

SECTION 02745

ASPHALT MATERIAL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Asphalt materials.

1.2 PAYMENT PROCEDURES

- A. Price adjustments for asphaltic cement and liquid asphalt (chip-seal emulsions and/or cut-backs):
 - 1. Standard department procedures governs price adjustments made where asphalt material does not conform to the specifications
 - a. If the price adjustment exceeds 30 percent, the Engineer may order the removal of any or all the defective asphalt material.
 - b. The pay factor for such material is 0.50 when allowed to remain in place.
- B. Price adjustments for Performance Graded Asphalt Binder (PGAB):
 - 1. Standard department PGAB management plan governs price reductions or removal of material where they binder does not conform to the specifications.

1.3 REFERENCES

- A. AASHTO M 81: Cut-Back Asphalt (Rapid-Curing Type).
- B. AASHTO M 82: Cut-Back Asphalt (Medium-Curing Type).
- C. AASHTO M 140: Emulsified Asphalt.
- D. AASHTO M 208: Cationic Emulsified Asphalt.
- E. AASHTO M 226: Viscosity Graded Asphalt Cement.
- F. AASHTO MP 1: Performance Graded Asphalt Cement.
- G. AASHTO T 44: Solubility of Bituminous Materials.
- H. AASHTO T 49: Penetration of Bituminous Materials.

- I. AASHTO T 50: Float Test for Bituminous Materials.
- J. AASHTO T 51: Ductility of Bituminous Materials.
- K. AASHTO T 59: Testing Emulsified Asphalt.
- L. AASHTO T 201: Kinematic Viscosity of Asphalts.
- M. AASHTO T 228: Specific Gravity of Semi-Solid Bituminous Materials.
- N. AASHTO T 240: Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test).
- O. AASHTO T 300: Force Ductility of Bituminous Materials.
- P. AASHTO T 301: Elastic Recovery Test of Bituminous Materials by Means of a Ductilometer.
- Q. ASTM D 92: Flash and Fire Points by Cleveland Open Cup.
- R. ASTM D 1190: Concrete Joint Sealer, Hot-Applied Elastic Type.
- S. ASTM D 2007: Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method.
- T. ASTM D 2026: Cutback Asphalt (Slow-Curing Type).
- U. ASTM D 3405: Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements.
- V. ASTM D 4402: Viscosity Determinations of Unfilled Asphalts Using the Brookfield Thermosel Apparatus.
- W. ASTM D 5167: Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation.
- X. ASTM D 5329: Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.
- Y. ASTM D 5801: Toughness and Tenacity of Bituminous Materials.

1.4 SUBMITTALS

- A. For each shipment of material, supply a vendor-prepared bill of lading showing the following information:
1. Type and grade of material
 2. Type and amount of additives, used, if applicable
 3. Destination
 4. Consignee's name
 5. Date of Shipment
 6. Railroad car or truck identification
 7. Project number
 8. Loading temperature
 9. Net weight in metric units (or net liters corrected to 16 degrees C, when requested)
 10. Specific gravity
 11. Bill of lading number
 12. Manufacturer of asphalt material

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Each shipment of asphalt material must:
1. Be uniform in appearance and consistency.
 2. Show no foaming when heated to the specified loading temperature.
- B. Do not supply shipments contaminated with other asphalt types or grades than those specified.

1.6 GRADE OF MATERIAL

- A. The Engineer determines the grade of material to be used based on the supply source designated by the Contractor when the bid proposal lists more than one grade of asphalt material.

PART 2 PRODUCTS

2.1 PERFORMANCE GRADED ASPHALT BINDER (PGAB)

- A. Supply PGABs under the Approved Supplier Certification (ASC) System. Refer to UDOT Asphalt Binder Quality Management Plan.

