



Designation: D3935 – 21

Standard Classification System and Basis for Specification for Polycarbonate (PC) Unfilled and Reinforced Material¹

This standard is issued under the fixed designation D3935; 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 U.S. Department of Defense.

1. Scope*

1.1 This classification system covers unfilled and reinforced polycarbonate and polycarbonate copolymer materials suitable for injection molding, blow molding, and extrusion. Some of these compositions may also find use for compression molding or application from solution. This classification system allows for the use of recycled materials provided that all specification requirements are met.

1.2 The properties in this classification system are those required for identifying the compositions covered. Other requirements necessary for identifying particular characteristics important to specific applications are normally specified by using the suffixes in accordance with Section 5.

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

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 should be made by those having expertise in the plastic field only after 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 in this standard.

NOTE 1—This classification system and ISO 21305-1 and ISO 21305-2 address the same subject matter, but differ in technical content.

1.5 The following precautionary caveat pertains only to the test methods portion, Section 12, 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.*

¹ This standard 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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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
 - D638 Test Method for Tensile Properties of Plastics
 - D648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
 - D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
 - D883 Terminology Relating to Plastics
 - D1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
 - D1600 Terminology for Abbreviated Terms Relating to Plastics
 - D2584 Test Method for Ignition Loss of Cured Reinforced Resins
 - D3892 Practice for Packaging/Packing of Plastics
 - D4000 Classification System for Specifying Plastic Materials
 - D5630 Test Method for Ash Content in Plastics
 - E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
 - E169 Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis
- #### 2.2 ISO Standard:³
- ISO 21305-1 Plastics—Polycarbonate (PC) Moulding and Extrusion Materials—Part 1: Designation—System and

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 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

Basis for Specification
ISO 21305-2 Plastics—Polycarbonate (PC) Moulding and
 Extrusion Materials—Part 2: Preparation of Test Specimens and Determination of Properties

4. Classification

4.1 Unfilled polycarbonate materials are classified into groups according to their composition. These groups are subdivided into classes and grades as shown in Table PC

3. Terminology

3.1 *Definitions*—The terminology used in this classification system is in accordance with Terminologies **D883** and **D1600**. The polycarbonate materials are to be designated PC as specified in Terminology **D1600**.

TABLE 1 PC Polycarbonate Materials and Detail Requirements

NOTE 1— The values are for naturals; colors may be different.

Group	Description	Class	Description	Grade	Description ^A	Flow Rate, ^B Test Method D1238 , g/10 min	Specific Gravity, Test Method D792	Izod Impact, ^C Test Methods D256 , J/m, min	Tensile Yield Stress ^D Test Method D638 , MPa, min	Elongation at Break ^D Test Method D638 , %, min	Flexural Modulus, ^E Test Methods D790 , MPa, min	Deflection Tempera- ture, Test Method D648 , ^F °C, min
01	PC	1	general purpose	1		>24	1.19–1.22		Use Table B to define these properties.			
				2		15 to 30	1.19–1.22		Use Table B to define these properties.			
				3		12 to 20	1.19–1.22	640	55	100	2000	126
				4		9 to 18	1.19–1.22	750	60	105	2100	126
				5		6 to 13	1.19–1.22	750	60	110	2200	128
				6		4 to 8	1.19–1.22	750	60	110	2200	128
				7		<5	1.19–1.22	780	60	110	2200	130
				0	other	...	...	...	...	...	...	...
		2	flame-retarded ^G	1		>24	1.19–1.22		Use Table B to define these properties.			
				2		15 to 30	1.19–1.22		Use Table B to define these properties.			
				3		12 to 20	1.19–1.22	640	55	100	2000	126
				4		9 to 18	1.19–1.22	640	60	100	2100	126
				5		6 to 13	1.19–1.22	640	60	105	2200	128
				6		4 to 8	1.19–1.22	640	60	110	2200	128
				7		<5	1.19–1.22	640	60	110	2200	130
				0	other	...	...	...	...	...	...	...
		3	UV ^H stabilized	1		>24	1.19–1.22		Use Table B to define these properties.			
				2		15 to 30	1.19–1.22		Use Table B to define these properties.			
				3		12 to 20	1.19–1.22	640	55	100	2000	124
				4		9 to 18	1.19–1.22	750	60	105	2100	124
				5		6 to 13	1.19–1.22	750	60	110	2100	126
				6		4 to 8	1.19–1.22	750	60	110	2200	126
				7		<5	1.19–1.22	750	60	110	2200	128
				0	other	...	...	...	...	...	...	...
		4	impact-modified	1		6 to 15	1.18–1.22	375 ^I	50	90	1900	121
				0	other	...	...	...	...	...	...	...
		5	FDA ^J compliant formulations	1		>24	1.19–1.22		Use Table B to define these properties.			
				2		15 to 30	1.19–1.22		Use Table B to define these properties.			
				3		12 to 20	1.19–1.22	640	55	100	2000	126
				4		9 to 18	1.19–1.22	750	60	105	2100	126
				5		6 to 13	1.19–1.22	750	60	110	2200	128
				6		4 to 8	1.19–1.22	750	60	110	2200	128
				7		<5	1.19–1.22	780	60	110	2200	130
				0	other	...	...	...	...	...	...	...
				0	other	...	...	...	...	...	...	...
				0	other	...	...	...	...	...	...	...
02	PC copolymer- flame retarded	1	general purpose	1		>24	1.22–1.26		Use Table B to define these properties.			
				2		15 to 30	1.22–1.26		Use Table B to define these properties.			
				3		12 to 20	1.22–1.26	80	60	100	2100	128
				4		9 to 18	1.22–1.26	80	60	110	2200	128
				5		6 to 13	1.22–1.26	90	60	110	2200	130
				6		4 to 8	1.22–1.26	90	60	110	2200	130
				7		<5	1.22–1.26	90	60	110	2200	132
				0	other	...	...	...	...	...	...	...
		2	UV ^H stabilized	1		>24	1.22–1.26		Use Table B to define these properties.			
				2		15 to 30	1.22–1.26		Use Table B to define these properties.			
				3		12 to 20	1.22–1.26	80	60	100	2100	126
				4		9 to 18	1.22–1.26	80	60	110	2200	126
				5		6 to 13	1.22–1.26	90	60	110	2200	128
				6		4 to 8	1.22–1.26	90	60	110	2200	130
				7		<5	1.22–1.26	90	60	110	2200	130
				0	other	...	...	...	...	...	...	...
				0	other	...	...	...	...	...	...	...
				0	other	...	...	...	...	...	...	...