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Standard Test Method for Determining the Hiding Power of Paint by Visual Evaluation of Spray Applied Coatings[1]

This standard is issued under the fixed designation D6762; 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.

ε[1] NOTE—Units statement in 1.3 was added editorially in July 2009.

1. Scope

1.1 This test method provides for the quantitative visual determination of the film thickness required to achieve full hiding. This film thickness is considered to be the hiding power of a test paint.

1.2 This method applies only to spray applied coatings but its concepts are valid for other methods of application as well.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *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:*[2]

D16 Terminology for Paint, Related Coatings, Materials, and Applications

D609 Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products

D1005 Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

D1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base (Withdrawn 2006)[3]

D1400 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base (Withdrawn 2006)[3]

D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D1730 Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting

D2805 Test Method for Hiding Power of Paints by Reflectometry

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D16 and the *Paint/Coatings Dictionary*.[4]

4. Summary of Test Method

4.1 The test paint is applied by means of spray application in a wedge-shaped film over a black and white, black and gray or red and gray pattern so that a thickness variation is obtained, which provides excess hiding at one end of the pattern and partial hiding at the other end of the pattern.

4.2 The dry film is examined under standard illumination to select the point where the pattern just becomes obscured. The thickness of the film at this point is designated the hiding power of the paint.

5. Significance and Use

5.1 This test method determines hiding power of a test paint by visual evaluation of a spray applied coating.

NOTE 1—Test Method D2805 describes an instrumental method for determining hiding power. The paint film is applied at a uniform thickness (for example with a doctor blade), the film thickness is measured rigorously, and the opacity is determined photometrically. Hiding power is

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.26 on Optical Properties.

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

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Published by the Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422.

thereby determined with a high degree of precision.

5.2 Test Method D6762 is less precise than Test Method D2805, but is commonly used since it is more closely related to the application characteristics of the paint and is simpler in concept and evaluation.

6. Apparatus

6.1 *Test Surface,* a smooth-surfaced paper chart, approximately 2 by 11 in., with a test pattern having adjacent black and white, black and gray or red and gray areas and coated with a suitable varnish or lacquer so as to render the surface impervious to paint liquids.

NOTE 2—The red, gray, white and black areas should fall in the following colorimetric range:

	CIE-Y %	C[A]	h[A]
Red	4–7	10–18	26–38
Gray	28–34		
White	80–83		
Black	1 max		

[A] Valid for Illuminant D65[10] or C[2], with 0°/45° geometry.

6.2 *Illumination,* a light source providing diffuse light of reasonable intensity, preferably northern sky light or an approximation of the same (see Practice D1729).

6.3 *Backer Panel,* 4 by 12 in. steel or aluminum panel. A larger panel may be used if desired.

6.4 *Film Thickness Measuring Device,* a film thickness measuring device in accordance with Test Methods D1005, D1186, and D1400.

6.5 *Spray Equipment,* either a hand spray gun or an automatic spray machine.

6.6 *Oven,* capable of maintaining the bake schedule for the product being evaluated.

6.7 *Tape,* masking or adhesive.

7. Preparation of Wedge-shaped Paint Film (Hand Spray)

7.1 Prepare the backer panel in accordance with Practices D609 or D1730.

7.2 Attach the desired test pattern to one side of the backer panel with masking tape or adhesive tape.

7.3 Reduce the material being tested to spray viscosity.

7.4 Attach spray gun to a suitable compressed air supply line and adjust air pressure for consistent fan spray.

7.5 Position the backer panel so that the long side is vertical. The panel should be placed so that the spray gun tip is approximately 12 in. from the face of the panel.

7.6 Prepare a wedge-shaped film. An example of a procedure for preparing a wedge-shaped film by means of hand spray is shown in Appendix X1.

NOTE 3—The film thickness should vary from partial hiding at one end to excess hiding at the other end, but the total variation from one end to the other should not exceed 50 µm.

7.7 Remove the panel and flash and bake per the recommended bake schedule.

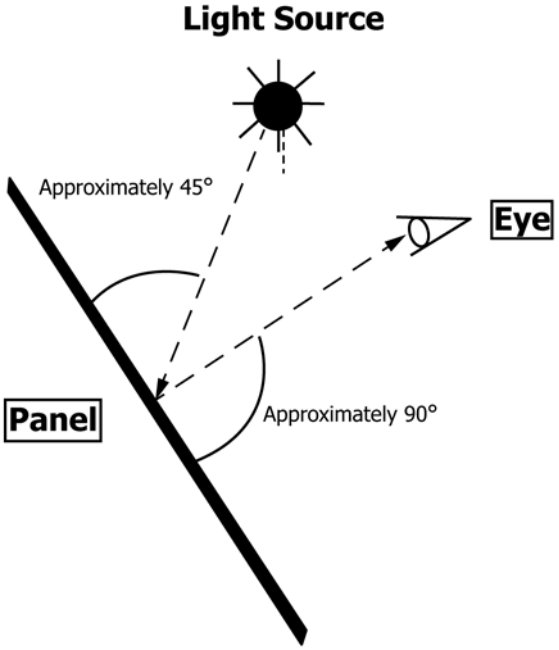

FIG. 1 Test Panel

8. Preparation of Wedge-shaped Paint Film (Automatic Spray Machine)

8.1 Prepare the backer panel in accordance with Practices D609 or D1730.

8.2 Attach the desired test pattern to the one side of the backer panel with masking tape or adhesive tape.

8.3 Reduce the material being tested to spray viscosity.

8.4 Position the backer panel on the panel holder so that the long side is horizontal or vertical depending on the type of spray machine being used.

