EXPERIMENT NO: 04

DETERMINATION OF AGGREGATE IMPACT VALUE

(BS: 812: 1975 (PART 1, 2, 3))



1.1 GENERAL

The aggregate impact value gives a relative measure of the resistance of an aggregate to "sudden shock or impact", which in some aggregates differs from its resistance to a slowly applied compressive load. With aggregate of aggregate impact value (AIV) higher than 30 the result may be anomalous. Also aggregate sizes larger than 14 mm are not appropriate to the aggregate impact test.

The standard aggregate impact test shall be made on aggregate passing a 14. mm BS test sieve and retained on a 10.0 mm BS test sieve. If required, or if the standard size is not available, smaller sizes may be tested but owing to the non-homogeneity of aggregates the results are not likely to be the same as those obtained from the standard size. In general, the smaller sizes of aggregate will give a lower impact value but the relationship between the values obtained with different sizes may vary from one aggregate to another.

1.2 APPARATUS

The following apparatus is required.

1.2.1 An impact testing machine of the general form and complying with the followings,

(a) Total mass not more than 60 kg or less than 45 kg.
The machine shall have a circular metal base weighing between 22 kg and 30 kg., with a plane lower surface of not less than 300 mm diameter, and shall be supported on a level and plane concrete or stone block or floor at least 450 mm thick. The machine shall be prevented from rocking either by fixing it to the block or floor or by supporting it on a level and plane metal plate cost into the surface of the block or floor.

(b) A cylinder steel cup having an internal diameter of 102 mm and an internal depth of 50 mm. The walls shall be not less than 6 mm thick and the inner surfaces shall be case hardened. The cup shall be rigidly fastened at the center of the base and be easily removed for emptying.

(c) A metal hammer weighing 13.5 kg to 14.0 kg the lower end of which shall be cylindrical in shape, 100.00 mm diameter and 50 mm long, with a 1.5 mm chamfer at the lower edge, and case hardened. The hammer shall slide freely between vertical guides so arranged that the lower (cylindrical) part of the hammer is above and concentric with the cup.

(d) Means or raising the hammer and allowing it to fall freely between the vertical guides from a height of 380±5 mm on to the test sample in the cup, and means for adjusting the height of fall within 5 mm.

