Plastics - Resins in the liquid state or as emulsions or dispersions - Determination of apparent viscosity using a single cylinder type rotational viscometer method (ISO 2555:2018)

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NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 2555:2018 sisaldab Euroopa standardi EN ISO 2555:2018 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 2555:2018 consists of the English text of the European standard EN ISO 2555:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 13.06.2018.	Date of Availability of the European standard is 13.06.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Plastics - Resins in the liquid state or as emulsions or dispersions - Determination of apparent viscosity using a single cylinder type rotational viscometer method (ISO 2555:2018)

Plastiques - Résines à l'état liquide ou en émulsions ou dispersions - Détermination de la viscosité apparente par la méthode du viscomètre rotatif de type à un cylindre (ISO 2555:2018)

Kunststoffe - Harze im flüssigen Zustand, als Emulsionen oder Dispersionen - Bestimmung der scheinbaren Viskosität mit einem Rotationsviskosimeter mit Einzelzylinder (ISO 2555:2018)

This European Standard was approved by CEN on 26 May 2018.

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

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European foreword

This document (EN ISO 2555:2018) 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 NBN.

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of an identical text or by endorsement, at the latest by December 2018, and conflicting national standards shall be withdrawn at the latest by December 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 2555:1999.

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

Endorsement notice

The text of ISO 2555:2018 has been approved by CEN as EN ISO 2555:2018 without any modification.

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Principle ... **1**
4.1 General ... 1
4.2 Operating principle ... 2
4.3 Brief description ... 2
5 Apparatus ... **3**
5.1 Single cylinder type rotational viscometer ... 3
5.2 Thermostatic liquid bath ... 7
5.3 Additional apparatus ... 7
6 Choice of spindle and rotational speed ... **7**
7 Procedure ... **8**
8 Expression of results ... **10**
9 Test report ... **11**
Annex A (informative) **Choice of test conditions for general application to resins in the liquid state, emulsions and dispersions** ... **12**
Annex B (normative) **Spindle and guard stirrup** ... **14**
Bibliography ... **17**

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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 2555:1989), which has been technically revised. The main changes compared to the previous edition are as follows:

a) the name of the equipment has been changed to “single cylinder type rotational viscometer” and the method of determination of viscosity is described with more general terms to avoid reference to specific brand names;

b) the commercially available main models and spindles have been summarized;

c) digital type viscometer has been added;

d) the accuracy of test method has been added;

e) the calibration method has been added.

Introduction

A rotational viscometer is composed of a spindle, a torque measuring device and a spring. There are three types of rotational viscometers with regard to difference of the spindle:

a) single cylinder type (used in this document, i.e. ISO 2555);

b) coaxial cylinder type (used in ISO 3219[2]);

c) cone-plate type (used in ISO 3219[2]).

Single cylinder type rotational viscometers measure viscosity under non-constant shear rate. Coaxial cylinder type and cone-plate type instruments measure viscosity under constant shear rate.

When using a single cylinder type instrument, the measured viscosity is relative to measuring conditions. Conditions are therefore intended to be specified for viscosity measurements.

For Newtonian fluids, the viscosity value remains the same even if different viscosity measuring methods from this document and ISO 3219 are used.

With non-Newtonian fluids the measured viscosity changes depending on shear rate. The viscosity determined using different measuring methods such as methods from this document and ISO 3219 therefore may differ from each other, depending on shear rates used during measurements.

The Brookfield method has contributed a lot to determination of liquid viscosity. With its simple measuring low-cost equipment, the principles underlying the Brookfield technique still remain an important element in determination of viscosity of liquids.

This document is largely based on the Brookfield method established in 1989. However, some of the instruments mentioned in the previous edition of this document have long been discontinued. Moreover, although analogue (or the so-called “dial”) type was the predominant viscometer type at that time, the use has now shifted to digital viscometers in the recent years, increasing the need for this document to be revised.

The terms and standards introduced in this new edition are based on ISO 1652[1].

Currently, digital viscometer has become the mainstream. However, analogue (or dial) viscometer is still used and cannot be removed from the method. This document allows the use of both analogue (or dial) viscometer and digital viscometer.

Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity using a single cylinder type rotational viscometer method

1 Scope

This document specifies a method of determining apparent viscosity of resins in a liquid state using a single cylinder type rotational viscometer.

The method can be used for viscosity measurements in the range from 0,02 Pa · s to 60 000 Pa · s.

This document is applicable to both Newtonian and non-Newtonian liquids and the measured apparent viscosity depends on the velocity gradient to which the liquids are subjected during the measurement.

2 Normative references

There are no normative references in this document.

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:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
single cylinder type rotational viscometer
apparatus that determines viscosity by measuring the torque acting on a cylinder or a disc surface rotating in laminar flow condition at constant angular velocity

3.2
spindle
rotational symmetric object in the form of a cylinder or disc connected to a vertically rotating shaft

3.3
apparent viscosity
viscosity of liquids/fluids determined from the measured torque using predetermined calibration table

Note 1 to entry: For non-Newtonian fluids the apparent viscosity depends on the shear rate. With these types of viscometer, the velocity gradient is not the same for every point of the spindle. Thus, for a non-Newtonian fluid, the result is not strictly the true “viscosity at a known velocity gradient” and therefore is conventionally called the apparent viscosity.

4 Principle

4.1 General

A rotational symmetric spindle is driven at constant rotational speed in the liquid being measured.