

Experiment #10 Aggregate Crushing Value Test – Determine Aggregate Crushing Strength

Aggregate crushing value test on coarse aggregates gives a relative measure of the resistance of an aggregate crushing under gradually applied compressive load.

Coarse aggregate crushing value is the percentage by weight of the crushed material obtained when test aggregates are subjected to a specified load under standardized conditions.

Aggregate crushing value is a numerical index of the strength of the aggregate and it is used in construction of roads and pavements.

Crushing value of aggregates indicates its strength. Lower crushing value is recommended for roads and pavements as it indicates a lower crushed fraction under load and would give a longer service life and a more economical performance.

The aggregates used in roads and pavement construction must be strong enough to withstand crushing under roller and traffic. If the aggregate crushing value is 30 or higher' the result may be anomalous and in such cases the ten percent fines value should be determined instead.

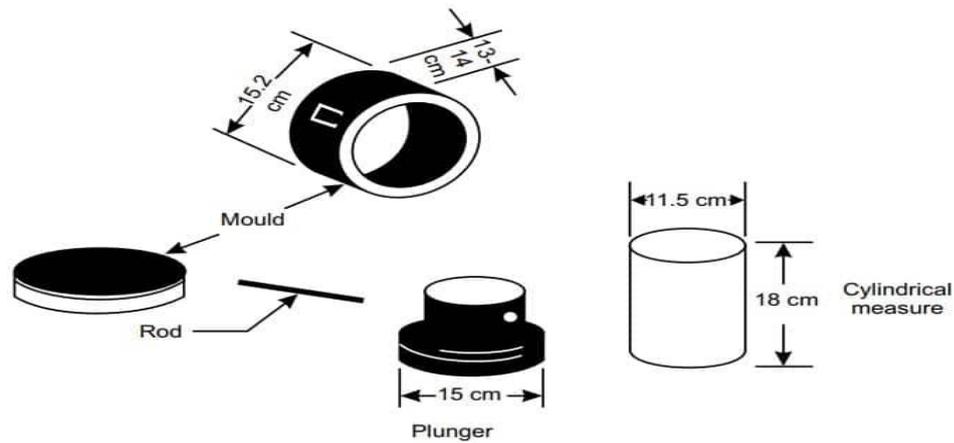
Aggregate Crushing Value Test

The objective of this test is to:

1. Determine the aggregate crushing value of coarse aggregate
2. Assess suitability of coarse aggregates for use in different types of road

Apparatus

1. A steel cylinder 15 cm diameter with plunger and base plate.
2. A straight metal temping rod 16mm diameter and 45 to 60cm long rounded at one end.
3. A balance of capacity 3 kg readable and accurate to one gram.
4. IS sieves of sizes 12.5mm, 10mm and 2.36mm
5. A compression testing machine.
6. Cylindrical metal measure of sufficient rigidity to retain its form under rough usage and of 11.5cm diameter and 18cm height.
7. Dial gauge



Sampling of Aggregates

Coarse aggregate passing 12.5mm IS sieve and retained on a 10mm IS sieve are selected and heated at 100 to 110°C for 4 hours and cooled to room temperature.

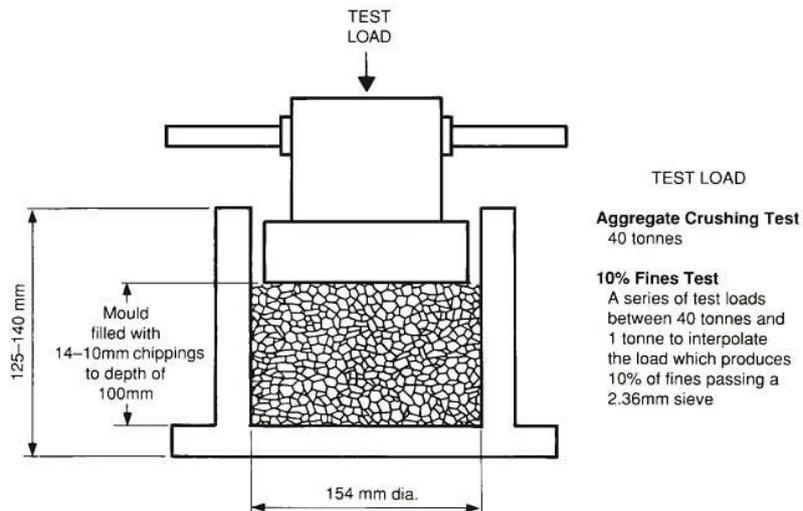
The quantity of aggregate shall be such that the depth of material in the cylinder, after tamping as described below shall be 10 cm. The appropriate quantity may be found conveniently by filling the cylinder.

Measure in three layers of approximately equal depth, each layer being tamped 25 times with the tamping rod and finally leveled off using the tamping rod as straight edge.

Care being taken in the case of weaker materials not to break the particles. The weight of the material comprising the test sample shall be determined (weight A) and the same weight of sample shall be taken for the repeat test.

Procedure of Aggregate Crushing Value Test

1. Put the cylinder in position on the base plate and weigh it (**W**).
2. Put the sample in 3 layers, each layer being subjected to 25 strokes using the tamping rod. Care being taken in the case of weak materials not to break the particles and weigh it (**W1**).
3. Level the surface of aggregate carefully and insert the plunger so that it rests horizontally on the surface. Care being taken to ensure that the plunger does not jam in the cylinder.
4. Place the cylinder with plunger on the loading platform of the compression testing machine.
5. Apply load at a uniform rate so that a total load of 40T is applied in 10 minutes.
6. Release the load and remove the material from the cylinder.
7. Sieve the material with 2.36mm IS sieve, care being taken to avoid loss of fines.
8. Weigh the fraction passing through the IS sieve (**W2**).



Calculation of Aggregate Crushing Value

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

$$\text{Aggregate crushing value} = (W_2 \times 100) / (W_1 - W)$$

W_2 =Weight of fraction passing through the appropriate sieve

$W_1 - W$ =Weight of surface dry sample.

The mean of two result to nearest whole number is the aggregate crushing value.

Result

The aggregate crushing value of the given sample=

Aggregate Crushing Values for Roads and Pavement Construction

The table below shows limits of aggregate crushing value for different types of road construction:

Types of Roads / Pavements	Aggregate Crushing Value Limit
Flexible Pavements	
Soling	50
Water bound macadam	40
Bituminous macadam	40
Bituminous surface dressing or thin premix carpet	30
Dense mix carpet	30
Rigid Pavements	
Other than wearing course	45
Surface or Wearing course	30