

---

## Test Procedure for

# DETERMINING HYDROCARBON-VOLATILE CONTENT OF BITUMINOUS MIXTURES



## TxDOT Designation: Tex-213-F

**Effective Date: November 2004**

---

### 1. SCOPE

- 1.1 Use this test method to determine the hydrocarbon volatile content of a bituminous mixture.
  - 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 *Metal still*, consisting of a vertical cylindrical container, approximately 5 in. (127 mm) in diameter and 6 in. (152 mm) in depth with removable lid, heavy fiber gasket, or O-ring, and a clamping system. There should be two holes in the lid, each approximately 1 in. (25 mm) in diameter to provide entry of the water trap-condenser assembly and a safety valve. (See Figure 1.)
- 2.2 *Volatile trap*, 0.2 oz. (5 mL) capacity, graduated in 0.0034 oz. (0.1 mL) divisions, and equipped with cork or rubber stoppers.
- 2.3 *Condenser*, Liebig glass-tube type, with a condenser jacket approximately 16 in. (400 mm) long.
- 2.4 *Tubing*.
- 2.5 *Loose, clean cotton*.
- 2.6 *Balance*, Class G2 in accordance with Tex-901-K.
- 2.7 *Hot plate*.
- 2.8 *Ring stand*, with base and clamp.
- 2.9 *Bucket*, 1 gal. (4 L) with airtight lid, or plastic bag.

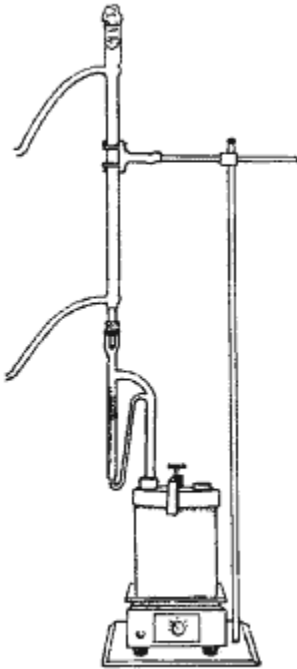


Figure 1—Metal Still (No. 2)

---

### 3. MATERIALS

- 3.1 *Clean tap water*, free of dissolved salts or minerals.

---

### 4. PRECAUTIONS

- 4.1 All connections including the lid must fit tightly to avoid vapor loss, which will skew readings and create an unsafe condition.

---

### 5. PROCEDURE

- 5.1 Obtain a representative sample of the bituminous mixture in accordance with Tex-222-F.
- 5.2 Thoroughly mix the sample, breaking up large lumps.
- 5.3 Reduce the mixture to laboratory test size by quartering, or thoroughly blending, the material and taking small portions from several places in the pan.  
**Note 1**—Keep samples in moisture-tight containers from the time of sampling to the time of testing.
- 5.4 Weigh a 500 to 600 g sample and record to the nearest 0.1 g as X under Section 6.  
**Note 2**—Keep samples in moisture-tight containers at all times.

- 5.5 Immediately pour the weighed sample into the still. Add water until the sample is covered to a depth of about 25 mm (1 in.)
- 5.6 Place gasket or O-ring on rim of metal still and firmly fasten the lid by means of the clamping system.
- 5.7 Insert the volatile trap in the still lid making sure the lower end of trap extends away from the source of heat, and assemble the condenser as shown in Figure 1.
- 5.8 Place a cork or rubber stopper in the other hole to serve as a safety valve. Minimize evaporation loss by inserting a loose cotton plug in the top of the glass condenser. Inspect all stoppers regularly to be certain they do not leak.
- 5.9 Circulate plenty of cool water continuously through the condenser.
- 5.10 Apply heat so that refluxing will start within 5 to 10 minutes after application and water will drip from the condenser at a rate of 85 to 95 drops per minute. Check the temperature of the water passing from the condenser and control the flow so that its temperature does not exceed 43°C (110°F).
- 5.11 Continue distillation until three consecutive readings of the upper and lower volatiles, at 15-minute intervals, show no increase in the condensed volatiles.
- 5.12 Cool the hydrocarbon volatile trap and contents to room temperature and permit the volatiles to separate from the water.
- 5.13 Read the two menisci. Record this difference to the nearest 0.1 ml as V under Section 6.
- 5.14 Determine the specific gravity of the hydrocarbon volatiles at the temperature the distillate was measured.

**Note 3**—When the specific gravity is not available, use a specific gravity of 0.8.

---

## 6. CALCULATIONS

- 6.1 Calculate the percent of hydrocarbon volatiles based on the weight of the bituminous mixture:

$$\text{Percent Hydrocarbon Volatiles} = \frac{100 VG}{X}$$

Where:

X = Weight of total sample, g

V = Volume of volatiles, mL

G = Specific gravity of volatiles.

**7. ARCHIVED VERSIONS**

7.1 Archived versions are available.