

Experiment No. 4: AGGREGATE CRUSHING STRENGTH TEST

Aim: To determine the aggregate crushing value of the given specimen

Theory and Scope:

The test evaluates the ability of the Aggregates used in road construction to withstand the stresses induced by moving vehicles in the form of crushing. The crushing strength or aggregate crushing value of a given road aggregate is found out as per **IS-2386 Part- IV**.

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.

The aggregate crushing value of the coarse aggregates used for cement concrete pavement at surface should not exceed 30% and aggregates used for concrete other than for wearing surfaces, shall not exceed 45% as specified by Indian Standard (IS) and Indian Road Congress (IRC).

Apparatus:

- A steel cylinder of internal diameter 15.2 cm (Steel cylinder with open ends)
- A square base plate, plunger having a piston diameter of 15 cm.
- A cylindrical measure of internal diameter of 11.5 and height 18 cm.
- Steel tamping rod having diameter of 1.6 cm length 45 to 60 cm.
- Balance of capacity 3 kg with accuracy up to 1 gm.
- Compression testing machine capable of applying load of 40 tonnes at a loading rate tonnes per minute.

Procedure:

1. The aggregate in surface-dry condition before testing and passing 12.5 mm sieve and retained on 10 mm sieve is selected.
2. The cylindrical measure is filled by the test sample of the aggregate in three layers of approximately equal depth, each layer being tamped 25 times by the rounded end of the tamping rod.
3. After the third layer is tamped, the aggregates at the top of the cylindrical measure are levelled off by using the tamping rod as a straight edge. Then the test sample is weighed. Let that be w_1 gm.
4. Then the cylinder of test apparatus is kept on the base plate and one third of the sample from cylindrical measure is transferred into cylinder and tamped 25 times by rounded end of the tamping rod.
5. Similarly aggregate in three layers of approximately equal depth, each layer being tamped 25 times by rounded end of the tamping rod.
6. Then the cylinder with test sample and plunger in position is placed on compression testing machine.
7. Load is then applied through the plunger at a uniform rate of 4 tonnes per minute until the total load is 40 tonnes and the load is released.
8. Aggregates including the crushed position are removed from the cylinder and sieved on a 2.36mm IS Sieve and material which passes this sieve is collected and weighed. Let this be w_2 gm.
9. The above step is repeated with second sample of the same aggregate. The two tests are

made for the same specimen for taking an average value.

10. Total weight of dry sample taken is w_1 gm. weight of the portion of crushed material passing 2.36 mm IS sieve be w_2 gm. Then the aggregate crushing value is defined as the ratio of weight of fines passing the specified IS sieve to the total weight of the sample (w_1).

$$\text{Aggregate crushing value} = (100 * w_2 / w_1) \%$$

Observation and Calculation:

Trials	Total weight of test sample (w_1 gm)	Weight of aggregate passing 2.36mm IS sieve (w_2 gm)	Aggregate crushing value %
1			
2			
3			

Result: The mean of the aggregate crushing value is _____ %.