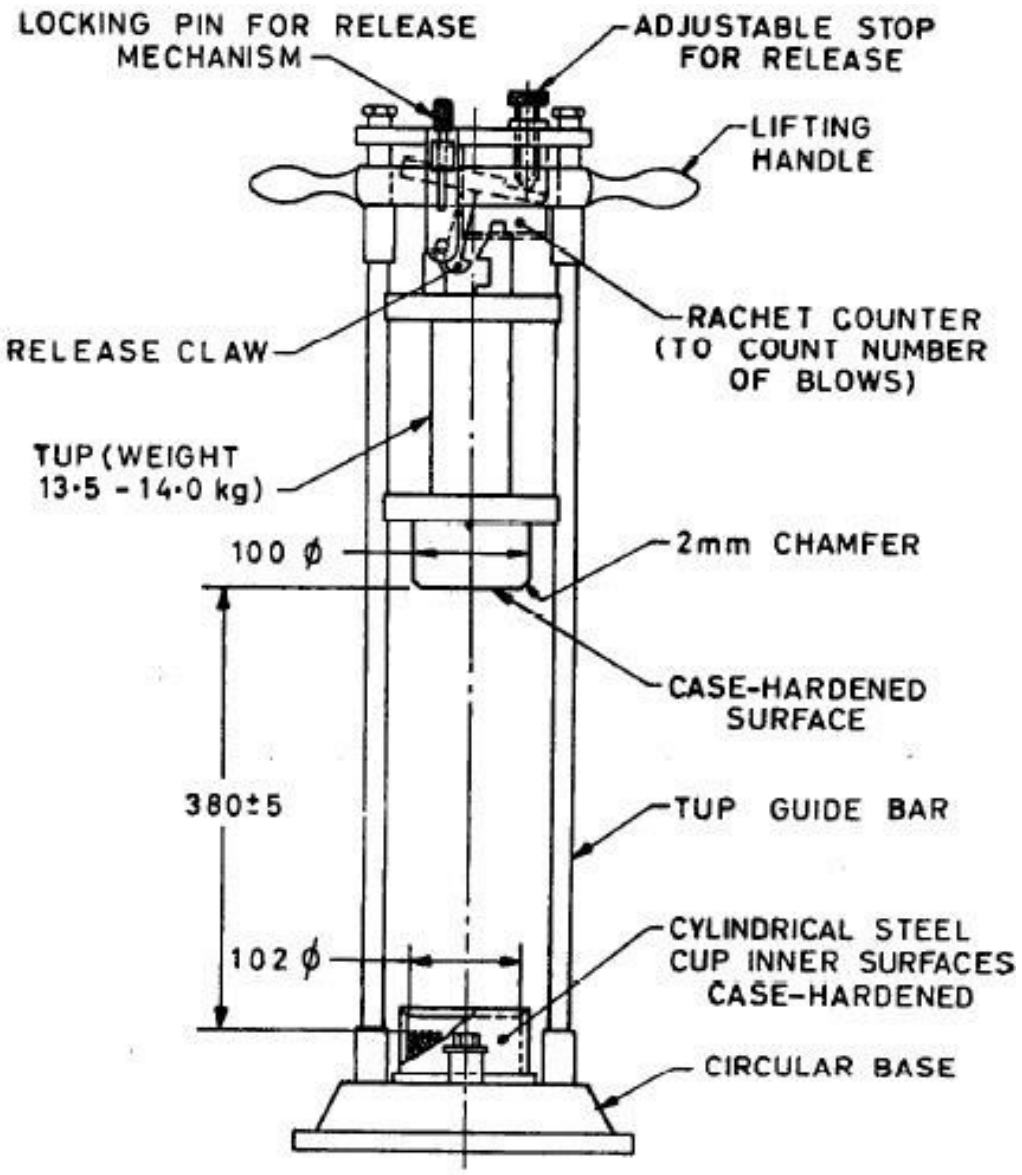


Figure1.1 Aggregate Impact Test machine

(e) Means for supporting the hammer whilst fastening or removing the cup.

NOTE: Some means for automatically recording the number of blow is desirable.

1.2.2 BS test sieves of aperture size 14.0 mm, 10.0 mm and 2.36 mm for a standard test.

1.2.3 A cylindrical metal measure of sufficient rigidity to retain its form under rough usage and with an internal diameter of 75 $\pm$ 1 mm and an internal depth of 50$\pm$ 1 mm.

1.2.4 A straight metal tamping rod of circular cross section, 10 mm diameter, 230 mm long, rounded at one edge.

1.2.5 A balance of capacity not less than 500 gm, and accurate to 0.1 gm.

1.3 PREPARATION OF THE TEST SAMPLE

The material for the standard test shall consist of aggregate passing a 14.0 mm BS test sieve and retained on a 10.00 mm BS test sieve and shall be thoroughly separated on these sieves before testing. For smaller sizes the aggregate shall be prepared in a similar manner using the appropriate sieves given in Table 1. The quantity of aggregate sieved out shall be sufficient for two tests.

The aggregate shall be tested in a surface dry condition. If dried by heating, the period of drying shall not exceed 4 h, the temperature shall not exceed 110^0C and the samples shall be cooled to room temperature before testing.

The measure shall be filled about one third full with the aggregate by means of a scoop, the aggregate being discharged from a height not exceeding 50mm above the top of the container. The aggregate shall then be tamped with 25 blows of the rounded end of the tamping rod, each blows being given by allowing the tamping rod to fall freely from a height of about 50 mm above the surface of the aggregate and the blows being evenly distributed over the surface. A further similar quantity of aggregate shall be added in the same manner and a further tamping of 25 times and the surplus aggregate removed by rolling the tamping rod across, and in contact with, the top of the container, any aggregate which impedes its progress being removed by hand and aggregate being added to fill any obvious depressions. The net mass of aggregates in the measure shall be recorded (mass A) and the same mass used for the second test.

1.4 TEST PROCEDURE

Rest the impact machine, without wedging or packing, upon the level plate, black or floor, so that it is rigid and the hammer guide columns are vertical. Fix the cup firmly in position on the base of the machine and place the whole of the test sample in it and compact by a single tamping of 25 strokes of the taming rod as above.

Adjust the height of the hammer so that its lower face is 380± 5 mm above the upper surface of the aggregate in the cup and then allow it to fall freely on to the aggregate. Subject the test sample to a total of 15 such blows, each being delivered act an interval of not less than 1 s. No adjustment for hammer height is required after the first blow.

Then remove the crushed aggregate by holding the cup over a clean tray and hammering on the outside with a suitable rubber mallet until the sample particles are sufficiently disturbed to enable the mass of the sample to fall freely on to the tray. Transfer fine particles adhering to the inside of

the cup and the underside of the hammer to the tray by means of a stiff bristle brush. Sieve the whole of the sample in the tray, for the standard test, on the 2.36 mm BS test sieve until no further significant amount in 1 min. When testing sizes smaller than the standard separate the fines on the appropriate sieve given in the 'for separating fines' column in table 1.1.

Weigh the fraction passing and retained on the sieve to an accurately of 0.1 gm (mass B and mass C respectively) and if the total mass B+C is less than the initial mass (mass A) by more than 1 gm, discard the result and make afresh test.
Repeat the whole procedure starting from the beginning using a second sample of the same mass as the first sample.

Table 1.1 Particulars of BS test sieves for testing standard and non-standard sizes of aggregates

Sample size	Nominal aperture sizes of BS test sieves complying with the requirements of BS410 (full tolerance)			
	for sample preparation		for separating fines	
	Passing	Retained		
Non-standard	mm	mm	mm	μ
	28.0	20.0	5.00	-
	20.0	14.0	3.35	-
Standard	14.0	10.0	2.36	-
Non-standard	10.0	6.30	1.70	-
	6.30	5.00	1.18	-
	5.00	3.35	-	85
	3.35	2.36	-	60

NOTE: Aggregate sizes larger than 14.0 mm are not appropriate to the aggregate impact test.

1.5 CALCULATIONS

The ratio of the mass of fines formed to the total sample mass in each test shall be expressed as a percentage, the result being recorded to the first decimal place.

Percentage fines: B/A × 100

Where,
A is the mass of surface dry sample (gm)
B is the fraction passing the sieve for separating the fines (gm)

1.6 REPORTING OF RESULTS

The mean of the two results shall be reported to the nearest whole number as the aggregate impact value.