



## Standard Test Method for Aggregate Layer Hiding Power<sup>1</sup>

This standard is issued under the fixed designation D5081/D5081M; 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. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Units information was editorially corrected in January 2012.

### 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 **D448**, may be tested.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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:<sup>2</sup>

**C702** Practice for Reducing Samples of Aggregate to Testing Size

**D75** Practice for Sampling Aggregates

**D448** Classification for Sizes of Aggregate for Road and Bridge Construction

**D1079** Terminology Relating to Roofing and Waterproofing

### 3. Terminology

3.1 **Definitions**—For definitions of terms used in this test method, see Terminology **D1079**.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee **D08** on Roofing and Waterproofing and is the direct responsibility of Subcommittee **D08.03** on Surfacing and Bituminous Materials for Membrane Waterproofing and Built-up Roofing.

Current edition approved Nov. 1, 2011. Published January 2012. Originally approved in 1990. Last previous edition approved in 2005 as D5081 – 90 (2005). DOI: 10.1520/D5081\_D5081M-90R11E01.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### 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.

### 5. Apparatus

5.1 **Exposure Box**, 300-mm<sup>2</sup> [12-in.<sup>2</sup>] ± 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-mm<sup>2</sup> [4-in.<sup>2</sup>] 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 blueline printing machines.

5.5 **Sample Splitter**, riffle type.

5.6 **Balance**, 30-kg [66-lb] capacity, sensitive to 3 × 10<sup>-3</sup> % of the capacity.

5.7 **Diazo Printing Machine**.

### 6. Sampling

6.1 Follow the sampling recommendations of Practice **D75**.

### 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] ± 1 % specimens in accordance with Practice **C702**.

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] ± 1 % specimens in accordance with Practice **C702**. These specimens represent aggregate application rates of 15 kg/m<sup>2</sup> [3.1 lb/ft<sup>2</sup>].

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/m<sup>2</sup> [0.02 lb/ft<sup>2</sup>] between laboratories and within a laboratory. Therefore, results of two properly conducted tests should not differ by more than 0.30 kg/m<sup>2</sup> [0.061 lb/ft<sup>2</sup>].

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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