



Designation: D 4321 – 99

## Standard Test Method for Package Yield of Plastic Film<sup>1</sup>

This standard is issued under the fixed designation D 4321; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope \*

1.1 This test method covers the determination of yield (area per unit mass) of plastic film.

1.2 Also described in this test method is the means for calculating nominal yield, given values for nominal density, and nominal thickness. This is needed since, in material specifications, limits for yield are normally stated in terms of the percent deviation of actual yield from nominal yield.

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

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.*

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

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 374 Test Methods for Thickness of Solid Electrical Insulation<sup>2</sup>

D 1505 Test Method for Density of Plastics by the Density-Gradient Technique<sup>3</sup>

D 1898 Practice for Sampling of Plastics<sup>3</sup>

E 252 Test Method for Thickness of Thin Foil and Film by Weighing<sup>4</sup>

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method<sup>5</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *density, apparent*—the weight in air of a unit volume of a material.

3.1.2 *yield*—the area per unit mass of a material.

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *measured density*—the density of the fabricated film as determined by actual measurement.

3.2.1.1 *Discussion*—The measured density is *not* the value used to classify the material according to a standard material specification. The measured value will depend on the manufacturing process of the film.

3.2.2 *measured thickness*—the thickness of the fabricated film as determined by actual measurement.

3.2.3 *nominal density*—an estimated value of density of film as agreed upon between the user and the supplier.

3.2.4 *nominal thickness*—the target value of film thickness as agreed upon between the user and the supplier.

3.2.5 *nominal yield*—the target value of yield as agreed upon between the user and the supplier.

3.2.6 *package yield*—the calculated value of yield as determined by this test method.

### 4. Significance and Use

4.1 Actual yield is important to the film converter as this determines the actual number of units or packages that he can derive in a particular conversion from any given mass of film.

### 5. Apparatus

5.1 Means for preparing test specimens of accurately known area and weighing at least 1 g.

5.1.1 When film width and thickness are such that a specimen weighing at least 1 g will be produced, a rectangular metal template, nominally 100-mm (4-in.) wide, having a length greater than the width of the film from which the specimens are to be taken and having accurately parallel edges in the length direction, is to be used for preparing specimens. The width is to be accurately measured for subsequent use in calculating the specimen area. If slippage of film beneath the template during the cutting operation is a problem, a thin layer of cork, felt, or other suitable material may be cemented onto the contact face of the template.

5.1.2 For narrower, thinner films for which the above template would not produce a specimen weighing at least 1 g, a steel straightedge may be used. Using the steel straightedge, cuts should be made as far apart as necessary to produce a specimen weighing at least 1 g.

5.2 *Horizontal Flat Surface*, of a size large enough to accommodate film samples from which test specimens are to be cut.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film and Sheeting. Current edition approved Nov. 10, 1999. Published February 2000. Originally published as D 4321 – 83. Last previous edition D 4321 – 95.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 10.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 02.02.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 14.02.

\*A Summary of Changes section appears at the end of this standard.