



Standard Test Method for Evaluating Ink Stainblocking of Architectural Paint Systems by Visual Assessment¹

This standard is issued under the fixed designation D7514; 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 standard provides a method for evaluating the ability of an architectural paint system to block ink stains from markers and writing instruments from bleeding through a primer into a topcoat.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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:*²

D823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels

D1640 Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

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

3. Terminology

3.1 *Definitions:*

3.1.1 *stainblocking, n*—the ability of a paint or coating to prevent stains from bleeding through into the top finish.

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.

4. Summary of Test Method

4.1 A substrate, typically a painted surface or an uncoated building material, is stained using a series of ink writing implements.

4.2 The stained substrate is coated with the test paints and allowed to dry for a specified interval.

4.3 The test paints are top-coated with a wall paint and the test paint/topcoat system is evaluated for stainblocking effectiveness.

5. Significance and Use

5.1 This standard may be used by paint companies and raw material suppliers to assess effectiveness of interior architectural primers for blocking stains from bleeding through to a topcoat.

5.2 In practice, different ink-stained substrates may give various results for stainblocking performance for a primer and topcoat system. As such, this test method may be used for a number of different ink-stained surfaces.

6. Apparatus

6.1 *Film applicator*, such as a drawdown bar, capable of applying 0.075 to 0.100 mm (3 to 4 mil) wet film thickness with a minimum film width as needed to cover the test area defined in 9.2.

6.2 *Ruler* or suitable straight edge instrument.

7. Reagents and Materials

7.1 *Substrate desired for testing*. The substrate must be able to accept a variety of ink marks and must have a uniform flat surface to enable paint films to be applied with a drawdown bar applicator. A sealed drawdown chart coated with a base paint is commonly used.

7.2 Staining media selected from among the following materials:

7.2.1 Permanent marker.

7.2.2 Washable marker.

7.2.3 Dry erase marker.

7.2.4 Ink pen.

7.2.5 Highlighter.

7.2.6 Other suitable writing implements as agreed upon between purchaser and seller.

NOTE 1—Parties involved in comparing ink stainblocking results between laboratories must ensure the selected writing implements are from a common supply. This is important as inks may produce different staining effects depending on their age, storage conditions, or manufactured lot. Additionally, it may be useful when replacing ink pens or markers with a new supply to conduct a comparison of old and new to validate if new ink stainblocking results will correlate to historical findings.

8. Hazards

8.1 The user of this standard should refer to appropriate MSDS for hazards associated with handling of paint samples or other laboratory items used as specified in this standard.

9. Procedure

9.1 Substrate Preparation:

9.1.1 If the primer/topcoat system is to be evaluated directly over an existing substrate that will accept ink stains, proceed directly to the ink-staining procedure in 9.1.3.

9.1.2 If no specific substrate is identified for the evaluation, a test substrate shall be prepared by coating a drawdown chart with a suitable basecoat as follows.

9.1.2.1 Select a paint to use as a basecoat. Any commercially available white flat wall paint may be used for this purpose.

NOTE 2—Because different basecoat paints will vary in how they accept the ink stains, performance can only be compared for tests using the same substrate system.

9.1.2.2 Apply the selected basecoat paint to an all-white sealed drawdown chart to achieve a wet-film thickness of approximately 0.075 mm (3.0 mils). The application shall be conducted in accordance with any appropriate practice described in Practices D823.

9.1.2.3 The basecoat paint must cover enough of the width of the drawdown chart to enable smooth passage of the drawdown bar for subsequent coats of test paint. The progression of paint applications for this standard beginning with the basecoat application is represented in Fig. 1.

9.1.2.4 Allow basecoat paint to dry overnight. Environmental conditions during drying of the basecoat paint are not critical to the end test result, however, the basecoat paint should be Dry-Through as described in Test Methods D1640 before continuing.

