Designation: D 4634 – 99

Standard Specification for Styrene-Maleic Anhydride Materials (S/MA)[1]

This standard is issued under the fixed designation D 4634; 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 covers styrene-maleic anhydride materials suitable for molding or extrusion. Styrene-maleic anhydride materials, being thermoplastic, are reprocessable and recyclable. This specification allows for the use of those materials provided that all the specific requirements of this specification are met.

1.2 The properties included in this standard 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 as given in Section 5.

1.3 This classification system and subsequent line call out (specification) are intended to provide means of calling out properties of plastic materials used in the fabrication of end items or parts. It is not intended for the selection of materials. Materials should be selected 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, costs involved, and the inherent properties of the material other than those covered by this classification system.

1.4 The values stated in SI units are to be regarded as the standard.

1.5 The following precautionary caveat pertains only to the test methods portion, Section 11, of this specification. *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—There is no equivalent or similar ISO standard for S/MA.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 256 Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials

D 618 Practice for Conditioning Plastics for Testing

D 638 Test Method for Tensile Properties of Plastics

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

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

D 883 Terminology Relating to Plastics

D 1525 Test Method for Vicat Softening Temperature of Plastics

D 1600 Terminology for Abbreviated Terms Relating to Plastics

D 1898 Practice for Sampling of Plastics

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

D 3892 Practice for Packaging/Packing of Plastics

D 4000 Classification System for Specifying Plastic Materials

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *Military Standard:*[3]

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

2.3 *Underwriters Laboratories Standard:*[4]

UL 94 Standard for Tests for Flammability for Parts in Devices and Appliances

[1] This specification is under the jurisdiction of ASTM Committee D-20 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.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[4] Available from Underwriters Laboratories, Inc., Publications Stock, 333 Pfingsten Road, Northbrook, IL 60062.

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

3. Terminology

3.1 *General*—For definitions of technical terms pertaining to plastics used in this specification see Terminology D 883.

4. Classification

4.1 Styrene-maleic anhydride materials are classified into groups according to their use either for injection molding, or for extrusion. These groups are subdivided into classes and grades, as shown in Table S/MA.

NOTE 2—An example of this classification system is as follows: The designation S/MA 211 would indicate:

S/MA = Styrene-maleic anhydride,
2 = injection-molding resin (group),
1 = general purpose (class),
1 = requirements given in Table S/MA (grade).

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 S/MA. The basic properties can be obtained from Tables A and B as they apply (see 4.3).

TABLE S/MA Requirements for Natural Color Only

Group	Description	Class	Description	Grade	Description	Tensile Strength[A] (D 638) min, MPa	Flexural Modulus[B] (D 790) min, MPa	Izod Impact Strength[C] (D 256) min, J/m	Vicat Softening Point[D] (D 1525) min, °C
1	Crystal	1	general purpose	1		45	3000	20	120
				0	other	...	...	...	...
		2	high-heat resistant	1		45	2900	20	130
				0	other	...	...	...	...
		0	other	0	other	...	...	...	...
2	Impact-modified, molding	1	general purpose	1		40	2200	140	115
				2		33	2100	170	115
				3		30	2000	200	115
				0	other	...	...	...	...
		2	high-impact	1		45	2200	500	115
				2		34	2200	300	120
				0	other	...	...	...	...
		3	high-heat resistant	1		35	2500	120	135
				2		33	2200	210	125
				3		30	2200	80	125
				0	other	...	...	...	...
		4	plating	1		30	2000	150	120
				0	other	...	...	...	...
		5	FR	1		28	1900	130	115
				2		22	1800	70	115
				0	other	...	...	...	...
		0	other	0	other	...	...	...	...
3	Impact modified, extrusion	1	general purpose	1		40	2500	140	115
				2		35	2300	170	115
				3		30	2200	200	115
				0	other	...	...	...	...
		2	high-heat resistant	1		33	2200	210	125
				2		30	2200	80	125
				0	other	...	...	...	...
		3	FR	1		28	1900	130	115
				2		22	1800	70	115
		0	other	0	other	...	...	...	...
0	Other	0	other	0	other	...	...	...	...

[A] Tensile strength determined on 3.2-mm thick injection-molded Type I specimen, tested at 5 mm/min.
[B] Flexural modulus determined on 12.5 by 3.2-mm injection molded specimen, 2-in. span, tangent, Method I, 1.3 mm/s.
[C] Izod impact strength determined on 12.5 by 3.2-mm injection molded specimen. The specimen shall be cut from a bar of 125 mm in length (such as that used in the Vicat test). All specimens shall be taken from the dead end (opposite to gate).
[D] Vicat softening point shall be 1-kg load, 12.5 by 3.2-mm injection molded specimen, Rate B.