



Designation: D8330 – 20

Standard Specification for Artists' Pastels¹

This standard is issued under the fixed designation D8330; 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 specification establishes requirements for composition, performance, and labeling of artists' pastels.

1.2 This specification includes requirements for identification and lightfastness.

1.3 Pastel specimens are exposed to both natural daylight through window glass and window glass-filtered simulated daylight radiation to determine the lightfastness category for each pastel.

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

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

D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

D4236 Practice for Labeling Art Materials for Chronic Health Hazards

D4303 Test Methods for Lightfastness of Colorants Used in Artists' Materials

E284 Terminology of Appearance

G24 Practice for Conducting Exposures to Daylight Filtered Through Glass

G113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials

G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology E284 for appearance terms used in this specification and to Terminology G113 for terms relating to natural and artificial lightness tests.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *pastel, n*—a chalk-like stick, varying in hardness from hard to soft, composed of minimal binder and colored and white pigments for obtaining shades and tints.

3.2.2 *substrate, n*—white, neutral pH, buffered, uncoated paper, or board, without optical brighteners, to which pastel is applied. Some substrates are coated with a gritty layer to aid in adhesion—these are called sanded pastel papers or boards.

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 pastels 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 to another, either of which may be acceptable under this specification.

4.3 Variation in test results can be due to differences in pigment manufacture from time to time by a company, different properties of a pigment from company to company, different combinations of pigments and other ingredients, specimen preparation, thickness of pastel on substrate, 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 pastel may be unusually sensitive to some aspect of simulated daylight accelerated lightfastness testing and show a change in color that would not occur in a

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 D01.57 on Artist Paints and Related Materials.

Current edition approved June 1, 2020. Published June 2020. DOI: 10.1520/D8330-20.

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.

normal home or gallery environment, two types of exposure are required, both natural daylight and simulated daylight.

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 each of the two types of exposures, the lightfastness category of the pastel by each exposure method is based on the mean of the color change of the three specimens, or two specimens if an outlier is discarded.

4.6 If the two methods place the pastel in the same lightfastness category, the pastel is assigned to that category. If the pastel is placed in different lightfastness categories by the two methods, either the pastel is placed in the poorer of the two categories or a retest is conducted using the test method that yielded the poorer lightfastness category. The lightfastness category by that test method is based on the mean of the color change of the specimens in both the original and retest that had not been discarded as outliers.

5. Labeling Requirements

5.1 *Provide with the Product:*

5.1.1 Company or brand name; company assigned identification number for the pastel, or company assigned color name for the pastel, or both; however, pigment names shall not be used as pastel names unless the pastel 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.

5.1.2 Lightfastness Category indicated by the symbols I, II, III, IV, or V. Only pastels in Lightfastness Categories I and II conform with this specification.

5.2 *Provide on Package Label or in Literature, or Both:*

5.2.1 Name and address of manufacturer, importer, or supplier;

5.2.2 Country of origin; and

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

5.3 *Toxicity*—All products and labeling must conform to the Federal Hazardous Substances Act and to Practice **D4236**.

5.4 *Statement of Conformance*—“Conforms to ASTM Specification D8330,” or “Conforms to ASTM D8330.” This statement may be combined with other conformance statements, such as, “Conforms to the quality and health requirements of ASTM Specification D8330 and Practice **D4236**.”

6. Quality Assurance for Artists’ Pastels

6.1 *Conditions Not Covered in This Specification that Affect Pastels:*

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

6.1.2 *Additives*—Materials added to achieve appropriate consistency, prevent microbial deterioration, and control application may affect results.

6.2 Pastels shall be capable of applying an even coating of color without scratch marks.

6.3 The pastel shall not crumble or break excessively when used with pressure sufficient to apply the color smoothly.

7. Specimen Preparation and Exposure

7.1 *Materials:*

7.1.1 *Soft, Medium, Hard Pastel Sticks, Pastel Pencils*—Materials to be tested.

7.1.2 *Substrate*—White, uncoated, neutral pH, buffered 100 % cotton watercolor paper or board without any optical brighteners. Sanded pastel papers may be used that conform to the watercolor paper or board criteria.

