International Standard 4896

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Plastics — Melamine/phenolic moulding materials — Specification

Plastiques — Matières à mouler mélamine/phénol — Spécification

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Foreword

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It has been approved by the member bodies of the following countries :

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The member bodies of the following countries expressed disapproval of the document on technical grounds :

France
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Plastics — Melamine/phenolic moulding materials — Specification

1 Scope and field of application

1.1 This International Standard specifies requirements for two types of melamine/phenolic moulding materials, classified according to use, as follows :

— type MPF A : General purpose.

— type MPF C : Heat resistant.

1.2 Type MPF A is sub-divided into three grades based on resistance to tracking (see table) :

— MPF A10 : substantially alpha cellulose filled material.

— MPF A11 : substantially alpha cellulose filled material.

— MPF A20 : substantially woodflour filled material.

1.3 Type MPF C is sub-divided into two grades :

— MPF C10 : alpha cellulose and mineral filled material.

— MPF C20 : woodflour and mineral filled material.

1.4 It must not be inferred from the above that materials of any particular type are necessarily unsuitable for applications other than those indicated, or that specific materials will be suitable for all applications within the wide descriptions given.

2 References

ISO 62, *Plastics — Determination of water absorption.*[1]

ISO 75, *Plastics and ebonite — Determination of temperature of deflection under load.*

ISO/R 171, *Plastics — Determination of bulk factor of moulding materials.*

ISO 178, *Plastics — Determination of flexural properties of rigid plastics.*

ISO/R 179, *Plastics — Determination of Charpy impact resistance of rigid plastics (Charpy impact flexural test).*

ISO 181, *Plastics — Determination of the behaviour of rigid plastics in contact with an incandescent bar.*[2]

ISO 295, *Plastics — Compression moulding test specimens of thermosetting materials.*

ISO 2577, *Thermosetting moulding materials — Determination of shrinkage of compression moulded test specimens in the form of bars.*

ISO 2818, *Plastics — Preparation of test specimens by machining.*

IEC Publication 112, *Recommended method for determining the comparative tracking index of solid insulating materials under moist conditions.*

IEC Publication 167, *Methods of test for the determination of the insulation resistance of solid insulating materials.*

IEC Publication 243, *Recommended methods of test for electric strength of solid insulating materials at power frequencies.*

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 melamine/phenolic moulding material : Thermosetting moulding compound consisting of a melamine/phenolic resin binder that has been intimately combined in the uncured or partially cured condition with fillers, pigments and other chemical agents.

3.2 melamine/phenolic resin : Synthetic resin derived from the reaction of melamine and phenol with aldehydes, usually formaldehyde, either co-condensed or physical mixtures.

1) At present at the stage of draft. (Revision of ISO/R 62 and ISO/R 117.)

2) At present at the stage of draft. (Revision of ISO/R 181.)

4 General requirements

Melamine/phenolic moulding materials shall comply with the appropriate property requirements given in the table.

5 Test specimens

Bulk factor and flow shall be measured on the moulding material. The other properties shall be determined on moulded specimens prepared in accordance with annex B of ISO 295. It is permissible to machine[1] specimens from sheet moulded according to the moulding conditions of annex B of ISO 295, as long as it can be shown that the specimens give results which do not differ significantly from those obtained using moulded specimens.

Specimens to be used for determining the properties given in the lower part of the table shall be conditioned under prevailing atmospheric conditions, unless otherwise stated in the method of test or agreed between the interested parties.

Testing shall commence not less than 16 h and not more than 72 h after the specimens have been moulded.

6 Methods of test

NOTE — For mechanical tests it is also permissible for the force to be applied in an alternative direction to that specified in the test methods, provided that the results do not differ significantly from those obtained when the force is applied in the specified direction.

6.1 Flexural stress at rupture (see ISO 178)

Five specimens of length not less than 80 mm, width 10 mm and thickness 4 mm, shall be used.

For both moulded bars and specimens machined from sheet, the loads shall be applied parallel to the direction of moulding pressure. The testing speed shall be 2 ± 0,2 mm/min.

6.2 Charpy impact strength (see ISO/R 179)

Five specimens, 120 mm × 15 mm × 10 mm, shall be used.

For both moulded bars and specimens machined from sheet, the loads shall be applied parallel to the direction of moulding pressure.

If any individual result is less than 90 % of the value specified in the table, five additional test specimens shall be tested. The mean and the approximate standard deviation[2] of the 10 combined results of the original test and the repeat test shall be calculated. The mean of the 10 values shall fulfil the requirements of the table. The difference between the mean and the standard deviation shall be greater than or equal to 90 % of the value specified in the table.

