SLOVENSKI STANDARD
oSIST prEN ISO 17855-2:2023

01-september-2023

Nadomešča:
SIST EN ISO 17855-2:2016

Polimerni materiali - Polietilenski (PE) materiali za oblikovanje in ekstrudiranje - 2. del: Priprava preskušancev in ugotavljanje lastnosti (ISO/DIS 17855-2:2023)

Plastics - Polyethylene (PE) moulding and extrusion materials - Part 2: Preparation of test specimens and determination of properties (ISO/DIS 17855-2:2023)

Kunststoffe - Polyethylen (PE)-Formmassen - Teil 2: Herstellung von Probekörpern und Bestimmung von Eigenschaften (ISO/DIS 17855-2:2023)

Plastiques - Matériaux à base de polyéthylène (PE) pour moulage et extrusion - Partie 2: Préparation des éprouvettes et détermination des propriétés (ISO/DIS 17855-2:2023)

Ta slovenski standard je istoveten z: **prEN ISO 17855-2**

ICS:

83.080.20	Plastomeri	Thermoplastic materials

oSIST prEN ISO 17855-2:2023 **en,fr,de**

DRAFT INTERNATIONAL STANDARD
ISO/DIS 17855-2

ISO/TC **61**/SC **9**
Secretariat: **KATS**

Voting begins on:
2023-07-20

Voting terminates on:
2023-10-12

Plastics — Polyethylene (PE) moulding and extrusion materials —

Part 2: Preparation of test specimens and determination of properties

Plastiques — Polyéthylène (PE) pour moulage et extrusion —

Partie 2: Préparation des éprouvettes et détermination des propriétés

ICS: 83.080.20

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 17855-2:2023(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword

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 the subject of patent rights. 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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 17855-2:2016(E)), which has been technically revised.

The main changes compared to the previous edition are as follows:

— ISO 16241, ISO18488, ISO 18489 and ISO 22088-2 have been integrated to Clause 2;

— Table 1 Conditions for injection moulding of test specimens have been changed;

— Table 2 Conditions for compression moulding of test specimens have been changed;

— Properties from ISO 16241, ISO18488, ISO 18489 and ISO 22088-2 have been integrated in Table 4;

— Annex A (informative) is deleted .

A list of all parts in the ISO 17855 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.

Plastics — Polyethylene (PE) 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 methodsfor determining the properties of polyethylene (PE) moulding and extrusion materials. It establishes general principles for handling test material and for conditioning both the test material before moulding and the specimens before testing.

This document specifies the procedures and conditions for the preparation of test specimens and procedures for measuring properties of the materials from which these specimens are made. It gives guidance on properties and test methods that are suitable and essential to characterize PE materials for injection moulding and extrusion.

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 these moulding and extrusion materials are also included in this document, as are the designatory properties specified in ISO 17855-1.

In order to obtain reproducible and comparable test results, it give guidance on using the methods of 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.

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/DIS 293[1], *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*

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 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 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

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

ISO 16241, *Notch tensile test to measure the resistance to slow crack growth of polyethylene materials for pipe and fitting products (PENT)*

ISO 16770, *Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)*

ISO 17855-1, *Plastics — Polyethylene (PE) moulding and extrusion materials — Part 1: Designation system and basis for specifications*

ISO 18488, *Polyethylene (PE) materials for piping systems — Determination of Strain Hardening Modulus in relation to slow crack growth — Test method*

ISO 18489, *Polyethylene (PE) materials for piping systems — Determination of resistance to slow crack growth under cyclic loading — Cracked Round Bar test method*

ISO 20753, *Plastics — Test specimens*

ISO 22088-2, *Plastics — Determination of resistance to environmental stress cracking (ESC) — Part 2: Constant tensile load method*

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 638, *Standard test method for tensile properties of plastics?*

ASTM D 1693, *Standard test method for environmental stress-cracking of ethylene plastics*

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

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 Tables 3 and 4 (M = injection moulding, Q = compression moulding).

4.2 Treatment of the material before moulding

No pre-treatment of the material sample is normally necessary before moulding.

4.3 Injection moulding

Injection moulding of test specimens is used for PE moulding materials having a melt mass-flow rate (MFR) of ≥ 1 g/10 min, determined in accordance with ISO 1133-1 using set of test conditions D (190 °C/2,16 kg) specified in ISO 17855-1.

Injection-moulded specimens shall be prepared in accordance with ISO 294-1 or ISO 294-3, using the conditions specified in Table 1.The preparation of test specimens by machining is used as agreed upon by the interested parties .

NOTE It has been found that bar test specimens prepared by cutting from type A1 specimens in accordance with ISO 20753 give better precision than those injection-moulded specimens.

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

Table 1 — Conditions for injection moulding of test specimens

Material	Melt temperature °C	Mould temperature °C	Average Injection velocity[a] mm/s	Hold time s	Cycle time s
MFR ≥ 1 g/10min	210	40	100 ± 10	30± 5	50± 5
[a] Average injection velocity shall be calculated according to ISO 294-1.					

4.4 Compression moulding

Compression moulding is used for materials with a melt mass-flow rate of < 1 g/10 min, determined in accordance with ISO 1133-1 using set of test conditions D (190 °C/2,16 kg) specified in ISO 17855-1. For thinner specimens (≤ 2 mm thick) and where specifically prescribed in Tables 3 and 4, compression moulding shall be used for all materials.

Compression-moulded sheets shall be prepared in accordance with ISO 293 using the conditions specified in Table 2.

Table 2 — Conditions for compression moulding of test specimens

Material	Moulding temperature °C	Cooling rate k /min	Demoulding temperature °C	Preheating pressure MPa	Preheating time min	Full pressure MPa	Full-pressure time min
All grade[a]	180	15 ± 2[b]	≤ 40	<0.1	5 to 15	5 or 10[c]	5 ± 1
[a] Different compression moulding conditions apply to specimens for SCR and ESCR measurements, in particular for specimen thicknesses of 10 mm and above. Appropriate compression moulding conditions for these applications shall be taken from ISO 16241, ISO 16770 and ISO 18489.							
[b] Cooling method B1 of ISO/DIS 293 can keep a constant (linear) cooling rate.							
[c] Use 5 MPa for a frame mould and 10 MPa for a positive mould.							

If the preheating of the material is insufficient, the sheets produced will suffer from insufficient homogeneity and pellet boundaries. The preheating time depends on the type of mould and the type of energy input (steam, electricity). For frame moulds, 5 min is usually sufficient. But for positive moulds, due to the bigger mass, a preheating time of up to 15 min can be necessary, especially if electric heating is used. Conditions for compression moulding ,such as moulding temperature, may be adjusted when materials containing fillers ,as agreed upon by the interested parties.

If the tested PE material is a powder, it may be necessary to calendar or compound the material prior to the compression moulding step. It is essential to make sure that the powder is heat-stabilized when this is done.

Whether it is frame or positive mould, it is necessary to start the cooling cycle whilst simultaneously applying the full pressure. This avoids sink marks for frame mould and avoids the physical properties are influenced by different pressure when positive mould is used.

For 4 mm thick sheets, the positive mould has been found to work satisfactorily, while for the thicker sheets (>4 mm) use of the positive mould is necessary.

