Designation: D1636 – 13

Standard Specification for Allyl Molding Compounds[1]

This standard is issued under the fixed designation D1636; 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 compression molding, thermosetting, allyl compounds as further defined in Section 3.

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

NOTE 1—The properties included in this specification are those required to identify the molding compounds covered. There may be other requirements necessary to identify particular characteristics. These will be added to the specification as their inclusion becomes generally desirable and the necessary test data and methods become available.

NOTE 2—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

D229 Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation

D256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

D257 Test Methods for DC Resistance or Conductance of Insulating Materials

D618 Practice for Conditioning Plastics for Testing

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

D3892 Practice for Packaging/Packing of Plastics

D5224 Practice for Compression Molding Test Specimens of Thermosetting Molding Compounds

3. Classification

3.1 This specification provides for the identification of three types of allyl molding compounds, based on the general type of filler employed in their manufacture, which shall be distinguished by the requirements prescribed in Table 1.

Type I—High-strength materials, glass-fiber reinforced.

Type II—General-purpose mineral filled.

Type III—General-purpose synthetic fiber filler.

3.2 Types I and II may be subdivided into four classes according to resin composition and use as follows:

Class A—Diallyl ortho-phthalate resin, nonflame-retardant.

Class B—Diallyl ortho-phthalate resin, flame-retardant.

Class C—Diallyl meta-phthalate resin nonflame-retardant.

Class D—Diallyl meta-phthalate resin, flame-retardant.

3.3 The four classes of Type I are subdivided as follows: Classes A, B, C, and D into four grades. For Type II each of the four classes is subdivided into two grades. For Type III only Class A compounds are produced and are available in three grades.

4. General Requirements

4.1 The molding compound shall be of uniform composition and so compounded as to conform to the requirements of this specification.

4.2 Although other than allyl resin may be added for flame resistance and other purposes, the major part of the resin portion shall be diallyl ortho-phthalate or diallyl meta-phthalate.

4.3 The apparent density, bulk factor, particle size, physical form, and color of the compounds shall be as agreed upon between the purchaser and supplier.

5. Detail Requirements

5.1 Average results obtained on test specimens, each compression-molded using the manufacturer's recommended techniques, shall conform to the requirements listed in Table 2.

6. Sampling

6.1 Adequate statistical sampling shall be used.

6.2 A batch of molding compound shall be considered a unit of manufacture and may consist of a blend of two or more production runs of the same material.

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.16 on Thermosetting 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 Types, Classes, and Grades of Allyl Molding Compounds

Type	Class	Grade	Description
I	A, B, C, D	1	Long-glass fiber reinforcement
		2	Medium-glass fiber reinforcement
		3	Short-glass fiber reinforcement
II	A, B, C, D	4	High-impact, long-glass fiber reinforcement
III	A	1	Mineral-filled
		2	Mineral and organic fiber-filled
		1	Acrylic fiber reinforcement, short fiber
		2	Polyester fiber reinforcement, long fiber
		3	Polyester fiber reinforcement, milled fiber

NOTE 3—Some molding compounds are light and fluffy. The resin may have a tendency to separate out to a degree and should be thoroughly mixed before sampling.

7. Specimen Preparation

7.1 Test specimens shall be compression molded in accordance with Practice D5224.

8. Conditioning

8.1 *Conditioning*—Molded test specimens of allyl molding compounds shall be conditioned in accordance with Procedure B of Practice D618, unless otherwise specified in the test methods or in this specification.

8.2 Tests shall be conducted in the standard laboratory atmosphere of 23 ± 2°C and 50 ± 10 % relative humidity, unless otherwise specified in the test methods or in this specification.

9. Test Methods[3]

9.1 The properties enumerated in this specification shall be determined in accordance with the following methods:

9.2 *Impact Resistance (Izod)*—Test Method D256, Method A. Test specimens shall be 12.7 by 12.7 by 63.5 mm.

9.3 *Flexural Strength*—Test Methods D790 Procedure A. Test specimens shall be 6.4 by 12.7 by 127-mm bars tested parallel to molding pressure.

9.4 *Permittivity and Dissipation Factor*—Test Methods D150. Measure the permittivity and dissipation factor at 1 kHz and 1 MHz after conditioning by Procedure B of Practice D618. Determine permittivity and dissipation factor after conditioning 48 h at 50°C followed by Procedure D of Practice D618. Use 102 by 3.2-mm disks for 1 kHz frequency and 51 by 3.2-mm disks for 1 MHz frequency.

