**The following Supplemental Specification supersedes, in its entirety, the version contained the Standard Specifications for Highway Construction, Edition 16, 2019:**

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* 1. SUPPLY OF ASPHALT
		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.

* + 1. MATERIALS
			1. General

The Contractor shall supply the types and grades of asphalt specified in the Contract. Asphalt suppliers' materials, including proprietary products, must be pre-qualified by the Department. Pre-qualified suppliers are listed in the Alberta Transportation Products List.

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.

Re-refined Engine Oil Bottoms (REOB), also known as Vacuum Tower Asphalt Extenders (VTAE), shall not be added in any proportion to PGAC. The Department may perform a chemical composition analysis to determine if REOB has been used.

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 Contractor shall notify the Consultant of any changes in asphalt material suppliers.

Performance grade asphalt cements (PGAC) shall meet the requirements of AASHTO M320 Standard Specification for Performance Graded Asphalt Binder (Table 1) with modifications for certain grades as outlined within the specification.

Suppliers of the following PG asphalts will be required to meet the following additional “quality stipulations” prior to receiving approval for listing on the Products list.

* For the PG 58-28 designation the Department will not pre-qualify an asphalt product which grades to a low temperature warmer than -30°C when tested according to AASHTO T313 Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR).
* For the PG 46-34 designation the Department will not pre-qualify an asphalt product which grades to a low temperature warmer than -37°C when tested according to AASHTO T313.

For asphalts designated as a PG 58-37, Table 1, Performance Graded Asphalt Binder Specification contained in AASHTO M320 shall be modified in accordance with the following criteria:

* The test temperature for creep stiffness and direct tension shall be -27oC;
* Dynamic Shear criteria on the PAV residue shall be met at a temperature of 14.5°C or lower.

For asphalts designated as a PG 64-37, Table 1, Performance Graded Asphalt Binder Specification contained in AASHTO M320 are modified in accordance with the following criteria:

* The test temperature for creep stiffness and direct tension shall be -27oC.
* Dynamic Shear criteria on the PAV residue shall be met at a temperature of 17.5°C or lower.

Liquid anti-strip additives listed on the Alberta Transportation Products List may be added to the asphalt product at a rate not to exceed 1% by weight of liquid asphalt. The anti-strip additive shall be heat stable and shall have no injurious effect on the asphalt product. The anti-strip additive/asphalt combination shall meet the AASHTO M320 requirements with modifications as outlined within this specification. The type and percentage of anti-strip additive used shall be listed on the delivery weigh-bills by the asphalt supplier.

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

The Department no longer specifies Penetration-Viscosity grades for Asphalt Cement and the associated tables (ASPH-1, 2 and 3) have been removed from this specification. Those tables can be referenced in Edition 15 of the Standards Specification for Highway Construction.

* + - 1. Percent Recovery Requirements for Selected PGAC Grades

Selected grades of PGAC will be tested at a temperature of 58⁰C to determine the average percent recovery at 3.2 kPa (R3.2) according to the requirements of AASHTO T 350 Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer. The minimum R3.2@58⁰C value for selected grades shall be as outlined in Table 5.7.2.2

|  |
| --- |
| **Table 5.7.2.2****PERCENT RECOVERY REQUIREMENTS** |
| **PGAC Grade** | **R3.2@58**⁰**C** |
| 58-34,64-28 | 25% |
| 58-37, 58-40, 64-34, 70-28 | 40% |
| 64-37, 76-28 | 55% |

In cases where the supplied asphalt grade is different from the specified grade of asphalt, in order to meet the Asphalt Grade Adjustment requirements listed in specification 3.50.2.4 Reclaimed Asphalt Pavement, the elastic recovery requirementslisted in Table 5.7.2.2 for the supplied grade shall apply.

Asphalt cements which have been enhanced to meet AASHTO M320 specifications through the use of polymer additives or other chemical means shall be referred to as modified asphalts.

