Colorado Procedures – Laboratory 3103-19

Standard Method of Test for

Specific Gravity of Soils

(AASHTO T 100 is the primary procedure with CP-L 3103 modifying select subsections only.
AASHTO T 100 and CP-L 3103 must be used together.)

AASHTO T 100:
Will be used to determine the bulk specific gravity and absorption, except for Subsections: 5.1.1 (replacement), 5.1.5, 5.1.6, 5.1.7 (addition) of *Apparatus*; Subsection 8.1 (replacement) of *Sample*; Subsections 9.1, 9.2, 9.3 (replacements) of *Procedure*; Subsections 10.1.1, 10.1.2 and 10.6.1 (additions) of *Calculation and Report*.

5.   APPARATUS

5.1.1   *Erlenmeyer flask* - A minimum 1000 ml glass flask with sufficient capacity for a 500g $\pm$ 0.5g sample. The stopper shall be composed of a suitable rubber, and of such size and shape that it can easily be inserted to a fixed depth in the neck of the bottle, and shall have a small hole through its center to permit the emission of air and surplus water.

5.1.5   *Sieves* - A 3/4" (19 mm), 3/8" (9.5 mm), and No. 4 (4.75 mm)

5.1.6   *Flat Glass*- Suitable piece that fits smoothly over and seals the mouth of the flask.

5.1.7   **Optional:** A vibrating table with variable frequency control and of sufficient capacity to shake without damaging the sample or flask.

8.   SAMPLE

8.1   A test sample weighing 500g $\pm$ 0.5g shall be obtained which passes the 3/4 inch (19 mm) sieve, and is either retained on the No. 4 (4.75 mm), and/or is retained on the 3/8 inch (9.5 mm) sieve. A representative percent from each of the two smallest sieves will be included in the sample being tested.

9.   PROCEDURE

9.1   After thoroughly washing to remove dust or other coatings from the surface of the particles, immerse in water at room temperature for a minimum of 15 hours.

9.2   Remove the sample from the water and roll it in a large, dry, absorbent cloth until all visible films of water are removed. Take care to avoid evaporation of water from aggregate pores during the Operation of surface-drying. Determine the mass of the test sample in the saturated surface-dry (SSD) condition. Record this and all subsequent weights to the nearest 0.1g.

9.3   After determining the mass, immediately place the saturated surface-dry (SSD) test sample in the glass flask. Fill the flask with sufficient water to completely cover the sample to a minimum of 1 inch. The water temperature shall be 23°C $\pm$ 1.7° (73.4°F $\pm$ 3°). Remove entrapped air by subjecting the contents to a vacuum of 13.33 kPa (100 mm Hg) or less absolute pressure. Evacuate all air for 20 minutes. Gently agitate the flask once the vacuum has stabilized and at five-minute intervals thereafter. Remove the vacuum pump line from the flask and completely fill the flask with water at 23°C $\pm$ 1.7° (73.4°F $\pm$ 3°). Slide the flat piece of glass over the mouth of the flask in a manner that will exclude any free air in the vessel. Wipe all visible water from the outside of the flask and glass. Weigh the combination of flask, glass, water, and sample and then record to the nearest 0.1g.

Optional: If using a vibrating table, secure the flask on the vibrating table and turn on. Adjust frequency of the vibrating table such that the material within the flask does not rotate. Process the aggregate for a time-period not to exceed 10 + 1 minutes.

10.   CALCULATION AND REPORT

10.1.1 Calculate the specific gravity of the aggregate, based on water at a temperature of 23°C $\pm$ 1.7° (73.4°F $\pm$ 3°), as follows:

$$\text{Bulk Specific Gravity} = A/(B - C)$$

Where:

A = Weight of oven-dry test sample in air,
B = Weight of saturated-surface-dry test sample in air (SSD),
C = Weight of saturated test sample in water

[Where: Weight of flask, water, glass plate, and sample - (minus) Weight of calibrated flask, water and glass plate]

10.1.2 Calculate the absorption as follows:

$$\text{Absorption} = [(B - A)/A] \times 100$$

Where:

A and B are as previously stated.

10.6.1 Report the results of the specific gravity to the nearest 0.01 and the absorption to the nearest 0.001.