Designation: D 7489 – 09

Standard Practice for Evaluating Touch-Up Properties of Architectural Coatings under Various Environmental Conditions[1]

This standard is issued under the fixed designation D 7489; 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 practice determines the ability of a paint to be recoated or "touched up" in small areas. Variations in color, gloss, and sheen that result in a different appearance from the original paint can be evaluated visually.

1.2 This practice describes evaluation of touch-up characteristics in a laboratory-scale controlled environment as opposed to a full-scale field environment.

1.3 Evaluation of touch-up properties under constant drying conditions is described. Environmental conditions can be adjusted to incorporate high or low temperature drying , or both. The changes in application temperature can lead to larger differences in touch-up than applying both coats under the same environmental conditions.

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]

D 344 Test Method for Relative Hiding Power of Paints by the Visual Evaluation of Brushouts

D 523 Test Method for Specular Gloss

D 1475 Test Method For Density of Liquid Coatings, Inks, and Related Products

D 1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D 5068 Practice for Preparation of Paint Brushes for Evaluation

D 5069 Practice for Preparation of Paint-Roller Covers for Evaluation of Architectural Coatings

D 6762 Test Method for Determining the Hiding Power of Paint by Visual Evaluation of Spray Applied Coatings

E 1347 Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry

3. Terminology

3.1 Definition:

3.1.1 *touch-up*, *n*—to repair visual differences in a painted surface by recoating small areas with the same paint that was used for the original coat.

3.1.1.1 *Discussion*—This includes color and sheen differences in the dry film.

4. Summary of Practice

4.1 Paints, application tools, and drying conditions are selected before starting this practice. Relevant color(s) for testing and any specific primers should also be selected at this time.

4.2 Multiple coats of the test paint are applied to a specified substrate in a prescribed manner to simulate touch-up conditions. The results are visually evaluated for variations in color, gloss, and sheen between the touch-up coating and the first and second coat.

4.3 A qualitative rating scale for the touch-up result is described.

5. Significance and Use

5.1 During construction of a home, paints are subjected to a wide variety of drying conditions, and this may exhibit differences between the original coat and the touched-up area in appearance after its full cure. Therefore, it it essential for the paint to be able to perform under a wide variety of drying conditions. A paint that does this is very advantageous to the contractor.

5.2 It is possible for a paint to have excellent color touch-up, but poor sheen touch-up, or vice-versa. The ideal paint will have both excellent color and sheen touch-up under testing conditions.

5.3 Color, gloss and base choice can have a major impact on touch-up of the paint.

6. Apparatus and Materials

6.1 *Tinted Test Paint*.

[1] This practice 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.

6.2 *Dry Wall Panels, Upson Board*, or other accepted material. Minimum size 30 by 30 cm (1 ft by 1 ft).

6.3 *Primary Applicator*, which could be:

6.3.1 Good quality paint roller with ⅜ in. nap.

6.3.2 Airless spray unit capable of 1000 to 3000 psi and appropriate spray tip.

NOTE 1—If using an airless spray unit, typically a larger test panel is required.

6.3.3 Other applicators, as agreed upon.

6.4 *Secondary Applicator*, which could be:

6.4.1 Good quality paint roller with 1 cm (⅜ in.) nap.

6.4.2 Good quality polyester/nylon paint brush.

6.4.3 A natural or synthetic sponge.

6.4.4 Other applicators, as agreed upon.

6.5 *Controlled Temperature Drying Area/Cabinet*, such as:

6.5.1 Cold cabinet (refrigerator), maintaining 4 ± 2°C (40 ± 5°F).

6.5.2 Constant temperature room, maintaining 25 ± 2°C (77 ± 5°F).

6.5.3 May be done in a cabinet maintained at other temperatures or humidities, or both, as agreed.

6.6 *Gloss Meter (optional)*, to read gloss differences on test panel.

6.7 *Spectrophotometer (optional)*, to read color differences on test panel.

6.8 *Bench Scale (optional)*, to measure weight of paint applied to test.

6.9 *Ruler (optional)*, or other measuring device to measure area of paint application.

7. Procedure

7.1 Before starting this method, agree upon paints, tinted color, applicator types for first coat, second coat and touch-up area(s), as well as temperature under which each will be applied and dried.

7.2 Select a convenient and suitable spreading rate, mutually agreeable to all parties involved in the testing program, and preferably in the range from 8.6 to 11.0 m^2/L (350 to 450 ft^2/gal). See Appendix X1 for examples of typical touch-up applicator and drying conditions.

7.2.1 Results may be highly dependent on film thickness; therefore, it is essential that the test paints be weighed on accurately, particularly for small test areas. The amount of paint in grams required for a specific spread rate can be determined from the following equation:

$$g = ((Am * D)/Sm) * 1000 \quad (1)$$

where:

Am = area, square metres,
D = density, g/mL or kg/L, and
Sm = spreading rate, square metres/L.

or the following imperial units equation:

$$g = ((A * W)/S) * 3.15 \quad (2)$$

where:

A = area, sq. in.,
W = weight per gal. (Test Method D 1475), lb./gal, and
S = spreading rate, square ft/gal.

