



Standard Specification for Polyethylene Films Made from Low-Density Polyethylene for General Use and Packaging Applications¹

This standard is issued under the fixed designation D 4635; 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.

1. Scope

1.1 This specification covers unpigmented, unsupported, tubular, low-density polyethylene films (hereafter referred to as film or films) from resins having densities ranging from 910.0 to 925.0 kg/m³ (0.910 to 0.925 g/cm³), inclusive, as measured on molded plaques.

NOTE 1—The density of a film will not necessarily be equal to the density of a molded plaque from the same resin.

NOTE 2—Blends of ethylene/vinylacetate (EVA) with low-density polyethylene may have densities up to 0.929 g/cm³.

1.2 This specification is applicable to homopolymer polyethylene, but is not restricted to it. It is applicable to films made from copolymer polyethylene commonly referred to in industry as low-pressure or linear low-density polyethylene, and also applicable to films made from blends of homopolymers and copolymers, including ethylene/vinylacetate copolymers.

1.3 The thickness of the films covered by this specification is 100 μm or less (0.004 in. or less), inclusive. The maximum width of the sheet or layflat is 3.00 m (120 in.).

1.4 This specification does not cover oriented heat-shrinkable films.

1.5 This specification allows for the use of recycled polyethylene film or resin as feedstock, in whole or in part, as long as all of the requirements of this specification are met and as long as any specific requirements as governed by the producer and end user are also met. (See Note 3.)

NOTE 3—Guide D 5033 describes terminology and definitions related to recycled plastics.

1.6 This specification defines the levels of the various physical properties from which specifications for specific films may be described. The levels of physical properties required by a film for a given application are selected from Section 6. However, Sections 2-5 relating to tolerances shall apply without change to all film falling within the scope indicated by the title and 1.1-1.4.

1.7 This specification covers dimensional tolerances, clas-

sifications, intrinsic quality requirements, and test methods. The dimensional tolerances include thickness, width, and length or yield. Classification defines types, classes, surfaces, and finishes. The intrinsic quality requirements include density, workmanship, tensile strength, heat sealability, and odor, as well as the classification properties for impact strength, coefficient of friction, optical properties, and surface treatment. A sampling method is included.

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

1.9 The following precautionary caveat pertains only to the test methods portion, Section 10, of this specification: *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 4—There is no similar or equivalent ISO specification.

2. Referenced Documents

2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing²

D 882 Test Methods for Tensile Properties of Thin Plastic Sheet²

D 883 Terminology Relating to Plastics²

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

D 1505 Test Method for Density of Plastics by the Density-Gradient Technique²

D 1709 Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method²

D 1894 Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheet²

D 1898 Practice for Sampling of Plastics²

D 1928 Practice for Preparation of Compression-Molded Polyethylene Test Sheets and Test Specimens²

D 2103 Specification for Polyethylene Film and Sheet²

D 2457 Test Method for Specular Gloss of Plastic Films and Solid Plastics³

¹ This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film and Sheet.

Current edition refers to resin density, not film density; it also has a revised section for inspection and certification.

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 08.02.

D 2578 Test Method for Wetting Tension of Polyethylene and Polypropylene Films³

D 4321 Test Method for Package Yield of Plastic Film³

D 5033 Guide for the Development of Standards Relating to the Proper Use of Recycled Plastics⁴

E 462 Test Method for Odor and Taste Transfer from Packaging Film⁵

F 88 Test Methods for Seal Strength of Flexible Barrier Materials⁶

NOTE 5—Relevant government regulations also apply to this specification.

NOTE 6—If this product is intended for packaging foods, medicines, drugs, and cosmetics, it is subject to applicable regulations of the Food and Drug Administration or the Department of Agriculture and must comply with such regulations. If it is necessary to comply with regulations of other government agencies, such as the Consumer Product Safety Commission, Environmental Protection Agency, Department of Transportation, Federal Trade Commission, or others, such compliance should be arranged between the buyer and the seller prior to placing an order.

