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Designation: D4941 – 06 (Reapproved 2021)

Standard Practice for Preparing Drawdowns of Artists' Paste Paints[1]

This standard is issued under the fixed designation D4941; 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 covers the production of uniform films of artists' tube paints and other nonflowing pigmented paints using paint applicators designed for less viscous paints.

1.2 Information on how to achieve opaque specimens from these paints is included.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

D4838 Test Method for Determining the Relative Tinting Strength of Chromatic Paints

E1164 Practice for Obtaining Spectrometric Data for Object-Color Evaluation

3. Terminology

3.1 *Definitions*—See Terminology D16 for definitions of terms used in this practice.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *drawdown, n*—a layer of paint deposited on a substrate by use of a drawdown bar for the evaluation of paint characteristics.

3.2.2 *drawdown bar, n*—a metal applicator with a specified gap designed to deposit a wet paint film uniformly on a specified test panel (for example, an opacity chart) or other substrate.

4. Summary of Practice

4.1 The paint is spread over the area of the test panel to be covered by the drawdown and the bar is pulled down with pressure just sufficient to avoid lifting of the bar from the chart surface.

4.2 Test panels are allowed to dry in a dust-free environment.

4.3 If complete hiding (opacity) is needed and not produced by a single paint film, a second film is applied at a 90° angle to the first. If required, additional layers may be applied using a narrower drawdown bar.

5. Significance and Use

5.1 Quality standards for artists' paints require the evaluation of various appearance characteristics of paint films. Tinting strength determination (Test Method D4838) specifically requires the preparation of drawdowns for colorimetric measurement. Other evaluations such as color designation, transparency, gloss, and color difference measurements also require drawdown samples.

5.2 Artists' tube paints have a paste consistency that makes the use of traditional film application methods difficult, especially for drying oil paints.

5.3 Artists' paints vary in two properties important to the preparation of films, that is, transparency and drying time. Colorimetric determination and some other types of evaluation require paint specimens that completely hide the substrate. Very transparent paints require such a thick film to produce complete hiding that drying times is excessively long or the specimen surface is blemished. When complete hiding is necessary, this practice is designed to provide opaque films without these defects through application of a series of thin films.

[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 D01.57 on Artist Paints and Related Materials.

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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.

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6. Apparatus

6.1 *Drawdown Bars,* two, of different widths with a clearance of 0.152 mm (0.006 in.). Recommended widths are 7.6 cm (3 in.) and 15.2 cm (6 in.). The second bar is required to prepare drawdowns with more than two layers. Wire wound drawdown bars have been found to be unsuitable.

6.2 *Drawdown Charts,* sealed paper type, half black and half white if transparency is being evaluated or opacity is necessary.

7. Procedure

7.1 Attach chart to a firm, smooth, level plane surface using tape, a vacuum plate, or a clamp. Label the chart with the identity of the specimen and other data as required.

7.2 Mix paint sample thoroughly using two spatulas. Tube paints that have separated should be expelled completely and mixed.

NOTE 1—The use of coated freezer wrapping paper as a mixing surface simplifies clean-up. The same paper can be used for weighing specimens when required as in the tinting strength determination (Test Method D4838).

7.3 Using a spatula, spread the paint, in a thickness exceeding the bar's gap clearance, over the entire area to be covered by the drawdown. Do not cover the area to be contacted by the supporting feet of the wider of the two bars. Starting at the top of the chart and using the wider bar, draw the bar down over the paint in an even motion applying sufficient pressure to ensure that the resistance of the viscous paint does not raise the feet of the bar from the surface. When using oil paints the motion should be slow enough to allow for the high viscosity. Acrylic paints, which have short drying times, should be applied immediately after mixing to avoid premature film formation.

7.4 After drying in a horizontal position for 15 min, specimens may be hung in a vertical position in a dust-free area to complete the drying. Allow 24 h for acrylic and alkyd paints and 48 h or longer for oil paints until dry to touch.

