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HIGHWAY ENGINEERING

Abrasion tests

Due to the movements of traffic the road stones used in the surface course are subjected to wearing action at the top. Hence road stones should be hard enough to resist the abrasion due to the traffic. Abrasion tests are carried out to test the hardness property of stones and to decide whether they are suitable for the different road construction works. The abrasion test on aggregate may be carried out using any one of the following three tests :

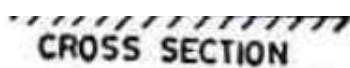
- (i) Los Angeles abrasion test
- (ii) Deval abrasion test
- (iii) Dorry abrasion test

However Los Angeles abrasion test is preferred as the test results have been correlated with pavement performance.

Los Angeles Abrasion Test

The principle of Los Angeles abrasion test is to find the percentage wear due to the relative rubbing action between the aggregate and steel balls used as abrasive charge. Pounding action of these balls also exists during the test and hence the resistance to wear and impact is evaluated by this test. The Los Angeles machine consists of a hollow cylinder closed at both ends, having inside diameter 70 cm and length 50 cm and mounted so as to rotate about its horizontal axis. The machine is shown in Fig. 6.16. The abrasive charge consists of cast iron spheres of approximate diameter 4.8 cm and each of weight 390 to 445 g. The number of spheres to be used as abrasive charge and their total weight have been specified based on grading of the aggregate sample. The test has been standardised by the ISI.

The specified weight of aggregate specimen, (5 to 10 kg, depending on gradation) is placed in the machine along with the abrasive charge. The machine is rotated at a speed of 30 to 33 rpm for the specified number of revolutions (500 to 1000 depending on the grading of the specimen). The abraded aggregate is then sieved on 1.7 mm IS sieve, and the weight of powdered aggregate passing this sieve is found. The result of the abrasion test expressed as the percentage wear or the percentage passing 1.7 mm sieve expressed



CROSS SECTION

Fig. 6.16 Los Angeles Abrasion Testing Machine

in terms of the original weight of the sample. The Los Angeles abrasion value of good aggregates acceptable for cement concrete, bituminous concrete and other high quality pavement materials should be less than 30 percent. Values up to 50 percent are allowed in base courses like water bound and bituminous macadam. This test is more dependable than other abrasion tests as rubbing and pounding action in the test simulate the field conditions better. Also correlation of Los Angeles abrasion value with field performance and specifications of the test values have been established.