

ASTM D1248-84
14 July 1988

ADOPTION NOTICE

This non-Government document was adopted on 14 July 1988 and is approved for use by the DOD. The indicated industry group has furnished the clearance required by existing regulations. Copies of the document are stocked by DOD Single Stock Point, Naval Publications and Forms Center, Philadelphia, PA 19120, for issue to DOD activities only. Contractors and industry groups must obtain copies from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

Title of Document:	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
Date of Specific Issue Adopted:	November 30, 1984
Releasing Industry Group:	American Society for Testing and Materials
Custodians: Army - MR Navy - YD Air Force - 99	Military Coordinating Activity: Navy - YD (Project 9330-1001)
Review Activity: Navy - SH Air Force - 84 DLA - GS	

AMSC N/A

FSC 9330

DISTRIBUTION STATEMENT A. Approved for public release; distribution is
unlimited.

THIS DOCUMENT CONTAINS 1 PAGES.



Documents

Document Sharing Hub



Standard Specification for Polyethylene Plastics Molding and Extrusion Materials¹

This standard is issued under the fixed designation D 1248; 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.

^{ε1} NOTE—Sections 3 and 4 were renumbered editorially January 1989.

1. Scope

1.1 This specification provides for the identification of polyethylene plastics molding and extrusion materials in such a manner that the seller and the purchaser can agree on the acceptability of different commercial lots or shipments. The tests involved in this specification are intended to provide information for identifying materials according to the types, classes, categories, and grades covered. It is not the function of this specification to provide specific engineering data for design purposes.

1.2 The values stated in SI units are to be regarded as the standard.

1.3 The following precautionary caveat pertains only to the test method portion, Section 11, of this specification. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 150 Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials²
- D 257 Test Methods for D-C Resistance or Conductance of Insulating Materials²
- D 618 Methods of Conditioning Plastics and Electrical Insulating Materials for Testing²
- D 638 Test Method for Tensile Properties of Plastics⁴
- D 746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact²
- D 792 Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement²
- D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer²
- D 1505 Test Method for Density of Plastics by the Density-Gradient Technique²
- D 1531 Test Method for Relative Permittivity (Dielectric Constant) and Dissipation Factor of Polyethylene by Liquid Displacement Procedure³

- D 1603 Test Method for Carbon Black in Olefin Plastics⁴
- D 1693 Test Method for Environmental Stress-Cracking of Ethylene Plastics⁴
- D 1898 Practice for Sampling of Plastics⁴
- D 1921 Test Method for Particle Size (Sieve Analysis) of Plastic Materials⁴
- D 1928 Method for Preparation of Compression-Molded Test Sheets and Test Specimens⁴
- D 2951 Test Method for Thermal Stress-Cracking Resistance of Types III and IV Polyethylene Plastics⁴
- D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets⁵
- D 3349 Test Method for Absorption Coefficient of Carbon Black Pigmented Ethylene Plastic Film⁶
- D 3892 Practice for Packaging/Packing of Plastics⁶

2.2 Federal Specification:

- L-P-390 Plastic, Molding, and Extrusion Materials, Polyethylene and Copolymers (Low, Medium, and High Density)⁷

2.3 Military Standard:

- MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes⁷

3. Terminology

3.1 Definition:

3.1.1 *polyethylene plastics*—as defined by this specification, plastics or resins prepared by the polymerization of no less than 85 % ethylene and no less than 95 weight % of total olefins.

4. Classification

4.1 This specification recognizes that polyethylene plastic are identified primarily on the basis of two characteristics namely, density and flow rate (previously identified as mel index). The former is the criterion for assignment as to type the latter for designation as to category. Other attribute important to the user for certain applications are covered by three general classes and by specifying in greater detail, by grades, a minimum number of key characteristics covered too broadly or not at all by the type, class, and category designations.

¹ This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.12 on Olefin Plastics. Current edition approved Nov. 30, 1984. Published January 1985. Originally published as D 1248 – 52. Last previous edition D 1248 – 81a.

² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vols 10.02 and 10.03.

⁴ Annual Book of ASTM Standards, Vol 08.02.

⁵ Annual Book of ASTM Standards, Vol 09.01.

⁶ Annual Book of ASTM Standards, Vol 08.03.

⁷ Available from Naval Publications and Forms Center, 5801 Tabor Ave Philadelphia, PA 19120.



TABLE 1 Classification of Polyethylene Plastics Molding and Extrusion Materials According to Type

Type	Nominal Density, ^A g/cm ³
I	0.910 to 0.925
II	0.926 to 0.940
III	0.941 to 0.959
IV	0.960 and higher

^A Uncolored, unfilled material (see Note 9).

4.1.1 Types:

4.1.1.1 This specification provides for the identification of four types of polyethylene plastics molding and extrusion materials by density in accordance with 10.1 and 11.1.3 and the requirements prescribed in Table 1 (Notes 1, 2, 3, and 9).