- B. As specified in AASHTO MP 1, with the following modifications:
1. Delete superscript (f) for all specified grades having algebraic differences of 92 degrees C or greater between the high and low design temperatures.
 2. Add Direct Tension Test for all specified grades having algebraic differences of 92 degrees C or greater between the high and low design temperatures.
 - a. Failure Strain, minimum of 1.5 percent at 1.0 mm/min.
 - b. Failure Stress, minimum of 4.0 Mpa
 3. Delete $G^*/\sin \delta$ requirement for the original binder on all specified grades having algebraic differences of 92 degrees C or greater between the high and low design temperatures.
 4. Add G^* and phase angle (δ) requirements for the original binder on all specified grades having an algebraic difference of 92 degrees C between the high and low design temperatures.
 - a. G^* (complex modulus), 1.3 kPa, minimum
 - b. Phase angle (δ), 74 degrees, maximum
 5. Add G^* and phase angle (δ) requirements for the original binder on all specified grades having an algebraic difference of 98 degrees C or greater between the high and low design temperatures.
 - a. G^* (complex modulus), 1.3 kPa, minimum
 - b. Phase angle (δ), 71 degrees, maximum
 6. Add Toughness and Tenacity Test for all specified grades having algebraic differences of 92 degrees C or greater between the high and low design temperatures.
 - a. Meet a minimum of 75 lb-in 50 lb-in respectively for each test specimen.

2.2 ASPHALTIC CEMENT, LIQUID ASPHALTS, REJUVENATING AGENTS

- A. As specified in AASHTO M 226, Table 2 with the following modifications:
1. Delete and replace ductility at 77°F(25°C) with ductility at 39.2°F(4°C) with values as detailed below.

| | | | |
|-----------------|---------------|----------------|----------------|
| <u>AC - 2.5</u> | <u>AC - 5</u> | <u>AC - 10</u> | <u>AC - 20</u> |
| 50+ | 25+ | 15+ | 5+ |

- B. As specified for cationic and anionic emulsified asphalt.
1. All standard Slow Setting (SS, CSS), Medium Setting (MS, CMS), and Rapid Setting (RS, CRS) grades; inclusive of all High-Float designations (HF).
 2. Supply under the Approved Supplier Certification System (ASC).
 3. Meet AASHTO M 208 and M 140.

- C. Conform to the requirements of:
 - 1. Table 1: Cationic Rapid Setting Emulsified Polymerized Asphalt (CRS-2P); or
 - 2. Table 2: Latex Modified Cationic Rapid Setting Emulsified Asphalt (LMCRS-2); or
 - 3. Table 3: Cationic Medium Setting Emulsified Asphalt (CMS-2S); or
 - 4. Table 4: High Float Medium Setting Emulsified Polymerized Asphalt (HRMS-2SP); or
 - 5. Table 5: High Float Rapid Setting Emulsified Polymerized Asphalt (HFRS-2P); or
 - 6. Table 6: Cationic Rapid Setting Emulsified Asphalt (CRS-2A, B).

- D. Curing cut-back asphalt:
 - 1. As specified for slow curing (SC) in ASTM D 2026.
 - 2. As specified for medium curing (MC) in AASHTO M 82.
 - 3. As specified for rapid curing (RC) in AASHTO M 81.

- E. Conform to requirements for Emulsified Asphalt Pavement Rejuvenating Agent:
 - 1. Table 7: Type B
 - 2. Table 8: Type B Modified
 - 3. Table 9: Type C
 - 4. Table 10: Type D

