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Plastics — Test specimens

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Foreword

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical behavior,* 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 third edition cancels and replaces the second edition (ISO 20753:2018), which has been technically revised.

The main changes are as follows:

— Clarified overview of dimensions for reduced-scale dumb bell specimen type A.

  — That it contains harmonization of all tolerances for radii, widths and lengths, calculation of the total tolerance for l_2 (the length l_1 including radii), which now includes the summary of tolerances of the single dimensions.

  — That dimension l_2 is most important for a testing lab, as it needs to be observed to ensure distance between grips at tensile test.

— Change of dimension of test specimen type CP. The dimension is now consistent with type 3 of ISO 8256. The former dimension refers to type 2 of ISO 8256. However, the new dimension tends to be used for high-speed tensile tests for crash simulation.

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.

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Introduction

Information on plastics test specimens has been specified in several different locations: in test method standards (e.g. ISO 527-2), in ISO 3167 (for multipurpose test specimens) and in ISO 294-1, ISO 294-2, ISO 294-3 and ISO 294-5 (for moulding conditions). The aim of this document is to give the designations and dimensions of test specimens used for the acquisition of comparable data, and also of other frequently used specimens, in one document for ease of reference. Other International Standards that have hitherto used different designations for the same specimen type will also be revised to bring the designations into line with those in this document.

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Plastics — Test specimens

1 Scope

This document specifies dimensional requirements relating to test specimens prepared from plastics materials intended for processing by moulding, as well as to test specimens prepared by machining from sheets or shaped articles. It compiles the designations and dimensions of test specimens used for the acquisition of comparable data and of other frequently used specimens.

The following types of test specimen are specified:

A Tensile specimen, multipurpose or reduced-scale

B Bar specimen

C Small tensile specimen

D Square plate specimen

F Rectangular plate specimen

NOTE If a particular type of test specimen is not mentioned in this document, this does not mean that there is any intention to exclude the use of the specimen. Additional specimen types can be added in future if they are commonly used.

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

ISO 294-3, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates*

ISO 294-5, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 5: Preparation of standard specimens for investigating anisotropy*

ISO 295, *Plastics — Compression moulding of test specimens of thermosetting materials*

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

ISO 10724-1, *Plastics — Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs) — Part 1: General principles and moulding of multipurpose test specimens*

3 Terms and definitions

No terms and definitions are listed in this document.

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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 http://www.electropedia.org/

4 Symbols

l_3	overall length of the type A and type C test specimens
l_2	distance between the broad parallel-sided sections (tabs) of the type A and type CP test specimens
l_1	length of the narrow parallel-sided section (central section) of the type A and type CP test specimens, length of the type B bar specimen and length of the type D (square) and type F (rectangular) plate specimens
r	radius of the shoulder region of the type A and type C test specimens
b_2	width of the broad parallel-sided sections (tabs) of the type A and type C test specimens
b_1	width of the narrow parallel-sided section (central section) of the type A test specimen, minimum width of the type C test specimen and the width of the type D (square) and type F (rectangular) plate specimens
h	thickness of the test specimen

5 Preparation of test specimens

5.1 General

Test specimens shall be prepared in accordance with the relevant material specification. When none exists, specimens shall be either directly compression or injection moulded from the material in accordance with ISO 293, ISO 294-1, ISO 294-2, ISO 294-3, ISO 294-5, ISO 295 or ISO 10724-1, as appropriate, or machined in accordance with ISO 2818 from sheets that have been compression or injection moulded from the compound, extruded from the compound, or polymerized and cast.

Strict control of all the specimen preparation conditions is essential to ensure that all test specimens in a set are in the same state.

All surfaces of the test specimens shall be free from visible flaws, scratches, or other imperfections. With moulded specimens, any flash present shall be completely removed, taking care not to damage the moulded surface.

The broad sides of multipurpose test specimens shall be suitably marked, for injection-moulded specimens to distinguish between the sides formed by the cavity plate and the fixed plate of the mould (see ISO 294-1 or ISO 10724-1), for compression-moulded and machined specimens to identify any asymmetry resulting from the underlying moulding process.

For injection-moulded specimens, the sides can be identified by the impressions of the ejection pins and by the draft angle. Compression-moulded and machined specimens shall be marked at their shoulders. ISO bars taken from the central section of multipurpose test specimens shall be marked outside their central 64 mm section, which is loaded during flexural testing.

Asymmetry with respect to thickness may influence the flexural properties, including the temperature of deflection under load (see Annex A).

5.2 Injection moulding of test specimens

Test specimens shall be injection moulded as specified in ISO 294-1, ISO 294-2, ISO 294-3, ISO 294-5 or ISO 10724-1, as appropriate, and under the conditions defined in the relevant International Standard for the material under examination or, if no such standard exists, as recommended by the manufacturer of the material or as agreed upon between the interested parties.

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