



SLOVENSKI STANDARD

SIST EN 14598-2:2005

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ČU YbYXi fca YfbYa UgY'nUcV]_cj UbY!'GdYWZ_UMYUnUcV]_cj UbYa UgYj
d'cy U 'fGA7L]b'cV]_cj UbYa UgYj 'hYgUghYa 'ghUb' 'f6A7L!'&"XY.'DfYg_i gbY
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Reinforced thermosetting moulding compounds - Specification for Sheet Moulding Compound (SMC) and Bulk Moulding Compound (BMC) - Part 2: Methods of test and general requirements

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Verstärkte härtbare Formmassen - Spezifikation für Harzmatten (SMC) und faserverstärkte Pressmassen (BMC) - Teil 2: Prüfverfahren und allgemeine Anforderungen

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Mélanges a mouler themodurcissables renforcés - Spécification pour mats préimprégnés (SMC) et mélanges a mouler en masse (BMC) - Partie 2 : Méthodes d'essai et exigences générales

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Reinforced plastics

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14598-2

April 2005

ICS 83.120

English version

**Reinforced thermosetting moulding compounds - Specification
for Sheet Moulding Compound (SMC) and Bulk Moulding
Compound (BMC) - Part 2: Methods of test and general
requirements**

Mélanges à mouler thermodurcissables renforcés -
Spécification pour mats préimprégnés (SMC) et mélanges
à mouler en masse (BMC) - Partie 2 : Méthodes d'essai et
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(BMC) - Teil 2: Prüfverfahren und allgemeine
Anforderungen

This European Standard was approved by CEN on 21 February 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

[SIST EN 14598-2:2005](https://standards.iteh.ai/catalog/standards/sist/5bcd7e06-4d4b-4b29-9069-3214971a7197/EN-14598-2:2005)

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Foreword

This document (EN 14598-2:2005) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

EN 14598 consists of the following parts, under the general title *Reinforced thermosetting moulding compounds – Specification for Sheet Moulding Compound (SMC) and Bulk Moulding Compound (BMC)*

- *Part 1: Designation*
- *Part 2: Methods of test and general requirements*
- *Part 3, Specific requirements*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EN 14598-2:2005 (E)

1 Scope

This part of EN 14598 specifies the methods of preparation of test specimens and the test methods to be used in determining the properties of Sheet Moulding Compound (SMC) and Bulk Moulding Compound (BMC). Requirements for handling test material and for conditioning both of the test material before moulding and of the specimens before testing are found here.

Procedures and conditions for the preparation of test specimens and procedures for measuring properties of the materials from which these specimens are made are given. Properties and test methods which are suitable and necessary to characterize SMCs and BMCs are listed.

The properties have been selected from the general test methods in EN ISO 10350-2, *Plastics - Acquisition and presentation of comparable single-point data – Part 2 Long-fibre-reinforced plastics*. Other test methods in wide use for or of particular significance to these compression and injection moulding materials are also included in this part of EN 14598, as are the designatory properties found in *Part 1: Designation and basis for specifications*.

In order to obtain reproducible and comparable test results, it is necessary to use the methods of preparation and conditioning, test-specimens with the dimensions and the test procedures specified herein. Values determined will not necessarily be identical to those obtained using test-specimens of different dimensions or prepared using different procedures.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60112, *Method for determination of the proof and the comparative tracking indices of solid insulating materials* (IEC 60112:2003)

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EN 60243-1, *Electric strength of insulating materials – Test methods – Part 1: Tests at power frequencies* (IEC 60243-1:1998)

EN 60296, *Fluids for electrotechnical applications - Unused mineral insulating oils for transformers and switchgears* (IEC 60269:2003)

EN 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods* (IEC 60695-11-10:1999)

EN 60695-11-20, *Fire hazard testing – Part 11-20: Test flames – 500 W flame test methods* (IEC 60695-11-20:1999)

EN 60707, *Flammability of solid non-metallic materials when exposed to flame sources – List of test methods* (IEC 60707:1999)

EN ISO 62, *Plastics - Determination of water absorption* (ISO 62:1999)

EN ISO 75-2, *Plastics - Determination of temperature of deflection under load - Part 2: Plastics, ebonite and long-fibre-reinforced composites* (ISO 75-2:2004)

EN ISO 175, *Plastics – Methods of test for the determination of the effects of immersion in liquid chemicals* (ISO 175:1999)

EN ISO 179-1, *Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test* (ISO 179-1:2000)

EN ISO 179-2, *Plastics - Determination of Charpy impact properties – Part 2: Instrumented impact test* (ISO 179-2:1997)