Table 1

| Cationic Rapid Setting Emulsified Polymerized Asphalt (CRS-2P) | | | |
|---|---------------------------|-------------|-------------|
| Tests | AASHTO Test Method | Min. | Max. |
| Emulsion | | | |
| Viscosity , SFS, 140°F(60°C), sec (Project-site Acceptance/Rejection Limits) | T59 | 100 | 400 |
| Settlement (a) 5 days, percent | T 59 | | 5 |
| Storage Stability Test (b) 1 d, 24 h, percent | T 59 | | |
| Demulsibility (c) 35 ml, 0.8% sodium dioctyl Sulfosuccinate, percent | T 59 | 40 | |
| Particle Charge Test | T 59 | Positive | |
| Sieve Test, percent | T 59 | | 0.10 |
| Distillation | | | |
| Oil distillate, by vol of emulsion, percent | | | 0 |
| Residue (d), percent | | 68 | |
| Residue from Distillation Test | | | |
| Penetration, 77°F(25°C), 100 g, 5 s, dmm | T 49 | 80 | 150 |
| Ductility, 39.2°F(4°C), 5 cm/min, cm | T 51 | 35 | |
| Toughness, lb-in | ASTM D5801 | 75 | |
| Tenacity, lb-in | ASTM D5801 | 50 | |
| Solubility in trichloroethylene, percent | T 44 | 97.5 | |
| <p>(a) The test requirement for settlement may be waived when the emulsified asphalt is used in less than a five-day time; or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.</p> <p>(b) The 24-hour (1-day) storage stability test may be used instead of the five-day settlement test.</p> <p>(c) The demulsibility test is made within 30 days from date of shipment.</p> <p>(d) Distillation is determined by AASHTO T 59, with modifications to include a 350 ± 5 °F(177 ± 3°C) maximum temperature to be held for 15 minutes.</p> | | | |
| Modify the asphalt cement prior to emulsification. | | | |

Table 2

| Latex Modified Cationic Rapid Setting Emulsified Asphalt (LMCRS-2) | | | |
|---|---------------------------|-------------|-------------|
| Tests | AASHTO Test Method | Min. | Max. |
| Emulsion | | | |
| Viscosity, SFS, 122 °F(50 °C), Sec (Project Site Acceptance/Rejection Limits) | T59 | 75 | 300 |
| Settlement (a) 5 days, percent | T 59 | | 5 |
| Storage Stability Test (b) 1 d, 24 h, percent | T 59 | | 1 |
| Demulsibility (c) 35 ml, 0.8% sodium dioctyl Sulfosuccinate, percent | T 59 | 40 | |
| Particle Charge Test | T 59 | Positive | |
| Sieve Test, percent | T 59 | | 0.3 |
| Distillation | | | |
| Oil distillate, by vol of emulsion, percent | | | 0 |
| Residue (d), percent | | 65 | |
| Residue from Distillation Test | | | |
| Penetration, 77°F(25°C), 100 g, 5 s, dmm | T 49 | 80 | 150 |
| Ductility, 39.2 °F(4 °C), 5 cm/min, cm | T51 | 35 | |
| Toughness, lb-in | ASTM D5801 | 75 | |
| Tenacity, lb-in | ASTM D5801 | 50 | |
| <p>(a) The test requirement for settlement may be waived when the emulsified asphalt is used in less than a five-day time; or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.</p> <p>(b) May use the 24-hour (1-day) storage stability test instead of the five-day settlement test.</p> <p>(c) Make the demulsibility test within 30 days from date of shipment.</p> <p>(d) Determine distillation by AASHTO T 59,with modifications to include a 350 ± 5 °F(177 ± 3°C) maximum temperature to be held for 15 minutes.</p> | | | |
| Co-mill latex and asphalt during emulsification | | | |

Table 3

| Cationic Medium Setting Emulsified Asphalt (CMS-2S) | | |
|--|---------------------------|----------------------|
| Tests | AASHTO Test Method | Specification |
| Emulsion | | |
| Viscosity, SSF, 122°F(50°C), sec. | T 59 | 50 - 450 |
| Percent residue | T 59 | 60 min |
| One-day storage stability, percent | T 59 | 1 max |
| Sieve, percent | T 59 | 0.10 max |
| Particle charge | T 59 | Positive |
| Oil Distillate, percent by volume of emulsion | T 59 | 5-15 |
| Residue | | |
| Penetration, 77°F(25°C), 100g, 5 sec, dmm | T 59 | 100-250 |
| Solubility, percent | T 59 | 97.5 min. |

