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Plastics — Polypropylene (PP) moulding and extrusion materials —

Part 2: Preparation of test specimens and determination of properties

Plastiques — Matériaux à base de polypropylène (PP) pour moulage et extrusion —

Partie 2: Préparation des éprouvettes et détermination des propriétés

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Foreword

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*, 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).

This second edition cancels and replaces the first edition (ISO 19069-2:2016), which has been technically revised.

The main changes are as follows:

— updated the Normative references;

— changed the NOTEs in Table 1 of previous edition into text;

— added new the test condition of melt mass-flow rate and melt volume-flow rate into Table 3;

— added flexural strength to Table 3;

— added thermal oxidative stability in air to Table 4.

A list of all parts in the ISO 19069 series can be found on the ISO website.

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Plastics — Polypropylene (PP) moulding and extrusion materials —

Part 2: Preparation of test specimens and determination of properties

1 Scope

This document specifies the methods of preparation of test specimens and the test methods for determining the properties of polypropylene (PP) moulding and extrusion materials. It gives requirements for handling test material and for conditioning both the test material before moulding and the specimens before testing.

This document specifies procedures and conditions for the preparation of test specimens, and procedures for measuring properties of the materials from which these specimens are made. Properties and test methods which are suitable and essential to characterize PP moulding and extrusion materials are listed.

The properties have been selected from the general test methods in ISO 10350-1. Other test methods in wide use for, or of particular significance to PP moulding and extrusion materials are also included in this document, as are the designatory properties specified in ISO 19069-1.

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 75-2, *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 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

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*

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

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

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

ISO 1628-3, *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers — Part 3: Polyethylenes and polypropylenes*

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

ISO 4577, *Plastics — Polypropylene and propylene-copolymers — Determination of thermal oxidative stability in air — Oven method*

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

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

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

ISO 10350-1, *Plastics — Acquisition and presentation of comparable single-point data — Part 1: Moulding materials*

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

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

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

ISO 16152, *Plastics — Determination of xylene-soluble matter in polypropylene*

ISO 20753, *Plastics — Test specimens*

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

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

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*

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

ASTM D 5420, *Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a falling Weight (Gardner Impact)*

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3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Preparation of test specimens

4.1 General

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

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

The procedure to be used for each test method is indicated in Table 1 and Table 2 (M = injection moulding; Q = compression moulding).

4.2 Treatment of the material before moulding

Pre-treatment of the material sample is normally not necessary before moulding.

4.3 Injection moulding

Injection-moulded specimens shall be prepared in accordance with ISO 294-1 or ISO 294-3, under the conditions specified in Table 1.

NOTE It has been found that bar test specimens prepared by cutting from type A1 specimens according to ISO 20753 give better precision than those injection-moulded directly to their final dimensions.

An appropriate hold pressure, consistent with the production of blemish-free mouldings, shall be used.

The uniformity of the mouldings shall be checked by weighing. Their masses shall not differ by more than 1 % from each other.

Heat-sensitive polypropylenes may undergo molecular breakdown during moulding; therefore, an increase in the melt flow rate (MFR) to > 1,5 times the original value shall be avoided with such materials. If the MFR increased by more than 1,5 times the original value, the melt temperature shall be lowered, 10 °C at a time, until the increase in MFR is < 1,5 times the original value. This adjustment in melt temperature shall be reported.

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