* + - 1. Code of Practice – Cutback and Emulsified Asphalts

Suppliers and users of cutback and emulsified asphalts shall be familiar with the recommendations contained in the Environment and Climate Change Canada document titled Code of Practice for the Reduction of Volatile Organic Compound (VOC) Emissions from Cutback and Emulsified Asphalt. The Code defines the ozone season as the period between May 1 and September 30.

Volatile organic compounds (VOC) referred in the Code and this specification means the Item 65 components on the List of Toxic Substances in Schedule 1 of the Canadian Environmental Protection Act, 1999.

During the ozone season, the Contractor shall use only emulsified asphalts, or low-emitting VOC alternative products, with a VOC content equal to or less than 3% as determined by the oil portion of distillate collected when analyzed in accordance with ASTM D6997.

* + - 1. Delivery, Handling and Storage

When requested by the Consultant, 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.

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. Modified asphalts from different suppliers shall not be mixed, regardless of grade.

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.

* + 1. SAMPLING AND TESTING
			1. General

The Contractor shall obtain representative, uncontaminated samples of all asphalt materials 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 the appropriate one or two litre containers.

If the Contractor adds a liquid anti-strip additive to the asphalt product, asphalt samples shall be taken after the addition of the additive. The Contractor shall have the necessary procedures in-place to safely sample the treated asphalt including, where applicable, an in-line valve and sampling system.

* + - 1. 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.
			2. Quality Assurance

The Contractor shall deliver all quality assurance samples to the Consultant on the day they were sampled. The Consultant will forward the samples to the Department's designated quality assurance laboratory for testing and will accept or reject asphalt material based on the test results. Quality assurance testing for PGAC will be in accordance with AASHTO R29 Grading or Verifying the Performance Grade of an Asphalt Binder, and determination of R3.2@58°C according to AASHTO T350.

|  |
| --- |
| **TABLE 5.7.3****SAMPLING FREQUENCY FOR QUALITY ASSURANCE** |
| **material** | **Minimum Frequency (1) (For Each Asphalt Type)** |
| Asphalt Cement - all grades | One (2) per five 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 |

1. Minimum of one sample for each asphalt type or as listed above, whichever is greater.
2. One sample of asphalt cement consists of 2 - one litre cans, as per ATT-42
	* 1. ACCEPTANCE

Asphalt materials 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 material 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 payments from the subsequent monthly progress payment estimates.Payment adjustments will be as follows:

* For Work where the anti-strip additive or lime has not been incorporated into the mix, there is a payment reduction of 15% of the unit bid price of the affected asphalt concrete mix.
* For Work where the PGAC does not meet the specified grade, the payment adjustment to the affected mix will be:

Table 5.7.4

|  |  |
| --- | --- |
| Temperature Deviation (1) (2) | Payment Adjustment(% Reduction of unit bid price of mix) |
| Within 3 degrees of specified grade | N/A |
| From >3 degrees to <6 degrees of specified grade | 5% |
| From ≥6 degrees to ≤ 9 degrees of specified grade | 15% |
| Greater than 9 degrees of specified grade | Reject (3) |

1. Temperature Deviation – cumulative deviation of high and low temperature
2. The above payment adjustments would apply to a performance graded asphalt binder with lower than the specified high temperature or higher than the specified low temperature, with a cumulative temperature deviation of greater than 3 degrees. A performance graded binder better than specified is excluded from the calculations.

(3) The Department will determine whether removal and replacement is necessary. Removal and replacement of rejected asphalt concrete pavement shall be at the Contractor’s expense, and no separate or additional payment will be made. For material allowed to stay in-place, payment adjustment will be at a reduction of 50% of unit bid price.

* For asphalt materials, other than those identified above, that fail to meet the specifications; the deducted payment will be determined by the Consultant and will be equal to the estimated value of the asphalt material that fails to meet the requirements.

