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Standard Test Method for Comparison of the Brush Drag of Latex Paints[1]

This standard is issued under the fixed designation D 4958; 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.

1. Scope

1.1 This test method is a standardized brushout procedure for comparing the brush drag of architectural type solvent-borne paints.

1.2 With slight modifications this test method is also applicable to solvent-borne paints.

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:*

D 1475 Test Method for Density of Liquid Coatings, Inks, and Related Products[2]

D 3924 Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer and Related Materials[2]

D 3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings[2]

D 4287 Test Method for High-Shear Viscosity Using the ICI Cone/Plate Viscometer[2]

D 5068 Standard Practice for Preparation of Paint Brushes for Evaluation[3]

3. Terminology

3.1 Definitions—See *Paint/Coatings Dictionary*[4] for definition of terms used in this test method.

3.1.1 *brush-drag*—resistance encountered when applying a coating by brush.

4. Summary of Test Method

4.1 A 2-in. (50-mm) polyester brush is used to apply the test paint on a 1.076-ft^2(1000-cm^2) test area. The application is made at a spreading rate of 400 ft^2/gal (9.82 m^2/L) and is completed in 30 to 35 s. The degree of brush drag is rated subjectively using a series of standard descriptive terms corresponding to numerical values of 1 to 10. The rank order of a set of samples is thereby established.

5. Significance and Use

5.1 As the brush drag of a paint increases, any natural tendency on the part of the painter to overspread the paint is reduced. When all other factors are held constant, increased brush drag will result in greater film thickness with consequent improvement in durability and hiding. Conversely, sometimes it might be preferred to have a lesser degree of brush drag for easier application (that is, the amount of time and effort in applying a paint to a specific area is reduced with a lesser degree of brush drag).

5.2 This test method provides a standardized brushout procedure for the evaluation of brush drag as an alternative to customary informal ad hoc procedures. Its objective is to maximize the reliability and precision with which this characteristic may be determined.

NOTE 1—The brush drag of paints is directly related to their high-shear viscosity. There is generally good rank order agreement between results obtained by this method and Test Method D 4287. The sensitivity of this brushout method has been found sufficient to distinguish between brushabilities corresponding to high-shear viscosity differences not lower than 0.3 poise (0.03 Pa.s). Round robin data show that rank order agreement between the brushout and viscometric methods is poor when latex and solvent-borne paints are part of the same comparison group. This is the result of these two paint types having markedly different rheological properties that affect the relative perception of brush drag.[5]

6. Apparatus

6.1 *Brush*, 2-in. (50-mm) polyester filament, 2¾-in. (70-mm) length-out, 9⁄16 in. (14 mm) thick, with a chiseled tip.

NOTE 2—All tests of a given series of paints, within or between laboratories, should be carried out with commercially identical brushes.

6.2 *Stopwatch.*

6.3 *Balance,* capable of weighing accurately to 0.1 g.

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[1] This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.42 on Architectural Finishes.

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[2] *Annual Book of ASTM Standards*, Vol 06.01.

[3] *Annual Book of ASTM Standards*, Vol 06.02.

[4] Available from Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422.

[5] Supoporting data are available from ASTM Headquarters. Request RR: D01–1072.

6.4 *Test charts*, with a sealed surface, having 1.076 ft^2(1000 cm^2) of test area.[6]

7. Sampling and Conditioning

7.1 Sample in accordance with Practice D 3925.

7.2 Condition the samples in accordance with the Conditioning and Testing section of Specification D 3924.

7.3 All testing should be performed under the same conditions.

8. Procedure

8.1 Do not change operators during the running of a series of specimens, since this will invalidate any conclusions as to rank order.

8.2 Determine the density in pounds per gallon (kilograms per litre) of the paint sample in accordance with Test Method D 1475.

8.3 Multiply the density by 1.221 to obtain the weight of paint in grams to apply on the specified test chart to obtain a spreading rate of 400 ft^2/gal (9.82 m^2/L).

8.4 *Conditioning of the Brush*:

8.4.1 Soak the brush in clean water, then spin rapidly to remove the water from the bristles as completely as possible.

8.4.2 Dip the test brush into the specified paint to the depth shown below:

Brush Width, in. (mm)	Depth, in. (mm)
2 and 2½ (50 and 62.5)	1½ (38)
3 and 3½ (75 and 87.5)	1¾ (45)
4 (100)	2 (50)

8.4.3 Hold the brush at the specified depth in the paint for 10 s. Remove and hold the brush vertically for 30 s allowing any excess paint to drain.

8.5 Place the test chart on the balance and weigh the correct amount of paint as calculated in 8.3 directly onto the center of the card.

8.6 Immediately tape the card onto a hard, flat surface, start the stopwatch, and proceed to spread the paint using the previously conditioned 2-in. (50-mm) brush. Using long, steady brush strokes, alternately parallel and perpendicular to the edge of the chart, cover the test area uniformly and completely in 30 to 35 s.

8.7 Immediately assign and record a brush drag rating according to the following series of qualitative descriptive terms, first characterizing it by a verbal description, and then by the corresponding number.

1—Very slight
2—Slight
3—Slight to moderate
4—Moderate
5—Moderate to considerable
6—Considerable
7—Considerable to pronounced
8—Pronounced
9—Very pronounced
10—Extreme

8.8 Thoroughly clean the brush with warm water and spin it to remove excess water between tests.

8.9 Repeat 8.2-8.8, using a fresh sample for each specimen in the set and rate the specimen as the mean of the two results.

8.10 If more than one sample has the same rating, brush out the similarly rated specimens again, in close comparison. If small differences are perceived, then indicate these by assigning intermediate decimal values. If no difference is found then the original ratings stand.

9. Interpretation of Results

9.1 Tabulate the paints in order of their brush drag ratings, showing verbal descriptions and numerical ratings in separate columns.

9.2 In a fourth rank order column, rank the paints from 1 to *n* (least to most brush drag), where *n* is the total number of paints in the series.

9.3 Paints with the same qualitative ratings should be assigned multiple rank numbers, with the mean of those numbers shown in parentheses, for example, 3 to 4 (3.5), 5 to 7 (6). The mean ranking (in parentheses) is used to calculate a grand mean ranking when the same series of paints is ranked by more than one operator.

10. Report

10.1 Report the brush drag ranking as determined in Section 9.

11. Precision and Bias

11.1 *Precision*—In an interlaboratory study of this test method in which five coatings varying widely in brush drag were ranked by one operator in each of nine laboratories, two operators in one laboratory, and three operators in another laboratory, the coefficient of concordance (agreement in ranking) was found to be 0.84, reflecting the fact that seven of the fourteen operators agreed perfectly and four others reversed one of two adjacent pairs. The coefficient is statistically significant at the 99.9 % confidence level.

11.2 *Bias*—Bias can not be determined for this test method because there is no standard reference material.

12. Keywords

12.1 brush drag; high shear viscosity; brushability; ease of brushing; drag

[6] Leneta Form 8H-BW, obtainable from The Leneta Co., P.O. Box 86, Ho-Ho-Kus, NJ 07423, has been found satisfactory for this purpose.