175		
Solubility in Trichloroethylene, % minimum	D2042	99.5			99.5			99.5			99.5			99.5		
Tests on Residue from Thin-Film Oven Test: Ratio of Absolute Viscosity of Residue from Thin-Film Oven Test to Original Absolute Viscosity, maximum	D1754															
	D2171	4.0			4.0			4.0			5.0			5.0		
Ductility, 25°C, cm, minimum	D113	100			---			---			---			---		
Ductility, 15.6°C, cm, min.		---			100			100			100			100		

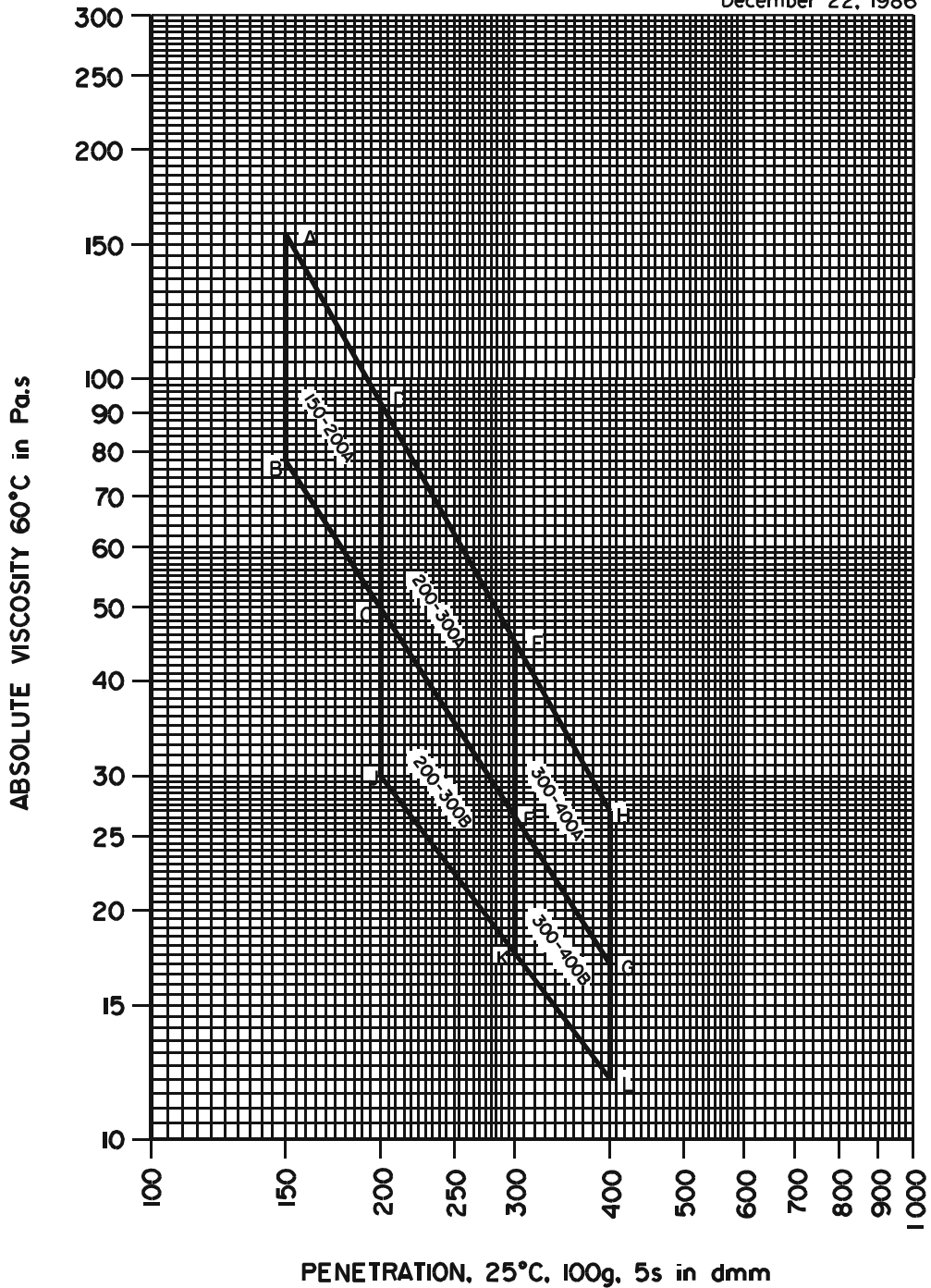
General Requirement - The asphalt shall be prepared by the refining of petroleum. It shall be uniform in character and shall not foam when heated to 175 °C.