7.5 Examine the specimen for surface defects and discard if unacceptable.

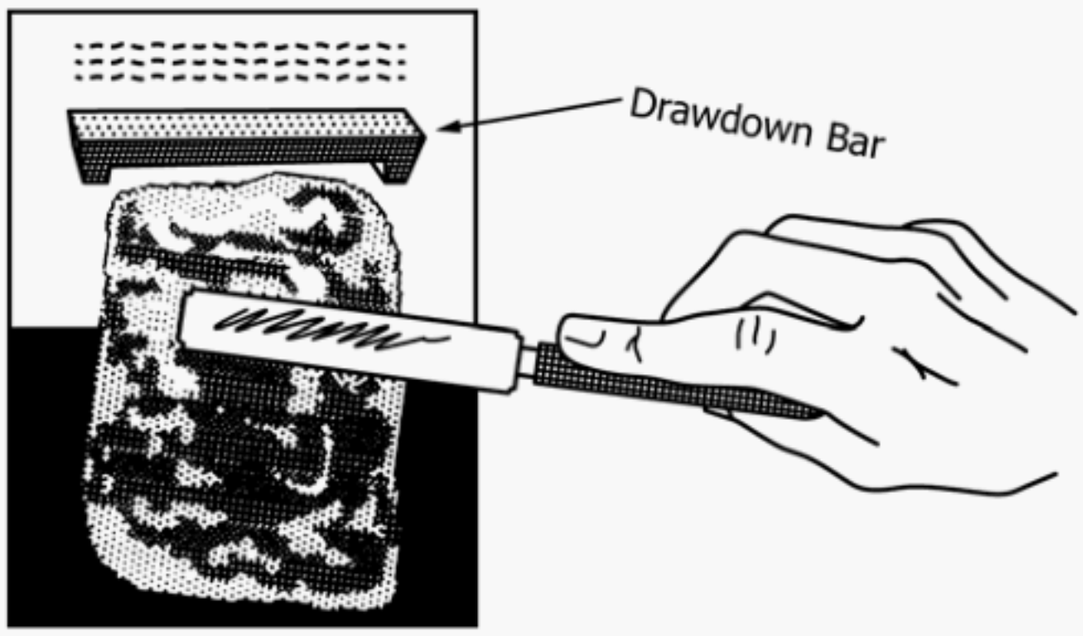

FIG. 1 Preparation for Drawdown

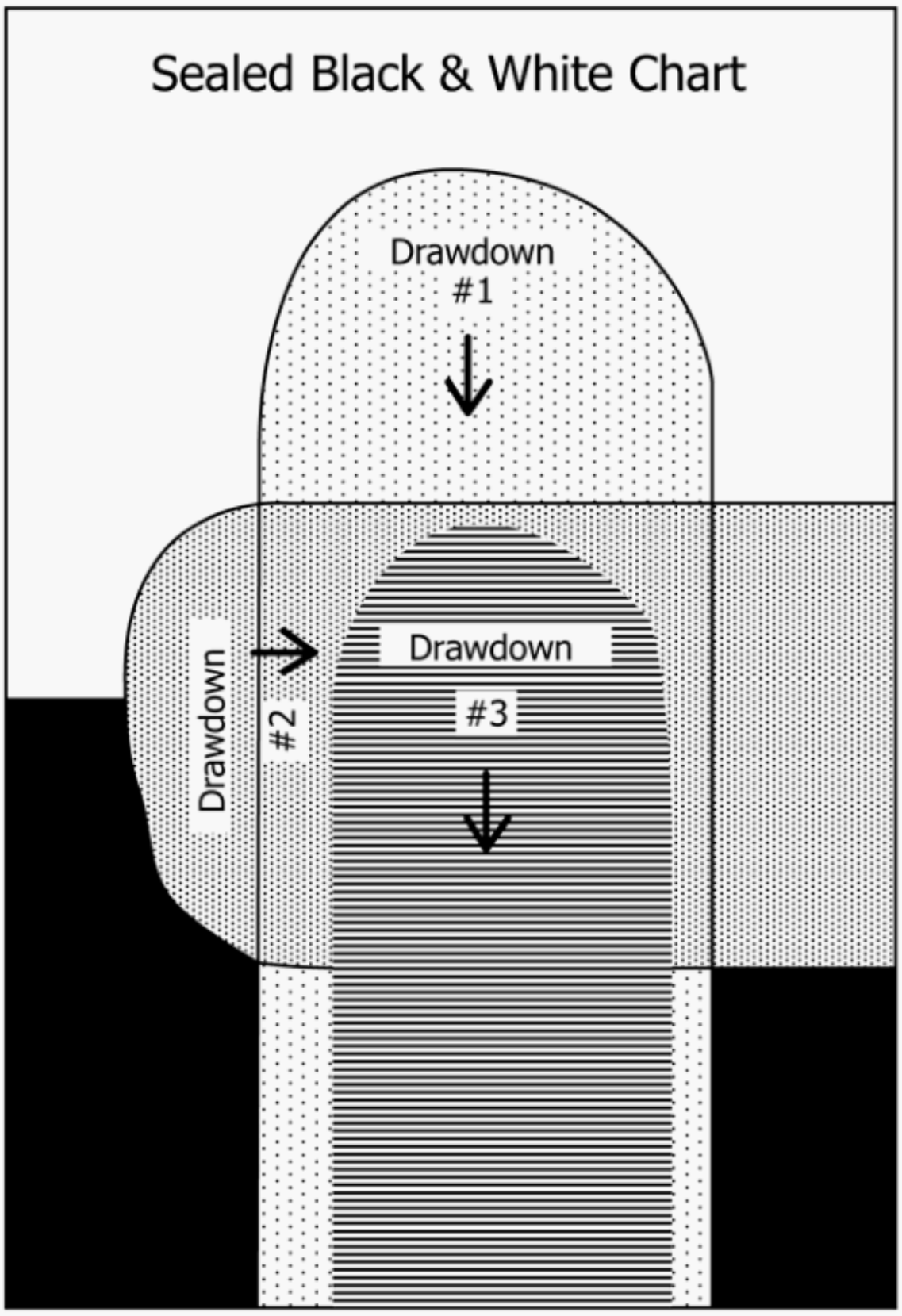

FIG. 2 Three Overlapping Drawdowns

7.6 If complete hiding is required, compare, either visually or instrumentally, the lightness of the paint on the black portion of the chart with that on the white. For instrumental evaluation, follow the procedures given in Practice E1164 to determine CIE Y for each portion, then calculate the contrast ratio of the paint film on the two portions of the chart (CIE Y_{black}/CIE Y_{white}). A contrast ratio of 0.98 or higher is considered opaque.

7.6.1 If opacity is not sufficient, rotate the chart through a 90° angle and deposit a second film using the wider bar to repeat the procedure in 7.3 through 7.5. If additional layers are required, repeat this sequence using the narrower bar. Be careful each time that the feet of the drawdown bar ride on the surface of the combined lower layers. See Fig. 1 and Fig. 2.

NOTE 2—The most transparent paints studied were found to require three coats; however, in some instances, such as with alizarin crimson oil paint, it may not be practical to obtain complete hiding.

8. Keywords

8.1 artists' paint; drawdown; paint specimens

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