Designation: D8156 – 18

Standard Classification System for and Basis of Specifications for Thermoplastic Elastomer Copolyester Molding and Extrusion Materials (TPC)[1]

This standard is issued under the fixed designation D8156; 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 classification system covers segmented block copolyester elastomers suitable for molding and extrusion.

1.2 This classification system allows for the use of segmented block copolyesther elastomers that are recycled provided that the requirements as stated in this classification system are met. The proportions of recycled material used, as well as the nature and amount of any contaminant, however, cannot be covered practically in this specification.

1.3 The properties included in this classification system are those required to identify the compositions covered. It is possible that there are other requirements necessary to identify particular characteristics important to specialized applications. One way of specifying them is by using the suffixes as given in Section 5.

1.4 This classification system and subsequent line callout (specification) are intended to provide a means of calling out plastic materials used in the fabrication of end items or parts. It is not intended for the selection of materials. Material selection is best made by those having expertise in the plastic field after careful consideration of the design and the performance required of the part, the environment to which it will be exposed, the fabrication process to be employed, the costs involved, and the inherent properties of the material other than those covered by this classification system.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 The following precautionary caveat pertains only to the test methods portion, Section 11, of this classification system. *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—This standard, ISO 14910-1, and ISO 14910-2 address the same subject matter, but differ in technical content.

1.7 *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:*

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2240 Test Method for Rubber Property—Durometer Hardness

D3418 Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry

D3641 Practice for Injection Molding Test Specimens of Thermoplastic Molding and Extrusion Materials

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)[2]

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *ISO Standards:*

ISO 294-1 Plastics—Injection Moulding of Test Specimens of Thermoplastic Materials—Part 1: General Principles and Moulding of Multipurpose and Bar Test Specimens

ISO 868 Plastics and Ebonite-Determination of Indentation Hardness by Means of a Durometer (Shore Hardness)

[1] This test method 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] The last approved version of this historical standard is referenced on www.astm.org.

ISO 1133 Plastics-Determination of the Melt Mass-Flow Rate (MFR) and the Melt Volume–Flow Rate (MVR) of Thermoplastics

ISO 11357-3 AMD 1 Plastics-Differential Scanning Calorimetry (DSC)—Part 3: Determination of Temperature and Enthalpy of Melting and Crystallization

ISO 7619:2010 Rubber, vulcanized or thermoplastic—Determination of indentation hardness—Part 1: Durometer method (Shore hardness)

ISO 14910-1 Plastics-Thermoplastic Polyester/ester and Polyether/ester Elastomers for Moulding and Extrusion-Part 1: Designation System and Basis for Specifications

ISO 14910-2 Plastics-Thermoplastic Polyester/ester and Polyether/ester Elastomers for Moulding and Extrusion—Part 2: Preparation of Test Specimens and Determination of Properties

3. Terminology

3.1 *Definitions*—The terminology used in this classification system is in accordance with Terminologies D883 and D1600.

4. Classification

4.1 Thermoplastic copolyester elastomers are classified into groups in accordance with the material chemical structure. These groups are subdivided into classes by Hardness and with it, as the result of some relationship with modulus, Flexibility, and are further subdivided into grades by melting point and melt mass-flow rate, as shown in the Table 1 TPC Group, Table 2 TPC Classification, and Table 3 Property requirements.

4.1.1 There are no callout-lines included in this standard. A designation, a callout-line, is drawn up by using Tables 1-4 as 'building blocks' (see Tables 1-4 and Fig. 1).

NOTE 2—Drawing up callout lines by using Tables 1-4 as 'building blocks' implies that addition of new callout lines is not necessary anymore. In case of addition of a new TPC type, only the new material type need to be added to Table 1.

4.1.2 To facilitate the incorporation of future or special materials, the category unspecified (0) is shown in the Table TPC group.

4.2 Reinforced, filled, and/or lubricated versions of the Polyester copolymer materials are classified in accordance with Tables TPC Group, TPC Classification and TPC Requirements. Table A is used to specify the addition of reinforcements or lubricants at the nominal level indicated (see 4.2.1).

TABLE A Reinforcements and Lubricants

Symbol	Material	Tolerance
C	carbon and graphite fiber	±2 %
G	glass	±2 %
L	lubricants (for example, PTFE, graphite, silicone, and molybdenum disulfide)	depends upon material and process—to be specified
M	mineral	±2 %
R	combination of reinforcements or fillers, or both	±3 %

4.2.1 Reinforced, filled, and/or lubricated versions of the basic materials are identified by a single letter that indicates the reinforcement or filler used and two digits that indicate the nominal quantity in percent by weight. Thus, a letter designation G for glass-reinforced and 33 for % of reinforcement, G33, specifies a filled material with a nominal glass level of 33 %. The reinforcement letter designations and associated tolerance levels are shown in the following table:

NOTE 3—This part of the classification system uses the percent of reinforcements or additives, or both, in the control of the modified basic material. The types and percentages of reinforcements and additives are sometimes shown on the supplier's technical data sheet. If necessary, additional callout of these reinforcements and additives can be accomplished by the use of the suffix part of the system (see Section 5).

NOTE 4—Examples of an unfilled and filled Thermoplastic copolyester elastomer of this classification system can be found in Table 5.

5. Suffixes

5.1 When additional requirements are needed that are not covered by the basic requirements or cell-table requirements, they shall be indicated through the use of suffixes.

5.2 A list of suffixes can be found in Classification D4000 (Table 3) and can be used to indicate additional requirements as appropriate. Additional suffixes will be added to that classification system as test methods and requirements are developed and requested.

6. General Requirements

6.1 Basic requirements from the property or cell tables are always in effect unless superseded by specific suffix requirements, which always take precedence.

6.2 The plastics composition shall be uniform and shall conform to the requirements specified herein.

TABLE 1 TPC Group

TPC Group	Abbreviation		Block
	ISO	ASTM	
1	TPC-ES	—	Polyester soft segment
2	TPC-ET	TEEE	Polyether soft segment
3	TPC-EA	—	Alkane soft segment
0	Unspecified	—	Unspecified