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**DIVISION OF ENGINEERING SERVICES**  
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## **METHOD OF TEST FOR BULK SPECIFIC GRAVITY (S.S.D.) OF COARSE AGGREGATE BY THE DISPLACEMENT METHOD (FIELD METHOD)**

### **A. SCOPE**

This test method, which is a modification of AASHTO T 85, describes a rapid procedure used in the field for determining the bulk specific gravity of coarse aggregate in a saturated surface-dry (SSD) condition. The bulk specific gravity is the value desired for calculations in connection with portland cement concrete.

### **B. REFERENCES**

AASHTO T 85 - Specific Gravity and Absorption of Coarse Aggregate

### **C. APPARATUS**

The apparatus shall consist of the following:

1. A balance having a capacity of 20 kg and accuracy of 1 g.
2. A galvanized water pail of 12 to 14 qt size.
3. A suitable container for the immersion of the pail and sample in water. A 20 in. diameter container 24 in. high may be used.
4. A brass or galvanized rod about  $\frac{3}{16}$  in. diameter with open hooks on each end. The rod should preferably be made in two detachable sections; the upper section is attached to the center of the scale pan and becomes part of the tare weight. This upper section is of such length that its lower end remains above the surface of the water in the container, and it is in a convenient position for attaching and removing the lower section from which the pail is suspended when weighing in water.
5. A bench or table to support the balance over the water container with sufficient clearance to permit inserting the pail into the water container. Make an opening in the bench to permit suspending the hooked rod from the center of the balance pan. See Figure 1 for a suitable arrangement.
6. A spoon, rod or other suitable device for stirring and removing trapped air from the sample when it is inundated in the pail. (The hand may be used if desired.)

### **D. PREPARATION OF SAMPLE**

Select a representative sample of the coarse aggregate weighing approximately 8 kg. If the sample is not visibly wet, immerse it in water at room temperature overnight.

**E. TEST PROCEDURE**

1. Make all weighings to the nearest gram.
2. Weigh the empty pail and record as tare weight of pail,  $W_1$ .
3. Submerge the pail, as shown in Figure 1, and exercise care when immersing to see that no air is trapped under the pail. Adjust the water level in the container to intersect the straight portion of the lower section of the hook-ended rod. Place a reference mark at this intersection of the rod with the water surface or insert an overflow spout through the side of the water container at this level. Adjust to this same water level within  $\pm 1$  in. for all future "in water" weighings. Weigh the pail and rod in water and record as weight,  $W_2$ . Remove the pail from the water container and invert it to dry, as it will be used later as a container for the sample when weighed in air.
4. Roll the wet sample in a large absorbent cloth until all excess water is removed, although the surfaces of the particles still appear to be damp. The larger fragments or particles may be individually wiped. Exercise care to avoid evaporation of absorbed water during the operation of surface drying.
5. Immediately after it has reached a saturated surface dry (SSD) condition place the sample in the dry pail and weigh in air. Record this as weight,  $W_3$ .
6. Remove the pail and sample from the balance and add enough water to the pail to completely inundate the sample. Stir the inundated sample with the spoon, rod or hand in order to remove any entrapped air.
7. Add enough water to almost fill the pail and attach the pail to the balance by means of the hook-ended rod. Lower and immerse the pail and sample to within  $\pm 1$  in. of the same level where the pail was when filled with water only (see E.3.). Exercise care when immersing to see that no air is trapped under the pail. Weigh the pail, rod and sample in water and record as weight,  $W_4$ .

**F. CALCULATIONS**

1. The weight of the sample in water,  $W_w$ , is equal to the weight of the pail, rod and sample in water minus the weight of the pail and rod in water.

$$W_w = W_4 - W_2$$

2. The weight of the sample in saturated SSD condition in air,  $W_a$ , is equal to the weight of the SSD sample and dry pail in air minus the weight of the dry empty pail.

$$W_a = W_3 - W_1$$

3. Calculate the bulk specific gravity (SSD) from the following formula.

$$\text{Bulk Sp. Gr. (SSD)} = W_a / (W_a - W_w)$$

4. Duplicate determinations should check to within  $\pm 0.02$ .

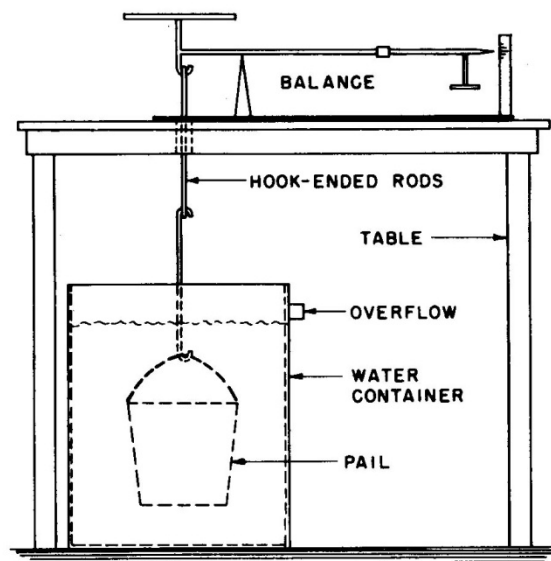
**G. HEALTH AND SAFETY**

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

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(California Test 224 contains 3 Pages)**



**FIGURE 1. Apparatus For The Immersion Of The Pail In Water**