



Standard Test Method for Aggregate Layer Hiding Power¹

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^{ε1} NOTE—Editorially switched from English dominant to SI dominant.

1. Scope

1.1 This test method measures the quantity of aggregate needed to provide an opaque layer under laboratory conditions. Aggregate size Numbers 1 through 8, as listed in Classification D 448, may be tested.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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.*

2. Referenced Documents

2.1 ASTM Standards:

C 702 Practice for Reducing Field Samples of Aggregate to Testing Size²

D 75 Practice for Sampling Aggregates³

D 448 Classification for Sizes of Aggregate for Road and Bridge Construction³

D 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology D 1079.

4. Significance and Use

4.1 One of the functions of a roofing aggregate is to shield the roofing membrane from sunlight that may be destructive to the roofing membrane. This test method measures the quantity of gravel needed to exclude light under arbitrary laboratory conditions. This test method need not be performed if the roofing membrane is not affected by light exposure.

¹ This test method is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing, and Bituminous Materials and is the direct responsibility of Subcommittee D08.03 on Surfacing and Bituminous Materials for Membrane Waterproofing and Builtup Roofing.

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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 04.04.

5. Apparatus

5.1 *Exposure Box*, 300-mm²(12-in.²) \pm 1 % tray, 90 mm (3.6 in.) minimum deep with an opaque lid.

5.2 *Light Source*— 150-W floodlight with stand.

5.3 *Counting Template*—A clear plastic mask with 100-mm²(4-in.²) grid of lines 10 mm (0.4 in.) apart to result in 100 counting cells.

5.4 *Light Sensitive Paper*—Rapid printing opaque diazo papers for use in diazo blue-line printing machines.

5.5 *Sample Splitter*, riffle type.

5.6 *Balance*, 30-kg (66-lb) capacity, sensitive to 3×10^{-3} % of the capacity.

5.7 *Diazo Printing Machine*.

6. Sampling

6.1 Follow the sampling recommendations of Practice D 75.

7. Procedure

7.1 *For Roofing Ballast*—Fractionate the aggregate, dried to 110°C (230°F) to constant weight, using a sample splitter, until a 25-kg (55-lb) sample is obtained. Riffle out 2.3-kg (5.1-lb), 4.5-kg (9.9-lb), 6.8-kg (15.0-lb), and 9-kg (20.0-lb) \pm 1 % specimens in accordance with Practice C 702.

7.2 *For Builtup Roofing Aggregate*—Fractionate the dried aggregate sample, using the sample splitter, until a 6-kg (13.4-lb) sample is obtained. Riffle out 1.394-kg (3.073-lb), 1.858-kg (4.096-lb), and 2.323-kg (5.12-lb) \pm 1 % specimens in accordance with Practice C 702. These specimens represent aggregate application rates of 15 kg/m²(3.1 lb/ft²).

7.3 Cut a sheet of light sensitive paper to cover the bottom of the exposure box. Place the paper in the box. Position the light source over the center of the box with 610 mm (24 in.) between the bottom of the bulb and the paper. Cover the paper uniformly with the test aggregate.

7.4 Turn the light source on for 10 min.

7.5 Remove the aggregate and develop the light sensitive paper in a “blue ray” or other appropriate printing machine.

7.6 Expose and record on light sensitive paper the light transmitted through the weighed aggregate specimens.

7.7 Estimate the light pigmented areas on the print, place the counting template over a representative area of each print, and count the number of cells (the percent) that fall on light areas.

8. Calculation

8.1 The number of template cells that show no light penetration is the percent opacity.

8.2 Assume a linear relationship between percent opacity and application rate. Calculate the quantity of aggregate needed to obtain 100 % opacity.

9. Report

9.1 Report the source, size number, and type of each sample.

9.2 Report the percent opacity (from 8.1) and the application rate of the aggregate.

9.3 Attach a clearly labeled copy of each print (from 7.5).

9.4 Report the quantity of ballast needed to obtain 100 % opacity.

10. Precision and Bias

10.1 The linear relationship assumed between application rate and opacity (used in 7.4) is justified by round-robin testing

where the least squares linear regression coefficient averaged 0.94, with a range from 0.82 to 0.99.

10.2 *Precision*—Both the multilaboratory and the within-laboratory standard deviations have been found to be 2.8 % in percent opacity. Therefore, results of two properly conducted tests should not differ by more than 8 % opacity. The standard deviation of the quantity of aggregate to obtain complete opacity is 0.1 kg/m²(0.02 lb/ft²) between laboratories and within a laboratory. Therefore, results of two properly conducted tests should not differ by more than 0.30 kg/m²(0.061 lb/ft²).

10.3 *Bias*—The procedure in this test method for hiding power has no bias because the quantity of aggregate needed to exclude sunlight is defined by this test method.

11. Keywords

11.1 aggregate; ballast; bituminous; roofing

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