



## Designation: E 1348 – 90 (Reapproved 1996)

AMERICAN SOCIETY FOR TESTING AND MATERIALS  
100 Barr Harbor Dr., West Conshohocken, PA 19428  
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

# Standard Test Method for Transmittance and Color by Spectrophotometry Using Hemispherical Geometry<sup>1</sup>

This standard is issued under the fixed designation E 1348; 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 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 *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:

- D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics<sup>2</sup>
- D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates<sup>3</sup>
- E 179 Guide for Selection of Geometric Conditions for Measurement of Reflection and Transmission Properties of Materials<sup>3</sup>
- E 284 Terminology Relating to Appearance.<sup>3</sup>
- E 308 Practice for Computing the Colors of Objects by Using the CIE System<sup>3</sup>
- E 805 Practice for Identification of Instrumental Methods of Color or Color-Difference Measurement of Materials<sup>3</sup>
- E 1164 Practice for Obtaining Spectrophotometric Data for Object-Color Evaluation<sup>3</sup>

## 3. Terminology

### 3.1 Definitions:

- 3.1.1 The definitions in Guide E 179, Terminology E 284,

and Practice E 1164 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 E 1164, 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 Practice E 308, 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 either hemispherical or bidirectional optical measuring systems. This test method provides procedures for such measurement by transmittance spectrophotometry using a hemispherical optical measuring system.

5.2 This test method is especially suitable for measurement of the following types of specimens (see also Guide E 179 and Practice E 805):

5.2.1 Fully transparent specimens (free from turbidity, haze, or translucency), and

5.2.2 Translucent or hazy specimens, provided that the specimen can be placed flush against the transmission port of the integrating sphere.

5.3 This test method is not recommended for measurement of transparent or translucent retroreflective or fluorescent specimens.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E-12 on Appearance and is the direct responsibility of Subcommittee E12.02 on Spectrophotometry and Colorimetry.

Current edition approved March 30, 1990. Published May 1990.

<sup>2</sup> Annual Book of ASTM Standards, Vol 08.01.

<sup>3</sup> Annual Book of ASTM Standards, Vol 06.01.