



Designation: D6262 – 23

Standard Specification for Extruded, Compression Molded, and Injection Molded Basic Shapes of Poly(aryl ether ketone) (PAEK)¹

This standard is issued under the fixed designation D6262; 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.

INTRODUCTION

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

1. Scope*

1.1 This specification covers requirements for the PAEK materials used and the requirements and methods of test for the dimensions, workmanship, and the properties of extruded, compression molded, and injection molded PAEK sheet, plate, rod, and tubular bar manufactured from PAEK. PAEK is a family of thermoplastic materials that differ in properties (see Section 3).

1.2 The properties included in this specification are those required for the compositions covered. Requirements necessary to identify particular characteristics important to specialized applications are described by using the classification system given in Section 4.

1.3 This specification allows the use of key clad plastics (see Section 4).

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

1.5 The following precautionary caveat pertains only to the test method 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, 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.

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

D7209 Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products (Withdrawn 2015)³

D8033 Classification System for Poly(Ether Ether Ketone) (PEEK) Molding and Extrusion Materials

3. Terminology

3.1 *Definitions:*

3.1.1 *plate, n*—flat stock 1/4 in. (6.4 mm), or greater.

3.1.2 *Polyaryletherketone (PAEK), n*—a family of semi-crystalline thermoplastics whose molecular backbone contains alternately ketone (R-CO-R) and ether groups (R-O-R). The linking group R between the functional groups consists of a 1,2-, 1,3- or 1,4-substituted aryl group.

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.

Current edition approved Aug. 1, 2023. Published August 2023. Originally approved in 1998. Last previous edition approved in 2017 as D6262 - 17. DOI: 10.1520/D6262-23.

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.

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

3.1.2.1 *Discussion*—Plastic materials that fall within this family include PEK, PEEK, PEKK, PEEKK and PEKEKK. These PAEK polymers differ in thermal transitions and properties. The current types 01, 02 and 03 in this standard cover shapes made from PEEK materials while the shapes produced of these three types are referred to as PAEK shapes per long standing use since 1998. In the future, other types referring to specific PAEK polymers may be added.

3.1.3 *recycled plastic shape, n*—a product made from up to 100 % recycled plastic.

3.1.4 *rod, n*—solid cylindrical shape with a minimum diameter of 1/8 in. (3.2 mm).

3.1.5 *sheet, n*—flat stock less than and including 1/4 in. (6.4 mm) thickness.

3.1.6 *tubular bar, n*—annular shapes with minimum inside diameter of 3/8 in. (9.5 mm) and minimum wall thickness of 1/16 in. (1.6 mm).

3.1.7 *virgin plastic shape, n*—product that is produced from 100 % plastic resin that has not been subjected to subsequent melt processing.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 For definitions of other technical terms pertaining to plastics used in this specification, see Terminology D883 or Guide D7209.

4. Classification and Material

4.1 Product shape and size as defined in the applicable purchase order.

4.2 This specification covers product extruded as listed in Table S-PAEK. Products included in the designations reference Classification D8033 callout for PEEK materials where applicable. Other products produced from other PAEK materials may be added in the future, with reference to appropriate ASTM D4000 classification standard.

4.2.1 The type of PAEK extruded, compression molded, and injection molded product is categorized by type, grade and class depending on resin and filler compositions as defined in Table S-PAEK.

NOTE 2—The PAEK shape producer should verify that characteristics of the PAEK material such as molecular weight parameters, viscosity and rheological properties, are suitable for the required consistency and flow patterns, for the specific shape production process used.

4.2.2 Every type of PAEK shape is categorized into one of several grades as follows:

4.2.2.1 *Grade 1 — General Purpose*—Extruded, compression molded or injection molded product made using only 100 % virgin PAEK resin.

4.2.2.2 *Grade 2 — Recycle Grade*—Extruded, compression molded or injection molded product made using any amount up to 100 % of recycled thermoplastic PAEK.

4.3 The type, class and grade is further differentiated based on dimensional stability (elevated temperature excursion test), Table S-PAEK and dimensional requirements, Tables A and B.

4.4 Property Tables:

4.4.1 Table S-PAEK is used to describe extruded, compression molded, and injection molded products for specific PAEK polymers.

4.4.2 Table 1 is also used to describe extruded, compression molded, and injection molded products not included in Table S-PAEK via a cell callout which includes the applicable Table S-PAEK PAEK type and specific properties (Designations 1 through 7).

4.4.3 To facilitate the incorporation of future or special materials not covered by the Table S-PAEK, the “as specified” category (00) for type, class and grade is shown on the table with the basic properties to be obtained from Table 1, as they apply.

4.4.4 Reinforcements and additive materials. A symbol (single-letter) will be used for the major reinforcement or combination, or both, along with two numbers which indicate the percentage of addition by mass with the tolerances as tabulated below. This must be included in all Table 1 callouts.

Symbol	Material	Tolerance (Based on the Total Mass);
C	Carbon and graphite fiber	±2 %
G	Glass	± 2 %
L	Lubricants (for example, PTFE, graphite, silicone and molybdenum disulfide)	± 2 %
M	Mineral	± 2 %
R	Combinations of reinforcements by agreement between supplier and the user for the total reinforcement or fillers, or both	± 3 %

4.5 *Callout Designation*—A one-line system shall be used to specify PAEK shapes covered by this specification. The system uses predefined cells to refer to specific aspects of this specification, as illustrated below:

4.5.1 Description:

4.5.1.1 *Example 1*—Extruded natural PAEK extruded rod from PEEK:

CELL CALLOUT: S-PAEK0111

S-PAEK01	=	Product made from PAEK resin as called in the material designation in Table S-PAEK and meeting shape requirements in Table S-PAEK
1	=	Unfilled class
1	=	General purpose grade product

4.5.1.2 *Example 2*—Compression molded natural PAEK plate from PEEK.

CELL CALLOUT: S-PAEK0211

S-PAEK02	=	Product made from PAEK resin as called in the material designation in Table S-PAEK and meeting stock shape requirements in accordance with Table S-PAEK
1	=	Unfilled class
1	=	General purpose grade product

4.5.2 The two examples illustrate how a one-line, alphanumeric sequence identifies the product composition, commercial parameters and physical characteristics of extruded or compression molded product. A space must be used as a separator between the specification number and the type designation. No separators are needed between type, class and grade. When special notes are to be included, such information should be preceded by a comma. Special tolerances must be noted at time of order and are inserted after the grade in parenthesis and preceded by a comma.