



SLOVENSKI STANDARD
oSIST prEN ISO 293:2022

01-september-2022

Polimerni materiali - Preskušanci plastomerov, oblikovani s stiskanjem (ISO/DIS 293:2022)

Plastics - Compression moulding of test specimens of thermoplastic materials (ISO/DIS 293:2022)

Kunststoffe – Formgepresste Probekörper aus Thermoplasten (ISO/DIS 293:2022)

Plastiques - Moulage par compression des éprouvettes en matières thermoplastiques (ISO/DIS 293:2022)

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83.080.20 Plastomeri Thermoplastic materials

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Plastics — Compression moulding of test specimens of thermoplastic materials

Plastiques — Moulage par compression des éprouvettes en matières thermoplastiques

ICS: 83.080.20

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ISO/DIS 293:2022(E)

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*, 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 fourth edition of ISO 293 cancels and replaces the third edition (ISO 293:2004), which has been technically revised.

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

- ISO 20753 has been added in normative references (see [Clause 2](#));
- ISO 21920-2 has been revised in normative references (see [Clause 2](#));
- “Cooling rate” has been revised in terms and definitions (see [Clause 3](#));
- The biggest clamping force and the highest platens temperature has been revised (see [4.1](#));
- The description of common specifications of positive mould has been given (see [4.2.3.3](#));
- The conditions for the use of vacuum oven while material drying has been given (see [5.1.1](#));
- The methods of cooling rate have been revised (see [Table 1](#)).

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.

Introduction

For reproducible test results, specimens with a defined state are required. In contrast to injection moulding, the aim of compression moulding is to produce test specimens and sheets for machining or stamping of test specimens that are homogeneous and isotropic.

In the process of compression moulding, mixing of material takes place on a negligible scale. Granules and powders fuse only at their surfaces and preforms (milled sheets) are only partially softened.

Isotropic and homogeneous specimens can, therefore, only be obtained when the moulding material is itself homogeneous and isotropic. This has to be considered when processing multiphase materials, such as ABS, which retain their internal structure.

The cooling rate in the crystallization stage has a great influence on the properties of semi-crystalline or crystalline polymer (such as PB, PE, PP, etc.), so it is necessary to control the cooling rate more strictly at the cooling stage.

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Plastics — Compression moulding of test specimens of thermoplastic materials

1 Scope

This document specifies the general principles and the procedures to be followed with thermoplastics in the preparation of compression-moulded test specimens, and sheets from which test specimens may be machined or stamped.

In order to obtain mouldings in a reproducible state, the main steps of the procedure, including four different cooling methods, are standardized. For each material, the required moulding temperature and cooling methods are as specified in the appropriate International Standard for the material or as agreed between the interested parties.

This document is not recommended for reinforced thermoplastics.

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 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

ISO 20753, *Plastics — Test specimens*

ISO 21920-2, *Geometrical product specifications (GPS) — Surface texture: Profile — Part 2: Terms, definitions and surface texture parameters*

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

moulding temperature

temperature of the mould or the press platens during the preheating and moulding time, measured in the nearest vicinity to the moulded material

Note 1 to entry: The moulding temperature is usually expressed in Degrees Celsius.

3.2

demoulding temperature

temperature of the mould or the press platens at the end of the cooling time, measured in the nearest vicinity to the moulded material

Note 1 to entry: The demoulding temperature is usually expressed in Degrees Celsius.

ISO/DIS 293:2022(E)**3.3****preheating time**

time required to heat the material in the mould up to the moulding temperature while maintaining the contact pressure

Note 1 to entry: The preheating time is usually expressed in Minute.

3.4**moulding time**

time during which full pressure is applied while maintaining the moulding temperature.

Note 1 to entry: The moulding time is usually expressed in Minute.

3.5**average cooling rate (non-linear)**

rate of cooling by a constant flow of the cooling fluid, calculated by dividing the difference between moulding and demoulding temperatures by the time required to cool the mould to the demoulding temperature

Note 1 to entry: The average cooling rate is usually expressed in degrees Celsius per minute.

3.6**cooling rate (linear)****controlled cooling rate (linear)**

constant rate of cooling in a defined temperature range obtained by controlling the flow of the cooling fluid in such a way that over each defined time interval the deviation from this specified cooling rate does not exceed the specified tolerance

Note 1 to entry: The cooling rate is usually expressed in degrees Celsius per minute.

Note 2 to entry: The defined time interval controlled cooling rate is based on the system design of moulding press. Usually the shorter time interval used, the more accurate controlled cooling rate could be gained.

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4 Apparatus**4.1 Moulding press**

The press shall have a clamping force capable of applying a pressure (conventionally given as the ratio of the clamping force to the area of the mould cavity) of at least 12 MPa.

The pressure shall be maintained to within 10 % of the specified pressure during the moulding cycle.

The platens shall be capable of

- a) being heated to at least 320 °C;
- b) being cooled at a rate given in [Table 1](#).

The difference between the temperatures of any points of the mould surfaces shall not vary by more than ± 2 °C during heating and ± 4 °C during cooling.

When the heating and cooling system is incorporated in the mould, it shall comply with the same conditions.

The platens or mould shall be heated either by high-pressure steam, by a heat-conducting fluid in an appropriate channel system, or by using electric heating elements. The platens or mould are cooled by a heat-conducting fluid (usually cold water) in a channel system.

For quench cooling (see method C in [Table 1](#)), two presses shall be used, one for heating during moulding and the other for cooling.