7.2 *Preparation of Test Specimens:*

7.2.1 Prepare ten specimens of each pastel or stick to be tested. For each specimen the substrate used is cut into a size that fits the holder to be used for exposure. Draw a square 28 by 28 mm (1 1/8 by 1 1/8 in.) in the center of each substrate. Leave enough white substrate around each specimen so that the colored portion will not be damaged by handling or instrument mounting hardware. Using constant pressure, apply pastel to each substrate evenly and firmly. Repeat as necessary to completely cover the square drawn on the substrate.

7.2.1.1 Burnish each sample with the back of a stainless steel spoon and reapply a final coat of pastel to the substrate.

7.3 *Color Measurement Prior to Exposure:*

7.3.1 Prior to conducting the measurements described in **7.3.2**, examine the sample to assure that pastel from an adjoining sample has not cross-contaminated a neighboring pastel. Remove any contaminants and reapply as described in **7.2.1**.

7.3.2 Color measurements are made using either a spectrophotometer, spectrocolorimeter, or colorimeter set to use Illuminant D65 and the 1964 10° observer and excluding specular reflection from the measurement. The color difference among the ten replicate specimens and the uniformity of color on each specimen shall be <3 CIELAB units. Color differences among specimens can be determined using a 25 mm viewing port on the color measurement device. For color uniformity across the colored area, use a 10 mm or smaller viewing port. If the color difference among specimens or non-uniformity across the specimen exceeds two CIELAB units, apply more color to the specimens as needed until they meet the uniformity requirement.

7.3.2.1 When using a 25 mm viewing port, make three measurements. After each measurement, lift, partially rotate the specimen, and reposition in the viewing port for the next measurement. Find the mean of these measurements in CIELAB units and record it as the value for the unexposed specimen.

7.3.2.2 When using an instrument with a 10 mm or smaller measuring port, make five measurements. After each measurement, lift, partially rotate the specimen, and reposition in the measuring port for the next measurement. Find the mean of these measurements in CIELAB units and record it as the value for the unexposed specimen.

NOTE 1—It is difficult to achieve an even coating of the color with complete hiding of the substrate. If the pastel does not completely hide the substrate, measurement will vary from spot to spot. If the coating has varying thicknesses, the specimen will fade unevenly. In these cases the

complete colored area may have to be measured to get a measurement that represents the average color of the specimen. If a 25 mm (1 in.) diameter instrument measuring port is used, the whole colored surface of the specimen is measured; if a smaller measuring port is used, additional measurements of different portions of the colored surface of the specimen are necessary to accurately represent the color.

7.4 Exposure:

7.4.1 Three specimens of each color shall be exposed to glass filtered solar radiation using Method A. In addition, three specimens shall be exposed in a xenon-arc device operating with window glass filters using Method B or C. 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.

7.4.2 Store the retained, unexposed specimens in the dark.

7.4.3 *Test Method A—Exposure to Natural Daylight Filtered through Glass:*

7.4.3.1 Follow Practice **G24** and expose specimens during the months from September through May in an Arizona test site in the weathering industry defined “open box” sample exposure container that is covered with standard window glass with the minimum distance between the sample and the glass. With the “open box” positioned at a 45° angle to the horizontal, expose the specimens to a total global solar (290 to 2500 nm) radiation dose of 1260 MJ/m² incident on the glass.

7.4.4 *Test Method B—Exposure to Xenon-Arc Radiation Simulating Daylight Filtered Through Window Glass:*

7.4.4.1 Use a xenon-arc device that conforms to the requirements defined in Practices **G151** and **G155**. Unless otherwise specified, the spectral power distribution of the xenon-arc device shall conform to the requirements in Practices **G151** and **G155** for xenon arc radiation through a window glass filter.

7.4.4.2 Place specimens in the test device in positions that conform with irradiance uniformity specified in Practices **G151** and **G155**.

NOTE 2—Replicate specimens should not be placed near one another during the exposures.

7.4.4.3 When only a few pastel specimens are being exposed in a small xenon-arc device, test all triplicates at the same time. However, if there are too many specimens for all triplicates to fit in the device at once, test one or two replicate specimens at a different time.