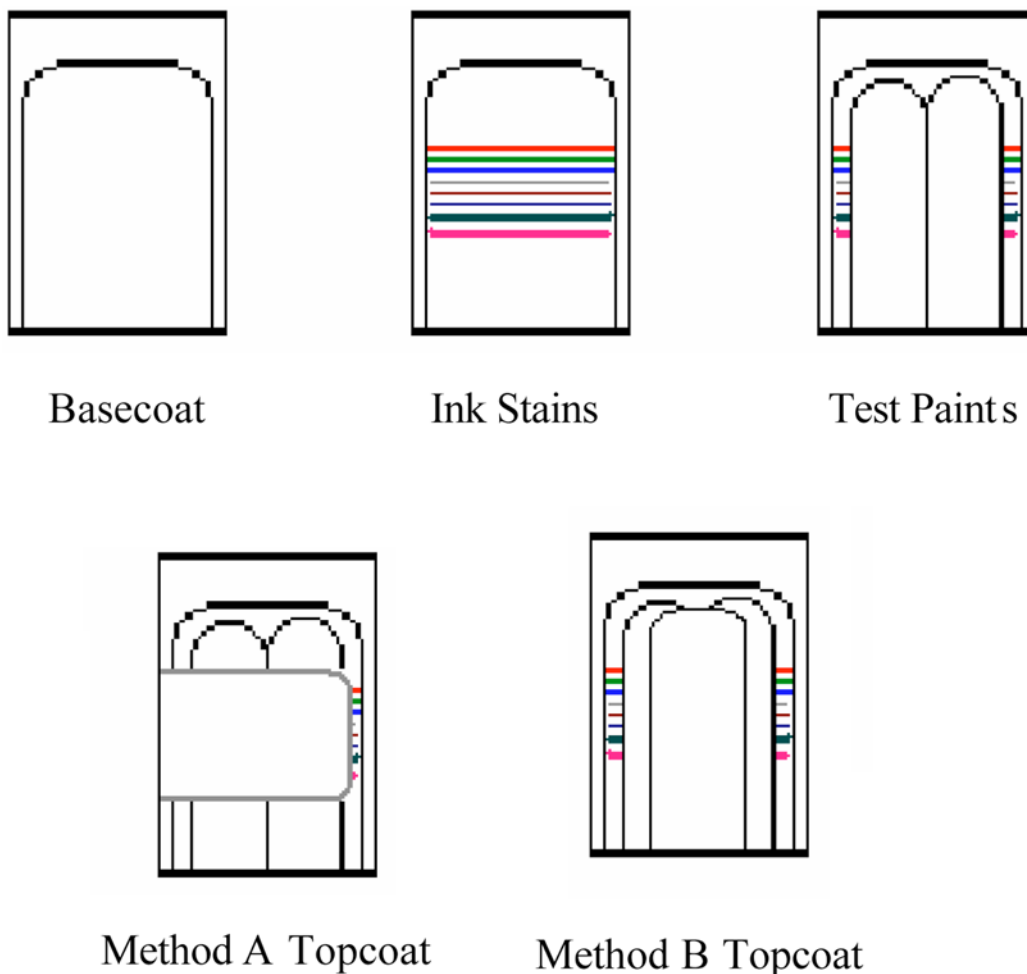


FIG. 1 Progression of Paint Applications

9.1.3 Using a straight edge as a guide, make a series of solid stain lines perpendicular to the direction of the drawdown with various ink markers and pens as specified in 7.2. It is generally suggested to select inks of varying chemical composition such as those having different carrier solvents.

9.1.4 A minimum of 2 colors of each marker and pen is recommended. Leave a minimum of 3 mm unstained area between each stain line.

NOTE 3—Selecting a variety of colors for each stain is recommended as this gives an indication of a coating system's stainblocking ability using a common ink composition but with varying pigmentation. In practice, three or more colors are often selected to represent each ink.

9.1.5 If the test will be run using Method A as described in 9.2.6.1, the distance between the top and bottom stain lines on the test chart should not exceed the practical application width of the film applicator selected for applying the topcoat.

9.1.6 Allow the marker and ink stains to dry minimum of overnight before proceeding.

NOTE 4—The duration of ink drying should be agreed upon before beginning the test. Additionally, stained panels should be stored in an environment with limited natural light exposure.

9.2 Application of Test Paint System:

9.2.1 Application of test paint systems shall be conducted in accordance with Blade Film Application techniques described in Practice E of Practices D823.

9.2.2 Using an appropriate film applicator, apply a 0.075 to 0.100 mm (3 to 4 mil) wet film of the test paint or primer sample(s) perpendicular to the direction of the ink stains. Be careful to ensure the edges of the drawdown bar remain on the surface of the substrate or basecoat along the entire length of the drawdown path. It is recommended to include a control paint or a paint of known ink stainblocking performance in addition to the test paint samples.

NOTE 5—Generally this test method is conducted as a comparison of two test paint systems with a single topcoat. However, additional test paints may be simultaneously applied as described in 9.2.2 taking into consideration the available width of the selected film applicator and substrate.

9.2.3 Allow test paints to dry for 2 hours or other agreed upon time interval. Selected drying time should match or

exceed the recommended drying time for the test paint. If drying time is uncertain, it can be determined using Test Methods D1640.

9.2.4 If the test paint system is designed for use without an additional topcoat, proceed directly to final evaluation described in Section 10.

9.2.5 Select a paint to use as a topcoat. The topcoat paint should represent a paint that would be applied over the test paints in practice. If evaluating a self-priming system, the test paint itself may be used as the topcoat.

9.2.6 Complete the panel by applying the selected topcoat using a film applicator to achieve a 0.075 to 0.100 mm (3 to 4 mil) wet film.

9.2.6.1 *Method A*—The topcoat drawdown is cast so that it is parallel to the applied direction of the ink stains on the substrate.

9.2.6.2 *Method B*—The topcoat drawdown is cast so that it is perpendicular to the applied direction of the ink stains on the substrate.

