~~Designation:D4801–07~~ Designation: D 4801 – 08

Standard Specification for Polyethylene Sheeting in Thickness of 0.25 mm ~~[0.010 in.]~~(0.010 in.) and Greater[1]

This standard is issued under the fixed designation D 4801; 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 standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification covers requirements for extruded (cast or blown) and compression-molded sheeting made from low-, medium- and high-density polyethylenes and copolymers in thickness of 0.25 mm ~~[0.010 in.]~~(0.010 in.) and greater. Depending on the functional requirements, sheeting conforming to this specification is used in applications such as chemical tank linings, spacers in electrical equipment, thermoforming into such items as trays, pallets, and shipping containers, and as machine-shop stock.

1.2 Polyethylene materials, being thermoplastics, are reprocessable and recyclable (see Guides D 5033 and D 7209). This specification allows for the use of those polyethylene plastic materials, provided that any specific requirements as governed by the producer and end user are met.

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

1.4 The following precautionary caveat pertains only to the test methods portion, Section 11, 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 1—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D~~618Practice~~ 618 Practice for Conditioning Plastics for Testing
D 638 Test Method for Tensile Properties of Plastics
D 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D 883 Terminology Relating to Plastics
D 1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
D 2103 Specification for Polyethylene Film and Sheeting
D 3892 Practice for Packaging/Packing of Plastics
D 4976 Specification for Polyethylene Plastics Molding and Extrusion Materials
D 5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics
D 5947 Test Methods for Physical Dimensions of Solid Plastics Specimens
D 7209 Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products

2.2 *Military Standard:*[3]

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

2.3 *Federal Standard:*[3]

Fed. Std. No. 406A Plastics: Methods of Testing (Method 6051, Warpage)

3. Terminology

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

---

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film and Sheeting .

Current edition approved ~~April~~Nov. 1, ~~2007.~~2008. Published ~~April 2007.~~November 2008. Originally approved in 1988. Last previous edition approved in ~~2006~~2007 as D 4801 – 0~~6~~7.

[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.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

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

4. Classification

4.1 The polyethylene sheeting in accordance with this specification is classified by special types as follows:
4.1.1 *Type I*—General purpose, natural and colors.
4.1.2 *Type II*—Dielectric, natural and colors.
4.1.3 *Type III*—Weather-resistant, black.

5. Ordering Information

5.1 As appropriate, the following information shall be included in the purchase contract.
5.1.1 Title, number, and date of this specification.
5.1.2 Classification in accordance with the appropriate cell call-out as found in Specification D 4976.
5.1.3 Length and width of sheets (see 7.5 and 7.6).
5.1.4 Thickness of sheets (see 7.5).
5.1.5 Color (see 7.7).
5.1.6 Requirements for packaging, packing, and marking (see 13.1).

6. Materials and Manufacture

6.1 *Materials*—The sheeting shall be manufactured from polyethylene thermoplastic material of the special grade specified in 5.1.2. The supplier shall furnish, for the material used, data for the classification properties.
6.2 *Manufacture*—Sheeting shall be formed by extrusion and roll polishing, or compression.

7. Detail Requirements

7.1 *Form*—The sheeting shall be furnished flat or in rolls in the dimensions specified.
7.2 *Tensile Stress at Yield and Nominal Strain at Break*—Sheeting shall conform to the values shown for the appropriate cell classification as found in Specification D 4976.
7.3 *Shrinkage*—The sheeting, when tested as specified in 11.3, shall conform to the requirements as determined between the user and the supplier.
7.4 *Warpage and Twist*—The sheeting, when tested as specified in 11.4, shall conform to the requirements as determined between the user and the supplier.
7.5 *Dimensions*—Sheeting shall be supplied in the width, length (or weight), and thickness as specified between the user and the supplier, except that is permissible for a maximum of 4 % of the sheet in a shipment to be trimmed 55-mm ~~[2-in.]~~(2-in.) undersize or half-size. Such trimmed sheet shall be packed separately from full-sized sheet. The thickness shall be tested in accordance with 11.5. Thickness tolerances are shown in Table 1.
7.6 *Length or Weight and Diameter of Rolls*—Sheeting in rolls shall be supplied with either the length or weight specified, except that one roll in a shipment shall be permitted to have the lesser length or weight required to make the total length or weight of the shipment equal to the quantity ordered. Specify the diameter of the roll.
7.7 *Color*—The sheeting shall be of the color specified by the user.
7.8 *Grade*—The sheeting shall be of the grade specified by the user.
7.9 *Workmanship*—The sheeting shall have a smooth finish and shall be free of cracks, blisters, bubbles, discolorations, craze, surface scratches that form definite indentations, and other defects that could affect appearance or serviceability.
7.9.1 *Dimensional Defects*—The sheeting shall show none of the defects described in Table 2.
7.9.2 *Defects in Color, Appearance, and Workmanship*—The sheeting shall show none of the defects described in Table 3.

