



Designation: D 6901 – 04

## Standard Specification for Artists' Colored Pencils<sup>1</sup>

This standard is issued under the fixed designation D 6901; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification establishes requirements for composition, performance, and labeling of artists' colored pencils.

1.2 This specification covers vehicles and additives. Requirements are included for identification, lightfastness, and consistency.

1.3 Colored pencil specimens are exposed to both natural daylight through window glass and simulated window glass-filtered daylight radiation to determine the lightfastness rating for each pencil.

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

- D 1729 Practice for Visual Evaluation of Colors and Color Differences of Diffusely-Illuminated Opaque Materials
- D 2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
- D 4236 Practice for Labeling Art Materials for Chronic Health Hazards
- D 4303 Test Methods for Lightfastness of Colorants Used in Artists' Materials
- D 5383 Practice for Visual Determination of the Lightfastness of Art Materials by Art Technologists
- E 284 Terminology of Appearance of Materials
- G 24 Practice for Conducting Exposures to Daylight Filtered Through Glass
- G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials
- G 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
- G 155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings and Materials and is the direct responsibility of Subcommittee D01.57 on Artist Paints and Related Materials.

Current edition approved June 1, 2004. Published June 2004. Originally approved in 2003. Last previous edition approved in 2003 as D 6901 – 03.

<sup>2</sup> 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. Terminology

3.1 *Definitions*—Refer to Terminology E 284 for appearance terms used in this specification.

#### 3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *colored pencil, n*—a core of extenders, binders, pigments and additives, such as wax/oil and thickeners surrounded by a casing.

3.2.2 *watercolor pencil, n*— a colored pencil with a water-dispersible core.

3.2.3 *color stick, n*—a core of extenders, binders, pigments and additives, such as wax/oil and thickeners without a casing but sometimes with a paper sleeve.

3.2.4 *water-soluble color stick, n*—a water-dispersible color stick.

3.2.5 *bloom, n*—hazy appearance that sometimes appears on the surface of applied colored pencil.

3.2.6 *substrate, n*—white, uncoated, neutral pH, buffered paper, or board, without optical brighteners, to which color is applied.

### 4. Significance and Use

4.1 This specification establishes quality requirements and provides a basis for common understanding among producers, distributors, and users.

4.2 It is not intended that all pencils meeting the requirements be identical nor of uniform excellence in all respects. Variations in manufacture, not covered by this specification, may cause some artists to prefer one brand over another, either of which may be acceptable under this specification.

4.3 Variation in test results can result from differences in pigment manufacture from time to time in a company, different varieties of a pigment from company to company, different combinations of pigments and other ingredients, specimen preparation, different instruments and instrumental readings, variations in the surface of the specimen, and the conditions of exposure. Allowance for these variations is made by establishing lightfastness categories that include a range of color differences.

4.4 Since a specific colored pencil may be unusually sensitive to some aspect of a particular method of accelerated lightfastness testing and show a change in color that would not

occur in a normal home or gallery environment, two types of exposure are required.

4.5 Some variation in test results is to be expected even when the same type of exposure is repeated; therefore, after triplicate specimens are exposed in the two types of exposure, outliers are discarded and, depending on how similar test results are, the mean is found of the two, or in some cases three exposures, to determine the lightfastness category for that pencil. Instead of testing a third time, producers may elect to use the poorer of the two relevant lightfastness categories.

## 5. Labeling Requirements

### 5.1 *Provide on the Pencil:*

5.1.1 Company or brand name.

5.1.2 Company assigned identification number for the pencil, or company assigned color name for the pencil, or both; however, pigment names shall not be used as pencil names unless the pencil contains only that pigment, or a variant of that pigment, or that pigment and white; otherwise the word “Hue” must be added to the name.

5.1.3 Country of origin.

5.1.4 The Colour Index Names of the pigments used in the pencil if space permits.

5.1.5 *Lightfastness*—Lightfastness Category indicated by the symbols I, II, III, IV or V. Only colored pencils in Lightfastness Categories I and II conform with this Specification.

