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

*Plastiques — Détermination de la fluidité au moyen de rhéomètres
équipés d'une filière capillaire ou plate*



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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).

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 5, *Physical-chemical properties*.

This fourth edition cancels and replaces the third edition (ISO 11443:2014), which has been technically revised.

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

- the use of a zero length die has been added.

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.

Plastics — Determination of the fluidity of plastics using capillary and slit-die rheometers

1 Scope

This document specifies methods for determining the fluidity of plastics melts subjected to shear stresses at rates and temperatures approximating to those arising in plastics processing. Testing plastics melts in accordance with these methods is of great importance since the fluidity of plastics melts is generally not dependent solely on temperature, but also on other parameters; in particular shear rate and shear stress.

The methods described in this document are useful for determining melt viscosities from 10 Pa·s to 10⁷ Pa·s, depending on the measurement range of the pressure and/or force transducer and the mechanical and physical characteristics of the rheometer. The shear rates occurring in extrusion rheometers range from 1 s⁻¹ to 10⁶ s⁻¹.

Elongational effects at the die entrance cause extrudate swelling at the die exit. Methods for assessing extrudate swelling have also been included.

The rheological techniques described are not limited to the characterization of wall-adhering thermoplastics melts only; for example, thermoplastics exhibiting “slip” effects^{[1][2]} and thermosetting plastics can be included. However, the methods used for determining the shear rate and shear viscosity are invalid for materials which are not wall-adhering. Nevertheless, this document can be used to characterize the rheological behaviour of such fluids for a given geometry.

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 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

ISO 1133-2, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 2: Method for materials sensitive to time-temperature history and/or moisture*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 11403-2, *Plastics — Acquisition and presentation of comparable multipoint data — Part 2: Thermal and processing properties*

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/>