



Standard Classification System for Acrylonitrile–Butadiene–Styrene (ABS) Plastics and Alloys Molding and Extrusion Materials¹

This standard is issued under the fixed designation D 4673; 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 only ABS materials and ABS alloys suitable for injection molding and extrusion. Some of these compositions may also be suitable for compression molding. Recycle ABS and alloys will be addressed in a separate standard.

1.2 This classification system is not intended for the selection of materials, but only as a means of calling out materials to be used in the manufacture of parts. Materials are to be selected by personnel with expertise in the plastics field where the economics, the environment to be encountered, the inherent properties of the materials, the part design, the part performance required, and the manufacturing process to be employed all enter into the selection.

1.3 The properties included in this classification system are those required to identify the compositions covered. There may be other requirements necessary to identify particular characteristics important to specialized applications. These will be agreed upon between the user and the supplier by using the suffixes given in Section 5.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—This classification system and ISO 2580 are technically equivalent for those tests contained in both standards.

2. Referenced Documents

2.1 ASTM Standards:

D 256 Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics²

¹ This classification system 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 Annual Book of ASTM Standards, Vol 08.01.

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing²

D 638 Test Method for Tensile Properties of Plastics²

D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load²

D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials²

D 883 Terminology Relating to Plastics²

D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics²

D 1525 Test Method for Vicat Softening Temperature of Plastics²

D 1898 Practice for Sampling of Plastics²

D 1999 Guide for the Selection of Specimens and Test Parameters for International Commerce²

D 2584 Test Method for Ignition Loss of Cured Reinforced Resins³

D 3641 Practice for Injection Molding Test Specimens of Thermoplastic Molding and Extrusion Materials³

D 3892 Practice for Packaging/Packing of Plastics³

D 4000 Classification System for Specifying Plastic Materials³

2.2 ISO Standards:⁴

ISO/DIS 75 Plastics and Ebonite—Determination of Temperatures of Deflection under Load

ISO/DIS 178 Plastics—Determination of Flexural Properties

ISO 180 Plastics—Determination of Izod Impact Strength of Rigid Materials

ISO 291 Plastics—Standard Atmosphere for Conditioning and Testing

ISO/DIS 294 Plastics—Injection Moulding Test Specimen of Thermoplastics Materials

ISO 306 Plastics—Determination of Vicat Softening Temperature

ISO/DIS 527, Parts 1 and 2, Plastics—Determination of Tensile Properties

ISO 2580 Acrylonitrile/Butadiene/Styrene (ABS) Moulding and Extrusion Materials, Part 2

³ Annual Book of ASTM Standards, Vol 08.02.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

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3. Terminology

3.1 *Definitions*—Definitions of technical terms used in this classification system are in accordance with Terminology D 883.

4. Classification

4.1 ABS materials, based on three or more monomers, are grouped rather than rigidly classified. These groups are then

subdivided by class and then grades. In cases in which a resin may be classed into more than one group, the supplier will determine the specific callout(s). Table ABS has both ASTM procedure method and ISO procedure versions for callout under the preferred test system.

TABLE ABS ASTM/ISO Values, Requirements, Natural Color Only^A

NOTE 1—For property test parameters, see Section 12.

Group	Description	Class	Description	Grade	Description	Tensile Strength, MPa, ^B Test Method D 638/ ISO 527	Flexural Modulus, MPa, Test Methods D 790/ ISO 178	Izod Impact J/m, ^C Test Method D 256	Izod Impact kJ/m ² , ^D ISO 180	Softening, Test Method D 1525, °C, 120°/h	Temperature or ISO 306, °C, 50°/h
01	Molding	1	medium impact	1		45	2700	40	5	90	85
				2		40	2400	125	15	90	85
				3		40	2200	150	20	90	85
				4		35	2200	80	10	90	85
				5		32	1600	70	9	90	85
				0	other						
		2	high impact	1		35	2100	200	25	90	85
				2		35	2000	250	30	90	85
				3		30	1700	275	35	90	85
				4		30	1700	325	40	90	85
				5		25	1500	400	50	90	85
				6		30	1600	184	23	90	85
				0	other						
		3	high heat	1		45	2300	100	10	115	110
				2		40	2000	125	15	110	105
				3		40	2400	125	15	105	100
				4		35	2000	150	20	105	100
				5		35	2100	80	10	105	100
				6		34	1700	65	8	98	93
				7		32	1800	50	6	105	100
				0	other						
		4	plating ^E	1		45	2600	150	20	105	100
				2		40	2700	80	10	105	100
				3		40	2200	200	25	100	95
				4		35	2000	200	25	95	90
				5		34	2200	80	10	93	88
				0	other						
		5	clear ^F	1		40	2300	80	10	85	80
				0	other						
		6	additive FR ^G	1		40	2200	200	25	85	80
				2		40	2000	150	20	85	80
				3		35	2500	80	10	90	85
				4		30	2000	150	20	90	85
				5		25	1800	80	10	85	80
				0	other						
02	Extrusion	0	other	0	other						
		1	medium impact	1		50	2700	80	10	95	90
				2		45	2400	80	10	90	85
				3		40	2200	150	20	90	85
				4		40	2000	80	10	90	85
				5		35	2200	125	15	90	85
				0	other						
		2	high impact	1		35	2400	200	25	90	85
				2		35	2200	325	40	90	85
				3		30	2000	275	35	90	85
				4		30	2000	360	45	90	85
				5		25	1800	400	50	90	85
				6		25	1800	440	55	90	85
				0	other						
		3	FR	1		40	2300	280	35	90	85
				2		35	2000	275	35	90	85
				3		35	2000	210	30	85	80
		0	other	0	other						
03	Alloys ABS/PVC	1		1		50	2800	80	10	100	95