### 5.2 *Provide on Package Label and in Literature:*

5.2.1 Identification of the type of pencil: colored, watercolor, color stick, water-soluble color stick.

5.2.2 Name and address of manufacturer, importer or supplier.

5.2.3 The Colour Index name and Constitution Number of every pigment in each pencil.

5.3 *Toxicity*—All products and labeling must conform to the Federal Hazardous Substances Act and to ASTM Practice D 4236.

5.4 *Statement of Conformance*—“Conforms to ASTM Specification D 6901,” or “Conforms to ASTM D 6901.” This statement may be combined with other conformance statements, such as, “Conforms to the quality and health requirements of ASTM Specification D 6901 and Practice D 4236.”

## 6. Quality Assurance for Artists’ Colored Pencils

6.1 *Conditions Not Covered in This Specification that Affect Colored Pencils:*

6.1.1 *Substrate*—The effective pH of the paper used will affect the long-term color appearance of the applied color.

6.1.2 *Bloom*—Haze might appear on the surface in a few hours after the specimen is prepared.

6.2 *Additives*—Thickeners, preservatives, surfactants, wax, oil, and humectants may be used to achieve consistency, prevent microbial deterioration, and control application results.

6.3 Pencils shall be capable of applying an even coating of color without scratch marks.

6.4 The colored lead shall not crumble or break excessively when used with pressure sufficient to apply the color smoothly.

## 7. Lightfastness Determination

7.1 Expose colored pencil specimens using both Test Method A and Test Method B below.

7.1.1 Variations in specimen preparation and measurement may result in as much as 4 units of CIE 1976 L\*a\*b\* (CIELAB) color difference,  $\Delta E^*_{ab}$ , calculated using the equation given in Practice D 2244, between the measurements of a test specimen before and after exposure; therefore, only color differences greater than 4  $\Delta E^*_{ab}$  are considered color loss.

7.1.2 Lightfastness I colored pencils, when made into test specimens as described below, exposed in accordance with Test Method A and Test Method B, and rated in accordance with Sections 8 and 9, shall have color difference of  $\Delta E^*_{ab} \leq 4$  between the specimens measured before and after exposure.

7.1.3 Lightfastness II pencils, when made into test specimens as described below, exposed in accordance with Test Method A and Test Method B, and rated in accordance with Sections 8 and 9, shall have  $\Delta E^*_{ab} > 4$  and  $\leq 8$  between the specimens measured before and after exposure.

### 7.2 *Materials:*

7.2.1 *Colored Pencils, Watercolor Pencils, Color Sticks Or Water-soluble Color Sticks*—Materials to be tested.

7.2.2 *Substrate*—White, uncoated, neutral pH, buffered paper or board. It shall not contain optical brighteners.<sup>3</sup>

### 7.3 *Preparation of Test Specimens:*

7.3.1 Prepare ten specimens of each pencil or stick to be tested. Cut the paper substrate into a size that will fit the holder to be used for exposure. Draw a specimen square 28 by 28 mm (1 1/8 by 1 1/8 in.) in the center of each paper substrate. Three specimens of each color shall be exposed in each of the two test methods, one specimen of each color shall be retained for visual comparison with test specimens following exposure, and three specimens shall be retained for use in a third exposure, if needed.

7.3.1.1 Using constant pressure, color each specimen substrate evenly and firmly with the colored pencils, watercolor pencils, color sticks, or water-soluble color sticks. Repeat as necessary to completely cover the substrate. In the case of a metallic color, finish with parallel strokes in whichever direction results in an even metallic sheen.

7.3.2 Store the retained, unexposed specimens in the dark unless the formulation includes oil. Store specimens that contain oil in subdued light, 500 to 750 lx (50 to 75 fc), to prevent yellowing. If specimens must be stored for as long as 100 days, store all specimens in the dark, but remove those containing oil and place in subdued light for at least 7 days before measurement or visual evaluation.

### 7.4 *Measurement:*

7.4.1 The following day gently wipe each specimen twice with cotton to remove any surface bloom. Repeat this before all measurements.

<sup>3</sup> Crescent 2-ply Rag Mat 100 museum board, Rising 2 ply museum board, and Bainbridge 4 ply museum board have been found suitable. Bainbridge 2-ply Museum Board has been found superior to other museum boards and papers tested for non-yellowing during and following exposure, and achieving uniform and opaque colored pencil samples. This subcommittee solicits data showing that other boards and papers meet these criteria.