



AMERICAN NATIONAL  
STANDARD

ANSI/ASTM C 851 — 76

## Standard Recommended Practice for Estimating SCRATCH HARDNESS OF COARSE AGGREGATE PARTICLES<sup>1</sup>

This Standard is issued under the fixed designation C 851; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

### 1. Scope

1.1 This recommended practice describes a method of estimating the quantity of soft particles in coarse aggregates on the basis of scratch hardness. It is intended to be used to identify materials that are soft, particularly those which are so poorly bonded that the separate particles in the piece are easily detached from the mass. The test is not intended to identify other types of deleterious materials in aggregates, separate mention of which should be made in specifications. Neither is it intended to imply that certain types of aggregate such as limestone, whose mineral constituents may be relatively soft but well bonded together, will not perform quite adequately in concrete or other end products even though it may be possible to produce a groove in the particles by the scratch hardness apparatus.

1.2 This recommended practice is intended primarily for field use in estimating the quality of a deposit of coarse aggregate. It will be helpful in the laboratory, and when used with visual inspection will afford a fast, convenient means of determining the amount of soft particles in aggregate. The test may be useful for preliminary screening of aggregate sources, but should not be considered for specification enforcement.

1.3 In case of question, the scratch test should be made on a freshly broken surface of the aggregate particle. If the particle contains more than one type of rock and is partly hard and partly soft, it should be classed as "soft" only if the soft portion is one third or more of the volume of the particle. Scratch hardness tests can be made on the exposed surface of a particle provided consideration is given to

softening of the surface due to weathering. A particle with a thin, soft, and weathered surface and a hard core should normally be classed as "soft."

### 2. Apparatus

2.1 *Brass Rod*,  $\frac{1}{16}$  in. (1.6 mm) in diameter, with a rounded point, mounted in a device so that a force of  $2 \pm 0.1$  lbf ( $8.9 \pm 0.4$  N) is applied to the specimen tested. A suitable design for this apparatus is shown in Fig. 1. The brass rod shall be of suitable hardness so that when filed to a sharp point, it will scratch a copper penny (U. S. Lincoln design) but fail to scratch a nickel (U. S. Jefferson design). For use in the field, a brass rod of the specified size and hardness can be mounted into the wooden shaft of an ordinary lead pencil.

### 3. Samples

3.1 Coarse aggregate for the test shall consist of material from which the sizes finer than the  $\frac{3}{8}$ -in. (9.5-mm) sieve have been removed. The sample tested shall be of such size that it will yield not less than the amounts of the different sizes prescribed in Table 1, which shall be available in amounts of 10 % or more.

3.2 Should the sample contain less than 10 % of any of the sizes prescribed in Table 1, that size shall not be tested; but for the purpose of calculating the test results, it shall be

<sup>1</sup> This recommended practice is under the jurisdiction of ASTM Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.03.05 on Methods of Testing and Specifications for Physical Characteristics of Concrete Aggregates.

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