- The temperature at delivery to the site shall be between 135°C and 175°C.

ASPH-2

SPECIFICATIONS FOR ASPHALT CEMENT
ABSOLUTE VISCOSITY vs PENETRATION
FOR FIVE SPECIFIED GRADES

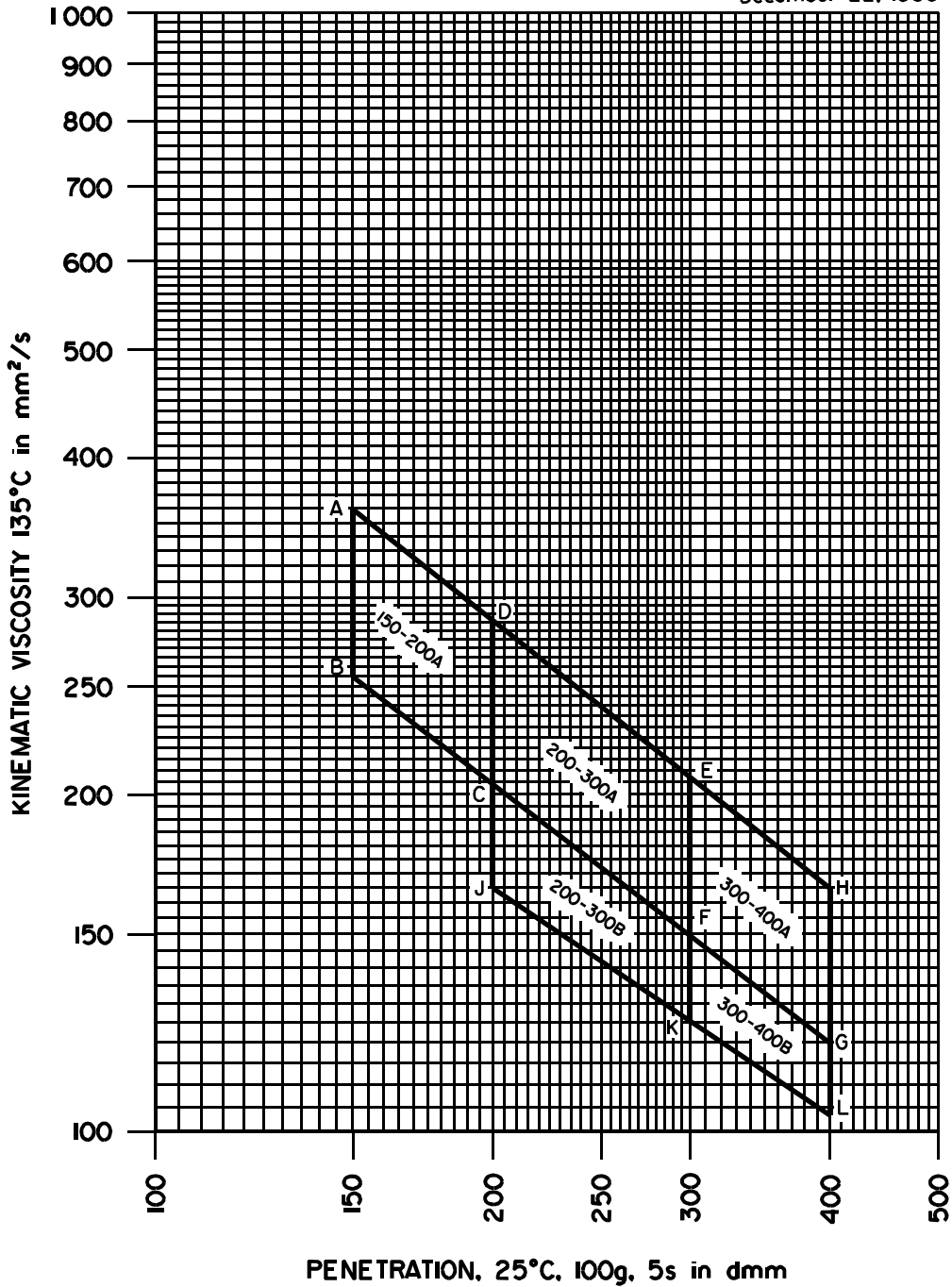
December 22, 1986



ASPH-3

SPECIFICATIONS FOR ASPHALT CEMENT KINEMATIC VISCOSITY vs PENETRATION FOR FIVE SPECIFIED GRADES

December 22, 1986



SPECIFICATIONS FOR SLOW CURING LIQUID ASPHALTS: Slow curing liquid asphalts shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

