DEPARTMENT OF TRANSPORTATION
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DEFINITIONS OF TERMS RELATING TO SPECIFIC GRAVITY

A. SCOPE

This test method defines the term specific gravity and explains how to calculate it given a variety of different materials and conditions. The information in this test method will be useful in other California Test Methods requiring specific gravity calculations (California Test 206, 207, 208 and 209).

B. REFERENCES

AASHTO T 84 - Specific Gravity and Absorption of Fine Aggregate
ASTM E 1547 - Standard Terminology Relating to Industrial and Specialty Chemicals
California Test 206 - Specific Gravity and Absorption of Coarse Aggregate
California Test 207 - Specific Gravity and Absorption of Fine Aggregate
California Test 208 - Apparent Specific Gravity and Absorption of Fine Aggregates
California Test 209 - Specific Gravity of Soils

C. SPECIFIC GRAVITY TERMS

1. In simplest terms, specific gravity is the ratio of the weight of a given volume of material to that weight of the equal volume of water at the same temperature.

2. Specific gravity may be expressed in a number of ways. The term “absolute specific gravity” refers to a value that is obtained by highly exacting methods. It is rarely used in engineering work and will not be discussed further. Reference may be made to ASTM E 1547 or AASHTO T 84 for a complete definition of absolute specific gravity.

3. Strictly speaking, specific gravity is not completely defined unless the temperatures of both the material and water are stated. However, for simplification, the statement of temperatures will be omitted in the following definitions, but it will be understood that the temperatures of the material and the water are the same and approximately at room temperature.

4. The terms “permeable voids” and “impermeable voids” used in the definitions of the different types of specific gravities shall be defined as follows:

    a. Permeable Voids. Those voids in the individual particles of a material, which become filled with water when the material is soaked or otherwise processed in accordance with the procedure specified.

    b. Impermeable Voids. Those voids in the individual particles of a material, which do not become filled with water when the material is soaked or otherwise processed in accordance with the procedure specified.

D. SPECIFIC GRAVITY TERMS

1. Specific Gravity (Liquids and Solids).

   The ratio of the mass of a given volume of material to the mass of an equal volume of water (See FIGURE 1).

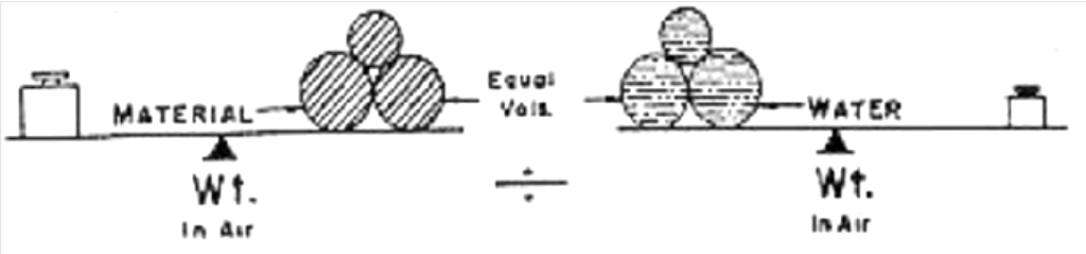

FIGURE 1. Specific Gravity

Note: See California Test 206.

2. Apparent Specific Gravity (Solids).

   The ratio of the mass of a given volume of material to the mass of a volume of water equal to the volume of the solid matter and impermeable voids of the material (See FIGURE 2).

