

Method of Test for Percentage of Crushed Particles

1. Scope:

This test is for determining the percentage of pieces having one or more crushed faces. A crushed face is an angular, rough, or broken surface of a particle created by crushing, by other artificial means, or by nature.

2. Apparatus:

- 2.1 Scale or balance having the capacity to weigh any sample which may be tested utilizing this procedure and readable to the nearest 0.1 gram.
- 2.2 Sieve. A #4 sieve conforming to ASTM E11.
- 2.3 Pans for washing and drying the samples.
- 2.4 Drying oven capable of maintaining a temperature of $230^{\circ} \pm 9^{\circ}\text{F}$.

3. Procedure:

- 3.1 Obtain sample in accordance with SD 201.
- 3.2 The sample should be large enough to yield the minimum quantity of + #4 sieve material required by the table below. The sample includes all rock retained on the #4 sieve and above.

Nominal maximum size of aggregate	Minimum sample size of + #4 material
#4	200 grams
3/8"	400 grams
1/2"	700 grams
3/4"	1000 grams
1"	1500 grams
1 1/2"	2500 grams

NOTE: Nominal maximum size of aggregate is denoted by the smallest sieve opening through which 90% or more of the sample being tested will pass.

- 3.3 The material used for this test may be the same material used for the total - #200 material tested in SD 202. This material will need to be screened over the #4 sieve prior to weighing.

If the material comes from the remaining portion of the original + #4 material, it shall be washed to remove the adhered fine material and to aid in the visual inspection of the crushed faces. Following washing, dry the material in an oven at $230 \pm 9^{\circ}\text{F}$ to a constant weight as per SD 108 and weigh it to the

nearest 0.1 gram. The material shall then be screened over a #4 sieve, weighed to the nearest 0.1 gram, and the weight recorded as the Weight of Total + #4 Sample.

- 3.4 Spread the aggregate on a flat clean surface and separate the particles not having the required number of crushed faces from those that have. Following are the definitions for a fractured face:

One crushed face

The particle face will be considered "Crushed" only if it has a projected area of at least 25% of the maximum cross-sectional area of the particle and the face has sharp and well-defined edges.

Two crushed faces

The particle will be considered to have two "Crushed faces" when the largest crushed face has a projected area of at least 50% of the maximum cross-sectional area of particle and the other crushed face has a projected area of at least 25% of the maximum cross sectional area of the particle. The crushed faces shall have sharp and well defined edges.

The maximum cross-sectional area of the particle would be the largest outline projected by the aggregate fragment when held under a light.

Weigh the crushed particles to the nearest 0.1 gram.



Figure 1
(Particles with one crushed face)



Figure 2
(Particles with two crushed faces)

4. Report:

4.1 Calculate the percent of crushed particles as follows:

$$\text{Percent crushed particles retained on \#4 sieve \& above} = \frac{\text{Wt. of crushed particles}}{\text{Wt. of sample retained on \#4 sieve \& above}} \times 100$$

4.2 Report the percent of crushed particles retained on the #4 sieve and above to the nearest whole number.

5. References:

ASTM E11
SD 108
SD 201
SD 202
DOT-3
DOT-69