ASPHALT GRADE	SC-70		SC-250		SC-800		SC-3000		A.S.T.M. TEST METHOD
	min.	max.	min.	max.	min.	max.	min.	max.	
Flash Point, Cleveland Open Cup, ° C	65	-	80	-	90	-	105	-	D92
Kinematic Viscosity at 60°C, mm ² /s	70	180	250	500	800	1 600	3 000	6 000	D2170
Distillation Test: Total distillate to 360°C, % by volume	10	30	4	20	2	12	-	5	D402
Distillation Residue Kinematic Viscosity at 60°C, mm ² /s	400	7000	800	10 000	2 000	16 000	4 000	35 000	D2170
Asphalt Residue Residue of 100 penetration, % by mass	50	-	60	-	70	-	80	-	D243
Ductility of 100 penetration residue at 25°C, cm(1)	100	-	100	-	100	-	100	-	D113
Solubility of Distillation Residue to 360°C, in Trichloroethylene, % by mass	99.0	-	99.0	-	99.0	-	99.0	-	D2042
Water, % by mass or volume	-	0.5	-	0.5	-	0.5	-	0.5	D95
Delivery Temperature, °C	55	75	75	95	90	110	110	130	

NOTE:

(1) If the ductility at 25°C is less than 100, the material will be acceptable if its ductility at 15°C is more than 100.

General Requirements: -The asphalt shall not foam when heated to the application temperature range recommended by the Asphalt Institute.
-The asphalt shall be uniform in character.

SPECIFICATIONS FOR MEDIUM-CURING LIQUID ASPHALTS: Medium curing liquid asphalts shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

ASPHALT GRADE	MC-30		MC-70		MC-250		MC-800		A.S.T.M. TEST METHOD
	min.	max.	min.	max.	min.	max.	min.	max.	
Flash Point, Open Tag, ° C	38	-	38	-	65	-	65	-	D1310
Kinematic Viscosity at 60°C, mm ² /s	30	60	70	140	250	500	800	1 600	D2170
Distillation Test: % by volume of total distillate to 360°C, -to 225°C	-	25	-	20	-	10	-	-	D402
-to 260°C	40	70	20	60	15	55	-	35	
-to 315°C	75	93	65	90	60	87	45	80	
Residue from distillation to 360°C, Volume % by difference	50	-	55	-	67	-	75	-	
Test on Residue from Distillation: a) Penetration at 25°C, 100 g, 5 s, dmm	120	250	120	250	120	250	120	250	D5
b) Ductility at 25°C, cm(1)	100	-	100	-	100	-	100	-	D113
c) Solubility in Trichloroethylene, % by mass	99.5	-	99.5	-	99.5	-	99.5	-	D2042
Water, % by mass or volume	-	0.2	-	0.2	-	0.2	-	0.2	D95
Delivery Temperature, °C	35	55	55	75	75	95	90	110	

NOTE:

(1) If the ductility at 25°C is less than 100, the material will be acceptable if its ductility at 15°C is more than 100.

General Requirements: -The asphalt shall not foam when heated to the application temperature range recommended by the Asphalt Institute.
-The asphalt shall be produced by the refining of petroleum and shall be uniform in character.

