



Designation: D 1746 – 97

Standard Test Method for Transparency of Plastic Sheeting¹

This standard is issued under the fixed designation D 1746; 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.

This test method has been approved for use by agencies of the Department of Defense.

1. Scope *

1.1 This test method covers the measurement of the transparency of plastic sheeting in terms of regular transmittance (T_r). Although generally applicable to any translucent or transparent material, it is principally intended for use with nominally clear and colorless thin sheeting.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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.*

NOTE 1—There is no similar or equivalent ISO standard.

NOTE 2—For additional information, see Terminology E 284 and Practice E 1164.

2. Referenced Documents

2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics for Testing²

D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics²

E 284 Terminology of Appearance³

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴

E 1164 Practice for Obtaining Spectrophotometric Data for Object-Color Evaluation³

E 1345 Practice for Reducing the Effect of Variability of Color Measurement by Use of Multiple Measurements³

E 1347 Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry³

E 1348 Test Method for Transmittance and Color by Spectrophotometry Using Hemispherical Geometry³

3. Terminology

3.1 Definitions:

3.1.1 *regular transmittance*—the ratio of undiffused transmitted flux to incident flux. The regular transmittance may equal the total transmittance but cannot exceed it. (For this test method, limitations on the geometry of the optical system are specified in Section 5.)

3.1.2 *transmittance*—the ratio of the flux transmitted by a specimen to the radiant flux incident on the specimen.

4. Significance and Use

4.1 The attribute of clarity of a sheet, measured by its ability to transmit image-forming light, correlates with its regular transmittance. Sensitivity to differences improves with decreasing incident beam- and receptor-angle. If the angular width of the incident beam and of the receptor aperture (as seen from the specimen position) are of the order of 0.1° or less, sheeting of commercial interest have a range of transparency of about 10 to 90 % as measured by this test. Results obtained by the use of this test method are greatly influenced by the design parameters of the instruments; for example, the resolution is largely determined by the angular width of the receptor aperture. Caution should therefore be exercised in comparing results obtained from different instruments, especially for samples with low regular transmittance.

4.2 Regular transmittance data according to this test method correlate with the property commonly known as “see-through,” which is rated subjectively by the effect of a hand-held specimen on an observer’s ability to distinguish clearly a relatively distant target. This correlation is poor for highly diffusing materials because of interference of scattered light in the visual test.

5. Apparatus

5.1 The apparatus shall consist of a light source, source aperture, lens system, specimen holder, receptor aperture, photoelectric detector, and an indicating or recording system, arranged to measure regular transmittance. The system shall meet the following requirements:

5.1.1 An incandescent or vapor-arc lamp, with a regulated power supply such that fluctuations in light intensity shall be

¹ This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D 20.40 on Optical Properties.

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 06.01.

⁴ Annual Book of ASTM Standards, Vol 14.02.