



Designation: ~~E805-06~~ Designation: E805 - 12

# Standard Practice for Identification of Instrumental Methods of Color or Color- Difference Measurement of Materials<sup>1</sup>

This standard is issued under the fixed designation E805; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice covers the documentation of instrumental measurement of color or color difference for current communication or for future reference. The practice is applicable to instrumental measurements of materials where color is seen by reflected, transmitted or emitted light and any combinations of one or more of these processes. The practice is recommended for documentation of methodology in interlaboratory color-measurement programs.

1.2 An adequate identification of an instrumental measure of color or color-difference consists of five parts:

1.2.1 Nature and source of available samples and the form of specimens actually measured,

1.2.2 Instrumental conditions of measurement, including instrument geometrical and spectral conditions of measurement,

1.2.3 Standards used,

1.2.4 Data acquisition procedure, and

1.2.5 Color scales employed.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

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

D156 [Test Method for Saybolt Color of Petroleum Products \(Saybolt Chromometer Method\)](#)

D1209 [Test Method for Color of Clear Liquids \(Platinum-Cobalt Scale\)](#)

D1500 [Test Method for ASTM Color of Petroleum Products \(ASTM Color Scale\)](#)

D1535 [Practice for Specifying Color by the Munsell System](#)

D1544 [Test Method for Color of Transparent Liquids \(Gardner Color Scale\)](#)

D2244 [Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates](#)

D5386 [Test Method for Color of Liquids Using Tristimulus Colorimetry](#)

D6166 [Test Method for Color of Naval Stores and Related Products \(Instrumental Determination of Gardner Color\)](#)

E179 [Guide for Selection of Geometric Conditions for Measurement of Reflection and Transmission Properties of Materials](#)

E259 [Practice for Preparation of Pressed Powder White Reflectance Factor Transfer Standards for Hemispherical and Bi-Directional Geometries](#)

E284 [Terminology of Appearance](#)

E308 [Practice for Computing the Colors of Objects by Using the CIE System](#)

E313 [Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates](#)

E991 [Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method](#)

E1164 [Practice for Obtaining Spectrometric Data for Object-Color Evaluation](#)

E1247 [Practice for Detecting Fluorescence in Object-Color Specimens by Spectrophotometry](#)

E1331 [Test Method for Reflectance Factor and Color by Spectrophotometry Using Hemispherical Geometry](#)

E1345 [Practice for Reducing the Effect of Variability of Color Measurement by Use of Multiple Measurements](#)

E1347 [Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry](#)

E1348 [Test Method for Transmittance and Color by Spectrophotometry Using Hemispherical Geometry](#)

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E12 on Color and Appearance and is the direct responsibility of Subcommittee E12.04 on Color and Appearance Analysis.

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<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.

(1) Instrumental Method for Measurements of:  Color  Color difference of: \_\_\_\_\_

(2) Color Scales Used (Section 9): \_\_\_\_\_

(3) Specimen Description (Section 5)

(a) Form: \_\_\_\_\_

(b) Additional information (see 5.3) \_\_\_\_\_  
 thickness (number of layers)  single layer backed by  powder (note packing pressure)  paste  liquid  film drawdown (specify thickness and backing material).

(c) Special Considerations:  
 Sensitivity to Environmental Conditions: temperature: \_\_\_\_\_, humidity \_\_\_\_\_

(d) Specimen Directionality: Specify orientation and rotation \_\_\_\_\_

(e) Specimen Conditioning: \_\_\_\_\_

(4) Instrument Description (Section 6)

Spectrophotometer  Tristimulus Colorimeter

Make and model \_\_\_\_\_

(a) Measurement Mode \_\_\_\_\_

(b) Geometry: Influx and Efflux Geometry \_\_\_\_\_  
 Specular Component included or excluded? \_\_\_\_\_  
 Light Trap (if applicable) size, shape, and position \_\_\_\_\_  
 Size and Shape of aperture \_\_\_\_\_  
 Cover glass at specimen window \_\_\_ Yes \_\_\_ No  
 Method of Correction \_\_\_\_\_

(c) Spectral: Lamp \_\_\_\_\_ Filters and elements used \_\_\_\_\_  
 Detector \_\_\_\_\_ Modified by filters and elements \_\_\_\_\_

(5) Material Standard Used: \_\_\_\_\_  
 Date of preparation or calibration: \_\_\_\_\_

(6) Reduction of Data: \_\_\_\_\_

(a) Tristimulus Integration:  Filter  Computed from spectral data taken every \_\_\_\_\_ nm over range \_\_\_\_\_ nm to \_\_\_\_\_ nm, with spectral bandwidth \_\_\_\_\_ nm bandpass correction according to E2729 \_\_\_\_\_ E308 Table 5 \_\_\_\_\_ E308 Table 6

(b) Color Difference Equation and Parameters used \_\_\_\_\_

FIG. 1 Sample Report Form

- E1349 Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45:0 or 0:45) Geometry
- E1708 Practice for Electronic Interchange of Color and Appearance Data
- E1767 Practice for Specifying the Geometries of Observation and Measurement to Characterize the Appearance of Materials
- E2152 Practice for Computing the Colors of Fluorescent Objects from Bispectral Photometric Data
- E2153 Practice for Obtaining Bispectral Photometric Data for Evaluation of Fluorescent Color
- E2175 Practice for Specifying the Geometry of Multiangle Spectrophotometers
- E2194 ~~Practice for Multiangle Color Measurement of Metal Flake Pigmented Materials~~ Practice for Multiangle Color Measurement of Metal Flake Pigmented Materials
- E2729 Practice for Rectification of Spectrophotometric Bandpass Differences

2.2 Other Standard Documents:

CIE Publication 51 A Method for Assessing the Quality of Daylight Simulators for Colorimetry<sup>3</sup>

DIN 6176 Farbmetrische, Bestimmung von Farbabstände bie Körperfarben nach der DIN99-Formel<sup>4</sup>

3. Terminology

3.1 Definitions of terms in Terminology E284 are applicable to this practice.

<sup>3</sup> Available from U.S. National Committee of the CIE (International Commission on Illumination), C/o Thomas M. Lemons, TLA-Lighting Consultants, Inc., 7 Pond St., Salem, MA 01970, <http://www.cie-usnc>.

<sup>4</sup> Available from Beuth Verlag GmbH (DIN-Deutsches Institut für Normung e.V.), Burggrafenstrasse 6, 10787, Berlin, Germany, <http://www.en.din.de>.