

**Plastid. Termoplastide sulandi  
massvooluhulga ja mahtvooluhulga  
määramine**

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

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 1133:2005 sisaldab Euroopa standardi EN ISO 1133:2005 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 15.07.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 1133:2005 consists of the English text of the European standard EN ISO 1133:2005.</p> <p>This document is endorsed on 15.07.2005 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p><b>Käsitlusala:</b></p> <p>This International Standard 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.</p>	<p><b>Scope:</b></p> <p>This International Standard 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.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**ICS** 83.080.20

**Võtmesõnad:** determination, plastics, rheological properties, tests, thermoplastic resins, viscosity index, viscosity measurement

English version

**Plastics - Determination of the melt mass-flow rate (MFR) and  
the melt volume-flow rate (MVR) of thermoplastics (ISO  
1133:2005)**

Plastiques - Détermination de l'indice de fluidité à chaud  
des thermoplastiques, en masse (MFR) et en volume  
(MVR) (ISO 1133:2005)

Kunststoffe - Bestimmung der Schmelze-Massefließrate  
(MFR) und der Schmelze-Volumenfließrate (MVR) von  
Thermoplasten (ISO 1133:2005)

This European Standard was approved by CEN on 19 May 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

## Foreword

This document (EN ISO 1133:2005) 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 IBN.

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 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

This document supersedes EN ISO 1133:1999.

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

## Endorsement notice

The text of ISO 1133:2005 has been approved by CEN as EN ISO 1133:2005 without any modifications.

---

---

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

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



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

Foreword.....	iv
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>2</b>
<b>4 Principle.....</b>	<b>3</b>
<b>5 Apparatus .....</b>	<b>3</b>
5.1 Extrusion plastometer.....	3
5.2 Accessory equipment.....	6
<b>6 Test sample .....</b>	<b>7</b>
6.1 Sample form .....	7
6.2 Conditioning.....	7
<b>7 Temperature-calibration, cleaning and maintenance of the apparatus .....</b>	<b>7</b>
7.1 Calibration of the temperature-control system .....	7
7.2 Cleaning the apparatus .....	8
<b>8 Procedure A: mass-measurement method .....</b>	<b>8</b>
8.1 Selection of temperature and load.....	8
8.2 Cleaning.....	8
8.3 Selection of sample mass and charging cylinder .....	8
8.4 Measurements.....	9
8.5 Expression of results .....	10
<b>9 Procedure B: displacement-measurement method .....</b>	<b>10</b>
9.1 Selection of temperature and load.....	10
9.2 Minimum piston displacement distance.....	10
9.3 Timer .....	11
9.4 Preparation for the test .....	11
9.5 Measurements.....	11
9.6 Expression of results .....	11
<b>10 Flow rate ratio (FRR).....</b>	<b>12</b>
<b>11 Precision.....</b>	<b>12</b>
<b>12 Test report .....</b>	<b>13</b>
<b>Annex A (normative) Test conditions for MFR and MVR determinations .....</b>	<b>14</b>
<b>Annex B (informative) Conditions specified in International Standards for the determination of the melt flow rate of thermoplastic materials.....</b>	<b>15</b>

## 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 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 1133:1997), in which the clauses relating to temperature control have been revised. In addition, the clarity of the text has been improved.



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

## 1 Scope

This International Standard 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 International Standard. The test conditions normally used for thermoplastics are listed in Annexes A and B.

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

These methods are in principle also applicable to thermoplastics for which the rheological behaviour is affected during the measurement by phenomena such as hydrolysis, condensation or crosslinking, 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, these methods are not appropriate. In such cases, the use of the viscosity number in dilute solution, determined in accordance with the relevant part of ISO 1628, is recommended for characterization purposes.

**NOTE** The rates of shear in these methods are much smaller than those used under normal conditions of processing, and therefore data obtained by these methods for various thermoplastics may 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 1622-2, *Plastics — Polystyrene (PS) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 1628 (all parts), *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers*

ISO 1872-2, *Plastics — Polyethylene (PE) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 1873-2, *Plastics — Polypropylene (PP) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 2580-2, *Plastics — Acrylonitrile-butadiene-styrene (ABS) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 2897-2, *Plastics — Impact-resistant polystyrene (PS-I) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

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

ISO 4613-2, *Plastics — Ethylene/vinyl acetate (E/VAC) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 4894-2, *Plastics — Styrene/acrylonitrile (SAN) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 6402-2, *Plastics — Acrylonitrile-styrene-acrylate (ASA), acrylonitrile-(ethylene-propylene-diene)-styrene (AEPDS) and acrylonitrile-(chlorinated polyethylene)-styrene (ACS) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

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

ISO 7391-2, *Plastics — Polycarbonate (PC) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 8257-2, *Plastics — Poly(methyl methacrylate) (PMMA) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 8986-2, *Plastics — Polybutene (PB) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 9988-2, *Plastics — Polyoxymethylene (POM) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 10366-2, *Plastics — Methyl methacrylate-acrylonitrile-butadiene-styrene (MABS) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

ISO 15494, *Plastic piping systems for industrial applications — Polybutene (PB), polyethylene (PE) and polypropylene (PP) — Specifications for components and the system — Metric series*

ISO 15876-3, *Plastics piping systems for hot and cold water installations — Polybutylene (PB) — Part 3: Fittings*

### 3 Terms and definitions

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

#### 3.1

##### **melt mass-flow rate**

##### **MFR**

rate of extrusion of a molten resin through a die of specified length and diameter under prescribed conditions of temperature, load and piston position in the barrel of an extrusion plastometer, the rate being determined as the mass extruded over a specified time

NOTE The correct SI units are decigrams per minute (dg/min). However, grams per 10 minutes (g/10 min) have customarily been used in the past and are also acceptable.