



Standard Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45°:0° or 0°:45°) Geometry¹

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1. Scope

1.1 This test method covers the instrumental measurement of the reflection properties and color of object-color specimens by use of a spectrophotometer or spectrocolorimeter with a bidirectional optical measuring system, such as annular, circumferential, or uniplanar 45:0 or 0:45 geometry.

1.2 This test method is generally suitable for any non-fluorescent, flat object-color specimen. It is especially recommended for measuring retroreflective specimens and specimens of intermediate gloss.

1.3 Procedures required for the measurement of fluorescent object color are given in Practice E991 and Practice E2153.

1.4 Procedures required for the measurement of color using filter colorimeters are contained in Test Method E1347 and this standard does not address those instruments.

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:²

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

E179 Guide for Selection of Geometric Conditions for Measurement of Reflection and Transmission Properties of Materials

E284 Terminology of Appearance

E308 Practice for Computing the Colors of Objects by Using the CIE System

E694 Specification for Laboratory Glass Volumetric Apparatus

E805 Practice for Identification of Instrumental Methods of Color or Color-Difference Measurement of Materials

E991 Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method

E1164 Practice for Obtaining Spectrometric Data for Object-Color Evaluation

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

E1767 Practice for Specifying the Geometries of Observation and Measurement to Characterize the Appearance of Materials

E2153 Practice for Obtaining Bispectral Photometric Data for Evaluation of Fluorescent Color

E2214 Practice for Specifying and Verifying the Performance of Color-Measuring Instruments

3. Terminology

3.1 Definitions:

3.1.1 The definitions contained in Guide E179, Terminology E284, Practice E1164, Practice E1767, and Practice E2214 are applicable to this test method.

4. Summary of Test Method

4.1 This test method provides a procedure for measuring the reflectance factors of reflecting object-color specimens by using a spectrophotometer or spectrocolorimeter equipped with a bidirectional optical measuring system.

4.2 When the specimens exhibit directionality, and an instrument with uniplanar geometry is used, information on directionality may be obtained by measuring the specimens at more than one rotation angle, typically at two angles 90° apart as described in Practice E1345. When such information is not required, these measurements may be averaged, or an instrument with annular or circumferential geometry may be used. However, even with annular or circumferential influx or efflux optics, some of the variability induced by specimen — optical system interactions may remain and the application of the methods in Practice E1345 may help to further reduce those measurement errors.

¹ This test method is under the jurisdiction of ASTM Committee E12 on Color and Appearance and is the direct responsibility of Subcommittee E12.02 on Spectrophotometry and Colorimetry.

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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.