8. Sampling

8.1 The materials shall be sampled in accordance with the sampling procedure prescribed in Practice D 1898. Adequate statistical sampling shall be considered an acceptable alternative. A lot of material shall be considered as a unit of manufacture as prepared for shipment, and shall be permitted to consist of a blend of two or more production runs or batches.

9. Testing

9.1 Test the sheeting for the applicable characteristics listed in 7.2, 7.3, and 7.4 and Table 1 and Table 2 in accordance with the test methods specified herein, for each lot submitted for inspection.

TABLE 1 Thickness Tolerances

Nominal Thickness, mm~~[(in.)]~~	Thickness Tolerance, Percent of Nominal
~~0.254 to 1.78 [0.010 to 0.070], incl~~	~~±10~~
0.254 to 1.78 (0.010 to 0.070), incl	±10
~~Greater than 1.78 [0.070]~~	~~±5~~
Greater than 1.78 (0.070)	±5

TABLE 2 Examination of the Sheeting for Defects in Dimensions

Examine	Defects
~~Length and width (sheet)~~	~~not of the length and width specified~~ ~~varies by more than +3.2, –0 mm [+⅛ , –0 in.]~~ ~~varies by more than ±13 mm [±½ in.] from true rectangles~~
Length and width (sheet)	not of the length and width specified varies by more than +3.2, –0 mm (+⅛ , –0 in.) varies by more than ±13 mm (±½ in.) from true rectangles
~~Width (sheeting)~~	~~not of the width specified~~ ~~varies by more than +13, –0 mm [+½ , –0 in.]~~
Width (sheeting)	not of the width specified varies by more than +13, –0 mm (+½ , –0 in.)
Length or weight of rolls (sheeting)	not of the length or weight specified varies by more than +3, –1 %
Diameter of rolls (sheeting)	not of the diameter specified
~~Cores (sheeting)~~	~~not having lengths equal to the nominal width of the sheeting, +13, –0 mm [+½ , –0 in.]~~ ~~not having inside diameters as specified varies by more than +3.2, –0 mm [+⅛ , –0 in.] for a 76-mm [3-in.] diameter hole unless otherwise specified~~
Cores (sheeting)	not having lengths equal to the nominal width of the sheeting, +13, –0 mm (+½ , –0 in.) not having inside diameters as specified varies by more than +3.2, –0 mm (+⅛ , –0 in.) for a 76-mm (3-in.) diameter hole unless otherwise specified

TABLE 3 Examination of Sheeting for Defects in Color, Appearance, and Workmanship

Examine	Defects
Appearance	not uniform texture, finish, or color any pits, blisters, cracks, dents, waviness, heat marks, or scratches
Workmanship	surface not polished and straight edges not smooth and straight any delaminations or porosity on edges

10. ~~Conditioning~~

~~10.1For natural unfilled polyethylene plastics the controlled laboratory atmosphere shall be 23 ± 2°C. Condition the test specimens not less than 40 h prior to testing in accordance with Procedure A of Practice D618. For filled and reinforced polyethylene plastics or polyethylene plastic blends, which contain a hydrophilic co-monomer, pigment, or modifier the specimens shall be conditioned in a standard laboratory atmosphere of 23 ± 2°C and 50 ± 5% relative humidity. For all materials to be conditioned for electrical testing, conditioning shall comply with the requirements of the standard test methods for electrical testing.~~ Conditioning

10.1 Condition the test specimens at 23 ± 2°C (73.4 ± 3.6°F) for not less than 40 h prior to test in accordance with Specification D 4976 or as otherwise specified by agreement. In cases of disagreement, the tolerances shall be ±1°C (±1.8°F).

10.2 In addition, for films containing hydrophilic fillers, co-monomers, pigments or other modifiers, conditioning and testing shall be done at 50 ± 10 % relative humidity. In cases of disagreement, the tolerance shall be ±5 % relative humidity.

11. Test Methods

~~11.1Conduct tests in the same environment used for conditioning in accordance with 10.1.~~

11.1 Conduct the tests at 23 ± 2°C (73.4 ± 3.6°F) in accordance with Specification D 4976 or as otherwise specified by agreement. In cases of disagreement, the tolerances shall be ± 1°C (±1.8°F)

11.2 *Tensile Stress at Yield and Nominal Strain at Break*—Test in accordance with Test Method D 638. Determine tensile stress at yield and nominal strain at break.

11.2.1 *Test Specimens*—Prepare test specimens by die cutting or machining. In extruded sheet, properties are dependent on the sampling direction; therefore, test specimens shall be cut and tested in the extrusion direction or in both the extrusion and transverse directions if agreed upon between the supplier and the user.