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~~Standard Specification for~~ Designation: D3965 – 11

Standard Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings[1]

This standard is issued under the fixed designation D3965; 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 ~~specification~~ classification system covers materials made from only virgin ABS polymers and blends of ABS polymers suitable for use in the extrusion of pipe and molding of fittings.

1.2 The requirements of this ~~specification~~ classification system are applicable only to the ABS polymers and blends of ABS polymers as classified and do not address the requirements of the finished pipe or fittings. The applicable ASTM standard specification for pipe or fittings ~~should~~shall be consulted for their requirements.

1.3 This ~~specification~~classification system excludes ABS polymers and blends of ABS polymers made from reprocessed, regrind, reclaimed, or recycled materials. ABS rework, generated in-house by the original plastic manufacturer, may be used by that original manufacturer, provided the ABS product shipped meets the physical and mechanical properties required by its callout in Table 1~~of this specification.~~

~~1.4This specification~~ .

1.4 This classification system and subsequent line callout (specification) provides a means for describing ABS materials used in the manufacture of pipe and fittings. It is not intended for the selection of materials. Material selection ~~should~~shall be made by those having expertise in the plastics 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 inherent properties of the material other than those covered by this ~~specification,~~ classification system, and the economics.

1.5 This classification system and subsequent line callout (specification) provides for the classification of ABS polymers and blends of ABS polymers into groups based on five properties: Izod impact strength at room temperature, Izod impact strength at low temperature, deflection temperature under load, tensile stress at yield point, and modulus of elasticity in tension. The properties included ~~in this specification~~ are those required to identify the ABS material by the cell classifications.

NOTE 1—Other requirements necessary to identify particular characteristics of ABS polymers and blends of ABS polymers will be added as test methods become available or the need is identified.

NOTE 2—Due to pipe and fitting standards requirements a separate standard is planned for recycled materials.

NOTE~~3—This specification and ISO 7245-1984~~ 3—This classification system and ISO 7245-1984 are not equivalent.

1.6 The values stated in SI units shall be the standard. The values given in ~~brackets~~parentheses are for information only.

1.7 The following safety hazards caveat pertains only to the test methods portion, Section 13~~, of this specification:~~, *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.*

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

[1] This ~~specification~~ 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] 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.

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

TABLE 1 Physical Property Requirements for ABS Pipe and Fitting Materials

NOTE—The minimum property value for any material will determine the cell number although the maximum expected value may fall within the next higher cell.

	ASTM Test Method	Cell Limits					
		0	1	2	3	4	5
Izod impact, min:	D256, Test Method A, Cantilever Beam (Izod-Type) Test						
~~at 23°C [73°F], J/m~~		~~A~~	~~110~~	~~160~~	~~210~~	~~320~~	~~430~~
at 23°C (73°F), J/m		A	110	160	210	320	430
~~[ft-lbf/in. of notch]~~		~~A~~	~~[2]~~	~~[3]~~	~~[4]~~	~~[6]~~	~~[8]~~
(ft-lbf/in. of notch)		A	(2)	(3)	(4)	(6)	(8)
~~at – 30°C [–22°F], J/m~~		~~A~~	~~50~~	~~110~~	~~160~~	~~210~~	~~270~~
at – 30°C (–22°F), J/m		A	50	110	160	210	270
~~[ft-lbf/in. of notch]~~		~~A~~	~~[1]~~	~~[2]~~	~~[3]~~	~~[4]~~	~~[5]~~
(ft-lbf/in. of notch)		A	(1)	(2)	(3)	(4)	(5)
~~Deflection temperature under load, min, 1.82 MPa, [264 psi] annealed, 3.18 mm [0.125 in.] thickness:~~	~~D648~~						
Deflection temperature under load, min, 1.82 MPa, (264 psi) annealed, 3.18 mm (0.125 in.) thickness:	D648						
°C		A	76	82	88	93	99
~~[°F]~~		~~A~~	~~[170]~~	~~[180]~~	~~[190]~~	~~[200]~~	~~[210]~~
(°F)		A	(170)	(180)	(190)	(200)	(210)
Tensile stress at yield point, min:	D638						
MPa		A	24	31	38	45	52
~~[psi]~~		~~A~~	~~[3500]~~	~~[4500]~~	~~[5500]~~	~~[6500]~~	~~[7500]~~
(psi)		A	(3500)	(4500)	(5500)	(6500)	(7500)
Modulus of elasticity in tension, min:	D638						
MPa		A	1380	1650	1930	2210	2480
~~[psi]~~		~~A~~	~~[200 000]~~	~~[240 000]~~	~~[280 000]~~	~~[320 000]~~	~~[360 000]~~
(psi)		A	(200 000)	(240 000)	(280 000)	(320 000)	(360 000)

[A] Unspecified.

D638 Test Method for Tensile Properties of Plastics
D648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D883 Terminology Relating to 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
D5947 Test Methods for Physical Dimensions of Solid Plastics Specimens
F412 Terminology Relating to Plastic Piping Systems

2.2 *ISO Standard:*

ISO 7245-1984 Pipes and Fittings of Acrylonitrile- Butadiene-Styrene (ABS)—General Specification for Moulding and Extrusion Materials[3]

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminologies D883 and F412 and abbreviations are in accordance with Terminology D1600, unless otherwise indicated. The abbreviation for acrylonitrile-butadienestyrene plastic is ABS.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *blend*—a homogenous mixture of polymers prepared by melt compounding or physical combination.

3.2.2 *lot*—a unit of manufacture; ~~may~~can consist of a blend of two or more production runs or batches of material.

3.2.3 *natural material*—a polymer as it exists when initially made by the original producer without addition of colorants.

3.2.4 *reprocessed plastic*—a thermoplastic prepared from usually melt-processed scrap or reject parts by a plastics processor or from purchased nonstandard or nonuniform virgin material.

3.2.5 *original plastic manufacturer*—a company that produces ABS resin by polymerization of monomers or compounding of virgin styrene-acrylonitrile plastic (SAN) and virgin polybutadiene rubber, which meets the requirements of this ~~specification.~~ classification system.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.