If, in the opinion of the Department, the failure to meet specification is significant enough to result in the probable unsatisfactory performance of the asphalt concrete pavement, the Contractor shall remove and replace all asphalt concrete pavement containing the rejected asphalt material. Removal and replacement of rejected asphalt concrete pavement shall be at the Contractor’s expense, and no separate or additional payment will be made.

Asphalt materials which pass AASHTO M320 specifications and minimum average percent recovery from Table 5.7.2.2, yet fail to meet the low temperature quality stipulations outlined in Subsection 5.7.2.1 General, will be accepted; however, products from approved suppliers with a history of frequent test results indicating non-compliance to these quality stipulations, as determined by the Department, will be removed from the Products list.

* + 1. APPEAL OF PGAC ACCEPTANCE TEST RESULTS AND APPEAL TESTING

The following procedures will apply for an appeal:

(i) Appeals will only be considered if the Contractor can demonstrate to the satisfaction of the Consultant that there is sufficient cause to support the appeal.

(ii) Acceptance test results for any rejected or penalized PGAC may be appealed only once.

(iii) The Contractor shall serve notice of appeal to the Consultant, in writing, within 24 hours of receipt of the test results.

(iv) The Consultant will request a retest on the un-opened can sample from the original material sample.

(v) The Contractor may have a representative present, virtually, during testing at the Department’s QA facility. During the period of the appeal testing, the Contractor’s representative shall comment, in writing, on anything concerning the testing which he/she does not consider to be valid, within 24 hours of the appeal testing. The Project Engineer and/or QA Consultant shall respond, in writing, to all comments to resolve them.

(vi) The cost of the appeal testing shall be borne by the Contractor unless the new values result in a reduced payment adjustment or not in reject, then the appeal testing costs will be the responsibility of the Department.

 The new values, thus determined, in all cases, will be binding on the Contractor and the Department.

* + 1. 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.

**ASPH-1**, **ASPH-2 and ASPH-3**

The Department no longer uses Penetration-Viscosity paving grades for Asphalt Cement. Tables ASPH-1, ASPH-2 and ASPH-3 can be found in Edition 15 of the Standard Specifications for Highway Construction.

**ASPH-4**

**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 Consultant:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ASPHALT GRADE** | **SC-70** | **SC-250** | **SC-800** | **SC-3000** | **A.S.T.M. TEST METHOD** |
| **REQUIREMENTS** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** |
| Flash Point, Cleveland Open Cup, ºC | 65 | - | 80 | - | 90 | - | 105 | - | D92 |
| Kinematic Viscosity at 60C, mm2 /s |  70 | 180 | 250 | 500 | 800 | 1 600 | 3 000 | 6 000 | D2170 |
| Distillation Test: Total distillate to 360ºC; % by volume | 10 | 30 | 4 | 20 | 2 | 12 | - | 5 | (2) TLT-214 |
| Distillation Residue; Kinematic Viscosity at 60ºC, mm2/s | 400 | 7 000 | 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 25ºC, cm(1) | 100 | - | 100 | - | 100 | - | 100 | - | D113 |
| Solubility of Distillation Residue to 360ºC, 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, ºC |  55 | 75 | 75 | 95 | 90 | 110 | 110 | 130 |  |

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

 (2) Alberta Transportation Laboratory Test.

**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.

**ASPH-5**

**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 Consultant:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ASPHALT GRADE** | **MC-30** | **MC-70** | **MC-250** | **MC-800** | **A.S.T.M. TEST METHOD** |
| **REQUIREMENTS** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** |
| Flash Point, Open Tag, ºC | 38 | - | 38 | - | 65 | - | 65 | - | D1310 |
| Kinematic Viscosity at 60ºC, mm2 /s |  30 | 60 | 70 | 140 | 250 |  500 |  800 | 1 600 | D2170 |
| Distillation Test:% by volume of total distillate to 360ºC,-to 225ºC-to 260ºC-to 315ºCResidue from distillation to 360ºC,Volume % by difference | -407550 | 257093- | -206555 | 206090- | -156067 | 105587- | --4575 | -3580- | (2) TLT-214 |
| Test on Residue from Distillation:a) Penetration at 25ºC, 100 g, 5 s, dmmb) Ductility at 25ºC, cm (1)c) Solubility in Trichloroethylene, % by mass | 12010099.5 | 250-- | 12010099.5 | 250-- |  12010099.5 | 250-- | 12010099.5 | 250-- | D5D113D2042 |
| Water, % by mass or volume | - | 0.2 | - | 0.2 | - | 0.2 | - | 0.2 | D95 |
| Delivery Temperature, ºC |  35 | 55 | 55 | 75 | 75 | 95 | 90 | 110 |  |

