



Standard Test Procedures Manual

Section: AGGREGATES

Subject: SPECIFIC GRAVITY - BULK, APPARENT
COARSE AGGREGATE

1. SCOPE

1.1. Description of Test

This method covers the determination of bulk and apparent specific gravity, 73.4/73.4° F (23/23° C) and absorption of coarse aggregate. Bulk specific gravity is the characteristic generally used for calculations of the volume occupied by the aggregate in asphalt mixes.

1.2. Application of Test

This method determines (after 24 hours in water) the bulk specific gravity and the apparent specific gravity as defined in Definitions E12, the bulk specific gravity on the basis of weight of saturated surface dry aggregate and the absorption as defined in Definitions C125.

2. APPARATUS AND MATERIALS

2.1. Equipment Required

2.1.1. Balance

A weighing device having a capacity of 5 kg or more, as required for the sample size selected; sensitive and readable to 0.5 g or 0.0001 times the sample weight, whichever is greater; and accurate within 0.1 percent of the test load at any point within the range used for this test. Within any 500 g range of test load, a difference between readings shall be accurate within a 0.5 g or 0.0001 times the sample weight, whichever is greater.

2.1.2. Sample Container

A wire basket of No. 6 (3 mm) or finer mesh, or a bucket of approximately equal breadth and height, with a capacity of 4000 to 7000 cm³ for 1 1/2 in (38.1 mm) nominal maximum size aggregate or smaller, and a larger capacity container in the range from 8000 to 16000 cm³ for testing of large maximum size aggregate.

Suitable apparatus for suspending the sample container in water from the center of the scale pan or balance.

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2.1.3. Container

Suitable pan for handling the sample.

2.1.4. Sieve

No. 5.00 mm sieve with pan

2.1.5. Drying Apparatus

Suitable oven or stove for drying sample

2.1.6. Sample splitter

2.1.7. Large Absorbant Cloth

3. PROCEDURE

3.1. Sample Preparation & Test Procedure

After thoroughly washing to remove dust or other coatings from the surface of the particles, dry the sample to constant weight at a temperature of 100 to 110° C, cool in air at room temperature for 1 to 3 hours and then immerse in water at room temperature for a period of 24 ± 4 hours.

Note: Where the absorption and specific gravity values are to be used in pro-portioning concrete mixtures in which the aggregates will be in their naturally moisture condition, the requirement for initial drying to constant weight may be eliminated.

Remove the specimen from the water and roll it in a large absorbent cloth until all visible films of water are removed. Wipe the larger particles individually. Take care to avoid evaporation of water from aggregate pores during the operation of surface-drying. Weigh the specimen in the saturated surface-dry condition. Record this and all subsequent weights to the nearest 0.5 g or 0.0001 times the sample weight, whichever is greater.

After weighing, immediately place the saturated surface-dry specimen in the sample container and determine its weight in water at $23 \pm 1.7^\circ$ C, having a density of 0.997 ± 0.002 g/cm³. Take care to remove all entrapped air before weighing by shaking the container while immersed.

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Note: The container should be immersed to a depth sufficient to cover it and the test specimen during weighing. Wire suspending the container should be of the smallest practical size to minimize any possible effects of a variable immersed length.

Dry the specimen to constant weight at a temperature of 100 to 110° C. Cool in air at room temperature 1 to 3 hours and weigh.

4. RESULTS AND CALCULATIONS

4.1. Calculations

4.1.1. Bulk Specific Gravity

Calculate the bulk specific gravity, 23/23° C, as defined in definitions E12 as follows:

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

Where: A = weight of oven-dry specimen in Air, g
B = weight of saturated surface-dry specimen in air, g
C = weight of saturated specimen in water, g

4.1.2. Bulk Specific Gravity (Saturated Surface-Dry Basis)

Calculate the bulk specific gravity, 23/23° C, on the basis of weight of saturated surface-dry aggregate as follows:

$$\text{Bulk Specific Gravity (saturated surface-dry basis)} = B/(B-C)$$

Where: B = weight of saturated surface-dry specimen in air, g
C = weight of saturated specimen in water, g

4.1.3. Apparent Specific Gravity

Calculate the apparent specific gravity, 23/23° C, as defined in Definitions E12 as follows:

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

Where: A = weight of oven-dry specimen in air, g
C = weight of saturated specimen in water, g

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4.1.4. Absorption

Calculate the percentage of absorption, as defined in Definitions C125, as follows:

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

Where A = weight of oven-dry specimen in air, g
 B = weight of saturated surface-dry specimen in air, g

5. CALIBRATION, CORRECTIONS, REPEATABILITY

5.1. Equipment Calibration

Make sure scale is zeroed before weighing specimen.

Make sure sample pan is weighed before use.

5.2. Tolerances and Repeatability

Where greater precision is required, such as for mix design, obtain two sub-samples and perform the test on each. Repeatability shall be ± 0.03 for multi-lab determinations on duplicate samples.

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STP 206-7.2

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APPROVAL SHEET

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Format of test procedure updated.

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Reviewed by the Materials Section of the Technical Standards and Policies Branch.

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