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# Standard Classification System for and Basis for Specification for Acrylonitrile–Butadiene–Styrene (ABS) Plastics and Alloys Molding and Extrusion Materials<sup>1</sup>

This standard is issued under the fixed designation D4673; 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 ( $\epsilon$ ) 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 only ABS materials and ABS alloys suitable for injection molding and extrusion. Some of these compositions are also suitable for compression molding.

1.2 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. 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. Other requirements necessary to identify particular characteristics important to specialized applications are addressed 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—This standard and ISO 19062 address the same subject matter, but differ in technical content.

<sup>1</sup> 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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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:<sup>2</sup>

- 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
- 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
- D883 Terminology Relating to Plastics
- D1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics
- D1525 Test Method for Vicat Softening Temperature of Plastics
- D1600 Terminology for Abbreviated Terms Relating to Plastics
- 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
- D5630 Test Method for Ash Content in Plastics
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

2.2 ISO Standards:<sup>3</sup>

- ISO 75-1 Plastics—Determination of Temperature of Deflection Under Load—Part 1: General Test Methods
- ISO 75-2 Plastics—Determination of Temperature of Deflection Under Load—Part 2: Plastics and Ebonite
- ISO 179 Plastics—Determination of Charpy Impact Properties
- ISO 291 Plastics—Standard Atmospheres for Conditioning and Testing
- ISO 294 Plastics—Injection Moulding Test Specimens of Thermoplastics Materials
- ISO 306 Plastics—Thermoplastic Materials—Determination of Vicat Softening Temperature (VST)
- ISO/DIS 527-1 Plastics—Determination of Tensile Properties—Part 1: General Principles
- ISO/DIS 527-2 Plastics—Determination of Tensile Properties—Part 2: Testing Conditions for Moulding and Extrusion Plastics
- ISO 3451-1 Plastics—Determination of Ash—Part 1: General Methods

- ISO 19062-1 Acrylonitrile-Butadiene-Styrene (ABS) Moulding and Extrusion Materials—Part 1: Designation System and Basis for Specifications ISO 19062-2
- ISO 19062-2 Acrylonitrile-Butadiene-Styrene (ABS) Moulding and Extrusion Materials—Part 2: Preparation of Test Specimens and Determination of Properties
- ISO 20753 Plastics—Test Specimens

3. Terminology

3.1 Definitions—Definitions of technical terms used in this classification system are in accordance with Terminology D883. For definitions of abbreviations used in this test method, refer to Terminology D1600, unless otherwise indicated.

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 meets the requirements of 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<sup>A</sup>

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

Group	Description	Class	Description	Grade	Description	Tensile Strength, MPa, <sup>B</sup> Test Method D638/ ISO 527	Modulus, MPa, Test Method Flexural D790/ Tensile ISO 527	Impact		Softening Temperature					
								Izod J/m, <sup>C</sup> Test Method D256	Charpy kJ/m <sup>2</sup> , <sup>D</sup> ISO 179	Test Method D1525, °C, 120°/h	ISO 306, °C, 50°/h				
01	Molding	1	medium impact	1		45	2600	40	-	90	85				
				2		40	2400	125	6	90	85				
				3		40	2200	150	8	90	85				
				4		35	2200	80	5	90	85				
				5		32	1600	70	3	90	85				
				0	other										
				2	high impact	1		35	2100	200	13	90	85		
						2		35	2000	250	16	90	85		
						3		30	1700	275	19	90	85		
						4		30	1700	325	25	90	85		
		5				25	1500	400	30	90	85				
		6				30	1600	184	12	90	85				
		3	high heat	0	other	1		45	2300	100	5	115	110		
						2		40	2000	125	6	110	105		
						3		40	2400	125	6	105	100		
						4		35	2000	150	10	105	100		
						5		35	2100	80	3	105	100		
						6		34	1700	65	2	98	93		
						7		32	1800	50	-	105	100		
						0	other								
		4	plating <sup>E</sup>	0	other	1		45	2500	150	8	105	100		
						2		40	2600	80	3	105	100		
						3		40	2200	200	13	100	95		
						4		35	2000	200	13	95	90		
5						34	2200	80	3	93	88				
0	other														
5	clear <sup>F</sup>					0	other	1		40	2300	80	3	85	80
								0	other						
6	additive FR <sup>G</sup>					0	other	1		40	2200	200	13	85	80
								2		40	2000	150	8	85	80
		3		35	2400			80	3	90	85				
		4		30	2000			150	8	90	85				
		5		25	1800			80	3	85	80				
		0	other												

