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Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics —

Part 1: Standard method

Plastiques — Détermination de l'indice de fluidité à chaud des thermoplastiques, en masse (MFR) et en volume (MVR) —

Partie 1: Méthode normale

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 1133-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

This first edition of ISO 1133-1 cancels and replaces ISO 1133:2005. It also incorporates the Technical Corrigendum, ISO 1133:2005/Cor.1:2006.

In this part of ISO 1133, changes have been made to accommodate ISO 1133-2. In addition: Clause 3 includes further definitions relevant to both parts of ISO 1133; 5.1.3 specifies the lower edge of the piston head; 5.1.4 updates temperature tolerances; 5.2.1.7 on a preforming device has been added; 5.2.2.2 includes revised cut-off timing accuracy; 8.3 provides cut-off time intervals that are consistent with other specifications in this part of ISO 1133; 8.5.3 and 9.6.3 have been included on expression of half die results; 9.3 provides minimum piston displacements that are consistent with other specifications in this part of ISO 1133; Annex B has been simplified to avoid inconsistencies between this and the materials specification standards; Annex C, has been added for the preparation of charges of material that is particularly suited to testing flake or other large aspect ratio particles; Annex D has been added to provide precision data from an intercomparison on a high MVR/MFR material.

This part of ISO 1133 applies to melt flow rate testing broadly equivalent to that of ISO 1133:2005. ISO 1133-2 applies to the testing of polymers that are rheologically sensitive to the time-temperature history to which they are subjected during melt flow rate testing.

ISO 1133 consists of the following parts, under the general title *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics*:

— *Part 1: Standard method*

— *Part 2: Method for materials sensitive to time-temperature history and/or moisture*

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Introduction

For stable materials that are not rheologically sensitive to the time-temperature history experienced during melt flow rate testing, this part of ISO 1133 is recommended.

For materials whose rheological behaviour is sensitive to the test's time-temperature history, e.g. materials which degrade during the test, ISO 1133-2 is recommended.

NOTE At the time of publication, there is no evidence to suggest that the use of ISO 1133-2 for stable materials results in better precision in comparison with the use of this part of ISO 1133.

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Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics —

Part 1:
Standard method

WARNING — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory requirements.

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1 Scope

This part of ISO 1133 specifies two procedures for the determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastic materials under specified conditions of temperature and load. Procedure A is a mass-measurement method. Procedure B is a displacement-measurement method. Normally, the test conditions for measurement of melt flow rate are specified in the material standard with a reference to this part of ISO 1133. The test conditions normally used for thermoplastics are listed in Annex A.

The MVR is particularly useful when comparing materials of different filler content and when comparing filled with unfilled thermoplastics. The MFR can be determined from MVR measurements, or vice versa, provided the melt density at the test temperature is known.

This part of ISO 1133 is also possibly applicable to thermoplastics for which the rheological behaviour is affected during the measurement by phenomena such as hydrolysis (chain scission), condensation and cross-linking, but only if the effect is limited in extent and only if the repeatability and reproducibility are within an acceptable range. For materials which show significantly affected rheological behaviour during testing, this part of ISO 1133 is not appropriate. In such cases, ISO 1133-2 applies.

NOTE The rates of shear in these methods are much smaller than those used under normal conditions of processing, and therefore it is possible that data obtained by these methods for various thermoplastics will not always correlate with their behaviour during processing. Both methods are used primarily in quality control.

2 Normative references

The following referenced documents are indispensable for the application 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 1133-2, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-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*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

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