Table 4

| High Float Medium Setting Emulsified Polymerized Asphalt (HFMS-2P) (a) | | | |
|--|-------------------------------|-------------|-------------|
| Tests | AASHTO Test method | Min. | Max. |
| Emulsion | | | |
| Viscosity , SSF ,122°F(50°C), sec (Project Site Acceptance/Rejection Limits) | T 59 | 50 | 450 |
| Storage Stability Test (a) 1 d, 24 h, percent | T 59 | | 0.1 |
| Sieve Test, percent | T 59 | | 0.1 |
| Distillation | | | |
| Oil distillate, by vol of emulsion, percent | T 59 | 1 | 7 |
| Residue (c), percent | T 59 | 65 | |
| Residue from Distillation Test | | | |
| Penetration, 77°F(25°C), 100 g, 5 s, dmm | T 49 | 70 | 300 |
| Float Test, 140°F(60°C), sec | T 50 | 1200 | 300 |
| Solubility in trichloroethylene, percent | T 44 | 97.5 | |
| Elastic Recovery, 77°F(25°C), percent | T 301 | 50 | |
| <p>(a) Supply an HFMS-2SP (anionic, polymerized, high-float) as an emulsified blend of polymerized asphalt cement, water, and emulsifiers. Polymerize the asphalt cement with a minimum of 3.0% polymer by weight of the asphalt cement prior to emulsification. After standing undisturbed for a minimum of 24 hours, the emulsion shall be smooth and homogeneous throughout with no white, milky separation, pumpable, and suitable for application through a distributor.</p> <p>(b) May use the 24-hour (1-day) storage stability test instead of the five-day settlement test.</p> <p>(c) Determine the distillation by AASHTO T 59, with modifications to include a 350 ± 5 °F(177 ± 3 °C) maximum temperature to be held for 15 minutes.</p> | | | |

Table 5

| High Float Rapid Setting Emulsified Polymerized Asphalt (HFRS-2P) (a) | | | |
|---|---------------------------|-------------|-------------|
| Tests | AASHTO Test method | Min. | Max. |
| Emulsion | | | |
| Viscosity , SFS @ 122°F(50°C), sec (Project Site Acceptance/Rejection Limits) | T 59 | 50 | 450 |
| Storage Stability Test (a) 1 d, 24 h, percent | T 59 | | 1 |
| Demulsibility (b) 0.02 N Ca Cl ₂ , percent | T 59 | 40 | |
| Sieve Test, percent | T 59 | | 0.1 |
| Distillation | | | |
| Oil distillate, by vol of emulsion, percent | T 59 | | 3 |
| Residue (c), percent | T 59 | 65 | |
| Residue from Distillation Test | | | |
| Penetration, 77°F(25°C), 100 g, 5 s, dmm | T 49 | 70 | 150 |
| Float Test, 140°F(60°C), sec | T 50 | 1200 | |
| Solubility in trichloroethylene, percent | T 44 | 97.5 | |
| Elastic Recovery, 77°F(25°C), percent | T 301 | 58 | |
| <p>(a) Supply an HFMS-2SP (anionic, polymerized, high-float) as an emulsified blend of polymerized asphalt cement, water, and emulsifiers. Polymerize the asphalt cement with a minimum of 3.0% polymer by weight of the asphalt cement prior to emulsification. After standing undisturbed for a minimum of 24 hours, the emulsion shall be smooth and homogeneous throughout with no white, milky separation, pumpable, and suitable for application through a distributor.</p> <p>(b) May use the 24-hour (1-day) storage stability test instead of the five-day settlement test.</p> <p>(c) Determine the distillation by AASHTO T 59, with modifications to include a 350 ± 5 °F(177±3°C) maximum temperature to be held for 15 minutes.</p> | | | |

