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ISO 10350-1

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Foreword

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ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be involved in the subject of a patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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This document was prepared by Technical Committee ISO/TC 61, Plastics, Subcommittee SC 2, Mechanical behavior, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, Plastics, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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This fourth edition cancels and replaces the third edition (ISO 10350-1:2017), which has been technically revised.

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The main changes are as follows:

- “Specimen type” columns have been clarified by adding specimen type designations specified in ISO 20751:20753.
- symbols of the stress at break and the strain at break have been harmonized with those used in ISO 527-1.
- the formula attached to the x-axis has been corrected.
- “Property” column 2.12 has been corrected to “2.12 Charpy unnotched impact strength”.

A list of all parts in the ISO 10350 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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The ISO 10350 series identifies specific test procedures for the acquisition and presentation of comparable data for certain basic properties of plastics. In general, each property is specified by a single experimental value, although in certain cases properties are represented by two values obtained under different test conditions. The properties included are those presented conventionally in manufacturers' data sheets.

NOTE—ISO 10350-2 deals specifically with long- or continuous-fibre-reinforced plastics. For the purpose of this document, long-fibre-reinforced plastics are considered to have fibre length greater than 7.5 mm prior to moulding.

The ISO 10350 series has been prepared because users of plastics find that available data cannot always be readily used to compare the properties of similar materials, especially when the data have been supplied by different sources. Even when the same standard tests have been used, they often allow the adoption of a wide range of alternative test conditions, and the data obtained are not necessarily comparable. The purpose of this document is to identify specific methods and conditions of test to be used for the acquisition and presentation of data in order that valid comparisons between materials can be made.

The ISO 10350 series is concerned with tests employed to present “single-point” data on the limited range of properties commonly included in data sheets and used for the preliminary selection of materials. Such data represent the most basic approach to the specification of properties of materials, and the ISO 10350 series thus facilitates the first steps towards more efficient selection and use of plastics in the many applications to which they are suited.

Complementary International Standards (ie, ISO 11403-1, ISO 11403-2 and ISO 11403-3) are concerned with the standardized acquisition and presentation of multipoint data, to demonstrate how properties vary with important factors such as time, temperature and the presence of particular natural and chemical environments. In these documents, some additional properties are included. Their use will provide a more substantial database than one containing only single-point data, and so will enable improved assessment of the fitness of a material for any particular application. In addition, ISO 11403-1, which deals with mechanical properties, assists predictions of the performance of components and ISO 11403-2, covering thermal and processing properties, aids predictions of melt-flow behaviour during manufacturing. ISO 11403-3 is concerned with environmental influences on properties, and other parts may be prepared to cover additional properties.

Plastics — Acquisition and presentation of comparable single-point data — Part 1: Moulding materials

Plastics — Acquisition and presentation of comparable single-point data —

Part 1: Moulding materials

1 Scope

This document defines test procedures for the acquisition and presentation of comparable data for moulding materials. This document applies predominantly to unreinforced and reinforced thermoplastic and thermosetting materials that may can be injection- or compression-moulded or prepared as sheets of specified thickness.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 62, *Plastics — Determination of water absorption*

ISO 75-1, *Plastics — Determination of temperature of deflection under load — Part 1: General test method*

ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 178, *Plastics — Determination of flexural properties*

ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

ISO 179-2, *Plastics — Determination of Charpy impact properties — Part 2: Instrumented impact test*

ISO 293, *Plastics — Compression moulding of test specimens of thermoplastic materials*

ISO 294-1, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 1: General principles, and moulding of multipurpose and bar test specimens*

ISO 294-3, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates*

ISO 294-4, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 4: Determination of moulding shrinkage*

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

ISO 306, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*

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ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

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ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

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ISO 899-1, *Plastics — Determination of creep behaviour — Part 1: Tensile creep*

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ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

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ISO 1133-2, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 2: Method for materials sensitive to time-temperature history and/or moisture*

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ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

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ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method*

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ISO 1183-3, *Plastics — Methods for determining the density of non-cellular plastics — Part 3: Gas pycnometer method*

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ISO 2577, *Plastics — Thermosetting moulding materials — Determination of shrinkage*

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

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ISO 3915, *Plastics — Measurement of resistivity of conductive plastics*

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ISO 4589-2, *Plastics — Determination of burning behaviour by oxygen index — Part 2: Ambient-temperature test*

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ISO 6603-2, *Plastics — Determination of puncture impact behaviour of rigid plastics — Part 2: Instrumented impact testing*

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ISO 8256, *Plastics — Determination of tensile-impact strength*

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ISO 10724-1, *Plastics — Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs) — Part 1: General principles and moulding of multipurpose test specimens*

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ISO 10724-2, *Plastics — Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs) — Part 2: Small plates*

