



Standard Test Method for Centrifuge Kerosine Equivalent¹

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1. Scope

1.1 This test method determines the centrifuge kerosine equivalent (CKE) of aggregate used in bituminous mixtures.

1.2 Units of Measure:

1.2.1 With regard to sieve sizes and size of aggregate as determined by the use of testing sieves, the values in inch-pound units are shown for the convenience of the user, but the standard sieve designation shown in parentheses is the standard value as stated in Specification E 11.

1.2.2 With regard to other units of measure, the values shown in parentheses are for information purposes.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see 7.1.

2. Referenced Documents

2.1 ASTM Standards:

C 127 Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate²

C 128 Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate²

C 702 Practice for Reducing Samples of Aggregate to Testing Size²

D 75 Practice for Sampling Aggregates³

D 4753 Specification for Evaluating, Selecting, and Specifying Balances and Scales for Use in Soil, Rock, and Construction Materials Testing⁴

E 11 Specification for Wire-Cloth and Sieves for Testing Purposes⁵

E 832 Specification for Laboratory Filter Papers⁵

3. Terminology

3.1 Symbols:

3.1.1 *C*—coarse aggregate fraction, that portion of the sample which passes the $\frac{3}{8}$ -in. (9.5-mm) sieve and is retained on the No. 4 (4.75-mm) sieve.

3.1.2 *F*—fine aggregate fraction, that portion of the sample which passes the No. 4 (4.75-mm) sieve.

3.1.3 *SA*—surface area. The sum, m²/kg (ft²/lb), obtained by adding the products of the percent passing each sieve and its corresponding factor, (see 11.1) and dividing by 100.

3.1.4 *K factors*—values determined as described in 3.1.5 through 3.1.8 and identified as *K_c*, *K_f*, or *K_m*.

3.1.5 *K_c*—determined from the percent of SAE No. 10 oil retained, which represents the total effect of the aggregate's absorptive properties and surface roughness of the aggregates coarse fraction.

NOTE 1—Based on comparative testing in California, the same results can be obtained substituting Shell Tellus No. 100 oil for SAE No. 10 oil.

3.1.6 *K_f*—determined from the following factors:

3.1.7 Percent of kerosine retained, which represents the total effect of superficial area, the aggregate's absorptive properties and surface roughness of the aggregate's fine fraction.

3.1.7.1 Computed surface area, based on particle size.

3.1.7.2 Percent of aggregate passing No. 4 (4.75-mm) sieve.

3.1.8 *K_m*—the “mean” or composite value of *K* for a given combination of coarse and fine materials on which *K_c* and *K_f* have already been determined independently.

4. Significance and Use

4.1 The CKE furnishes an index, designated as the *K* factor, that indicates the aggregate particle roughness and surface capacity based on porosity.

4.2 The CKE is used as part of the Hveem mix design procedure to determine the approximate bitumen ratio (ABR), as shown in Appendix X1. However, there are other applications such as determining the coarse aggregate fraction constant (*K_c*) for use as an aid in selecting a bitumen content for open-graded friction courses.

5. Apparatus

5.1 *Centrifuge*, power driven, capable of exerting a force of 400 ± 8 times gravity (400 G) on a 100-g sample.

The required r/min (± 10) of the centrifuge head =
$$\sqrt{(25.4)(14\,000\,000/r)}$$

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.51 on Aggregate Tests.

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² Annual Book of ASTM Standards, Vol 04.02.

³ Annual Book of ASTM Standards, Vol 04.03.

⁴ Annual Book of ASTM Standards, Vol 04.08.

⁵ Annual Book of ASTM Standards, Vol 14.04.