9.5 *Insulation Resistance*—Test Methods D257, using a 3.2-mm thick by 102-mm diameter disk fitted with binding post electrodes of the type shown in the figure illustrating Binding-Post Electrodes for Flat, Solid Specimens of Test Methods D257. Cut two sections from the disk so that the section under test is similar to the figure cited above. Scrub with soapy water, rinse in distilled water, and rinse with isopropyl alcohol. Air dry the sample before assembly, using stainless steel terminals which have been washed in isopropyl alcohol. The use of clean cotton or polyethylene gloves during assembly is required since skin oils contaminate the plastic surface and have been shown to seriously affect results. Insert one binding post through a hole drilled through the center of the disk. Space the other two electrodes 32 mm from the center electrode. Make test measurements between the center electrode and each of the other binding posts. The machine screw and washers shall be of stainless steel, the screw of a size to match the washer size specified in the figure illustrating Binding-Post Electrodes for Flat, Solid Specimens of Test Methods D257. Two specimens may then be mounted in a wide-mouth jar with the leads going through a TFE-fluorocarbon cover. Condition each specimen 720 h at 60°C and 95 % relative humidity, and measure the insulation resistance under the same conditions without removal from the environmental chamber.

9.6 *Flame Resistance*—Method II under Flame Resistance of Test Method D229. The specimen shall be 12.7 by 12.7 by 127 mm.

9.7 *Oxygen Index*—Test Method D2863. Test specimens shall be 3.2 by 6.4 by 127 mm.

10. Inspection

10.1 Inspection of the compound shall be agreed upon between the purchaser and supplier as part of the purchase contract.

11. Rejection and Rehearing

11.1 Compound that fails to conform with the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

NOTE 4—In the case of short shelf-life materials it is the responsibility of the purchaser to expedite the tests and to keep the material at optimum storage conditions until returned in case of failure.

12. Packaging and Package Marking

12.1 *Packaging*—The compound shall be packaged in standard commercial containers so constructed as to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery, unless otherwise specified in the contract or order.

12.2 *Package Marking*—Shipping containers shall be marked with the name of the compound, type, class, grade, color lot or batch number, limiting shelf-life data in common storage, the quantity contained therein as defined by the contract or order, and the name of the manufacturer or his trademark.

12.3 All packing, packaging, and marking provisions of Practice D3892 shall apply to this specification.

13. Keywords

13.1 allyl; diallyl phthalate (DAP); molding compounds-thermosetting

[3] Interlaboratory test data for this specification are available from ASTM Headquarters. Request RR:D20-1046.

TABLE 2 Detail Requirements for Compression-Molded Specimens

Property	Class	Type I				Type II		Type III		
		Grade 1	Grade 2	Grade 3	Grade 4	Grade 1	Grade 2	Grade 1[A]	Grade 2[A]	Grade 3[A]
Permittivity, max, 1 kHz/1 MHz	A, B, C, D	4.6/4.6	4.6/4.4	4.6/4.5	4.6/4.6	7.0/6.0	8.2/6.0	4.1/3.8	4.1/3.8	4.1/3.8
After immersion, max, 1 kHz/1 MHz	A, B, C, D	4.7/4.7	4.7/4.5	4.6/4.5	4.7/4.7	8.0/7.0	9.5/6.0	4.2/3.9	4.2/3.9	4.2/3.9
Dissipation factor, max 1 kHz/1 MHz	A, B, C, D	0.010/0.018	0.009/0.015	0.009/0.015	0.010/0.018	0.14/0.12	0.14/0.12	0.025/0.020	0.016/0.020	0.016/0.020
After immersion, max, 1 kHz/1 MHz	A, B, C, D	0.012/0.019	0.013/0.017	0.013/0.017	0.012/0.019	0.20/0.14	0.20/0.14	0.028/0.023	0.018/0.023	0.018/0.023
Impact resistance (Izod), min, J/m of notch	A, B, C, D	147	16	16	320	15	15	32	147	147
Flexural strength, min, MPa	A, B, C, D	69.0	62.1	62.1	69.0	46.8	46.8	55.2	69.0	69.0
Flame resistance:[B]										
Ignition time, min, s	B, D	90	90	90	90	90	...	...	...	...
Burning time, max, s		90	90	90	90	90	...	...	...	...
Insulation resistance, min,Ω	A	1×10^{10}	1×10^{11}	1×10^{11}	1×10^{10}	1×10^{10B}	1×10^{11B}	1×10^{11}	1×10^{11}	1×10^{11}
	B	1×10^{10}	1×10^{10}	1×10^{10}	1×10^{10}	1×10^{10B}	1×10^{11B}	...	...	...
	C	1×10^{9}	1×10^{9}	1×10^{9}	1×10^{9}	1×10^{10B}	1×10^{11B}	...	...	...
Oxygen index, min, %	D	1×10^{9}	1×10^{9}	1×10^{9}	1×10^{9}	1×10^{10B}	1×10^{11B}	...	...	...
	B, D	26	...	26	...	26	...	...	...	...

[A] Only Class A compounds are covered.
[B] Values are tentative until further testing is complete.

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue, D1636 - 99(2012), that may impact the use of this standard. (October 1, 2013)

(1) Updated humidity tolerances in 8.2.

Committee D20 has identified the location of selected changes to this standard since the last issue, D1636 - 99(2004)$^{\varepsilon 1}$, that may impact the use of this standard. (December 1, 2012)

(1) Five year review and reapproval without change.