7.4.4.4 Unless agreed otherwise, in a xenon-arc device that controls at 340 nm, the irradiance at the control point shall be 0.35 ± 0.02 W/(m².nm) at 340 nm and specimens exposed to 100 % light to reach a total radiant exposure of 510 kJ/(m².nm) at 340 nm, the calculated equivalent of 1260 MJ/m² of full spectrum solar radiation. For a xenon-arc device that controls exposure at 300 to 800 nm, the irradiance at the control point shall be 500 ± 75 W/m² at 300 to 800 nm and specimens exposed to 100 % light to reach a total radiant exposure of 739 MJ/m² at 300 to 800 nm. For xenon arc devices that control exposures in a different spectral region, consult the manufacturer of the device for the irradiance and radiant exposure required to produce equivalent test results. For further information see Appendix X1 in Test Methods **D4303**.

NOTE 3—To track the rate of color change in specimens as a function of radiant exposure in the xenon-arc device, the radiant exposure of

1260 MJ/m² can be divided into three or more phases and the device programmed to stop at the end of each phase so the color can be measured and recorded. The specimens are then returned to the test chamber and exposure is continued until the specified radiant exposure is reached.

7.4.4.5 The uninsulated black panel temperature shall be $63 \pm 2^\circ\text{C}$. For the equivalent insulated black panel temperature, consult the manufacturer of the device.

NOTE 4—The set point is the target condition for the control sensor with the exact number specified programmed by the user. The operational fluctuation given with the set point does not imply that the user is allowed to program a set point higher or lower than the exact set point specified. The operational fluctuation specified is the maximum deviation allowable from the set point of the sensor at the control point during equilibrium conditions. If the operational fluctuations are greater than the maximum allowable after the equipment has stabilized, discontinue the test and correct the cause of the problem before continuing.

7.4.5 *Test Method C—Exposure simulating daylight filtered through window glass in a humidity controlled xenon-arc device*—This environment will typically have higher relative humidity than Method B:

7.4.5.1 Follow section **7.4.4**.

7.4.5.2 Mount specimens in unbacked holders and follow section **7.4.4.2**. It is recommended that all unused spaces in the specimen exposure area be filled with blank metal panels that are not highly reflective.

7.4.5.3 Follow section **7.4.4.3**.

7.4.5.4 Follow section **7.4.4.4**.

7.4.5.5 Set the relative humidity at the control point in the test chamber to 50 ± 10 % RH.

7.4.5.6 In machines that allow control of chamber air temperature, it shall be set at 43°C and maintained at $\pm 2^\circ\text{C}$.

NOTE 5—It has been found that Alizarin Crimson and other pigments are affected differently when exposed to a light/dark cycle rather than to continuous light. Dark periods are characteristic of both outdoor and indoor exposures. Therefore, using a xenon arc machine, when mutually agreed on, the following light/dark cycle may be employed as an alternate to constant light: 3.8 h light followed by 1 h dark. During the light period, the conditions of irradiance, temperature, and humidity are as given in **7.4.4.4**. During the dark period, the uninsulated black panel temperature shall be set at $35 \pm 2^\circ\text{C}$ at the control point. In machines that allow control of air chamber temperature, it shall also be set at $35 \pm 2^\circ\text{C}$ at the control point. Relative humidity shall be set at 50 ± 10 % at the control point, during both the light and dark periods. Any variance from the specified test cycle must be detailed in the Report section.

8. Color Measurement After Exposure

8.1 Following exposure, but prior to measurement, examine the pastel samples to note any colors that have significant gross surface deformations that would prohibit accurate measurement and follow the guidance of section **8.2**.

8.2 If the colored area of an exposed test specimen appears excessively mottling or show areas of the substrate, assign that pastel to Lightfastness V.

8.3 Shortly after exposure, if a 25 mm measuring port is used, make three measurements of each exposed specimen not already placed in Lightfastness V as described in **7.3.2.1**. Use Illuminant D65 and the 1964 10° Observer and with specular reflection excluded. Record the mean of these measurements as the color of the exposed specimen.

8.3.1 If the measurement port is smaller than 25 mm and the pastel has not already been placed in Lightfastness V, make five