Designation: D 5398 – 97

Standard Practice for Visual Evaluation of the Lightfastness of Art Materials by the User[1]

This standard is issued under the fixed designation D 5398; 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 a method for exposing specimens of colored art materials indoors to sunlight coming through a closed window. Any color change is compared to fading in a Blue Wool Reference[2] and exposed simultaneously.

1.2 This practice shall only be used by individuals to select materials with satisfactory lightfastness for their own use or to identify materials that require special protection from light. When test information is to be communicated to others, Test Methods D 4303 or D 5383 must be used.

1.3 This practice may be used to indicate art materials that will change color within a few months or years in normal indoor exposure and those that will remain unchanged for a period of years. It is not rigorous enough to verify that materials will remain unchanged for more than fifty years in a home or office environment. A major consideration in developing this method was to keep it simple and short enough to be performed without instrumentation in a comparatively short length of time.

1.4 This practice is not suitable for evaluating the lightfastness of materials with a high oil content such as artists' oil, resin-oil or alkyd paints.

1.5 *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 4303 Test Methods for Lightfastness of Pigments Used in Artists' Paints[3]

D 5383 Practice for Visual Determination of the Lightfastness of Art Materials by Art Technologists[3]

E 284 Terminology of Appearance[4]

2.2 *Other Standards:*

ISO/R 105-B Textiles Tests for Colour Fastness Part B: Colour Fastness to Light and Weathering[5]

British Standards Institute (BSI) 1006 Group B Methods for Colour Fastness of Textiles and Leathers[6]

3. Terminology

3.1 The definitions included in Terminology E 284 are applicable to this practice.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *bloom, n*—a cloudy coating, sometimes appearing on colored pencil drawings due to migration of wax to the surface, that can be made transparent by gentle polishing.

3.2.2 *fugitive color, n*—colorant that changes color in a few days or weeks, or that bleaches white in less than 18 months, when exposed behind glass to sunlight.

3.2.3 *glazing, n*—the transparent glass or plastic sheet placed in front of a picture when it is framed.

3.2.4 *substrate, n*—the white, pH neutral paper or board on which the art materials are applied.

4. Summary of Practice

4.1 This practice employs as a control Blue Wool Reference 3 from the series of eight Blue Wool References of known lightfastness that were developed for use with ISO/R 105-B[5] and BSI 1006 Group B[6].

4.2 Specimens are made of the colored materials to be tested and placed on a backing board along with Blue Wool Reference #3 or a Blue Wool Reference Card containing all eight Blue Wool References.

4.3 One half of each colored specimen and one half of the Blue Wool References are covered, shielding that half of the specimens and references from light. The test specimens and reference are exposed to sunlight coming through a closed window.

---

[1] This practice is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.57 on Artists Paints and Related Materials.

Current edition approved Nov. 10, 1997. Published September 1998. Originally published as D 5398 – 93. Last previous edition D 5398 – 94.

[2] ISO Blue Wool Reference 3 is available from the Society of Dyers and Colourists, P.O. Box 244, Grattan Road, Radford, West Yorkshire, BD12 JB, England, or as the third band from the top of the Textile Fading Card from Talas, Division of Technical Library Service, Inc., 213 West 35th St., New York, NY 10001-1996.

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

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

[5] ISO/R 105-B is available from the American National Standards Institute, 13th Floor, 11 W. 42nd St., NY, NY 10036.

[6] British Standard 1006 Group B is available from British Standards Institute, Linford Wood, Milton Keynes MK14 6LE, United Kingdom.

4.4 The test is complete when Blue Wool Reference # 3 fades a specific amount.

4.5 The artist examines the test specimens and decides which materials are suitable for use in his or her works of art.

NOTE 1—Depending on the test location, the time of year, and the number of cloudy days, it will take from a few days to two months of exposure in a window facing south to reveal fugitive materials that will either bleach white or radically change color in a few years when displayed in a normal home environment. It will take from 4 to 18 months of exposure to determine materials that will show, under normal room conditions, various degrees of color change, and those that will remain unchanged for a long period of time.

5. Significance and Use

5.1 Artists have available to them a wide variety of art materials such as markers, colored pencils, pastels, colored inks and airbrush colors. Many of these materials are manufactured for temporary artwork and may contain pigments and dyes that fade in a relatively short time. Product labels and manufacturers' literature do not always supply the information necessary to distinguish products that are stable to light from those that are not. This practice makes it possible for an artist to check the lightfastness of coloring materials to be used in works of art. It may also be used to test the lightfastness of other types of colored materials.

6. Materials

6.1 *Backing Panel*, that is resistant to warping when placed on its edge and exposed to light and heat passing through window glass. Foam core board, particle board, hardboard, or plywood are suitable.