NOTE 2—The gallon unit here and throughout this test method is the U. S. gallon (3.78 L).

NOTE 3—To avoid variations in initial gloss, the substrate may require priming.

7.3 *Application of First Coat*:

7.3.1 The test substrate, applicator for the first coat (applicator A) and paint are placed in an area (oven, refrigerator, or constant temperature room) that corresponds with drying conditions for first coat (drying conditions A), and allowed to equilibrate for at least 4 h.

7.3.2 Applicator is broken in or conditioned for use (for example, Practice D 5068 for paint brushes and Practice D 5069 for paint rollers).

7.3.3 Then, one coat of the test paint is applied to the test substrate using the applicator A at drying conditions A. An illustration of the series of three application steps is found in Fig. 1. The panel is dried for a minimum of 18 h under drying conditions A.

7.3.3.1 (Optional) — If spread rates are being determined, measure the weight applied to the test panel using a bench scale, and measure the length and width of the test area.

7.4 *Application of Second Coat*:

7.4.1 The application of second coat step may be omitted if the critical touch-up being evaluated is directly over a one-coat application.

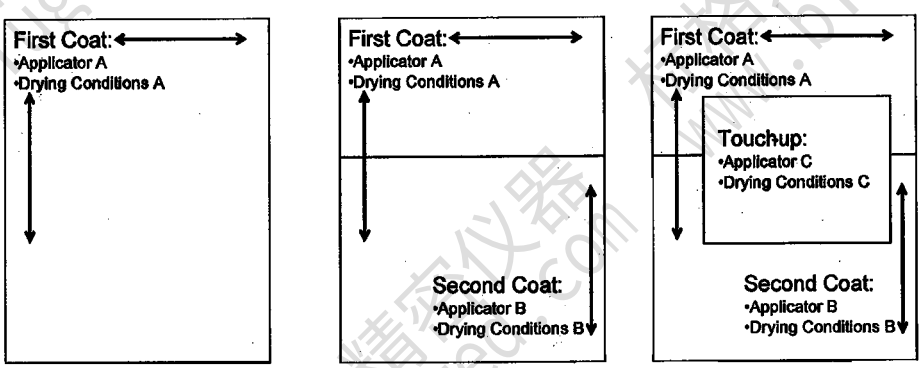

Figure 1. First Coat Figure 2. Second Coat Figure 3. Touch-up

FIG. 1 Graphic Representation of First and Second Coats and Touch-up Areas

7.4.2 The coated test substrate, applicator for the second coat (applicator B), and paint are placed in an area (oven, refrigerator, or constant temperature room) that corresponds with drying conditions for second coat (drying conditions B), and allowed to equilibrate for at least 4 h.

NOTE 4—Applicator B in the field can typically be the same as applicator A. Therefore it is acceptable that applicators A and B can be the same in some cases. See Table X1.1 for an example.

7.4.3 Applicator is broken in or conditioned for use (for example, Practice D 5068 for paint brushes and Practice D 5069 for paint rollers).

7.4.4 Then, the second coat of the test paint is applied to a portion of the coated test substrate (roughly 50 %) using the applicator B at drying conditions B. The panel is dried for a minimum of 18 h under drying conditions B.

7.4.4.1 (Optional) — If spread rates are being determined, measure the weight applied and test area as in 7.3.3.1.

7.5 *Application of the Touch-up Coat*:

7.5.1 The test panel, applicator for the touch-up coat (applicator C), and paint are placed in an area (oven, refrigerator, or constant temperature room) that corresponds with drying conditions for the touch-up coat (drying conditions C), and allowed to equilibrate for at least 4 h.

7.5.2 Applicator is broken in or conditioned for use (for example, Practice D 5068 for paint brushes and Practice D 5069 for paint rollers).

7.5.3 Then, the touch-up coat of the test paint is applied to a portion of the test panel, (roughly in the middle of the panel, overlapping both the first and second coat) using the applicator C at drying conditions C. The panel is dried for a minimum of 18 h under drying conditions C.

7.5.3.1 (Optional) — If spread rates are being determined, measure the weight applied and test area as in 7.3.3.1.

7.6 After 24 h dry time, remove panel to laboratory and inspect visually for differences in color and gloss.

8. Evaluation Procedure

8.1 *Viewing Conditions for Color Difference Determination*—When the test and comparison paint panels are thoroughly dry, place them vertically against a flat surface and view them for a distance of 0.6 to 3 m (2 to 10 ft) under illumination conditions as described in 9.1.1.

8.2 *Viewing Conditions for Gloss Difference Determination*—When the paint panels are thoroughly dry, place them vertically against a flat surface and view them from a distance of 0.3 to 1.5 m (1 to 5 ft) under illumination conditions as described in 9.2.1.

8.3 *Qualitative Evaluation*:

8.3.1 Refer to Test Method D 344, Practice D 1729, and Test Method D 6762 for suggestions on visual evaluation of the panels.

8.3.2 If the color or gloss difference between section A and section B for the test panel are small (not readily apparent), the difference is considered very good, whereas major differences are considered poor. See rating chart in 9.3.