NOTE 1—The addition of a Type O density below 0.910 may be expected later when such appear as commercial molding and extrusion polyethylene plastics.

NOTE 2—It is recognized that some high-density polyethylene plastics of very high molecular weight may have densities slightly less than 0.960 yet in all other respects they are characteristic of Type IV materials. Similarly, there are other polyethylene plastics of very high molecular weight having densities slightly less than 0.941 which in all other respects are more characteristic of Type III than of Type II materials.

NOTE 3—It has been a long-standing practice to use the following terms in describing polyethylene plastics:

Type I (0.910 to 0.925) = Low Density

Type II (0.926 to 0.940) = Medium Density

Type III (0.941 to 0.965) = High Density

While Type III now has been divided into two ranges of density (Types III and IV), both are still described by the term "High Density."

4.1.1.2 Material supplied under these types shall be of such nominal density, within the ranges given, as agreed upon between the manufacturer and the purchaser subject to the tolerances specified in 4.1.1.3 (Note 9).

4.1.1.3 In view of production, sampling, and testing variables, a commercial lot or shipment for which a nominal density has been agreed upon between the seller and the purchaser shall be considered as conforming and commercially acceptable when the density value found on a sample from the lot or shipment falls within the tolerance range of ± 0.002 of the nominal value.

4.1.1.4 If the nominal value is unknown or unspecified, classification shall be based on the tested value without tolerance consideration.

4.1.2 Classes—Each of the four types is subdivided into three classes according to composition and use as follows:

4.1.2.1 *Class A*—Natural color only (general-purpose and dielectric), without any or with such antioxidant or other additives in such proportions as agreed upon between the seller and the purchaser.

4.1.2.2 *Class B*—Colors including white and black (general-purpose and dielectric), without any or with such antioxidant or other additives in such proportions as agreed upon between the manufacturer and the purchaser.

4.1.2.3 *Class C*—Black (weather-resistant), containing not less than 2 % carbon black of a kind and particle size (Note 4), dispersed by such means and to such degree, all as may be agreed upon between the seller and the purchaser; without any or with such antioxidant or other additives in

TABLE 2 Classification of Polyethylene Plastics Molding and Extrusion Materials According to Category

Category	Nominal Flow Rate, g/10 min (190 °C, 2160-g load)
1	>25
2	>10 to 25
3	>1.0 to 10
4	>0.4 to 1.0
5	0.4 max

such proportions as agreed upon between the seller and the purchaser.

NOTE 4—Carbon black 20 nm or less in average particle diameter is used as required in black electrical and jacketing materials (Grades E and J) to impart maximum weather resistance.

4.1.3 Categories:

4.1.3.1 The three classes of each type are divided into five categories on the basis of broad ranges of flow rate in accordance with the requirements prescribed in Table 2.

NOTE 5—Some Type II and Type III polyethylene plastics of very high molecular weight cannot be categorized by flow rate. Solution viscosity is recommended as a means of distinguishing such materials.

4.1.3.2 Material supplied under these categories shall be of such nominal flow rate, within the ranges given, as agreed upon between the seller and the purchaser subject to the tolerances specified in 4.1.3.3.

4.1.3.3 In view of production, sampling, and testing variables, a commercial lot or shipment for which a nominal flow rate has been agreed upon between the seller and the purchaser shall be considered as conforming and commercially acceptable when the flow rate value found on a sample from the lot or shipment falls within the tolerance range of ± 30 % for nominal flow rate values below 1.0 and ± 20 % for nominal flow rate values of 1.0 or greater.

4.1.3.4 If the nominal value is unknown or unspecified, classification shall be based on the tested value without tolerance consideration.

4.1.4 Grades:

4.1.4.1 If further definition is necessary, one of the grades given in Table 3 and Tables 4a, 4b, and 4c shall be selected.

NOTE 6—Tables 4a, 4b, and 4c are included to correspond with the grades specified in Federal Specification L-P-390.

NOTE 7—The grade shall be associated with the appropriate type, class, and category designations; for example, IA5-E4 or IC5-J3 as required. Other grades may be added as necessary by revision of this specification in established manner. Also, it is anticipated that additional requirements may be added under a given grade designation by future revision to provide more meaningful characterization of the material covered by such designation.

NOTE 8—To cross-reference terminology used in previous issues of Specification D 1248 with each other and with the present issue the following table is given:

Year	Grade	Term
1963 T	Table II lists property values by grade within a density type	No term
1965	MI ranges 1 to 5	Table 3 lists wire, cable, and pipe resins by property values
1968	Table 3 lists wire, cable, and pipe resins by property values	MI ranges 1 to 5
1969	Same as 1968 except that a Type IV density has been added	

4.1.4.2 Instead of such selection, additional requirements