SPECIFICATIONS FOR RAPID-CURING LIQUID ASPHALTS: Rapid curing liquid asphalts shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

ASPHALT GRADE REQUIREMENTS	RC-30		RC-70		RC-250		A.S.T.M. TEST METHOD
	min.	max.	min.	max.	min.	max.	
Flash Point, Open Tag, ° C	-	-	-	-	27	-	D1310
Kinematic Viscosity at 60°C, mm ² /s	30	60	70	140	250	500	D2170
Distillation Test: % by volume of total distillate to 360°C, -to 190°C -to 225°C -to 260°C -to 315°C	15 55 75 90	- - - -	10 50 70 85	- - - -	- 35 60 80	- - - -	D402
Residue from distillation to 360°C, Volume % by difference	50	-	55	-	65	-	
Tests on Residue from Distillation: a) Penetration at 25°C, 100 g, 5 s, dmm b) Ductility at 25°C, cm(1) c) Solubility in Trichloroethylene, % by mass	80 100 99.5	120 - -	80 100 99.5	120 - -	80 100 99.5	120 - -	D5 D113 D2042
Water, % by mass or volume	-	0.2	-	0.2	-	0.2	D95
Delivery Temperature, °C	35	55	55	75	75	95	

NOTE:

(1) If the ductility at 25°C is less than 100, the material will be acceptable if its ductility at 15°C is more than 100.

General Requirements: -The asphalt shall not foam when heated to the application temperature range recommended by the Asphalt Institute.
-The asphalt shall be produced by the refining of petroleum and shall be uniform in character.

SPECIFICATIONS FOR ANIONIC EMULSIFIED ASPHALTS: Anionic emulsified asphalts shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

ASPHALT TYPE ASPHALT GRADE	RAPID SETTING (RS)				MEDIUM SETTING (MS)		SLOW SETTING (SS)				A.S.T.M. TEST METHOD
	RS-1		RS-2		MS-1		SS-1		SS-1H		
REQUIREMENTS	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	
Viscosity at 25 °C, SF s	20	100	-	-	20	100	20	60	20	60	D244
Viscosity at 50 °C, SF s	-	-	50	300	-	-	-	-	-	-	
Residue by Distillation, % by mass	55	(1)	60	(1)	55	(1)	55	(1)	55	(1)	D244
Settlement in 5 d, % difference by mass(2)	-	3	-	3	-	5	-	5	-	5	D244
Storage Stability Test, 24 h, % by mass(3)	-	1	-	1	-	1	-	1	-	1	D244
Sieve Test, % retained on a No. 1000 Sieve, % by mass(4)	-	0.10	-	0.10	-	0.10	-	0.10	-	0.10	D244
Demulsibility, 35 ml of 1.11 g/l CaCl ₂ , % by mass	60	-	60	-	-	-	-	-	-	-	D244
Cement Mixing Test, % by mass	-	-	-	-	-	-	-	2.0	-	2.0	D244
Particle Charge (5)	Negative		Negative		Negative		-		-		
Tests on Residue from Distillation:											
a) Penetration at 25 °C, 100 g, 5 s, dmm	100	200	100	200	100	200	100	200	40	100	D5
b) Ductility at 25 °C, and 5 cm/min., cm	60	-	60	-	60	-	60	-	60	-	D113
c) Solubility in Trichloroethylene, % by mass	97.5	-	97.5	-	97.5	-	97.5	-	97.5	-	D2042
Delivery Temperature, °C	35	65	45	70	40	70	40	70	40	70	

NOTES:

- (1) Upper limit on % residue is governed by the consistency limits.
- (2) The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days time.
- (3) The 24 hour storage stability test may be used instead of the 5 day settlement test, however in case of dispute the 5 day storage settlement test shall govern.
- (4) CGSB 8-GP-2M, Sieves, Testing, Woven Wire, Metric
- (5) Particle Charge Test (Qualitative) - The rapid setting grades will be tested for particle charge according to the procedure described in ASTM D 244, with the modification that the asphalt deposit will, for anionic emulsions, be found on the anode (positive electrode), and shall be continuous and opaque. In the event of dispute, the test will be repeated using freshly distilled water as the wash water for the electrodes, before evaluating the asphalt deposit.

General Requirements: -All tests shall be performed within 15 days of date of delivery.

-The asphalt shall be uniform in character, and shall have a refined petroleum base.

