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**Plastics — Determination of drawing  
characteristics of thermoplastics in  
the molten state**

*Plastiques — Détermination des caractéristiques d'étirage des  
thermoplastiques à l'état fondu*



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Published in Switzerland

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## 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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

This second edition cancels and replaces the first edition (ISO 16790:2005), which has been technically revised.

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

- the normative references have been updated;
- the figure keys have been completed;
- the test procedure and parameters have been revised.

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](http://www.iso.org/members.html).

# Plastics — Determination of drawing characteristics of thermoplastics in the molten state

## 1 Scope

This document specifies a method for determining the drawing and break characteristics of molten plastics. The method involves the measurement of the force generated in deforming a molten filament under defined extrusion temperature and drawing conditions.

Data is generated under non-isothermal and non-homogeneous deformation conditions. However, it is useful for the interpretation of polymer behaviour in extensional flow.

The method is suitable for thermoplastics moulding and extrusion materials that can be extruded using a capillary extrusion rheometer, or an extruder with capillary rod die or other extrusion devices and have sufficient melt strength to be handled without difficulty.

The method is applicable to chemically stable materials that produce a uniform extrudate free from heterogeneities, bubbles, unmelted impurities, etc.

This method can provide information on

- processability for all extrusion techniques,
- the effect of mechanical and thermal history, and
- the effect of chemical structure, such as branching, entanglements and molecular mass.

This technique is one of a number of techniques that can be used to measure the extensional flow behaviour of a material. This method of measurement does not necessarily reproduce the drawing conditions to which thermoplastics are subjected to during their processing.

## 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 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 11443, *Plastics — Determination of the fluidity of plastics using capillary and slit-die rheometers*

## 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:

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

### 3.1 drawing

process of stretching a filament of polymer melt that is being continuously formed by a capillary extrusion rheometer or extruder or other extrusion device