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

 (2) Alberta Transportation Laboratory Test.

**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.**ASPH-6**

**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 Consultant:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ASPHALT GRADE** | **RC-30** | **RC-70** | **RC-250** | **A.S.T.M. TEST METHOD** |
| **REQUIREMENTS** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** |
| Flash Point, Open Tag, ºC | - | - | - | - | 27 | - | D1310 |
| Kinematic Viscosity at 60ºC, mm2 /s |  30 | 60 | 70 | 140 | 250 |  500 | D2170 |
| Distillation Test:% by volume of total distillate to 360ºC,-to 190ºC-to 225ºC-to 260ºC-to 315ºCResidue from distillation to 360ºC,Volume % by difference |  1555759050 | ----- | 1050708555 | ----- | -35608065 | ----- | (2) TLT-214 |
| Tests on Residue from Distillation:a) Penetration at 25ºC, 100 g, 5 s, dmmb) Ductility at 25ºC, cm (1)c) Solubility in Trichloroethylene, % by mass | 8010099.5 | 120-- | 8010099.5 | 120-- |  8010099.5 | 120-- | D5D113D2042 |
| Water, % by mass or volume | - | 0.2 | - | 0.2 | - | 0.2 | D95 |
| Delivery Temperature, ºC |  35 | 55 | 55 | 75 | 75 | 95 |  |

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

 (2) Alberta Transportation Laboratory Test.

**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.

**ASPH-7**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ASPHALT TYPE**  | **RAPID SETTING (RS)** | **MEDIUM SETTING (MS)** | **SLOW SETTING (SS)** | **A.S.T.M. TEST METHOD** |
| **ASPHALT GRADE** | **RS-1** | **RS-2** | **MS-1** | **SS-1** | **SS-1H** |
| **REQUIREMENTS** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** |
| Viscosity at 25ºC, SF sViscosity at 50ºC, SF s | 20- | 100- | -50 | -300 | 20- | 100- | 20- | 60- | 20- | 60- | D244 |
| Residue by Distillation, % by mass | 55 | (1) | 60 | (1) | 55 | (1) | 55 | (1) | 55 | (1) | D6997 |
| Settlement in 5 d, % difference by mass (2) | - | 3 | - | 3 | - | 5 | - | 5 | - | 5 | D6930 |
| Storage Stability Test, 24 h, % by mass (3) | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 | D6930 |
| Sieve Test, % retained on a No. 1000 Sieve, % by mass (4) | - | 0.10 | - | 0.10 | - | 0.10 |  | 0.10 | - | 0.10 | D6933 |
| Demulsibility, 35 ml of 1.11 g/l CaCl2, % by mass | 60 | - | 60 | - | - | - | - | - | - | - | D6936 |
| Cement Mixing Test, % by mass | - | - | - | - | - | - | - | 2.0 | - | 2.0 | D6935 |
| Particle Charge (5) | Negative | Negative | Negative | - | - | D244 |
| Tests on Residue from Distillation:a) Penetration at 25ºC, 100 g, 5 s, dmmb) Ductility at 25ºC, and 5 cm/min., cmc) Solubility in Trichloroethylene, % by mass | 1006097.5 | 200-- | 1006097.5 | 200-- | 1006097.5 | 200-- |  1006097.5 | 200-- | 406097.5 | 100-- | D5D113D2042 |
| Delivery Temperature, ºC |  35 | 65 | 45 | 70 | 40 | 70 | 40 | 70 | 40 | 70 |  |

 (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. 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.