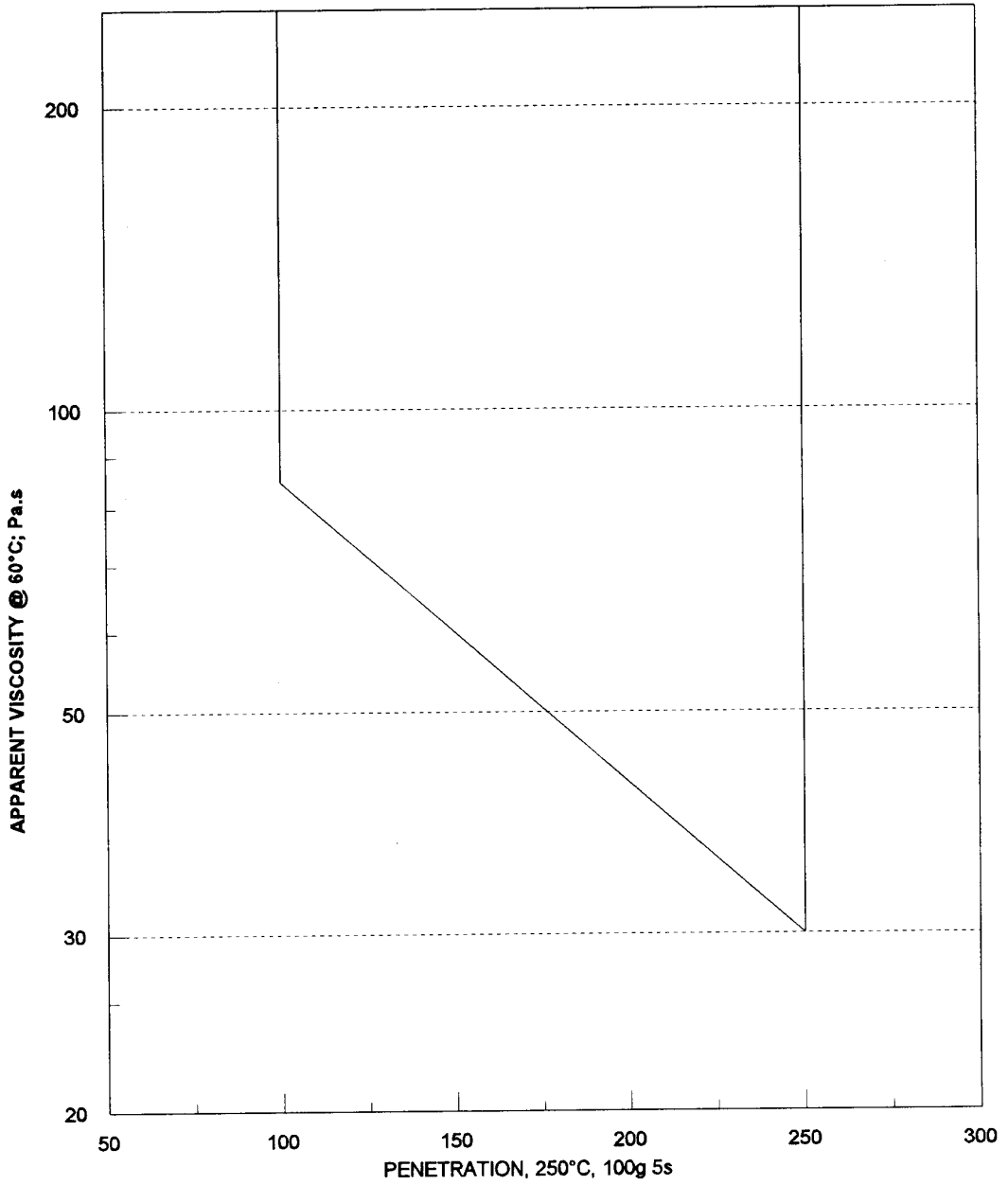
SPECIFICATIONS FOR CATIONIC EMULSIFIED ASPHALTS: Cationic emulsified asphalts shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