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ISO 11357-2, *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature and glass transition step height*

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ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*

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

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ISO 20753, *Plastics — Test specimens*

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IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

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IEC 60243-1, *Electrical strength of insulating materials — Test methods — Part 1: Tests at power frequencies*

IEC 60296, *Fluids for electrotechnical applications — Unused mineral insulating oils for transformers and switchgear*

IEC 60695-11-10, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods*

IEC 60695-11-20, *Fire hazard testing — Part 11-20: Test flames — 500 W flame test methods*

IEC 62631-2-1, *Dielectric and resistive properties of solid insulating materials — Part 2-1: Relative permittivity and dissipation factor — Technical frequencies (0,1 Hz to 10 MHz) — AC methods*

IEC 62631-3-1, *Dielectric and resistive properties of solid insulating materials — Part 3-1: Determination of resistive properties (DC methods) — Volume resistance and volume resistivity — General method*

IEC 62631-3-2:2023, *Dielectric and resistive properties of solid insulating materials — Part 3-2: Determination of resistive properties (DC methods) — Surface resistance and surface resistivity*

3 Terms and definitions

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

ISO and IEC maintain **terminological terminology** databases for use in standardization at the following addresses:

— IEC Electropedia: available at <https://www.electropedia.org/>

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— 3.1 IEC Electropedia: available at <https://www.electropedia.org/>

3.1 single-point data

data characterizing a plastics material by means of those property tests in which important aspects of performance can be described with single-value results

4 Specimen preparation and conditioning

In the preparation of specimens by injection moulding, the procedures described in ISO 294-1 and ISO 294-3 or ISO 10724-1 and ISO 10724-2 shall be used. For compression moulding, the procedures described in ISO 293 or ISO 295 shall be used. The moulding method and the conditions **will depend depends** upon the material being moulded. If these conditions are specified in the International Standard appropriate to the material, then they shall be adopted for the preparation of every specimen on which data are obtained using this document. For those plastics for which moulding conditions have not yet been standardized, the conditions employed shall be within the range recommended by the polymer manufacturer and shall, for each of the processing methods, be the same for every specimen.

Where moulding conditions are not stipulated in any International Standard, the values used for the parameters in **Table 1 Table 1** shall be recorded with the single-point data for that material. Where specimens are prepared by machining from sheet, the machining shall be performed in accordance with ISO 2818 and the dimensions of the specimen shall comply with those for the appropriate specimen in **Table 2 Table 2**.

For materials that have properties that are not significantly sensitive to any absorbed water, specimens shall be conditioned in accordance with the International Standard appropriate to the material concerned. If no

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materials standard is available, condition test specimens at 23 °C ± 2 °C and (50 ± 10) % relative humidity (RH) for a minimum length of time of 88 h (see ISO 291).

For those materials having properties that are significantly dependent upon the concentration of any absorbed water, data shall be presented both for material that is dry and also for material that is in equilibrium with an atmosphere of 50 % RH at 23 °C but with the following exceptions (see Table 2):

Rheological properties, 1.1 to 1.6	dry only
Creep modulus, 2.8 and 2.9	50 % RH only
Thermal properties, 3.1 to 3.8	dry only
Surface resistivity and comparative tracking index, 4.6 and 4.9	50 % RH only

For these materials, consult the relevant materials standard for procedures for conditioning specimens to achieve material that is dry or in equilibrium under 50 % RH. Following such conditioning, all test specimens shall be stored at 23 °C ± 2 °C for a minimum of 16 h before testing. The storage atmosphere shall then be either dry or at 50 % RH, depending upon the condition of the specimen.

Table 1 — Moulding parameters

Moulding-material type	Moulding method and standard (where applicable)	Moulding parameters
Thermoplastic	Injection ISO 294-1 and ISO 294-3	Melt temperature
		Mould temperature
		Injection velocity ^a
		Cavity pressure at hold ^b
	Compression ISO 293	Moulding temperature
	Moulding time	
	Cooling rate	
	Demoulding temperature	
Thermosetting	Injection ISO 10724-1 and ISO 10724-2	Injection temperature
		Mould temperature
		Injection velocity
	Compression ISO 295	Cure time
		Mould temperature
		Mould pressure
	Cure time	

^a For the preparation of standard specimens of the 80 mm × 10 mm × 4 mm bar (ISO 294-1, mould type B), values for the injection velocity shall be chosen to give an injection time comparable to that achieved with the multipurpose test specimen (ISO 294-1, mould type A).

^b Only to be recorded for the 60 mm × 60 mm × 2 mm plate specimen in ISO 294-3 and ISO 294-4 when used for the determination of moulding shrinkage.

5 Test requirements

The test methods, test conditions and units specified in Table 2 shall be used when determining data.