

CRD-C 171-95

**Standard Test Method for Determining Percentage
of Crushed Particles in Aggregate****1. Scope**

1.1 This test method covers the determination by visual inspection of the percentage of crushed particles (by mass) that are present in a sample of aggregate.

1.2 The values stated in SI units are to be regarded as the standard.

2. Referenced Documents2.1 *ASTM Standards*

C 136 Method for Sieve Analysis of Fine and Coarse Aggregates (CRD-C 103)

C 702 Practice for Reducing Field Samples of Aggregate to Testing Size (CRD-C 118)

D 75 Practice for Sampling Aggregates (CRD-C 155)

D 3665 Practice for Random Sampling of Construction Materials (CRD-C 172)

E 11 Specification for Wire-Cloth Sieves for Testing Purposes (CRD-C 102)

3. Terminology

3.1 Crushed Particle - A particle that has at least two fractured surfaces; the area of each of which is equal to at least 75 percent of the smallest cross-sectional area of the particle; when two fractured surfaces are contiguous, they will be counted as two fractured surfaces only if the angle formed by the two fracture planes is at least 30 degrees.

4. Summary of Method

4.1 A sample of aggregate is sieved and specified amounts of each fraction are examined particle by particle and classified as "crushed" or "not crushed." The proportion by mass of crushed particles is calculated for each fraction.

5. Significance and Use

5.1 This method is used to determine if an aggregate has the required proportion of crushed particles for use in base course and asphaltic concrete.

6. Apparatus

6.1 Balance: A balance or scales with a minimum capacity of 6 kg sensitive to 0.1 g.

6.2 Microscope: A stereoscopic microscope with objectives and oculars to give final magnifications from approximately 6X to 150X with appropriate illuminator.

6.3 Sieves: Sieves conforming to Specification E 11.

6.4 Oven: An oven of appropriate size capable of maintaining a uniform temperature of $110^{\circ} \pm 5^{\circ} \text{C}$.

6.5 Spatula: A spatula or similar tool to aid in sorting aggregate particles.

6.6 Sample Splitter: A sample splitter as described in practice C 702 with appropriate sized pans.

7. Sampling

7.1 Obtain the sample in accordance with Practice D 75 and D 3665. Wash the sample and oven-dry it at $110^{\circ} \pm 5^{\circ} \text{C}$ to constant weight.

7.2 Sieve the sample in accordance with Practice C 136.

7.3 From each of the sieve fractions listed in Table 1, select a portion of at least the amount shown in Table 1 in accordance with Practice C 702, except if there is less than the amount shown in column use all the sample.

8. Procedure

8.1 Determine the mass of each fraction to the nearest 0.1 g.

8.2 Spread the fraction of a clean flat surface large enough to permit inspection of each particle.

| Sieve Passing | Sieve Retained on | Minimum Sample Size |
|----------------------|--------------------------|----------------------------|
| 50-mm | 37.5-mm | 6000 g |
| 37.5-mm | 25.0-mm | 3000 g |
| 25.0-mm | 19.0-mm | 1500 g |
| 19.0-mm | 12.5-mm | 1000 g |
| 12.5-mm | 9.5-mm | 500 g |
| 9.5-mm | 4.75-mm | 100 g |
| 4.75-mm | 2.36-mm | 200 particles |
| 2.36-mm | 1.18-mm | 200 particles |
| 1.18-mm | 600- μ m | 200 particles |

8.3 Inspect each particle for the presence of fractured surfaces. Use a stereoscopic microscope to inspect fractions smaller than the 4.75-mm sieve.

8.4 Separate crushed particles from not crushed particles using the edge of a spatula or similar tool.

8.5 Determine the mass of crushed particles from each fraction to the nearest 0.1 g.

9. Calculations

9.1 Calculate the percentage of crushed particles in each fraction using the formula:

$$\text{Percentage of crushed particles (\%)} = \frac{\text{Mass of crushed particles}}{\text{Mass of fraction}} \times 100$$

10. Report

10.1 The report shall include the following:

10.1.1 Percentage of material retained on each sieve.

10.1.2 Mass of each fraction.

10.1.3 Mass of crushed particles in each fraction.

10.1.4 Percentage of crushed particles in each fraction.