ASPHALT TYPE AND GRADE REQUIREMENTS	RS-1K		RS-2K		CRS-2		QS-Kh		A.S.T.M. TEST METHOD
	min.	max.	min.	max.	min.	max.	min.	max.	
Viscosity at 25 °C, SF s	-	-	-	-	-	-	20	100	D244
Viscosity at 50 °C, SF s	75	200	150	400	100	400	-	-	
Residue by Distillation, % by mass	65	(1)	65	(1)	65	-	57	(1)	D244
Settlement in 5 d, % difference by mass(2)	-	5	-	5			-	5	D244
Storage Stability Test, 24 h, % by mass(3)	-	1	-	1	-	1.5 (8)	-	1	D244
Demulsibility. 35 ml of 0.5 % by weight solution of sodium dioctyl sulphosuccinate, % by mass					60				
Oil Portion of Distillate, % by volume of emulsion	-	3	-	3	-	3	-	-	D244
Sieve Test, % retained on No. 1 000 Sieve (4)(5), by mass	-	0.10	-	0.10	-	0.10(8)	-	0.10	D244
Particle Charge (6)	Positive		Positive		Positive		Positive		
Tests on Residue from Distillation:									
a) Penetration at 25 °C, 100 g, 5 s, dmm	100	250	100	250	100	250	40	125	D5
b) Apparent Viscosity at 60° C, Pa.s					See Figure 1				
c) Ductility at 25 °C,(4) and 5 cm/min., cm(7)	60	-	60	-	60	-	60	-	D113
d) Solubility in Trichloroethylene, % by mass	97.5	-	97.5	-	97.5	-	97.5	-	D2042
Delivery Temperature, °C	60	80	60	85			-		

NOTES:

- (1) Upper limit on % residue is governed by the consistency limits.
 - (2) The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days time.
 - (3) The 24 hour storage stability test may be used instead of the 5 day settlement test, however in case of dispute the 5 day storage settlement test shall govern.
 - (4) CGSB 8-GP-2M, Sieves, Testing, Woven Wire, Metric
 - (5) Replace sodium oleate solution (2%) with distilled water, use distilled water in all operations including wetting and subsequent washing of wire cloth sieves.
 - (6) Particle Charge Test (Qualitative)- The emulsion will be tested for particle charge according to the procedure described in ASTM D 244, and it is required that the layer of asphalt deposited be continuous and opaque. In the event of dispute, the test will be repeated using freshly distilled water as the wash water for the electrodes, before evaluating the asphalt deposit.
 - (7) Ductility - Ductility will be measured at 25 °C for 100-200 penetration asphalts, and at 15 °C for 200-250 penetration asphalts.
 - (8) Requirements for Storage Stability and Sieve Test are waived if emulsion per forms satisfactorily during application.
- General Requirements: -All tests shall be performed within 15 days of date of delivery. -The asphalt shall be uniform in character, and shall have a refined petroleum base.

FIGURE 1
MINIMUM VISCOSITY FOR CRS-2 DISTILLATION RESIDUE



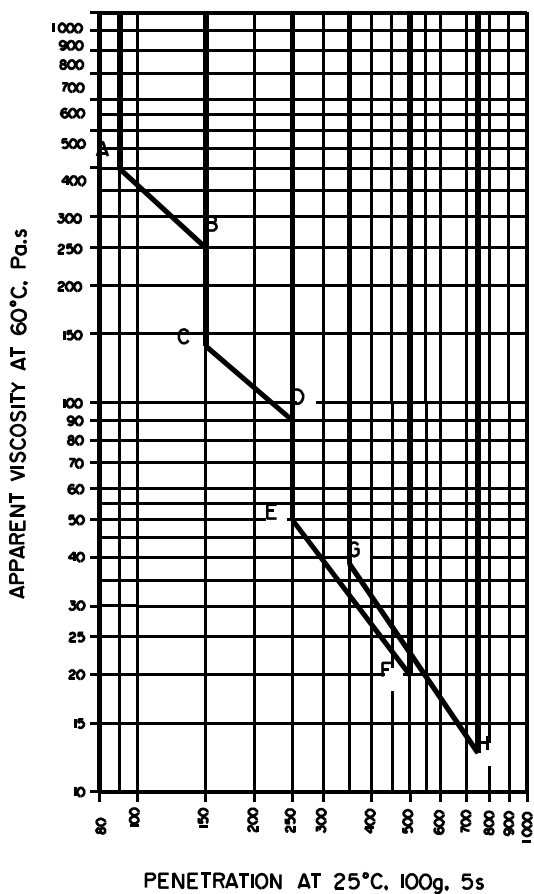
SPECIFICATIONS FOR HIGH FLOAT EMULSIFIED ASPHALTS: High Float emulsified asphalt shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

