METHOD B9

THE DETERMINATION OF THE BULK DENSITY OF COARSE AND FINE AGGREGATE

SCOPE

The bulk compacted and uncompacted density of an aggregate as defined below is calculated from the mass of compacted or uncompacted aggregate that fills a measure of known volume.

Definition

The bulk density of an aggregate is the mass of material in either a compacted or uncompacted state in a given volume and is expressed in kg/ml.

2   **APPARATUS**

2.1   A watertight cylindrical metal measure of appropriate nominal dimensions and approximate capacity as given in Table 1.

The inner surface of the bottom of the measure must be flat and its outer surface hemispherical or rounded to a radius of about 1 metre. The bottom must be solid and both the walls and the bottom must be sufficiently rigid to withstand, without deformation, the impacts to which it is subjected in use. The measure must also be fitted with two handles on the sides for lifting.

Nominal Aggregate size (mm)	Capacity (L)	Internal diameter (mm)	Internal depth (mm)	Min. thickness of metal (mm)
Under 4.75	3	150	150	3
4.75 - 37.5	15	250	280	4
Over 37.5	30	350	290	5

2.2   A balance to weigh up to 10 kg, accurate to 10 gram for material -4.75 mm.

2.3   A scale to weigh up to 100 kg, accurate to 0,1 kg for material + 4,75 mm.

3   **METHOD**

3.1   **Calibration of the measure**

Fill the measure with water at 20 - 24 EC so that no meniscus is present above the rim of the container. Weigh the water in the container or determine its volume by measuring it with a measuring cylinder.

3.2 Preparation of test sample

By means of a riffler quarter out sufficient aggregate to fill the measure to be used. Dry the test sample in an oven at a temperature of 105 to 110 EC to a constant mass.

3.3 Determination of compacted bulk density

Fill the measure to overflowing with aggregate and compact the aggregate by dropping the measure 30 times from a height of 15 to 20 mm onto a hard surface. Remove the surplus aggregate with a straight-edge.

Determine the mass of the aggregate in the measure accurate to 10 gram for -4,75 mm material and to 100 gram for + 4,75 mm material.

3.4 Determination of uncompacted bulk density

Fill the measure to overflowing by means of a shovel or scoop, discharging the aggregate from a height approximately 50 mm above the top of the measure. Take care to prevent, as far as possible, segregation of the particle sizes of which the sample is composed

Remove the surplus aggregate with a straightedge.

Determine the mass of the aggregate in the measure accurate to 10 gram for -4,75 mm material and to 100 gram for + 4,75mm material.

4 CALCULATIONS

4.1 Calculate the compacted or uncompacted bulk density to the nearest 10 kg/m3 as follows:

$$Bulk \ density \ in \ kg/m^3 = \frac{Ma}{Vm}$$

where :

Ma = mass of aggregate filling the measure in kg
Vm = volume of water filling the measure in m^3

$$Vm = \frac{Mw}{RDw}$$

where :

Mw = mass of water filling the measure in kg
RDw = relative density of water at test temperature (see Method A7 Section 5.39)

4.2   Report the bulk density accurate to the nearest 10 kg/m3.

REFERENCE

SABS Method 845