BSI Standards Publication

Plastics — Injection moulding of test specimens of thermoplastic materials

Part 1: General principles, and moulding of multipurpose and bar test specimens

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National foreword

This British Standard is the UK implementation of EN ISO 294-1:2017. It is identical to ISO 294-1:2017. It supersedes BS EN ISO 294-1:1998 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/82, Thermoplastic materials.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Plastics - Injection moulding of test specimens of thermoplastic materials - Part 1: General principles, and moulding of multipurpose and bar test specimens (ISO 294-1:2017)

Plastiques - Moulage par injection des éprouvettes de matériaux thermoplastiques - Partie 1: Principes généraux, et moulage des éprouvettes à usages multiples et des barreaux (ISO 294-1:2017)

Kunststoffe - Spritzgießen von Probekörpern aus Thermoplasten - Teil 1: Allgemeine Grundlagen und Herstellung von Vielzweckprobekörpern und Stäben (ISO 294-1:2017)

This European Standard was approved by CEN on 13 April 2017.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN ISO 294-1:2017) 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 NBN.

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of an identical text or by endorsement, at the latest by December 2017, and conflicting national standards shall be withdrawn at the latest by December 2017.

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

This document supersedes EN ISO 294-1:1998.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 294-1:2017 has been approved by CEN as EN ISO 294-1:2017 without any modification.

Contents

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).

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

For an explanation on 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.

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 294-1:1996), which has been technically revised with the following changes:

— the types of test specimen have been replaced according to ISO 20753;

— Annex D has been added to clarify the methods for setting the operation parameters on injection machine;

— the original Annex D has been renamed as Annex E.

It also incorporates the Amendments ISO 294-1:1996/Amd.1:2001 and ISO 294-1:1996/Amd.2:2005.

A list of all the parts in the ISO 294 series can be found on the ISO website.

Introduction

Many factors in the injection-moulding process influence the properties of moulded test specimens and hence the measured values obtained when the specimens are used in a test method. The mechanical properties of such specimens are strongly dependent on the conditions of the moulding process used to prepare the specimens. Exact definition of each of the main parameters of the moulding process is a basic requirement for reproducible and comparable operating conditions.

It is important in defining moulding conditions to consider any influence the conditions may have on the properties to be determined. Thermoplastics exhibit differences in molecular orientation in crystallization morphology (for crystalline and semicrystalline polymers), in phase morphology (for heterogeneous thermoplastics) as well as in the orientation of anisotropic fillers such as short fibres. Residual ("frozen-in") stresses in the moulded test specimens and thermal degradation of the polymer during moulding also influence properties. Each of these phenomena must be controlled to minimize variability of the numerical values of the properties measured.

Care has been taken to ensure that the ISO moulds described can all be fitted in existing injection-moulding equipment and have interchangeable cavity plates.

Plastics — Injection moulding of test specimens of thermoplastic materials —

Part 1: General principles, and moulding of multipurpose and bar test specimens

1 Scope

This document specifies the general principles to be followed when injection moulding test specimens of thermoplastic materials and gives details of mould designs for preparing two types of specimen for use in acquiring reference data, i.e. type A1 and type B1 test specimens as specified in ISO 20753, and provides a basis for establishing reproducible moulding conditions. Its purpose is to provide consistent descriptions of the main parameters of the moulding process and to establish a uniform practice in reporting moulding conditions. The particular conditions required for the reproducible preparation of test specimens will vary for each material used and are given in the International Standard for the relevant material or are to be agreed upon between the interested parties.

NOTE Interlaboratory tests with acrylonitrile/butadiene/styrene (ABS), styrene/butadiene (SB) and poly(methyl methacrylate) (PMMA) have shown that mould design is an important factor in the reproducible preparation of test specimens.

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

ISO 294-2, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 2: Small tensile bars*

ISO 294-3:2002, *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 20753, *Plastics — Test specimens*

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 http://www.iso.org/obp