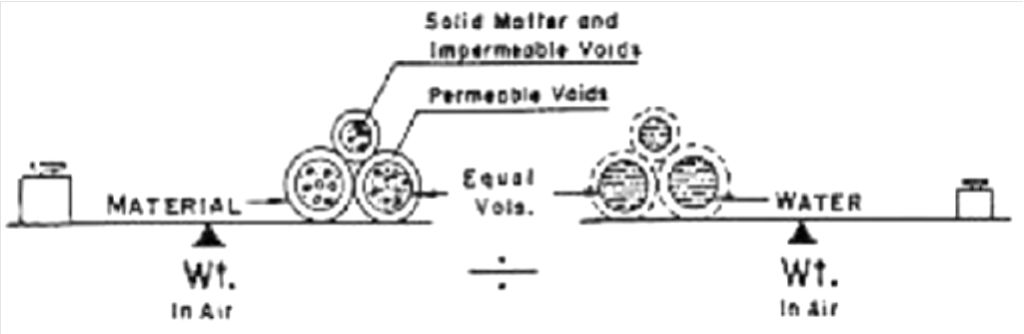

FIGURE 2. Apparent Specific Gravity

Note: See California Test 206, 208, 209.

3. Bulk Specific Gravity (Solids).

   The ratio of the mass of a given volume of material to the mass of a volume of water equal to the total volume of the material. The total volume includes the combined volume of solid matter, permeable voids and impermeable voids (See FIGURE 3).

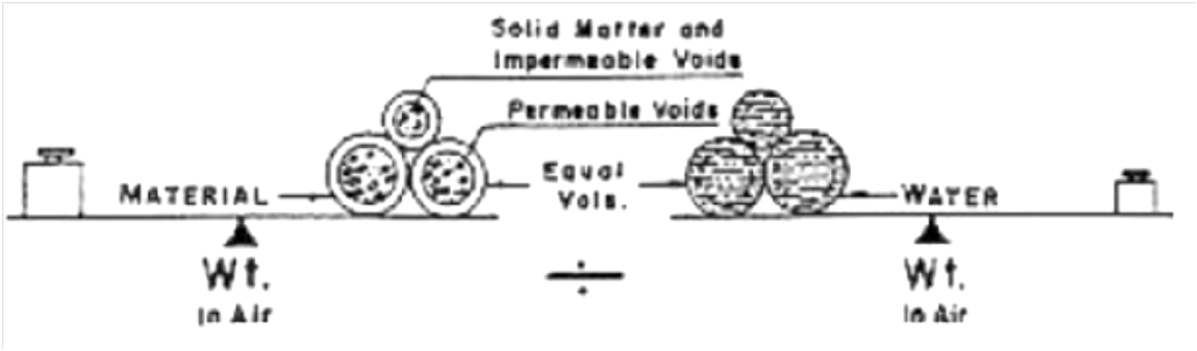

FIGURE 3. Bulk Specific Gravity

Note: See California Test 206.

4. Bulk Specific Gravity (Saturated Surface Dry).

The ratio of the mass of a given volume of material with its permeable voids filled with water to the mass of a volume of water equal to the total volume of the material. The total volume includes the combined volume of solid matter, permeable voids and impermeable voids (see FIGURE 4).

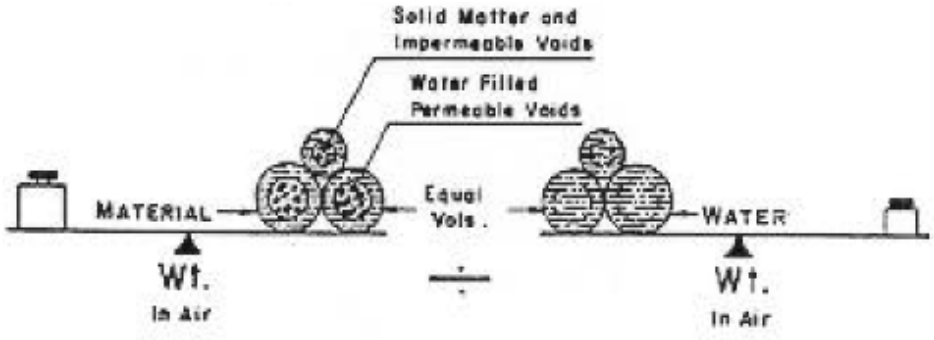

FIGURE 4. Bulk specific Gravity S.S.D.

Note: See California Test 206 and 207.

E. HEALTH AND SAFETY

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards, and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf

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(California Test 106 contains 3 pages)