Designation: D4958 – 10 (Reapproved 2016)

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

This standard is issued under the fixed designation D4958; 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 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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]

D1475 Test Method For Density of Liquid Coatings, Inks, and Related Products

D3924 Specification for Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials

D3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings

D4287 Test Method for High-Shear Viscosity Using a Cone/Plate Viscometer

D5068 Practice for Preparation of Paint Brushes for Evaluation

3. Terminology

3.1 *Definitions:* See *Paint/Coatings Dictionary*[3] 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 50-mm (2-in.) polyester brush is used to apply the test paint on a 1000-cm^2 (1.076-ft^2) test area. The application is made at a spreading rate of 9.82 m^2/L (400 ft^2/gal) 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 D4287. 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.[4]

6. Apparatus

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

[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 D01.42 on Architectural Coatings.

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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] Available from Federation of Societies for Coatings Technology (FSCT), 492 Norristown Rd., Blue Bell, PA 19422–2350, http://www.coatingstech.org.

[4] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D01-1072. Contact ASTM Customer Service at service@astm.org.

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.

6.4 *Test charts,* with a sealed surface, having 1000 cm^2 (1.076 ft^2) of test area.[5]

7. Sampling and Conditioning

7.1 Sample in accordance with Practice D3925.

7.2 Condition the samples in accordance with the Conditioning and Testing section of Specification D3924.

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 kilograms per litre (pounds per gallon) of the paint sample in accordance with Test Method D1475.

8.3 Multiply the density by 10.2 to obtain the weight of paint in grams to apply on the specified test chart to obtain a spreading rate of 9.82 m^2/L (multiply density in pounds per gallon by 1.22 to obtain a spreading rate of 400 ft^2/gal).

8.4 Load the brush with the specified paint and condition the brush for testing in accordance with Practice D5068.

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 50-mm (2-in.) 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 brushability; brush drag; drag; ease of brushing; high shear viscosity

[5] 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.