



Designation: D7293 – 19

Standard Specification for Extruded and Compression-Molded Shapes Made from Polyetherimide (PEI)¹

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INTRODUCTION

This specification is intended to be a means of calling out plastic shapes used in the fabrication of end items or parts.

1. Scope*

1.1 This specification covers requirements and test methods for the dimensions, workmanship, and the properties of extruded and compression-molded sheet, plate, rod and tubular bar manufactured from polyetherimide (PEI) resins.

1.2 The properties included in this specification are those required for the compositions covered. It is possible that other requirements will be necessary to identify particular characteristics important to specialized applications. These shall be specified by using the suffixes as given in Section 5.

1.3 This specification does not allow for the use of recycled plastics (as defined in Guide D7209).

1.4 The values stated in English units are regarded as standard in all property and dimensional tables. For reference purposes, SI units are also included in Table 1 and Table S-PEI.

1.5 The following safety hazards caveat pertains only to the test method or test methods described in 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—There is no known ISO equivalent to this standard.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials.

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2. Referenced Documents

2.1 ASTM Standards:²

D256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

D618 Practice for Conditioning Plastics for Testing

D638 Test Method for Tensile Properties of Plastics

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D883 Terminology Relating to Plastics

D3892 Practice for Packaging/Packing of Plastics

D4000 Classification System for Specifying Plastic Materials

D5205 Classification System and Basis for Specification for Polyetherimide (PEI) Materials

D7209 Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products (Withdrawn 2015)³

IEEE/ASTM SI-10 American National Standard for Use of the International System of Units (SI): The Modern Metric System

2.2 ANSI Standard:⁴

Z1.4-1993 Sampling Procedures and Tables for Inspection by Attributes

3. Terminology

3.1 *Definitions*—For definitions of the terms used in this specification and associated with plastics issues, refer to the terminology contained in D883.

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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *rod, n*—extruded solid cylindrical shape with a minimum diameter of $\frac{1}{16}$ in. (1.6 mm).

3.2.2 *sheet, n*—flat stock with thickness greater than $\frac{1}{4}$ -in. (6.4-mm).

3.2.3 *tubular bar, n*—extruded annular shapes with minimum inside diameter of $\frac{3}{8}$ in. (0.5 mm) and minimum wall thickness of $\frac{1}{16}$ in. (1.6 mm).

4. Classification

4.1 This specification covers shapes extruded and compression molded from polyetherimide (PEI) resins as listed in Table S-PEI. The PEI resin is included in the designation using Specification **D5205** callout.

4.1.1 The type of PEI extruded shape shall be categorized by composition.

4.1.2 There shall be only one class of PEI shape, for virgin products.

4.1.2.1 *Class 1*—General purpose product made using 100 % virgin resin.

4.2 The type and class shall be further differentiated based on dimensional tolerances and dimensional stability (based on elevated temperature excursion testing). Grades 1 and 2 shapes are produced with the closest commercial tolerances and lowest stress levels for machined parts as delineated in Table A and Table B. Any additional or custom tolerance requirements are to be specified. Custom tolerances shall be noted following the grade designation.

TABLE S-PEI Requirements for PEI Shapes, Dry-as-Manufactured (<0.2 % Moisture)

Type	Description	Class	Description	Grade	Applicable D5205 Callout ^A	Description	Ultimate Tensile Strength, min, psi (MPa)	Tensile Elongation, % at Break, min	Tensile Modulus, min, psi (MPa)	Dimensional Stability, %, max
01		1	Unfilled	1	D5205 PEI 0113	General purpose	14 000 (97)	50	425 000 (2930)	0.4
02	Glass filled	1	Unfilled	0	...	Other	14 500 (100)	2	500 000 (3447)	0.4
		1	10 % glass reinforced	1		General purpose				
	Glass filled	1	20 % glass reinforced	2		General purpose				
	Glass filled	1	30 % glass reinforced	3		General purpose				
	Glass filled	1	Glass rein- forced	0	D5205 PEI0110 ^B	Other	16 000 (110)	2	800 000 (5516)	0.4
00	Other	1	Other	0		Other				

^AApplicable Classification System **D5205** resin type to be specified on purchase order.

^BG30A99169

TABLE A Dimensional Requirements for Natural and Glass-Filled Extruded PEI Rod^A

Size, in. ^B	Diameter Tolerance, in.	Roundness TIR, in.	Camber, in./ft
$\frac{1}{16}$	+0.002–0.001	0.002	2½ /8
$\frac{1}{8}$	+0.002–0.001	0.002	2½ /8
$\frac{3}{16}$	+0.002–0.001	0.002	2½ /8
$\frac{1}{4}$	+0.003–0.001	0.002	2½ /8
$\frac{3}{8}$	+0.003–0.001	0.002	2½ /8
$\frac{1}{2}$	+0.003–0.001	0.002	2½ /8
$\frac{5}{8}$	+0.003–0.001	0.002	2½ /8
$\frac{3}{4}$	+0.003–0.001	0.002	2½ /8
$\frac{7}{8}$	+0.003–0.001	0.002	2½ /8
1	+0.003–0.001	0.002	1¼ /8
1½	+0.005–0.000	0.005	1¼ /8
1¼	+0.005–0.000	0.005	1¼ /8
1¾	+0.005–0.000	0.005	1¼ /8
1½	+0.005–0.000	0.005	1¼ /8
1⅝	+0.005–0.000	0.005	1¼ /8
1¾	+0.005–0.000	0.005	1¼ /8
1⅞	+0.005–0.000	0.005	1¼ /8
2	+0.005–0.000	0.010	1¼ /8
2½ – 2¾	+0.005–0.000	0.030	1¼ /8
3	+0.250–0.000	0.060	1¼ /4

^ABased on dry-as-manufactured condition and proper product storage and handling.

^BTo convert inches to millimeters, multiply by 25.40.