Test Procedure for

APPARENT SPECIFIC GRAVITY OF MATERIAL FINER THAN NO. 50 (300 µM) SIEVE

TxDOT Designation: Tex-202-F

Effective Date: April 2025

1. SCOPE

1.1 Use this test method to determine the specific gravity of very fine particles of material by means of a pycnometer.

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. DEFINITIONS

2.1 *Apparent Specific Gravity*—Apparent specific gravity is the ratio of the weight in air of a given volume of the water impermeable portion of a permeable material at a stated temperature to the weight in air of an equal volume of distilled water at a stated temperature.

3. APPARATUS

3.1 *Constant temperature water bath*, at 73°F (23°C) or other selected temperature.

3.2 *Desiccator*.

3.3 *Pycnometer*, volumetric flask with 500 mL capacity.

3.4 *Balance,* Class G1 in accordance with Tex-901-K, with a minimum capacity of 1000 g.

3.5 *Hot plate.*

3.6 *Aspirator or vacuum pump*.

3.7 *Mercury thermometer*, marked in 1°F (0.5°C) divisions, or digital thermometer capable of measuring the temperature specified in the test procedure.

3.8 *Small funnel.*

3.9 *Small pipette*, 1–10 mL capacity.

3.10 *Bent wire or glass rod*, used to break bubbles formed in neck of flask.

3.11 *Cotton- or cloth-tipped glass rod*, for cleaning volumetric flasks.

3.12 *Drying oven*, capable of attaining a temperature of at least 200 ± 9°F (93 ± 5°C).

4. MATERIALS

4.1 *Distilled, demineralized, or clean tap water.*

5. PREPARING SAMPLE

5.1 Select a representative portion of the material passing the No. 50 (300 µm) sieve during the sieve analysis using Tex-200-F and dry to constant weight.

5.2 Place dry sample in desiccator and cool to room temperature.

6. CALIBRATING PYCNOMETER

6.1 Test at approximately 73°F (23°C) to calibrate the volumetric flask, when possible. When this is not possible, select any temperature between 50–80°F (10–27°C), provided the water temperature is the same for both the calibration and the test procedure.

6.2 Weigh the volumetric flask to the nearest 0.01 g and record the weight as A under Section 8.

6.3 Fill the flask to the graduation mark with water and place the flask in the water bath, maintained at the selected temperature, until the temperature of the flask and its contents is constant.

6.4 Adjust the water level so the meniscus is precisely to the level of the graduation mark. The water temperature for testing and calibration must be the same. Take care in removing or adding water so that the neck of the flask above the calibration mark remains dry.

6.5 Remove the flask from water bath, carefully dry the outside with an absorbent cloth, and the inside neck with cotton or cloth wrapped glass rod.

6.6 Record the weight of the volumetric flask and water as Y in Section 8.

Note 1–Calibration may be performed before or after the material test.

7. PROCEDURE

7.1 Place the material finer than the No. 50 (300 µm) sieve in a desiccator. After the material has cooled to room temperature, use a small funnel to carefully place approximately 50 g into a thoroughly dry volumetric flask.

7.2 Determine the weight of the flask and sample to the nearest 0.01 g. Record this weight as B in Section 8.

7.3 Rinse the inside wall of the flask with a small amount of water and swirl the water and sample to mix thoroughly.

7.4 Perform one of the following steps to remove the entrapped air in the inundated sample:

7.4.1 Cover the sample with 1 in. (25 mm) of water. Gently boil on hot plate for 30 min. (Bubble breakers will prevent loss of material.)

7.4.2 Cover the sample with 0.5 in. (13 mm) of water and subject the contents to a partial vacuum. Gradually increase the vacuum level to cause the water to boil. Continue the evacuation process for 1 min. and 30 sec. after boiling begins.

7.5 Fill the flask to approximately 0.25 in. (6 mm) below the graduation mark with water and place in water bath until contents have reached the same temperature at which the volumetric flask was calibrated.

7.6 Adjust the water level in the flask to the calibration mark, using a small pipette.

7.7 Remove the flask from the water bath, carefully dry the outside with an absorbent cloth, and the inside neck with cotton or cloth wrapped glass rod.

7.8 Determine the weight of the flask and contents.

7.9 Record the weight of fine aggregate, flask, and water as Z to the nearest 0.01g, in Section 8.

8. CALCULATION

8.1 Calculate the specific gravity of material finer than No. 50 (300 µm) sieve:

$$\frac{X_1}{(X_1 + Y - Z)}$$

Where:

X_1 = B-A

A = Weight of volumetric flask empty, g

B = Weight of volumetric flask and dry sample, g

X_1 = Weight of oven-dry sample, g

Y = Weight of calibrated pycnometer filled with water, g

Z = Weight of pycnometer, sample of aggregate, and water, g.

9. NOTES

9.1 Take precautions to prevent vigorous boiling, which might result in loss of material.

9.2 Calculate the average specific gravity of combined sizes of aggregate or combination of materials in accordance with Tex-201-F.

9.3 Repeated results must check within ± 0.02 on material from the same sample.

10. ARCHIVED VERSIONS

10.1 Archived versions are available.