**ASPH-8a**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ASPHALT TYPE AND GRADE** | **CRS-1** | **CRS-2** | **CQS-1h** | **A.S.T.M. TEST METHOD** |
| **REQUIREMENTS** | **min.** | **max.** | **min.** | **max.** | **min.** | **max.** |
| Viscosity at 25ºC, SF sViscosity at 50ºC, SF s | -75 | -200 | -100 | -400 | 20- | 100- | D244 |
| Residue by Distillation, % by mass | 65 | (1) | 65 | - | 57 | (1) | D6997 |
| Settlement in 5 d, % difference by mass (2) | - | 5 |  |  | - | 5 | D6930 |
| Storage Stability Test, 24 h, % by mass (3) | - | 1 | - | 1.5 (8) | - | 1 | D6930 |
| Demulsibility. 35 ml of 0.8 % by weight solution of sodium dioctyl sulphosuccinate, % by mass |  |  | 40 |  |  |  | D6936 |
| Oil Portion of Distillate, % by volume of emulsion | - | 3 | - | 3 | - | - | D6997 |
| Sieve Test, % retained on No. 1 000 Sieve (4)(5), by mass | - | 0.10 | - | 0.10 (8) | - | 0.10 | D6933 |
| Particle Charge (6) | Positive | Positive | Positive | D244 |
| Tests on Residue from Distillation: |  |  |
| a) Penetration at 25ºC, 100 g, 5 s, dmm | 100 | 250 | 100 | 250 | 40 | 125 | D5 |
| b) Apparent Viscosity at 60ºC, Pa.s |  |  | See Figure 1 |  |  |  |
| c) Ductility at 25ºC,(4) and 5 cm/min., cm (7) | 60 | - | 60 | - | 60 | - | D113 |
| d) Solubility in Trichloroethylene, % by mass | 97.5 | - | 97.5 | - | 97.5 | - | D2042 |
| Delivery Temperature, ºC |  60 | 80 |  |  | - |  |  |

 (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 25ºC for 100-200 penetration asphalts, and at 15ºC for 200-250 penetration asphalts.

(8) Requirements for Storage Stability and Sieve Test are waived if emulsion performs 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.

**ASPH-8b**

 **SPECIFICATIONS FOR** **POLYMER-MODIFIED CATIONIC RAPID-SETTING EMULSIFIED ASPHALT**

| **ASPHALT TYPE AND GRADE** | **CRS-2P** | **A.S.T.M. TESTMETHOD** |
| --- | --- | --- |
| **REQUIREMENTS** | **min.** | **max.** |
| Viscosity at 50°C, SFs | 100 | 400 | D244 |
| Residue by Distillation, % by mass(1) | 65 | --- | D6997 |
| Oil Portion of Distillate, % by volume of emulsion | --- | 3.0 | D6997 |
| Storage Stability Test, 24 h, % by mass(2) | --- | 1.5 | D6930 |
| Demulsibility, 35 ml of 0.8% by weight solution of sodium dioctyl sulphosuccinate, % by mass | 40 | --- | D6936 |
| Sieve Test, % retained on a 1 000 µm sieve, % by mass | --- | 0.1 | D6933 |
| Particle Charge Test |  |  | D244 |
| **Test on Residue from Distillation** |  |  |  |
| Penetration at 25°C, 100 g, 5 s, dmm | 100 | 250 | D5 |
| Elastic Recovery at 10°C by Ductilometer, % | 55 | --- | D6084 Test B |
| Solubility in Trichloroethylene, % by mass(3) | 97.5 | --- | D2042 |
| Ash Content, % by mass of residue(3) | --- | 1.0 | TLT-229 |

Notes:

(1) Follow ASTM D 6997 except that the final temperature shall be 204°C and shall be maintained for 20 minutes. The ring burner shall be dropped when the temperature reaches 170°C. After distillation and weighing, the still shall be placed on a hot plate and uncovered. The contents shall be stirred with a preheated spatula for 10 seconds (approx. 30 times).