Table 6

| Cationic Rapid Setting Emulsified Asphalt (CRS-2A,B) | | | |
|--|---------------------------|------------|------------|
| Tests | AASHTO Test Method | Min | Max |
| Emulsion | | | |
| Viscosity, SSF, 122°F(50°C), sec (Project Site Rejection/Acceptance Limits) | T 59 | 140 | 400 |
| Storage stability test, 24 h, percent | T 59 | | 1 |
| Demulsibility, 35 mL 0.8 percent Sodium Dioctyl Sulfosuccinate, percent | T 59 | 40 | |
| Particle charge test | T 59 | Positive | |
| Sieve test, percent | T 59 | | 0.10 |
| Distillation | | | |
| Oil distillate, by volume of emulsion, percent | T 59 | | 0 |
| Residue, percent | T 59 | 65 | |
| Use PG58-22 and PG64-22 as base asphalt cement for CRS-2A, B, respectively. Specification for high temperature performance: original and RTFO $G^*/\sin\delta$ within 3 °C of grade. | | | |

Table 7

| Emulsified Type B Asphalt Pavement Rejuvenating Agent Concentrate | | |
|--|-----------------------|---------------|
| Tests | Test Method | Limits |
| Viscosity, SSF, 77°F(25°C), sec | AASHTO T 59 | 25-150 |
| Residue, percent W | AASHTO T 59 (mod) (a) | 62 Min. |
| Sieve Test, percent W | AASHTO T 59 | 0.10 Max. |
| 5-day Settlement | AASHTO T 59 | 5.0 Max. |
| Particle Charge | AASHTO T 59 | Positive |
| Pumping Stability (b) | | Pass |
| Residue from Distillation (a) | | |
| Viscosity @ 140°F(60°C), mm ² /s | AASHTO T 201 | 2500-7500 |
| Solubility in 1,1,1 Trichloroethylene, percent | AASHTO T 44 | 98 Min. |
| Flash Point, COC | ASTM D 92 | 204 °C, Min. |
| Asphaltenes, percent W | ASTM D 2007 | 15 Max. |
| Saturates, percent W | ASTM D 2007 | 30 Max. |
| Aromatics, percent W | ASTM D 2007 | 25 Min. |
| Polar Compounds, percent W | ASTM D 2007 | 25 Min. |
| (a) Determine the distillation by AASHTO T-59 with modifications to include a 300 ± 5 °F(149±3°C) maximum temperature to be held for 15 minutes. (b) Test pumping stability by pumping 475 ml of Type B diluted 1 part concentrate to 1 part water, at 77°F(25°C) through a 1/4 inch gear pump operating at 1750 rpm for 10 minutes with no significant separation or coagulation in pumped material. | | |
| Type B: an emulsion of lube oil and/or lube oil extract blended with petroleum asphalt. | | |