NOTE 6—Method A is preferred when the test paint samples vary in dry film thickness or when more than two test paints are applied to the same test panel. Method B is preferred when the evaluator wishes to visually examine the un-topcoated section of test paint.

9.2.7 Allow the panel to dry for 2 hours before final evaluation.

10. Calculation or Interpretation of Results

10.1 Visually evaluate each marker or ink stain type on the panel using a standard 0 to 10 rating scale. Ratings may be assigned between the rating guidelines below based on judgment of the evaluator:

10	Excellent. Staining is not visible through the topcoat. No stain is visible.
8	Very good. Slight staining. Approximately 20 % of stain is visible.
6	Good. Moderate staining. Approximately 40 % of stain is visible.
4	Fair. Moderate to heavy staining. Approximately 60 % of stain is visible.
2	Marginal. Heavy staining. Approximately 80 % of stain is visible.
0	Poor. Severe staining. Stain progressed through topcoat easily.

10.2 Record the individual score for each stain and color type.

TABLE 1 Stainblocking Rating (0 to 10 scale; 10 being best)

Material	Marker Type	Color	Average $\bar{X}$	s_r	S_R	Repeatability r	Reproducibility R
A	Permanent	Black	8.83	0.45	0.86	1.25	2.40
A	Permanent	Red	3.53	0.55	1.75	1.53	4.91
A	Permanent	Green	3.23	0.41	1.75	1.14	4.91
A	Washable	Black	3.00	0.63	1.69	1.77	4.73
A	Washable	Red	3.03	0.32	1.71	0.89	4.78
A	Washable	Green	3.10	0.45	1.47	1.25	4.11
B	Permanent	Black	8.60	0.41	1.10	1.14	3.09
B	Permanent	Red	4.87	0.26	1.84	0.72	5.15
B	Permanent	Green	5.07	0.18	2.05	0.51	5.75
B	Washable	Black	3.83	0.66	2.01	1.84	5.63
B	Washable	Red	3.83	0.66	1.78	1.84	4.98
B	Washable	Green	3.90	0.61	1.68	1.70	4.70
C	Permanent	Black	8.87	0.58	1.00	1.62	2.79
C	Permanent	Red	2.70	0.48	1.09	1.35	3.04
C	Permanent	Green	2.53	0.45	1.45	1.25	4.07
C	Washable	Black	2.63	0.61	1.52	1.70	4.25
C	Washable	Red	2.40	0.66	1.64	1.84	3.75
C	Washable	Green	2.63	0.58	1.22	1.62	3.42

11. Report

11.1 Rate each stain individually and report the average overall score across all stains.

11.2 *Optional Rating Schemes:*

11.2.1 The average score for each type of writing instrument used.

11.2.2 The total score based on summation of averages for each writing instrument (a maximum 40 points when four types of writing instruments are used).

12. Precision and Bias³

12.1 The precision of this test method is based on an interlaboratory study of ASTM D7514, Test Method for Evaluating Ink Stainblocking of Architectural Paint Systems by Visual Assessment conducted in 2012. Each of ten laboratories tested three different materials using two ink stain types in multiple colors. Every “test result” represents an individual determination, and all participants reported triplicate test results. Practice E691 was followed for the design and analysis of the data; the details are given in ASTM Research Report No. RR:D01-1176.

12.1.1 *Repeatability Limit (r)*—The difference between repetitive results obtained by the same operator in a given laboratory applying the same test method with the same apparatus under constant operating conditions on identical test material within short intervals of time would in the long run, in the normal and correct operation of the test method, exceed the following values only in one case in 20.

12.1.1.1 Repeatability can be interpreted as maximum difference between two results, obtained under repeatability

conditions, that is accepted as plausible due to random causes under normal and correct operation of the test method.

12.1.1.2 Repeatability limits are listed in Table 1.

12.1.2 *Reproducibility (R)*—The difference between two single and independent results obtained by different operators applying the same test method in different laboratories using different apparatus on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following values only in one case in 20.

12.1.2.1 Reproducibility can be interpreted as maximum difference between two results, obtained under reproducibility conditions, that is accepted as plausible due to random causes under normal and correct operation of the test method.

12.1.2.2 Reproducibility limits are listed in Table 1.

12.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

12.1.4 Any judgement in accordance with statements 12.1.1 and 12.1.2 would have an approximate 95 % probability of being correct.

12.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method, therefore no statement on bias is being made.

12.3 The precision statement was determined through statistical examination of 540 results, from ten laboratories, on three materials.

Material A: Premium Quality Interior Flat White Paint

Material B: Commercial Water-Based Primer #1

Material C: Commercial Water-Based Primer #2

12.4 To judge the equivalency of two test results, it is recommended to choose the material closest in characteristics to the test material.

13. Keywords

13.1 architectural primer; bleed-through; stainblocking

³ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D01-1176. Contact ASTM Customer Service at service@astm.org.

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