Group	Description	Class	Description	Grade	Description	Tensile Strength, MPa, <sup>B</sup> Test Method D638/ ISO 527	Modulus, MPa, Test Method Flexural D790/ Tensile ISO 527	Impact		Softening Temperature			
								Izod J/m, <sup>C</sup> Test Method D256	Charpy kJ/m <sup>2</sup> , <sup>D</sup> ISO 179	Test Method D1525, °C, 120°/h	ISO 306, °C, 50°/h		
02	Extrusion	0	other	0	other								
				1	medium impact	1		50	2600	80	3	95	90
		1	medium impact	2		2		45	2400	80	3	90	85
				3		3		40	2200	150	8	90	85
				4		4		40	2000	80	3	90	85
				5		5		35	2200	125	6	90	85
				0	other								
				1		1		35	2400	200	13	90	85
				2		2		35	2200	325	25	90	85
				3		3		30	2000	275	19	90	85
				4		4		30	2000	360	28	90	85
				5		5		25	1800	400	30	90	85
				6		6		25	1800	440	34	90	85
				0	other								
				1		1		40	2300	280	19	90	85
2		2		35	2000	275	19	90	85				
3		3		35	2000	210	17	85	80				
03	Alloys ABS/PVC	0	other	0	other								
				1		1		50	2700	80	5	100	95
		1	medium impact	2		2		40	1800	200	13	90	85
				3		3		40	1800	275	19	80	75
				4		4		35	2000	400	30	70	65
				5		5		50	2100	440	34	110	105
				6		6		35	2000	475	38	70	65
				7		7		45	2400	200	13	80	75
				0	other								
				0	other								
				1		1		55	2200	360	28	115	110
				2		2		55	2400	325	25	110	105
				3		3		50	2200	275	21	120	115
				4		4		45	2100	275	21	110	105
				5		5		40	1900	70	3	105	100
0	other												
1		1		55	2400	400	30	125	120				
2		2		50	2300	400	30	115	110				
3		3		50	2200	475	39	125	120				
4		4		48	2100	275	21	110	105				
5		5		45	2000	255	19	119	114				
0	other												
1		1		60	2400	275	21	140	135				
2		2		55	2400	400	30	130	125				
3		3		55	2000	500	41	125	120				
4		4		50	2300	360	28	135	130				
5		5		45	2100	600	50	130	125				
6		6		45	2000	325	25	128	123				
7		7		45	2000	325	25	119	114				
0	other												
1		1		50	2300	440	36	130	125				
2		2		45	2200	400	30	120	115				
3		3		45	2100	360	28	110	105				
0	other												
1		1		60	2400	125	6	110	105				
2		2		55	2400	200	13	110	105				
3		3		55	2400	400	30	90	85				
4		4		50	2000	440	36	110	105				
5		5		45	2100	275	21	110	105				
6		6		40	2000	440	36	110	105				
0	other												
0	other			0	other								

<sup>A</sup>All cell values are minimums.

<sup>B</sup>MPa × 145 = psi.

<sup>C</sup>J/m × 18.73 × 10<sup>-3</sup> = ft-lbf/in.

<sup>D</sup>kJ/m<sup>2</sup> × 0.476 = ft-lbf/in.<sup>2</sup>. Test configuration 1aE.

<sup>E</sup>Plating grades are those specifically recommended for plating or sputtering applications.

<sup>F</sup>Clear ABS has a light transmission of 70 % minimum. Test Method D1003 is allowed to be used.

<sup>G</sup>Specific flammability requirements shall be specified by the user.

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