6.3 Temperature of deflection under load (see ISO 75, method A)

Two specimens of length not less than 110 mm, width 10 mm and thickness 4 mm shall be used.

6.4 Incandescence resistance (see ISO 181)

Three specimens of length not less than 80 mm, width 10 mm and thickness 4 mm shall be used.

6.5 Insulation resistance (see IEC Publication 167)

The specimen shall be in the form of a flat plate moulded to a thickness of 3,0 ± 0,25 mm. The measurements shall be made at least 25 mm from the edges of the plate. The taper pin electrodes shall be used. Before carrying out the test, the specimen shall be conditioned (without electrodes) in an oven at 50 ± 2 °C for 24 ± 1 h and then cooled to room temperature in a desiccator. It shall then be immersed in distilled or deionised water at 23 ± 2 °C for 24 ± 1 h. Before testing, the surface water shall be removed with blotting or filter paper or with a clean absorbent cloth, and the electrodes then fitted. Measurement of insulation resistance shall be made within 5 min after the end of the immersion. Three specimens shall be used.

6.6 Electric strength at power frequencies (see IEC Publication 243)

The step-by-step method shall be used with the test temperature at 90 °C in transformer oil. Two specimens 3,0 ± 0,25 mm thick and not less than 100 mm in diameter shall be used.

6.7 Tracking resistance under moist conditions (see IEC Publication 112 — Proof test)

The applied voltage shall be the proof voltage given in the table of property requirements. The material shall not track before 51 drops of electrolyte have fallen. Two determinations shall be made.

1) See ISO 2818.

2) The approximate standard deviation shall be calculated by dividing the difference between the maximum and minimum test results, for 10 tests, by 3,08

6.8 Boiling water absorption (see ISO 62)

Method 4 and two specimens shall be used.

6.9 Water absorption (see ISO 62)

Method 1 and two specimens shall be used.

NOTE — As an alternative, when agreed between the interested parties, specimens 50 mm × 50 mm cut from 4 mm thick moulded plates may be used. If this alternative type of test specimen is used, the requirement shall also be the subject of agreement between the interested parties.

6.10 Mould shrinkage (see ISO 2577)

Two specimens shall be used.

6.11 Post-shrinkage (see ISO 2577)

Two specimens shall be used. The temperature of the determination shall be 110 ± 3 °C.

Table — Properties of melamine/phenolic moulding materials[1)]

Property	Method of test	Units	min. or max.	Type MPF A			Type MPF C	
				Grade			Grade	
				MPF A10	MPF A11	MPF A20	MPF C10	MPF C20
Properties measured on moulding powder								
Bulk factor	ISO/R 171	—	max.	X	X	X	X	X
Flow	2)	—	—	X	X	X	X	X
Properties measured on test specimens[3)]								
Flexural stress at rupture	ISO 178	MPa	min.	80	80	80	70	70
Impact strength — Charpy, notched — Charpy, unnotched	 ISO/R 179 ISO/R 179	 kJ/m^2 kJ/m^2	 min. min.	 1,5 7,0	 1,5 7,0	 1,5 6,0	 1,5 5,0	 1,2 4,0
Temperature of deflection under load	ISO 75, method A	°C	min.	135	135	135	160	160
Incandescence resistance — average burning time, $\bar{t}$ — average destroyed length, $\bar{L}$	 ISO 181 ISO 181	 s mm	 max. max.	 + +	 + +	 + +	 + +	 + +
Insulation resistance after 24 h in water	IEC 167	Ω	min.	10^{10}	10^{10}	10^{10}	10^{10}	10^{10}
Electric strength	IEC 243	MV/m	min.	3	3	3	3	3
Surface tracking	IEC 112 (proof test)	V	min.	500	300	175	500	500
Water absorption — hot	ISO 62, method 4[4)]	mg	max.	250	250	250	150	150
Water absorption — cold	ISO 62, method 1[4)]	mg	max.	150	150	150	120	120
Mould shrinkage	ISO 2577	%	max.	X	X	X	X	X
Post-shrinkage 48 h	ISO 2577	%	max.	X	X	X	X	X

1) The values specified in this table apply to the mean result for the property measured.

2) Test method in preparation.

3) Details of the methods, procedures and specimens to be used are given in clause 6.

4) See note to 6.9 regarding the use of an alternative type of test specimen.

X indicates that limits are to be agreed between the interested parties.

\+ indicates that limits will be added later.