



Designation: E1348 – 11

Standard Test Method for Transmittance and Color by Spectrophotometry Using Hemispherical Geometry¹

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1. Scope

1.1 This test method describes the instrumental measurement of the transmission properties and color of object-color specimens by the use of a spectrophotometer or spectrophotometer with a hemispherical optical measuring system, such as an integrating sphere.

1.2 This test method is generally suitable for all fully transparent specimens without regard for the specimen position relative to the transmission port of the instrument. Translucent specimens, however, must be placed flush against the transmission port of the sphere.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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

[D1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics](#)

[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](#)

[E805 Practice for Identification of Instrumental Methods of Color or Color-Difference Measurement of Materials](#)

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

3. Terminology

3.1 *Definitions:*

3.1.1 The definitions in Guide [E179](#), Terminology [E284](#), and Practice [E1164](#) are applicable to this test method.

4. Summary of Test Method

4.1 This test method provides a procedure for measuring the transmittance of transmitting specimens by using a spectrophotometer or spectrophotometer equipped with a hemispherical optical measuring system such as an integrating sphere.

4.2 This test method includes procedures for calibrating the instrument and for selecting specimens suitable for precision measurement.

4.3 This test method is satisfactory for all fully transparent specimens with plane and parallel surfaces. When possible, the user should select the position of the specimen in the transmission compartment to provide either essentially total or essentially regular transmittance, depending on the end use of the measured data.

4.4 Accurate measurement of translucent specimens requires that the specimen be placed flush against the transmission port of the integrating sphere (see Practice [E1164](#), 8.1.4).

4.5 Most modern spectrophotometers have the capacity to compute the color coordinates of the specimen during the measurement. When this is the case, the user of this test method must select the color system, observer, and illuminant (see the Procedure section in Practice [E308](#), Section 6).

5. Significance and Use

5.1 The most direct and accessible methods for obtaining the color coordinates of object colors are by instrumental measurement using spectrophotometers or colorimeters with

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.