3. Terminology

3.1 *Definitions*—Unless otherwise indicated, the terminology used in this specification is in accordance with Terminology D 883.

4. Classification

4.1 The low-density polyethylene film is, by this specification, classified by Types 1, 2, and 3; Surfaces 1, 2, and 3; Classes 1, 2, 3, and 4; and Finishes 1, 2, 3, and 4. These classifications are described in detail in 6.1.

5. Materials

5.1 The film shall be made from an ethylene homopolymer, ethylene copolymers, or blends of homopolymers or copolymers, or homopolymer and copolymer, so that it meets the density and other film requirements listed herein.

5.2 The film shall be made from resins having densities between 910.0 and 925.0 kg/m³ (0.910 and 0.925 g/cm³), inclusive. This is the range of standard densities in the definition of low-density polyethylene (see Terminology D 883). Standard density refers to the density of the material molded to a thickness of 1.9 mm (0.075 in.) using the procedures of Method C of Practice D 1928 (see Note 1).

5.3 The film shall be natural in color (essentially colorless).

6. Physical Requirements

6.1 Classification Properties:

6.1.1 *Type*—The dart drop impact for all thickness of film shall be as specified in Table 1 for Types 1, 2, and 3.

6.1.2 *Surface*—The kinetic coefficient of friction shall be as specified in Table 2 for Surfaces 1, 2, and 3.

6.1.3 *Class*—The optical properties shall be as specified in Table 3 for Classes 1, 2, and 3. The optical properties of gloss and haze do not always correlate. The particular property of most importance for the specific application shall be established, and the value for this property shall then govern in case of any inconsistency.

⁴ Annual Book of ASTM Standards, Vol 08.03.

⁵ Annual Book of ASTM Standards, Vol 15.07.

⁶ Annual Book of ASTM Standards, Vol 15.09.

TABLE 1 Classification for Type

Film Thickness		Drop Dart (g, min) ^A		
μm	in.	Type 1	Type 2	Type 3
<25	not specified	not specified	not specified	not specified
25	0.001	40	75	105
38	0.0015	65	105	140
50	0.002	85	135	175
75	0.003	125	195	245
100	0.004	165	255	315

^A Impact limits for thickness not covered in this table will be determined by linear interpolation between successive values in this table.

TABLE 2 Classification for Surface

Surface	Coefficient of Friction
1	>0.5
2	>0.2 to 0.5
3	0.2 or less

TABLE 3 Classification for Classes

Class	Gloss Units	Haze, %
1	30 or less	>25
2	>30 to 50	>10 to 25
3	>50 to 70	>5 to 10
4	>70	0 to 5

6.1.4 *Finish*—The surface treatment level of the film shall be as specified in Table 4 for Finishes 1, 2, 3, and 4.

6.2 Other Properties:

6.2.1 *Tensile Properties*—The tensile strength and elongation at break for all thicknesses shall be as specified in Table 5.

6.2.2 *Heat Sealability*—The minimum ratio of heat-seal strength to the film strength in the two principal directions shall be as specified in Table 6.

6.2.3 *Odor*—The odor level of the film shall average no more than a 3.5 rating level.

7. Dimensions

7.1 *Size*—The nominal thickness, width, length per roll or roll diameter, and yield of the film shall be established by mutual agreement between the purchaser and the supplier.

7.2 *Thickness Tolerance*—The thickness variation across the film shall be within the tolerances given in Table 7.

7.3 *Width Tolerance*—The width shall be within the tolerances given in Table 8.

7.4 *Yield Tolerance*—The deviation of the actual yield from nominal yield shall be within the tolerances given in Table 9.

7.5 *Flatness*—The flatness of the film shall be within limits as mutually agreed upon between the buyer and the seller.

7.6 Dimension tolerances for “J-Sheeting” lip and gusset depth shall be established by mutual agreement between the purchaser and the supplier.

TABLE 4 Classification for Finish

Finish	Wetting Tension, mN/m (dynes/cm)
1	32, 33, 34
2	35, 36, 37
3	38, 39, 40
4	41 and over