

**1218 SCRATCH HARDNESS OF COARSE AGGREGATE PARTICLES
(Soft Rock)
ASTM Designation C 851 (Mn/DOT Modified)**

1218.1 SCOPE

This method of test covers a procedure for determining the quantity of soft rock particles in coarse aggregate on the basis of scratch hardness. It is intended to be used to identify materials that are soft and to identify other types of deleterious materials in aggregates. The test is applicable to fine-grained rock types only, i.e., those rocks where the individual grains cannot be seen with the unaided eye.

1218.2 APPARATUS

Brass Rod - 1.59mm (1/16") in diameter with a rounded point. The rod shall be of suitable hardness so that when filed to a sharp point it will scratch a copper penny (U.S. Lincoln design, 1981 and earlier); but, will fail to scratch a nickel (U.S. Jefferson design). The rod may be mounted in the wooden shaft of an ordinary lead pencil or any other approved device.

Balance - Conforming to the requirements of AASHTO M 231 having a readability & sensitivity of 0.1 grams and an accuracy of 0.1 grams or 0.1%.

1218.3 SAMPLES

Representative test samples shall be prepared. See Table 1 for particle sizes and sample weights. If sufficient material is not available for the minimum sample weight shown in Table 1, that size shall not be tested; but, assumed to contain the same percentage of soft particles as the next larger or smaller size, whichever is present.

NOTE 1: In the laboratory the percent of soft rock will be determined from the lithological sample.

Table 1

Minimum Size of Test Sample

SIEVE SIZE (mm)	SIEVE SIZE (in.)	SAMPLE WEIGHT (g)
Greater than 25.0	Greater than 1	4500 – 9000
25.0 - 12.5	1 - 1/2	1500 – 4500
Less than 12.5	Less than 1/2	No Test

1218.4 PROCEDURE

Subject each piece of aggregate under test to a scratching motion of the brass rod using a pressure of $907 \pm 45\text{g}$ (2 ± 0.1 lbs).

If, during the scratching process a groove is made in the piece without the deposition of any metal from the brass rod, the piece shall be fractured and the newly fractured face tested. If the core of the rock is also grooved in the scratching process, the piece is considered to be soft rock and/or deleterious.

Fine-grained sandstone will not be considered as soft even though separate sand grains are detached from the mass during the scratching process.

1218.5 CALCULATION

- A. The percent of soft rock in each test sample shall be calculated using the following formula:

$$\text{Soft Rock \%} = \frac{\text{Weight of Soft Rock}}{\text{Total Weight of Sample}} \times 100$$

- B. When more than one fraction of coarse aggregate is used in the production of concrete, a weighted average percentage calculated on the percent in each fraction and the percent of each fraction used in the composite coarse aggregate shall be shown. For these calculations the grading of the material from that portion of the supply represented should be used. There is no test on the minus 12.5mm (1/2") material. Results shall be reported to the nearest 0.1%.

See example calculations Lithological Summary (Sections 1209.6 & 1209.7).