GRADE	HF-100S		HF-150S		HF-250S		HF-350S		HF-300M		HF-500M		HF-1000M		TEST METHODS Note(1)	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.		
Residue by Distillation, % by mass	62	(2)	62	(2)	62	(2)	65	(2)	65	(2)	65	(2)	65	(2)	Par./A1.6.2.1	
Oil Portion of Distillate, % by volume of emulsion	1	4	1	4	1	6	1.5	6	1	6	1	2	1	7	A.S.T.M. D244 & Par./A1.6.2.2	
Viscosity at 50°C, SF s	30	150	30	150	35	150	75	400	50	---	50	---	50	---	ASTM D244	
Sieve Test, % retained on No. 1000 sieve % by mass (3)	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10	Par. 6.2.3	
Coating Test (see Notes 4 & 5)	Note (4)		Note (4)		Note (4)		Note (5)		Note (5)		Note (5)		Note (5)		ASTM D244	
Workability at -10°C	---	---	---	---	---	---	---	---	---	---	---	---	Pass		Par./A1.6.2.4	
Storage Stability Test, 24h, % by mass	---	1.5	---	1.5	---	1.5	---	1.5	---	1.5	---	1.5	---	1.5	ASTM D244	
Demulsibility, 50 ml, 5.55 g/l CaCl ₂ , % by mass	60	---	60	---	---	---	---	---	---	---	---	---	---	---	ASTM D244	
Tests on Residue from Distillation:																
a) Penetration at 25°C, 100 g, 5 s, dmm	90	150	150	250	250	500	350	750	300	---	500	---	---	---	Par./A1.6.2.5	
b) Apparent Viscosity at 60°C, Pa·s	Requirements outlined on the chart beneath Figure 1									10	40	8	20	2	8	Par./A1.6.2.6
c) Float Test at 60°C, s	1200	---	1200	---	1200	---	1200	---	1200	---	1200	---	1200	---	Par./A1.6.2.7	
d) Solubility in Trichloroethylene, % by mass	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	ASTM D2042	
Delivery Temperature, °C	40	70	40	70	40	70	40	70	40	70	40	70	40	70		

NOTES:

- (1) Test methods are as outlined in CGSB CAN2-16.5-M84.
- (2) Upper limit on % residue is governed by the viscosity limits.
- (3) CGSB 8-GP-2M, Sieves, Testing, Woven Wire, Metric
- (4) Follow ASTM D244, except that the mixture of limestone and emulsified asphalt shall be capable of being mixed vigorously for 5 min., 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 90% coated.
- (5) Follow ASTM D244, except that the mixture of limestone and emulsified asphalt shall be mixed vigorously for 5 min., then allowed to stand for 3h, after which the mixture shall be capable of being mixed an additional 5 min. 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 90% coated.

ASPH-9 (cont.)



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

Viscosity value shall be reported at $0.5s^{-1}$ for grades HF-100S and HF-150S and at $1.0s^{-1}$ for grades HF-250S and HF-350S.

Grade of HF Emulsified Asphalt	HF-100S	HF-150S	HF-250S	HF-350S
	A, B	C, D	E, F	G, H

FIGURE 1

Viscosity Requirements for Distillation Residues from High-Float Emulsified Asphalts

SPECIFICATIONS FOR EMULSIFIED ASPHALT PRIMER: Emulsified asphalt primers shall conform to the requirements specified in the following table, for the grade designated by the Engineer:

ASPHALT GRADE REQUIREMENTS	SEP-1		SEP-2		A.S.T.M. TEST METHOD
	min.	max.	min.	max.	
Viscosity at 25°C, SF s	-	-	15	100	D88
Viscosity at 50°C, SF s	35	200	-	-	D244
Flash point, open Tag, °C	45	-	90	-	D3143
Residue by Distillation, % by mass	40	(1)	40	(1)	D244
Oil Portion of Distillate, % by volume of emulsion	12	29	12	29	D244
Settlement in 5 d	no visible separation		-	2	D244
Miscibility with Water (2)	is not miscible with water		pass		D244
Tests on Residue from Distillation:					
a) Penetration at 25°C, 100 g, 5 s, dmm	100	300	100	300	D5
b) Solubility in Trichloroethylene, % by mass	97.5	-	97.5	-	D2042

NOTES:

- (1) Upper limit on % residue is governed by the consistency limits.
- (2) Follow ASTM D244 except add the emulsified primer to the water. After two hours the water should be clear.