

## SPECIFIC GRAVITY OF AGGREGATE

**1. Objective:** The specific gravity of an aggregate is considered to be a measure of strength or quality of the material. Aggregates having low specific gravity are generally weaker than those with high specific gravity. This property helps in a general identification of aggregates.

### **2. Apparatus Required:**



Wire basket of not more than 6.3 mm mesh or a perforated container of convenient size with thin wire hangers for suspending it from the balance.

**Fig. 1: Wire Mesh Bucket**



The setup consists of container for filling water and suspending the wire basket in it and an airtight container of capacity similar to that of basket, a shallow tray and two dry absorbent clothes.

**Fig. 2: Setup of Specific Gravity Test  
(To be used for Aggregate > 6.3 mm)**



Pycnometer of 100ml for aggregates finer than 6.3 mm

**Fig. 3: Pycnometer**

**3. Reference:** IS 2720(Part 3):1980 Methods of test for soils: Determination of Specific Gravity- Fine, Medium and Coarse Grained Soil. Reaffirmed- Dec 2002

**4. Procedure:**

**A) Procedure for Specific Gravity determination for Aggregate coarser than 6.3 mm:**

1. About 2 kg of aggregate sample is taken, washed to remove fines and then placed in the wire basket. The wire basket is then immersed in water, which is at a temperature of 22°C to 32°C.
2. Immediately after immersion the entrapped air is removed from the sample by lifting the basket 25 mm above the base of the tank and allowing it to drop, 25 times at a rate of about one drop per second.
3. The basket, with aggregate are kept completely immersed in water for a period of  $24 \pm 0.5$  hour.
4. The basket and aggregate are weighed while suspended in water, which is at a temperature of 22°C to 32°C.
5. The basket and aggregates are removed from water and dried with dry absorbent cloth.
6. The surface dried aggregates are also weighed.
7. The aggregate is placed in a shallow tray and heated to about 110°C in the oven for 24 hours. Later, it is cooled in an airtight container and weighed.

**B) Procedure for Specific Gravity determination of Aggregate finer than 6.3 mm:**

1. A clean, dry pycnometer is taken and its empty weight is determined.
2. About 1000g of clean sample is taken into the pycnometer, and it is weighed.
3. Water at 27°C is filled up in the pycnometer with aggregate sample, to just immerse sample.
4. Immediately after immersion the entrapped air is removed from the sample by shaking pycnometer, placing a finger on the hole at the top of the sealed pycnometer.
5. Now the pycnometer is completely filled up with water till the hole at the top, and after confirming that there is no more entrapped air in it, it is weighed.
6. The contents of the pycnometer are discharged, and it is cleaned.

7. Water is filled up to the top of the pycnometer, without any entrapped air. It is then weighed.
8. For mineral filler, specific gravity bottle is used and the material is filled upto one-third of the capacity of bottle. The rest of the process of determining specific gravity is similar to the one described for aggregate finer than 6.3 mm.

### 5. Observation and Recording:

S. No.	Description	Observed values
1	Weight of saturated aggregate and basket in water: $W_1$ g	
2	Weight of basket in water: $W_2$ g	
3	Weight of saturated aggregates in air: $W_3$ g	
4	Weight of oven dry aggregates in air: $W_4$ g	
5	Apparent Specific Gravity: $W_4 / [W_4 - (W_1 - W_2)]$	
6	Bulk Specific Gravity: $W_4 / [W_3 - (W_1 - W_2)]$	

**Table 1: Observation Table for Specific gravity of Aggregate coarser than 6.3 mm**

S. No.	Description	Observed values
1	Weight of Pycnometer in air: $W_1$ g	
2	Weight of aggregates and Pycnometer: $W_2$ g	
3	Weight of aggregates, Pycnometer and water: $W_3$ g	
4	Weight of water and Pycnometer in air: $W_4$ g	

5	Apparent Specific Gravity: $(W_2 - W_1) / [(W_4 - W_1) - (W_3 - W_2)]$	
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**Table 2: Observation Table for Specific gravity of Aggregate finer than 6.3 mm**

### **6. General Remarks:**

1. The specific gravity of aggregates normally used in construction ranges from about 2.5 to 3.0 with an average value of about 2.68.
2. Specific gravity of aggregates is considered as an indication of strength. Material having higher Specific Gravity is generally considered as having higher strength. Water absorption of aggregate is a measure of porosity. This value is considered as a measure of resistance to frost action, and as a measure of sustaining weathering action.