8.5 Prepare a wedge-shaped film. An example of a procedure for preparing a wedge-shaped film by means of an automatic spray machine is shown in Appendix X2.

NOTE 4—The film thickness should vary from partial hiding at one end to excess hiding at the other end, but the total variation from one end to the other should not exceed 50 µm.

8.6 Remove the panel and flash and bake per the recommended bake schedule.

9. Evaluation Procedure

9.1 Remove the panel from the oven and cool to room temperature.

9.2 Examine the test panel, as shown in Fig. 1, under illumination conditions as described in 6.2 at a viewing angle perpendicular to the surface of the panel, and select the point where the test pattern is just barely or no longer visible. The dry film thickness at this point is considered to be the hiding power of the coating.

NOTE 5—The viewing angle may change depending on customer requirements.

9.3 Measure the film thickness at the point of hiding per Test Methods D1005, D1186, or D1400.

10. Report

10.1 Report the coating under evaluation, with serial number if applicable.

10.2 Report the hiding power, as noted in 9.3, in μm (mils).

11. Precision and Bias[5]

11.1 *Precision:*

11.1.1 An interlaboratory study of this test method was conducted in which one operator in each of six laboratories made two determinations each on six samples of paint. The samples represented two paint samples at each of three different levels of hiding power. The samples were analyzed statistically in accordance with Practice E691. On the basis of the standard deviations shown in Table 1, the following criteria should be used for judging the acceptability of results at the 95 % confidence level:

11.1.1.1 *Repeatability*—Two results obtained by the same operator should be considered suspect if they differ by more than the maximum allowable differences shown in Table 1, Section A.

TABLE 1 Precision of Hiding Power of Paint by Visual Evaluation of Spray Applied Coatings

Hiding Level mils	Average mils	Standard Deviation mils	Maximum Allowable Difference Mils (micrometers)
A. Repeatability (single operator)			
0.6–0.8	0.7	0.09	0.25 (6.3)
1.0–1.4	1.2	0.11	0.30 (7.6)
1.6–2.2	2.0	0.07	0.21 (5.3)
B. Reproducibility (between laboratories)			
0.6–.08	0.7	0.16	0.45 (11.3)
1.0–1.4	1.2	0.39	1.08 (7.6)
1.6–2.2	2.0	0.48	1.33 (33.8)

11.1.1.2 *Reproducibility*—Two results obtained by operators in different laboratories should be considered suspect if they differ by more than the maximum allowable differences shown in Table 1, Section B.

11.2 No information can be presented on the bias of the procedure in Test Method D6762 for measuring hiding power because no acceptable reference standard is available.

[5] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D01-1126. Contact ASTM Customer Service at service@astm.org.

12. Keywords

12.1 hiding power; spray applied coating; visual evaluation

APPENDIXES

(Nonmandatory Information)

X1. PREPARATION OF WEDGE-SHAPED PAINT FILM BY HAND SPRAY (EXAMPLE)

X1.1 Mount the panel vertically and spray the entire panel with a uniform coat of the test material approximately 10 μm thick.

X1.2 Flash and then spray the lower ¾ of the panel with an additional coat of the test material approximately 10 μm thick.

X1.3 Flash and then progressively spray the remaining lower areas of the panel, for example, bottom ½, bottom ¼, etc., until complete hiding is achieved near the center of the panel.

NOTE X1.1—Allow sufficient flash time, as experience dictates, to prevent sagging or flooding.

NOTE X1.2—The film thickness should vary from partial hiding at one end to excess hiding at the other end, but the total variation from one end to the other should not exceed 50 μm.

X2. PREPARATION OF WEDGE-SHAPED PAINT FILM BY AUTOMATIC SPRAY MACHINE (EXAMPLE)

X2.1 Spray a wedge-shaped film using an automatic spray machine. The spray machine should be programmed to yield the following spray pattern:

Portion 1	Portion 2	Portion 3	Portion 4
1 Pass	2 Passes	3 Passes	4 Passes

X2.2 After spraying Portion 4, rotate the panel 180° and repeat as shown below:

4 Passes	3 Passes	2 Passes	1 Pass
Total 8 Passes	Total 6 Passes	Total 4 Passes	Total 2 Passes

NOTE X2.1—Allow sufficient flash time, as experience dictates, to prevent sagging, flooding or popping.