

---

---

**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*

**iTeh Standards**  
**(<https://standards.itih.ai>)**  
**Document Preview**

[ISO 11443:2021](https://standards.itih.ai/catalog/standards/iso/5c71eff0-f811-4758-9125-b6f21664a7b6/iso-11443-2021)

<https://standards.itih.ai/catalog/standards/iso/5c71eff0-f811-4758-9125-b6f21664a7b6/iso-11443-2021>



**iTeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[ISO 11443:2021](https://standards.iteh.ai/catalog/standards/iso/5c71eff0-f811-4758-9125-b6f21664a7b6/iso-11443-2021)

<https://standards.iteh.ai/catalog/standards/iso/5c71eff0-f811-4758-9125-b6f21664a7b6/iso-11443-2021>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 General principles</b> .....	<b>4</b>
<b>5 Apparatus</b> .....	<b>4</b>
5.1 Test device.....	4
5.1.1 General.....	4
5.1.2 Rheometer barrel.....	5
5.1.3 Capillary dies (method A).....	5
5.1.4 Slit dies (method B).....	9
5.1.5 Piston.....	9
5.2 Temperature control.....	9
5.3 Measurement of temperature and calibration.....	10
5.3.1 Test temperature.....	10
5.3.2 Measurement of test temperature.....	10
5.3.3 Temperature calibration.....	10
5.4 Measurement of pressure and calibration.....	10
5.4.1 Test pressure.....	10
5.4.2 Pressure drop along the length of the slit die.....	11
5.4.3 Calibration.....	11
5.5 Measurement of the volume flow rate of the sample.....	11
<b>6 Sampling</b> .....	<b>11</b>
<b>7 Procedure</b> .....	<b>11</b>
7.1 Cleaning the test device.....	11
7.2 Selection of test temperatures.....	12
7.3 Preparation of samples.....	13
7.4 Preheating.....	13
7.5 Determination of the maximum permissible test duration.....	13
7.6 Determination of test pressure at constant volume flow rate: Method 2.....	14
7.7 Determination of volume flow rate at constant test pressure: Method 1.....	14
7.8 Waiting periods during measurement.....	14
7.9 Measurement of extrudate swelling.....	14
7.9.1 General.....	14
7.9.2 Measurement at room temperature.....	15
7.9.3 Measurement at the test temperature.....	15
<b>8 Expression of results</b> .....	<b>15</b>
8.1 Volume flow rate.....	15
8.2 Apparent shear rate.....	16
8.2.1 General.....	16
8.2.2 Method A: Capillary dies.....	16
8.2.3 Method B: Slit dies.....	16
8.3 Apparent shear stress.....	17
8.3.1 General.....	17
8.3.2 Method A: Capillary dies.....	17
8.3.3 Method B: Slit dies.....	17
8.4 True shear stress.....	17
8.4.1 General.....	17
8.4.2 Bagley correction for capillary dies (method A).....	18
8.4.3 Bagley correction for slit dies (method B).....	21
8.4.4 Direct determination using slit dies (method B).....	22
8.5 True shear rate.....	22

8.5.1	General.....	22
8.5.2	Method A: Capillary dies.....	23
8.5.3	Method B: Slit dies.....	23
8.6	Viscosity.....	23
8.7	Determination of extrudate swelling.....	23
8.7.1	Measurement at room temperature.....	23
8.7.2	Measurement at the test temperature.....	24
<b>9</b>	<b>Precision.....</b>	<b>24</b>
<b>10</b>	<b>Test report.....</b>	<b>25</b>
10.1	General.....	25
10.2	Test conditions.....	25
10.3	Flow characteristics.....	26
10.3.1	General.....	26
10.3.2	Graphical representation.....	26
10.3.3	Individual values.....	27
10.4	Visual examination.....	27
<b>Annex A (informative) Method of correcting for the influence of <math>H/B</math> on the apparent shear rate</b>		<b>28</b>
<b>Annex B (informative) Measurement errors.....</b>		<b>30</b>
<b>Annex C (informative) Uncertainties in the determination of shear viscosity by capillary extrusion rheometry testing.....</b>		<b>31</b>
<b>Bibliography.....</b>		<b>36</b>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 11443:2021](https://standards.iteh.ai/catalog/standards/iso/5c71eff0-f811-4758-9125-b6f21664a7b6/iso-11443-2021)

<https://standards.iteh.ai/catalog/standards/iso/5c71eff0-f811-4758-9125-b6f21664a7b6/iso-11443-2021>

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