(2) Requirements for Storage Stability and Sieve Test are waived if emulsion performs satisfactorily during application.

(3) The ash content shall be determined when the manufacturer indicates that the polymer additive is not soluble in trichloroethylene.

**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.



**ASPH-9**

**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 Consultant:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **GRADE** | **HF-100S** | **HF-150S** | **HF-250S** | **HF-350S** | **HF-300M** | **HF-500M** | **HF-1000M** | **TEST (1)****METHODS** |
| **REQUIREMENTS** | **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. 6.2.1 |
| Oil Portion of Distillate, % by volume of emulsion | 1 | 3 | 1 | 3 | 1 | 3 | 1.5 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | A.S.T.M. D6997 & Par. 6.2.2 |
| Viscosity at 50ºC, 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. 6.2.2 |
| Coating Test (see Notes 4 & 5) | (4) | (4) | (4) |  (5) | (5) | (5) | (5) | ASTM D6998 |
| Workability at -10ºC  | --- | --- | --- | --- | --- | --- | --- | --- |  | --- | --- | --- | --- | Pass | Par. 6.2.3 |
| Storage Stability Test, 24h, % by mass | --- | 1.5 | --- | 1.5 | --- | 1.5 | --- | 1.5 | --- | 1.5 | --- | 1.5 | --- | 1.5 | ASTM D6930 |
| Demulsibility, 50 ml, 5.55 g/l CaCl2, % by mass | 60 | --- | 60 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ASTM D6936 |
| **Tests on Residue from Distillation:**a) Penetration at 25ºC, 100 g, 5 s, dmm | 90 | 150 | 150 | 250 | 250 | 500 | 350 | 750 | 300 | --- | 500 | --- | --- | --- | Par. 6.2.4 |
| b) Apparent Viscosity at 60ºC, Pa.s | Requirements outlined on the chart beneath Figure 1 | 10 | 40 | 8 | 20 | 2 | 8 | Par. 6.2.5/ A |
| c) Float Test at 60ºC, s | 1200 | --- | 1200 | --- | 1200 | --- | 1200 | --- | 1200 | --- | 1200 | --- | 1200 | --- | Par./A1.6.2.6 |
| d) Solubility in Trichloroethylene, % by mass | 97.5 | --- | 97.5 | --- | 97.5 | --- | 97.5 | --- | 97.5 | --- | 97.5 | --- | 97.5 | --- | ASTM D2042 |
| Delivery Temperature, ºC  | 40 | 70 | 40 | 70 | 40 | 70 | 40 | 70 | 40 | 70 | 40 | 70 | 40 | 70 |  |

(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-10**

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

|  |  |  |  |
| --- | --- | --- | --- |
| **ASPHALT GRADE** | **SEP-1** | **SEP-2** | **A.S.T.M. TEST METHOD** |
| **REQUIREMENTS** | **min.** | **max.** | **min.** | **max.** |
| Viscosity at 25ºC, SF s | - | - | 15 | 100 | D88 |
| Viscosity at 50ºC, SF s | 35 | 200 | - | - | D244 |
| Flash point, open Tag, ºC | 45 | - | 90 | - | D3143 |
| Residue by Distillation, % by mass | 40 | (1) | 40 | (1) | D6997 |
| Oil Portion of Distillate, % by volume of emulsion | 1 | 29(2) | 1 | 29(2) | D6997 |
| Settlement in 5 d | no visible separation | - | 2 | D6930 |
| Miscibility with Water (3) | is not miscible with water | pass | D6999 |
| Tests on Residue from Distillation:a) Penetration at 25ºC, 100 g, 5 s, dmmb) Solubility in Trichloroethylene, % by mass | 10097.5 | 300- | 10097.5 | 300- | D5D2042 |

1. Upper limit on % residue is governed by the consistency limits.
2. During the ozone season a maximum limit of 3%
3. Follow ASTM D6999 except add the emulsified primer to the water. After two hours the water should be clear.