Table 8

| Emulsified Type B Modified Asphalt Pavement Rejuvenating Agent Concentrate | | |
|--|---|---------------|
| Property | Test Method | Limits |
| Viscosity, SSF, 77°F(25°C), sec | AASHTO T 59 | 50-200 |
| Residue by distillation or Evaporation (a), percent W | AASHTO T 59 | 62 Min. |
| Sieve Test, percent W | AASHTO T 59 | 0.20 Max. |
| 5-day Settlement, percent W | AASHTO T 59 | 5.0 Max. |
| Particle Charge | AASHTO T 59 | Positive |
| Pumping Stability (b) | | Pass |
| Residue from Distillation (a) | | |
| Viscosity (c)275°F(135 °C), cP | ASTM D 4402 | 150 - 300 |
| Penetration, 77°F(25°C), dmm | AASHTO T 49 | 180 Min. |
| Solubility in 1,1,1 Trichloroethylene, percent | AASHTO T 44 | 98 Min. |
| Flash Point, COC, °F(°C) | AASHTO T 48 | 400(204) Min. |
| Asphaltenes, percent W | ASTM D 2007 | 20-40 |
| Saturates, percent% W | ASTM D 2007 | 20 Max. |
| Polar Compounds, percent W | ASTM D 2007 | 25 Min. |
| Aromatics, percent W | ASTM D 2007 | 20 Min. |
| PC/S Ratio | ASTM D 2007 | 1.5 Min. |
| (a) | Determine the distillation by AASHTO T-59 with modifications to include a 300±5°F(149 ± 3°C) maximum temperature to be held for 15 minutes. | |
| (b) | Pumping stability is tested by pumping 475 ml of Type B diluted 1 part concentrate to 1 part water, at 77°F(25 °C) through a 1/4 inch gear pump operating at 1750 rpm for 10 minutes with no significant separation or coagulation in pumped material. | |
| (c) | Brookfield Thermocel Apparatus-LV model at 6 rpm with a #28 spindle at 2-98 torque. | |
| As required by the Asphalt Emulsion Quality Management system (Materials Manual Part 8-208), the supplier certifies that the base stock contains a minimum of 15 % by weight of Gilsonite Ore. Use the HCL precipitation method as a qualitative test to detect the presence of Gilsonite. | | |

Table 9

| Emulsified Type C Asphalt Pavement Rejuvenating Agent Concentrate | | |
|---|--------------------|----------------------------|
| Property | Test Method | Limits |
| Viscosity,SFS,77°F(25°C), sec | AASHTO T 59 | 10-100 |
| Residue (a), percent W (Type C supplied ready to use 1:1 or 2:1. | AASHTO T 59 (a) | 30 Min. 1:1 40 Min. 2:1 |
| Sieve Test, percent W (b) | | 0.10 Max. |
| 5-day Settlement, percent W | AASHTO T 59 | 5.0 Max. |
| Particle Charge | AASHTO T 59 | Positive |
| pH (May be used if particle charge test is inconclusive) | | 2.0 - 7.0 |
| Pumping Stability (c) | | Pass |
| Tests of Residue from Distillation (a) | | |
| Viscosity, 275°F(135°C), mm ² /s | AASHTO T 201 | 475-1500 |
| Solubility in 1,1,1 Trichloroethylene, percent | AASHTO T 44 | 97.5 Min. |
| RTFO mass loss, percent W | AASHTO T 240 | 2.5 Max. |
| Specific Gravity | AASHTO T 228 | 0.98 Min. |
| Flash Point, COC | AASHTO T 48 | 232 °C, Min. |
| Asphaltenes, percent W | ASTM D 2007 | 25 Min., 45 Max. |
| Saturates, percent W | ASTM D 2007 | 10 Max. |
| Polar Compounds, percent W | ASTM D 2007 | 30 Min. |
| Aromatics, percent W | ASTM D 2007 | 15 Min. |
| <p>(a) Determine the distillation by AASHTO T-59 with modifications to include a 300± 5°F(149 ± 3°C) maximum temperature to be held for 15 minutes.</p> <p>(b) Test method identical to AASHTO T 59 except that distilled water is used in place of 2 % sodium oleate solution.</p> <p>(c) Test pumping stability by pumping 475 ml of Type diluted 1 part concentrate to 1 part water, at 77°F(25°C) through a 1/4 inch gear pump operating at 1750 rpm for 10 minutes with no significant separation or coagulation in pumped material.</p> | | |
| <p>As required by the Asphalt Emulsion Quality Management system (Materials Manual Part 8-208), the supplier certifies that the base stock contains a minimum of 10 % by weight of Gilsonite ore. Use the HCL precipitation method as a qualitative test to detect the presence of Gilsonite.</p> | | |

