Test Procedure for

RECOVERY OF ASPHALT FROM BITUMINOUS MIXTURES BY THE ABSON PROCESS

TxDOT Designation: Tex-211-F

Effective Date: November 2004

1. SCOPE

1.1 Use this test method to recover the extracted asphalt from a bituminous mixture. Obtain a sufficient quantity for further testing.

1.2 The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

2. APPARATUS

2.1 *Apparatus listed in Tex-210-F,* for extraction of asphalt from paving mixtures.

2.2 *Centrifuge,* capable of handling two 8 oz. (237 mL) wide-mouth bottles at 770 times gravity. A centrifuge with 23 in. diameter operated at approximately 2200 rpm will meet these requirements.

2.3 *Ventilation system,* adequate to remove solvent fumes.

2.4 *Bottles,* wide-mouth, 8 oz. (237 mL).

2.5 *Two distillation assemblies,* consisting of the following items:

- heating mantle with controller, supported on ring stand
- condenser, glass-tube type having a condenser water-jacket approximately 15.75 in. (400 mm) in length fitted with distillation column and bent glass tube on discharge end for directing the flow of liquid solvent into flask
- upright metal supports (ring stands, flexa-frame, clamps, etc.) for the entire distillation assembly
- three-neck distillation flask, 17 oz. (500 mL) capacity
- collecting flask
- corks, assorted sizes
- mercury thermometer marked in 1°F (0.5°C) divisions or digital thermometer capable of measuring the temperature specified in the test procedure

- aeration tube for primary distillation, a 16 in. (406 mm) piece of 0.25 in. (6.35 mm) copper tubing with one end soldered closed. Bend the tube at a 90° angle 3 in. (76 mm) from the soldered end, being careful not to crimp the tubing. Drill eight 0.0625 in. (1.6 mm) holes on the bottom surface of the 3 in. (76 mm) bend, beginning approximately 0.25 in. (6.35 mm) from the soldered end, about 0.25 in. (6.35 mm) apart. Bend the 3 in. (76 mm) extension to form a circle perpendicular to the 13 in. (330 mm) length, being careful not to crimp the tubing.
- aeration tube for final distillation, a 0.25 in. (6.35 mm) copper tube bent on one end to fit the curvature of the distillation flask, with six holes 0.0625 in. (1.6 mm) drilled on 0.25 in. (6.35 mm) centers along the convex side of bend. The curved end should be sealed with the first hole 0.25 in. (6.35 mm) from the end.
- gas flow meter, or equivalent, capable of indicating a gas flow up to 34 oz. (1000 mL) per minute
- rubber or plastic tubing, to supply cool water through the condenser and to connect gas flow meter, aeration tube and supply of carbon dioxide.

2.6 *Tin cans,* 3 oz. (89 mL) seamless.

2.7 *Glass boiling flask,* 101 oz. (3000 mL) capacity.

2.8 *Balance,* Class G2 in accordance with Tex-901-K.

3. MATERIALS

3.1 *Trichlorethylene,* or other approved solvents.

3.2 *Supply of carbon dioxide gas,* (equipped with pressure gauge and regulator).

4. TEST SAMPLE

4.1 Use a sample of bituminous mixture, approximately 1500 to 2000 g, to produce at least 100 g of recovered asphalt.

5. PROCEDURE

5.1 Extract the asphalt from the asphaltic paving mixture in accordance with Tex-210-F.

5.2 Pour the extracted solvent and dissolved asphalt solution into the 101 oz. (3000 mL) glass bubble flask, and connect condenser. Distill the solution until approximately 13.5 oz. (400 mL) remain in the flask. Use a clean container to collect the reclaimed solvent. During this distillation process, gently bubble carbon dioxide (CO_2) through the solution to prevent pressure build-up and "blow-over."

5.3 Pour an equal amount (about 6.8 oz. [200 mL]) of the concentrated asphalt solution into two 8 oz. (237 mL) wide-mouth bottles. Carefully adjust the contents of the containers so the two bottles with contents and stoppers have the same weight.

5.4 Place the bottles into the centrifuge, and centrifuge the solution at room temperature for 30 minutes at 770 times gravity.

5.5 Pour the centrifuged solution from the two bottles into the 17 oz. (500 mL) three-neck distillation flask, taking care not to disturb the sediment at the bottom.

5.6 Using the Secondary Distillation Apparatus adjust the applied heat so the solvent will be removed at a uniform rate by distillation. To prevent pressure build-up and "blow-over," gently bubble carbon dioxide gas through this solution at a very low rate by means of the aeration tube connected to the flow meter. The rate of flow of the carbon dioxide and the heat should be adjusted so the solution does not boil too vigorously.

5.7 When the temperature reaches 315–320°F (157–160°C), increase the carbon dioxide gas flow to approximately 30 oz./min. (900 mL/min.). Maintain this flow for 10 min. while maintaining the temperature of the residue in the flask at 320–335°F (160–168°C).

5.8 If after 10 min. the distillation is not complete, continue the process until 5 min. after the dripping ceases to flush solvent vapors from the flask. The entire test must be complete in no more than 8 hr.

5.9 Remove the heat, shut off the carbon dioxide gas, and disassemble the flask with contents.

5.10 Pour the asphalt in the flask into the 3 oz. (89 mL) seamless can for further testing.

6. ARCHIVED VERSIONS

6.1 Archived versions are available.