- EN ISO 291, *Plastics - Standard atmospheres for conditioning and testing (ISO 291:1997)*
- EN ISO 295, *Plastics - Compression moulding of test specimens of thermosetting materials (ISO 295:2004)*
- EN ISO 527-1, *Plastics - Determination of tensile properties – Part 1: General principles (ISO 527-1:1993 including Corr 1:1994)*
- EN ISO 527-4, *Plastics - Determination of tensile properties - Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites (ISO 527-4:1997)*
- EN ISO 899-1, *Plastics - Determination of creep behaviour - Part 1: Tensile creep (ISO 899-1:2003)*
- EN ISO 1172, *Textile-glass-reinforced plastics - Prepregs, moulding compounds and laminates - Determination of the textile-glass and mineral-filler content - Calcination methods (ISO 1172:1996)*
- EN ISO 1183 (all parts), *Plastics - Methods for determining the density of non-cellular plastics*
- EN ISO 3167, *Plastics - Multipurpose test specimens (ISO 3167:2002)*
- EN ISO 4589-2, *Plastics - Determination of burning behaviour by oxygen index – Part 2: Ambient temperature test (ISO 4589-2:1996)*
- EN ISO 6721-1, *Plastics - Determination of dynamic mechanical properties – Part 1: General principles (ISO 6721-1:2001)*
- EN ISO 6721-2, *Plastics – Determination of dynamic mechanical properties – Part 2: Torsion pendulum method (ISO 6721-2:1994, including Technical Corrigendum 1:1995)*
- EN ISO 10350-2, *Plastics - Acquisition and presentation of comparable single-point data – Part 2: Long-fibre-reinforced plastics (ISO 10350-2:2001)*
- EN ISO 11667, *Fibre-reinforced plastics - Moulding compounds and prepregs - Determination of resin, reinforced-fibre and mineral-filler content - Dissolution methods (ISO 11667:1997)*
- EN ISO 12114, *Fibre-reinforced plastics - Thermosetting moulding compounds and prepregs - Determination of cure characteristics (ISO 12114:1997)*
- EN ISO 12115, *Fibre-reinforced plastics - Thermosetting moulding compounds and prepregs - Determination of flowability, maturation and shelf life (ISO 12115:1997)*
- EN ISO 14125, *Fibre reinforced plastic composites – Determination of flexural properties (ISO 14125:1998)*
- EN ISO 14126, *Fibre reinforced plastic composites - Determination of compressive properties in the in-plane direction (ISO 14126:1999)*
- ISO 1268-8, *Fibre-reinforced plastics – Methods of producing test plates - Part 8: Compression moulding of SMC, BMC*
- ISO 1268-10, *Fibre-reinforced plastics - Methods of producing test plates - Part 10: Injection moulding of BMC and other long-fibre moulding compounds - General principles and moulding of multipurpose test specimens*
- ISO 1268-11, *Fibre-reinforced plastics - Methods of producing test plates - Part 11: Injection moulding of BMC and other long-fibre moulding compounds - Small plates*
- ISO 2577, *Plastics - Thermosetting moulding materials - Determination of shrinkage*
- ISO 3795, *Road vehicles, and tractors and machinery for agriculture and forestry - Determination of burning behaviour of interior materials*

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ISO 11359-2, *Plastics - Thermomechanical analysis (TMA) – Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

IEC 60093, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*

IEC 60167, *Methods of test for the determination of the insulation resistance of solid insulating materials*

IEC 60250, *Recommended methods for the determination of the permittivity and dielectric dissipation factor of electrical insulating materials at power, audio and radio frequencies including metre wavelengths*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1**sheet moulding compound**

reinforced thermosetting moulding material, flat sheets

3.2**bulk moulding compound**

reinforced thermosetting moulding material, bulk

4 Preparation of test specimens**4.1 General**

It is essential that specimens are always prepared by the same procedure (either injection moulding or compression moulding), using the same processing conditions.

The procedure to be used for each test method is indicated in Table 3 (M = injection moulding, Q = compression moulding).

The material shall be kept in styrene-proof packaging until it is required for use.

4.2 Pre-treatment of the material

Before processing by injection moulding no pre-treatment of the material sample is normally necessary. If a pre-treatment is required this shall be in accordance with the manufacturer's recommendations.

Before processing by compression moulding pre-treatment of the material sample in accordance with ISO 1268 is allowed.

4.3 Injection moulding

Injection moulded specimens shall be prepared in accordance with ISO 1268-10 and/or ISO 1268-11, using the conditions specified in Table 1.

Table 1 — Conditions for injection moulding of test specimens

Type of SMC or BMC	Mould temperature T_c °C (range)	Average injection velocity v_i mm/s (range)	Cure time t_{CR} s (range)
Injection SMC and BMC	130 to 180	50 to 150	(see below)

The conditions may be freely selected from within the range specified in Table 1 provided that:

- the statement in Clause 4, first sentence is observed and in a specific case;
- definite values (not ranges) are laid down for:
 - the mould temperature T_c ; and
 - the cure time t_{CR} .

The cure time t_{CR} may be freely selected as a function of the curing behaviour of the SMC or BMC respectively under test provided that it is the same for all specimens with the same thickness moulded from any one SMC or BMC respectively and is stated together with the test results. The cure time selected shall ensure that all the specimens are cured as completely and homogeneously as possible.

4.4 Compression moulding

Compression moulded specimens shall be prepared in accordance with ISO 1268-8 using the conditions specified in Table 2.

Table 2 — Conditions for compression moulding of test specimens

Type of SMC or BMC	Mould temperature T_c °C (range)	Mould pressure p_M MPa (range)	Cure time t_{CR} s (range)
Compression SMC or BMC	130 to 180	40 to 100	20 to 60 per mm thickness

The conditions may be freely selected from within the ranges specified in Table 2 provided that:

- the statement in Clause 4, first sentence is observed and in a specific case;
- definite values (not ranges) are laid down for:
 - the mould temperature T_c ; and
 - the cure time t_{CR} .

The cure time t_{CR} may be freely selected as a function of the curing behaviour and the type of pre-treatment of the SMC or BMC respectively under test provided that it is the same for all specimens with the same thickness moulded from any one SMC or BMC respectively and is stated together with the test results. The cure time selected shall ensure that all the specimens are cured as completely and homogeneously as possible.