Table 10

| Emulsified Type D Asphalt Pavement Rejuvenating Agent Concentrate | | |
|--|-----------------------|---------------|
| Property | Test Method | Limits |
| Viscosity, SFS, 77°F(25°C), sec | AASHTO T 59 | 30-90 |
| Residue, (a) percent W | AASHTO T 59 (mod) (a) | 65 |
| Sieve Test, percent W | AASHTO T 59 | 0.10 Max. |
| pH | | 2.0 - 5.0 |
| Residue from Distillation (c) | | |
| Viscosity, 140°F(60°C), cm ² /s | AASHTO T 201 | 300-1200 |
| Viscosity, 275°F(135°C), mm ² /s | AASHTO T 201 | 300 Min. |
| Modified Torsional Recovery (b) | CA 332 (Mod) | 40 % Min. |
| Toughness, 77°F(25°C), in-lb | ASTM D 5801 | 8 Min. |
| Tenacity, 77°F(25°C), in-lb | ASTM D 5801 | 5.3 Min. |
| Asphaltenes, percent W | ASTM D 2007 | 16 Max. |
| Saturates, percent W | ASTM D 2007 | 20 Max. |
| (a) California test method #331 for recovery of residue. (b) Torsional recovery measurement to include first 30 seconds. (c) Determine the distillation by AASHTO T-59 with modifications to include a 300±5°F(149 ± 3°C) maximum temperature to be held for 15 minutes. | | |

2.3 HOT-POUR CRACK SEALANT FOR BITUMINOUS CONCRETE

- A. Combine a homogenous blend of materials to produce a sealant meeting properties and tests in Table 11.
- B. Packaging and Marking: Supply sealant pre-blended, pre-reacted, and pre-packaged in lined boxes weighing no more than 30 lb.
 - 1. Use a dissolvable lining that will completely melt and become part of the sealant upon subsequent re-melting.
 - 2. Deliver the sealant in the manufacturer's original sealed container. Clearly mark each container with the manufacturer's name, trade name of sealant, batch or lot number, and recommended safe heating and application temperatures.

Table 11

| Hot-Pour Bituminous Concrete Crack Sealant | | | |
|---|---|----------------|----------------|
| Application Properties: | | | |
| Workability: | Pour readily and penetrate 0.25 in and wider cracks for the entire application temperature range recommended by the manufacturer. | | |
| Curing: | No tracking caused by normal traffic after 45 minutes from application. | | |
| Asphalt Compatibility: ASTM D 5329, Sec 14. | No failure in adhesion. No formation of an oily ooze at the interface between the sealant and the bituminous concrete or softening or other harmful effects on the bituminous concrete. | | |
| Material Handling: | Follow the manufacturer's safe heating and application temperatures. | | |
| Test Method | Property | Minimum | Maximum |
| AASHTO T51 | Ductility, modified, 1cm/min, 39.2°F(4°C),cm | 30 | |
| UDOT method 967 | Cold Temperature Flexibility | no cracks | |
| AASHTO T 300 (a) | Force-Ductility, lbf | | 4 |
| ASTM D 5329 | Flow 140°F(60°C), 5 hrs 75 ° angle, mm | | 3 |
| ASTM D 3405 (b) | Tensile-Adhesion, modified | 300% | |
| AASHTO T 228 | Specific Gravity, 60°F(15.6°C) | | 1.140 |
| ASTM D 5329 | Cone Penetration, 77°F(25°C), 150 g, 5 sec., dmm | | 90 |
| ASTM D 5329 | Resilience, 77°F(25°C), 20 sec., percent | 30 | |
| ASTM D 4402 | Viscosity, 380°F(193.3°C), SC4-27 spindle, 20 rpm, cP | | 2500 |
| ASTM D 5329 | Bond as per ASTM D 1190, Section 6.4 | | Pass |
| (a) Maximum of 4 lbf during the specified elongation of 30 cm @ 1 cm/min , 39.2°F(4 °C). (b) Use ASTM D 3405, Section 6.4.1. Delete bond and substitute tensile-adhesion test in accordance to D 5329. | | | |

PART 3 EXECUTION Not used.

END OF SECTION