

3.AGGREGATE CRUSHING VALUE TEST.

(IS : 2386 – PART – 4)

INTRODUCTION:

The principal mechanical properties required in stones are (i) satisfactory resistance to crushing under the roller during construction and (ii) adequate resistance to surface abrasion under traffic.

Aggregates used in road construction, should be strong enough to resist crushing under traffic wheel loads. If the aggregates are weak, the stability of the pavement structure is likely to be adversely affected. The strength of coarse aggregates is assessed by aggregates crushing test. The aggregate crushing value provides a relative measure of resistance to crushing under a gradually applied compressive load. To achieve a high quality of pavement, aggregate possessing low aggregate crushing value should be preferred.

Object:

To determine the aggregate crushing value by compressive testing machine.

Apparatus:

- a) Steel cylinder with open ends, and internal diameter 152mm, square base plate, plunger having a piston of diameter 150mm, with a hole provided across the stem of the plunger so that a rod could be inserted for lifting or placing the plunger in the cylinder.
- b) Cylindrical measure having internal diameter of 115mm and height 180mm.
- c) Steel tamping rod with one rounded end, having a diameter of 16mm and length 450 to 600mm.
- d) Balance of capacity 3 kg with accuracy up to 1gm.
- e) Compressive testing machine capable of applying load of 40 tonnes, at a uniform rate of loading of 4 tonnes per minute.

Procedure:

The aggregate passing 12.5mm IS sieve and retained on 10mm IS sieve is selected for standard test. The aggregate should be in surface dry condition before testing. The aggregate may be dried by heating at a temperature 100⁰C to 110⁰C for a period of 4 hours and is tested after being cooled to room temperature.

The cylindrical measure is filled by the test sample of aggregate in three layers of approximately equal depth, each layer being tamped 25 times by the rounded end of the

tamping rod. After the third layer is tamped, using the tamping rod as a straight edge levels off the aggregate at the top of the cylindrical measure. About 6.5kg of aggregate is required for preparing two test samples. The test sample thus taken is then weighed. The same weight of the sample is taken in the repeat test.

The cylinder of the test apparatus is placed in position on the base plate; one third of the test sample is placed in this cylinder and tamped 25 times by the tamping rod. Similarly, the other two parts of the test specimen are added, each layer being subjected to 25 blows. The total depth of the material in the cylinder after tamping shall however be 100mm. The surface of the aggregates is leveled and the plunger inserted so that it rests on this surface in level position. The cylinder with the test sample and the plunger in position is placed on compression testing machine. Load is then applied through the plunger at a uniform rate of 4 tonnes per minute until the total load is 40 tonnes, and then the load is released. Aggregates including the crushed portion are removed from the cylinder and sieved on a 2.36mm IS sieve. The material, which passes this sieve, is collected.

The above crushing test is repeated on second sample of the same weight in accordance with above test procedure. Thus two tests are made for the same specimen for taking an average value.

Calculation:

The aggregate crushing value is defined, as a ratio of the weight of fines passing the specified IS sieve to the total weight of the sample expressed as a percentage.

$$\text{Aggregate crushing value} = \frac{100 W_2}{W_1}$$

Where, W1 = Total weight of dry sample.
 W2 = Weight of the portion of crushed material passing 2.36mm IS sieve.

Results:

The mean of the crushing value obtained in the two tests is reported as the aggregate crushing value.

Limits:

The aggregate crushing value for cement concrete pavement shall not exceed 30%.

The aggregate crushing value for wearing surfaces shall not exceed 45%.