**ASPH-11**

**SPECIFICATION FOR EMULSIFIED DUST SUPPRESSANTS**:

Emulsified Dust Suppressants shall conform to the requirements specified in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| **GRADE** | **EDS-1** | **EDS-2** | **ASTM Test Method** |
| **REQUIREMENTS** | **Minimum** | **Maximum** | **Minimum** | **Maximum** |
| Viscosity 25°C, SFs 50°C, SFs | 10 | 35 | 35 | 100 | D244 |
| Residue by distillation to 260°C, % by mass | 40 | - | 40 | - | D6997 |
| Oil portion of distillate, % by volume of emulsion | - | 5(1) | - | 10(1) | D6997 |
| Settlement, 5 days | - | No visible separation | D6930 |
| Storage Stability, 24 hours | No visible separation (2) | - | D6930 |
| Workability (3) | Pass | Pass | - |
| Flash Point, Open Tag, °C | - | - | 45 | - | D3143 |
| Miscibility with water | Pass | Pass (4) | D6999 |
| Kinematic viscosity of residue from distillation, 60°C, mm2/s | 25 | 100 | 25 | 300 | D2170 |

(1) Maximum limit of 3% during the ozone season.

(2) If EDS-1 is retained in storage for an extended period of time, it should be circulated prior to use.

(3) When 500 grams of sand and 50 g of emulsion are mixed for 5 minutes at ambient temperature, the sand shall be 100% coated. The mixture shall be oven dried at 120ºC to remove all the moisture. After cooling to room temperature, the mix shall be easily workable for the next 24 hours.

(4) Follow ASTM D6999 except add the EDS-2 to water. After 2 hours the water should be clear.

**ASPH-12**

**SPECIFICATION FOR COLD POUR RUBBER FILLED EMULSIFIED BITUMINOUS CRACK SEALANT**:

Cold Pout Rubber Filled Emulsified Bituminous Crack Sealants shall conform to the requirements specified in the following table:

|  |  |  |
| --- | --- | --- |
| **TYPE** | **EC-101** | **Test Method\*** |
| **REQUIREMENTS** | **Minimum** | **Maximum** |
| Uniformity, 24 hours | Pass | TLT-226 |
| Stormer viscosity at 25°C, Krebs | 70 | 90 | TLT-227 |
| Solids content, % | 59 | - | ASTM D244 (Residue by Evaporation Procedure A) |
| Ash content, % | - | 2.0 | TLT-229 |
| Rate of curing, % loss | 50%24 hrs. | 80%6 days | - | TLT-230 |
| Low temperature flexibility, -4°C, 30s | Pass (no cracks) | TLT-231 |
| Elastic recovery, % recovered | 40 | - | TLT-232 |

\* TLT Refers to: Alberta Transportation Laboratory Test

**ASPH-13**

**SPECIFICATION FOR HOT POUR BITUMINOUS CRACK SEALANT**:

Hot Pour Bituminous Crack Sealants shall conform to the requirements specified in the following table:

|  |  |  |
| --- | --- | --- |
| **TYPE** | **HC-200** | **Test Method** |
| **REQUIREMENTS** | **Minimum** | **Maximum** |
| Softening Point, °C | 80 | 95 | ASTM D36 |
| Flash Point, Cleveland Open Cup, °C | 230 | - | ASTM D92 |
| Penetration 0°C, 200g, 60s, dmm 25°C, 100g, 5s, dmm 46°C, 50g, 5s, dmm | 3055 | 65150 | ASTM D5 |
| Ductility, 25°C, cm | 45 | - | ASTM D113 |
| Solubility in Trichloroethylene, % | 98 | - | ASTM D2042 |
| Kinematic viscosity at 177°C, mm2/s | - | 1500 | ASTM D2170 |