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TABLE *Continued*

Group	Description	Class	Description	Grade	Description	Tensile Strength, MPa, ^B Test Method D 638/ ISO 527	Flexural Modulus, MPa, Test Methods D 790/ ISO 178	Izod Impact J/m, ^C Test Method D 256	kJ/m ² , ^D ISO 180	Softening, Test Method D 1525, °C, 120°/h	Temperature or ISO 306, °C, 50°/h
04	Alloys ABS/PC	0	other	2		40	1800	200	25	90	85
				3		40	1800	275	35	80	75
				4		35	2000	400	50	70	65
				5		50	2100	440	55	110	105
				6		35	2000	475	60	70	65
				7		45	2400	200	25	80	75
				0	other						
				0	other						
		1	medium impact	1		55	2200	360	45	115	110
				2		55	2400	325	40	110	105
				3		50	2200	275	35	120	115
				4		45	2100	275	35	110	105
				5		40	1900	70	9	105	100
				0	other						
		2	high impact	1		55	2500	400	50	125	120
				2		50	2300	400	50	115	110
				3		50	2200	475	60	125	120
				4		48	2100	275	35	110	105
				5		45	2000	255	32	119	114
				0	other						
		3	high heat	1		60	2400	275	35	140	135
				2		55	2500	400	50	130	125
				3		55	2000	500	40	125	120
				4		50	2300	360	45	135	130
				5		45	2100	600	75	130	125
				6		45	2000	325	40	128	123
		4	plating	7		45	2000	325	40	119	114
				0	other						
				1		50	2300	440	55	130	125
				2		45	2200	400	50	120	115
				3		45	2100	360	45	110	105
				0	other						
		5	additive FR	1		60	2500	125	15	110	105
				2		55	2500	200	25	110	105
				3		55	2500	400	45	90	85
				4		50	2000	440	55	110	105
				5		45	2100	275	35	110	105
				6		40	2000	440	55	110	105
		0	other	0	other						

^AAll cell values are minimums.^BMPa × 145 = psi.^CJ/m × 18.73 × 10⁻³ = ft-lbf/in.^DkJ/m² × 0.476 = ft-lbf/in.².^EPlating grades are those specifically recommended for plating or sputtering applications.^FClear ABS has a light transmission of 70 % minimum. It may be tested using Test Method D 1003.^GSpecific flammability requirements shall be specified by the user.

NOTE 2—An example of this classification system is as follows:

The designation ABS0111 would indicate:

ABS = acrylonitrile–butadiene–styrene,
 01 (group) = injection-molding resin,
 1 (class) = medium impact, and
 1 (grade) = requirements given in Table ABS.

4.1.1 To facilitate the incorporation of future or special materials, the “other/unspecified” category (0) for group, class, and grade is shown in Table ABS. The basic properties can be obtained from Cell Table A, B, and C as they apply.

4.2 Reinforced and lubricated versions of the ABS materials are classified in accordance with Table ABS and Cell Table A. Table ABS specifies the unreinforced material and Cell Table A

specifies the properties by either ASTM or ISO procedures after the addition of reinforcements or lubricants at the nominal level indicated.

4.2.1 A single letter shall be used for the major reinforcement or combination, or both, along with two digits that indicate the percentage of addition by mass, with the tolerance as tabulated below:

Symbol	Material	Tolerance
C	Carbon- and graphite-fiber reinforced	± 2 %
G	Glass-reinforced	± 2 %
L	Lubricants (for example, PTFE), graphite, silicone and molybdenum disulfide	depends on material and process—to be specified
M	Mineral-reinforced	± 2 %

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