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Plastics - Injection moulding of test specimens of thermoplastic materials - Part 5: Preparation of standard specimens for investigating anisotropy (ISO 294-5:2026)

EESTI STANDARDI EESSÕNA

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<p>See Eesti standard EVS-EN ISO 294-5:2026 sisaldab Euroopa standardi EN ISO 294-5:2026 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 28.01.2026.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN ISO 294-5:2026 consists of the English text of the European standard EN ISO 294-5:2026.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 28.01.2026.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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EUROPEAN STANDARD

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English Version

Plastics - Injection moulding of test specimens of thermoplastic materials - Part 5: Preparation of standard specimens for investigating anisotropy (ISO 294-5:2026)

Plastiques - Moulage par injection des éprouvettes de matériaux thermoplastiques - Partie 5: Préparation d'éprouvettes normalisées pour déterminer l'anisotropie (ISO 294-5:2026)

Kunststoffe - Spritzgießen von Probekörpern aus Thermoplasten - Teil 5: Herstellung von Standardprobekörpern zur Ermittlung der Anisotropie (ISO 294-5:2026)

This European Standard was approved by CEN on 13 January 2026.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO 294-5:2026) has been prepared by Technical Committee ISO/TC 61 "Plastics" in collaboration with Technical Committee CEN/TC 249 "Plastics" the secretariat of which is held by SIS.

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 July 2026, and conflicting national standards shall be withdrawn at the latest by July 2026.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 294-5:2017.

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Endorsement notice

The text of ISO 294-5:2026 has been approved by CEN as EN ISO 294-5:2026 without any modification.



**International
Standard**

ISO 294-5

**Plastics — Injection moulding of
test specimens of thermoplastic
materials —**

**Part 5:
Preparation of standard specimens
for investigating anisotropy**

*Plastiques — Moulage par injection des éprouvettes de matériaux
thermoplastiques —*

*Partie 5: Préparation d'éprouvettes normalisées pour déterminer
l'anisotropie*

**Fourth edition
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Foreword

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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 document 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).

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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 fourth edition cancels and replaces the third edition (ISO 294-5:2017), which has been technically revised.

The main changes are as follows:

- size 90 mm × 80 mm × 2 mm plates have been removed;
- the normative references have been updated.

A list of all parts in the ISO 294 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.

Introduction

Reinforced and self-reinforcing injection-mouldable thermoplastics are used in a wide variety of applications, some of which can be safety-related. During the injection-moulding process, reinforcement fibres can preferentially align with the flow of the molten material and not across the flow direction. This preferential alignment causes an imbalance in the properties of the moulded thermoplastic so that, in the flow direction, the alignment of the reinforcing fibres causes a higher strength and stiffness than in the cross direction with fewer aligned fibres. This difference in properties is termed anisotropy and it can result in an injection-moulded component having less than the desired or designed strength. To aid designers in understanding the potential strength of an injection-moulded component, it is desirable to know about the anisotropy of an injection-moulded component.

During the development of this document, it was found that injection-moulded test specimens do not exhibit the same fibre alignment across their thickness, but that the outer layers have fibres preferentially aligned in the mould filling direction while the core has randomly oriented fibres (i.e. no preferential alignment). The ratio of the cross-sectional area of aligned-fibre orientation (i.e. “skin” layer thickness) to that of random-fibre orientation (i.e. “core” thickness) is affected by the specimen thickness and the mould filling rate, i.e. the average injection velocity. Thicker specimens exhibit a lower proportion of aligned fibres than do thinner specimens. Slower mould fill speeds lead to thicker “skin” layers with aligned fibres. As a result, to obtain meaningful data on a particular design of moulding, an investigator should prepare specimens with the maximum anisotropic properties, as this data will best represent the upper and lower bounds of a composite structure. Since the specimen thickness and injection velocity have a significant influence on the final anisotropy, this document should only be used for determining information that is useful in designing mouldings and not as a quality control test for the plastic material itself.

A survey of more than 10 raw material suppliers worldwide carried out from 2010 to 2013 clearly indicated that the preparation of plates which provide a suitable degree of anisotropy requires plates with non-square shape to ensure a fibre orientation in flow direction. Under the conditions of this study, the highest degree of anisotropy was obtained using a plate with dimensions 120 mm × 80 mm × 2 mm. It can be considered that plates longer than 120 mm will show at least as good results. Square plates (e.g. 80 mm × 80 mm × 2 mm or even 150 mm × 150 mm × 2 mm) resulted in problems sometimes independent of the size. Within this study, the plate with size 90 mm × 80 mm × 2 mm as required in the previous edition of this document did not perform well in any case and was removed from this document.

Plastics — Injection moulding of test specimens of thermoplastic materials —

Part 5: Preparation of standard specimens for investigating anisotropy

1 Scope

This document specifies a mould (designated the type F ISO mould) for the injection moulding of plates with a preferred size of 80 mm × 120 mm, and a preferred thickness of 2 mm for single-point and multi-point data acquisition. Suitable test specimens according to ISO 20753 type A22 or B3 are then machined or stamped from the plates and used to obtain information on the anisotropy. For the design of plastic parts, this will provide upper and lower bounds for the tensile properties.

Investigation of the anisotropy of materials is a special procedure intended to provide guidance in the design of mouldings for end-use applications and is not intended as a quality control tool.

In the injection moulding of thermoplastic materials, the flow of molten polymer can influence the orientation of fillers such as fibreglass or the orientation of polymer chains, resulting in anisotropic behaviour.

For the purposes of this document, the flow direction is defined as the direction from the gate to the far end of the mould cavity and the cross direction as the direction perpendicular to the flow direction.

The type F mould is not intended to replace the type D mould used to determine the moulding shrinkage of 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 294-1:2017, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 1: General principles, and moulding of multipurpose and bar test specimens*

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

ISO 20753, *Plastics — Test specimens*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 294-1 apply.

ISO and IEC maintain terminology 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/>