8.4 *Quantitative Evaluation (optional)*:

8.4.1 Refer to Test Method D 523 for measuring instrumental gloss values of the panel sections.

8.4.2 Refer to Test Method E 1347 for measuring instrumental color values and differences of the panel sections.

9. Report

9.1 Examine the difference in COLOR visually of the touched-up versus either the one-coated or two-coated section.

9.1.1 Note: Evaluate COLOR head-on (perpendicular) to the panel to eliminate any visual differences in color that may be present due to differences in gloss. The lighting can be as agreed upon (fluorescent, incandescent, daylight, etc. For interior paints, typical lighting used is CIE F2 (or CWF), and for exterior paints typical lighting used is D65.)

9.1.2 Note: Typically a hand-held spectrphotometer can be used to back-up visual inspection with numerical differences, but visual determination of color is still the preferred method.

9.2 Examine the difference in gloss/gloss visually of the touched-up versus either the one-coated or two-coated section.

9.2.1 Note: View this gloss at different angles. Usually the most severe angle is almost parallel to the surface for matte or flat paints.

9.2.2 Note: Typically a gloss meter will not easily pick up the visual differences in sheen, but may be used to record numerical values if desired.

9.3 Qualitative rating system for both COLOR and GLOSS differences (report as two separate ratings for each comparison (touch-up area versus first coat area, touch-up area versus second coat area, first coat area versus second coat area):

Inasmuch as some observations are subjective, they have been rated using the following ASTM Standardized Scoring System in order to avoid lengthy descriptions:

Score	Performance	or	Effect
5	Perfect		None
4	Very good		Very slight
3	Good		Moderate
2	Fair		Considerable
1	Poor		Severe
0	No value		Complete failure

9.3.1 As described in 9.1.2 and 9.2.2, instrumental readings of color difference (typically L*a*b* ΔE) and gloss difference (usually 85° gloss) can also be reported, as agreed upon.

9.3.2 Depending on what is agreed upon, the information reported can include:

9.3.2.1 Color and gloss difference between first coat and second coat, visual or instrumental, or both.

9.3.2.2 Color and gloss difference between first coat and touch-up section, visual or instrumental, or both.

9.3.2.3 Color and gloss difference between second coat and touch-up section, visual or instrumental, or both.

9.4 Report applicators and drying conditions for each portion.

9.5 Record any unique conditions (colorants used to tint colors, tint bases used, etc.).

10. Keywords

10.1 color difference; latex paint; sheen difference; touch-up

APPENDIX

(Nonmandatory Information)

X1. INFORMATIONAL APPENDIX

X1.1 Included in Tables X1.1-X1.5 are some examples of applicators and drying conditions for a few typical touch-up scenarios.

X1.1.1 Other combinations of applicators and drying conditions can be used.

X1.2 Colors typically used may include:

X1.2.1 A beige color, typically made of yellow oxide, brown oxide and umber.

X1.2.2 A blue-green color, typically made of organic blue, organic green and black.

X1.2.3 A blue tinted color.

X1.2.4 Note: Straight white will not show color touch-up.

TABLE X1.1 Typical Lab Touch-up Scenario

	Applicator	Drying Conditions
First Coat	1 cm (⅜ in.) nap roller	5 ± 1°C (40 ± 2°F) and 20 ± 5 % RH
Second Coat	1 cm (⅜ in.) nap roller	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH
Touch-up	Polyester/nylon blend paint brush	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH

TABLE X1.2 DIY Type Touch-up Scenario

	Applicator	Drying Conditions
First Coat	1 cm (⅜ in.) nap roller	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH
Second Coat	1 cm (⅜ in.) nap roller	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH
Touch-up	Polyester/nylon blend paint brush	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH

TABLE X1.3 Winter Construction Touch-up Scenario #1

	Applicator	Drying Conditions
First Coat	$^{17}/_{100}^{th}$, s tip airless spray	5 ± 1°C (40 ± 2°F) and 20 ± 5 % RH
Second Coat	1 cm (⅜ in.) nap roller	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH
Touch-up	Polyester/nylon blend paint brush	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH

TABLE X1.4 Winter Construction Touch-up Scenario #2

	Applicator	Drying Conditions
First Coat	$^{17}/_{100}^{th}$, s tip airless spray, immediate backroll with 1 cm (⅜ in.) nap roller	5 ± 1°C (40 ± 2°F) and 20 ± 5 % RH
Second Coat	1 cm (⅜ in.) nap roller	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH
Touch-up	Natural sponge, damp but not wet	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH

TABLE X1.5 Fall Construction Touch-up Scenario

	Applicator	Drying Conditions
First Coat	$^{19}/_{100}^{th}$, s tip airless spray, immediate backroll with 1 cm (⅜ in.) nap roller	32 ± 1°C (90 ± 2°F) and 90 ± 5 % RH
Second Coat	1 cm (⅜ in.) nap roller	10 ± 1°C (50 ± 2°F) and 80 ± 5 % RH
Touch-up	Polyester/nylon blend paint brush	20 ± 1°C (72 ± 2°F) and 50 ± 5 % RH