



Designation: D 3013 – 99

Standard Specification for Epoxy Molding Compounds¹

This standard is issued under the fixed designation D 3013; 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 approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification covers requirements for epoxy thermosetting molding compounds. It provides for their identification, quality control, and purchase in such a manner that the purchaser and the seller can agree on the substantial similarity of different commercial lots or shipments.

1.2 The compounds covered under this specification consist of mixtures or blends of epoxy resins and curing agents intimately combined, in an unreacted or partially reacted condition, with fillers, reinforcements, colorants, and other chemical agents.

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

NOTE 1—The properties included in this specification are those required to identify the kinds of molding compounds covered. There may be other requirements necessary to define 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 similar or equivalent ISO standard.

2. Referenced Documents

2.1 ASTM Standards:²

- D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
- D 150 Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials
- D 256 Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics
- D 495 Test Method for High-Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation²
- D 570 Test Method for Water Absorption of Plastics
- D 618 Practice for Conditioning Plastics and Electrical

Insulating Materials 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 1896 Practice for Transfer Molding Specimens of Thermosetting Compounds
- D 2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
- D 3892 Practice for Packaging/Packing of Plastics

2.2 Military Standard:

- MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes³

3. Terminology

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

4. Classification

4.1 *Grades*—This specification is subdivided into various grades of epoxy molding compounds based on physical properties. This specification provides for a system of characterization and identification which enables coverage for all commercially available grades having properties within the range of the possible combinations as may be selected from Table 1. A grade is designated by the cell numbers for each property in the order in which they are listed in Table 1. When a property is not specified, a “0” is entered as the cell number.

4.2 *Classes*—Each of the grades of epoxy molding compound may be further subdivided into classes according to special requirements. A class is designated by a capital letter followed by cell designation corresponding to the requirements detailed in Table 2. Where no special requirements, in addition to grade properties, are needed, no class designation is shown.

NOTE 3—An example of this classification system would be grade 12324-D-00200-F-3 an epoxy molding compound having the following requirements (see Table 1 and Table 2):

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

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

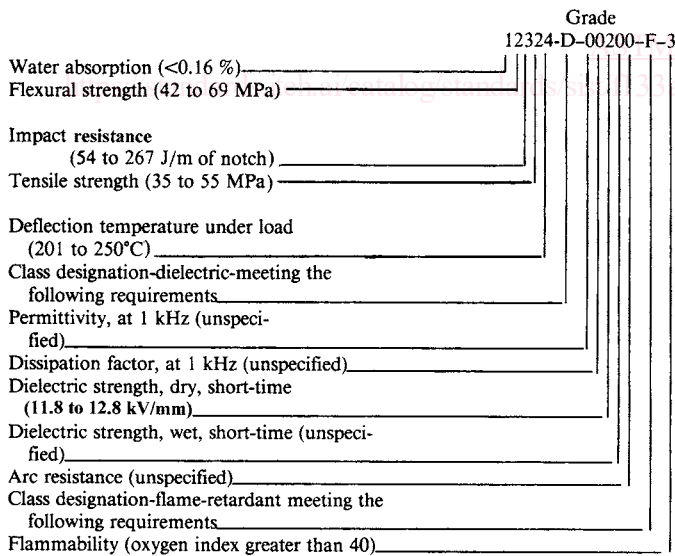
TABLE 1 Detail Grade Requirements for Epoxy Molding Compounds

Designation Order No.	Property and Unit	Grades (Cell Limits)					
		0	1	2	3	4	5
1	Water absorption, % in 24 h	unspecified	<0.16	0.16 to 0.30	0.31 to 1.0	1.1 to 3.0	>3.0
2	Flexural strength, MPa	unspecified	<42	42 to 69	70 to 103	104 to 207	>207
3	Impact resistance, J/m of notch	unspecified	<22	22 to 53	54 to 267	268 to 534	>534
4	Tensile strength, MPa	unspecified	<35	35 to 55	56 to 103	104 to 138	>138
5	Deflection temperature under load, °C	unspecified	70 to 100	101 to 150	151 to 200	201 to 250	>250

TABLE 2 Detail Class Requirements for Epoxy Molding Compounds

Class	Class Designation	Designation Order No.	Property and Unit	Classes (Cell Limits)					
				0	1	2	3	4	5
Dielectric	D	1	permittivity	unspecified	<3.81	3.81 to 4.50	4.51 to 5.00	5.01 to 6.00	>6.00
		2	dissipation factor	unspecified	<0.016	0.016 to 0.03	0.04 to 0.10	0.11 to 0.20	>0.20
		3	dielectric strength, V/mil (short-time): dry	unspecified	<301	301 to 325	326 to 350	351 to 400	>400
		4	wet	unspecified	min 80 % of dry value using same test				
		5	arc resistance, s	unspecified	<61	61 to 110	111 to 140	141 to 180	>180
Flame-retardant	F	1	flammability	unspecified	<25	25 to 40	>40

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NOTE 4—Although the values listed in Table 1 and Table 2 are necessary to include the range of properties available in existing materials, they should not be interpreted as implying that every possible combination of the properties exists or can be obtained commercially.

5. General Requirements

5.1 The molding compounds shall be of uniform composition and so formulated as to conform to the requirements of this specification.

5.2 The apparent density, bulk factor, flow, particle size, and color of the compounds shall be as agreed upon between the purchaser and the seller in the order or contract. Properties other than those specified in this specification may also be agreed upon.

6. Detail Requirements

6.1 Test specimens molded by transfer in accordance with Practice D 1896, or compression methods in accordance with the supplier's recommendations shall conform to the requirements prescribed in Section 4 and Table 1 and Table 2 for the grade and classes specified.

7. Sampling

7.1 A batch or lot shall be considered as a unit of manufacture and may consist of a blend of two or more production runs of a resin.

7.2 Adequate statistical sampling procedures shall be used.