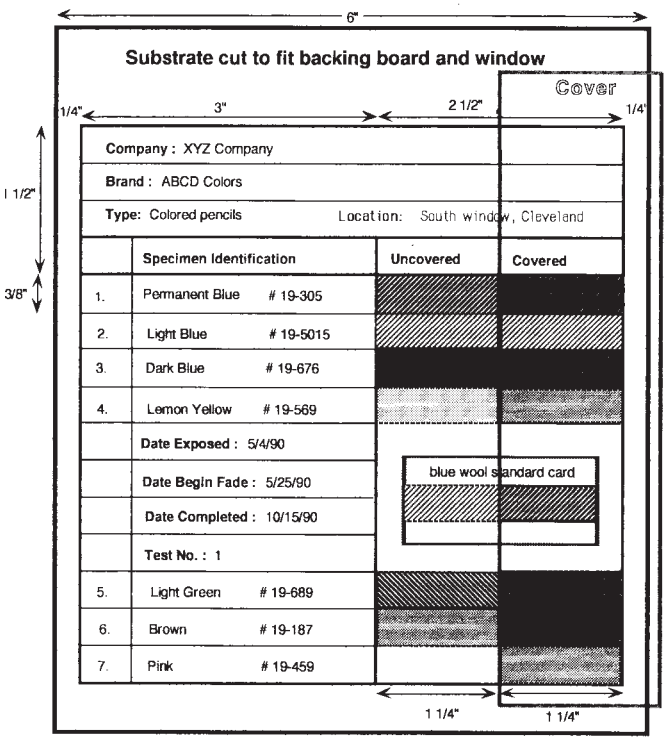
6.2 *Substrate*, of stiff drawing paper or museum board that is white, acid free (pH 7 to 9), and of medium weight, 72 to 140 lb (33 to 64 kg). Depending on the material being tested, a pH neutral foam core board may be suitable. It is desirable for the surface of the substrate to be similar to that customarily used with the materials being tested; however, it must be possible to completely cover the substrate with an even coat of the colors. Rough watercolor papers are not suitable.

6.3 *Blue Wool Reference 3*[2], a horizontal band of blue wool cloth, ⅜ in. (9.5 mm) high and 1¾in. (44.5 mm) wide, glued to a card 1 by 1¾in. (2.5 by 4.4 cm). If the Textile Fading Card from Talas is used, Reference 3 is the third band down from the end of the card with the narrower margin and brighter blue wool bands. Either card must be kept in complete darkness until time for the test. It should be wrapped in an opaque covering and stored in a drawer at normal room temperature.

6.4 *Colored Art Materials*, to be tested.

6.5 *Specimen Cover*, made from stiff material such as heavy gage aluminum; stainless steel; stiff, opaque plastic; or wooden strips. This cover shall be at least 1¼ in. (32 mm) wide and as long as the backing panel. It is used to protect one half of each art material specimen and one half of the Blue Wool Reference from light (see Fig. 1). The side of the cover that touches the art material specimens should be chemically inert to prevent interaction with, or migration of substances onto the test specimens.

6.6 *Tape*, to fasten the specimen support to the backing board and to fasten the specimen cover over the specimens and the Blue Wool Reference. Duct or electrical tape is suitable since it is designed to withstand heat.

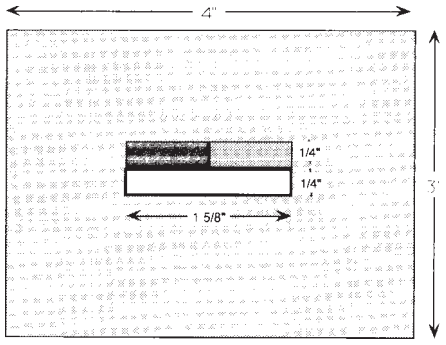


NOTE 1—1 in. = 25.4 mm (exact).

FIG. 1 Suggested Layout for Lightfastness Test Panel

6.6.1 *Optional—Metal Clamps*, To hold the cover more tightly against the specimen. This will exclude light better, making a sharper edge between the exposed and unexposed sections of the specimens. This will make visual determinations easier.

6.7 *Mask*, shall be made of stiff paper with a slot, ¼by 1⅝ in. (6.4 by 41.3 mm), slightly smaller than the Blue Wool Reference (see Fig. 2). Both sides of the mask shall be a neutral gray approximately Munsell Value 6.5. Side one shall have two blue color chips attached above the slot. One blue chip shall be Munsell 7 PB 4/13, matching the unexposed Blue Wool Reference # 3. The second chip shall be Munsell 5 PB 6/4, the color of the exposed half of Blue Wool Reference # 3 when the



NOTE 1—Side 2 is the same gray.

FIG. 2 Side 1 of the Gray Mask Showing the Slot and Two Blue Color Chips