SLOVENSKI STANDARD
oSIST prEN ISO 2431:2018

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Barve in laki - Ugotavljanje iztočnega časa z uporabo iztočnih čaš (ISO/DIS 2431:2018)

Paints and varnishes - Determination of flow time by use of flow cups (ISO/DIS 2431:2018)

Beschichtungsstoffe - Bestimmung der Auslaufzeit mit Auslaufbechern (ISO/DIS 2431:2018)

Peintures et vernis - Détermination du temps d'écoulement au moyen de coupes d'écoulement (ISO/DIS 2431:2018)

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Paints and varnishes — Determination of flow time by use of flow cups

Peintures et vernis — Détermination du temps d'écoulement au moyen de coupes d'écoulement

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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).

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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 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This sixth edition cancels and replaces the fifth edition (ISO 2431:2011), which has been technically revised.

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

— parts of the introduction were moved to the scope;

— a general rerference to ISO 4618 on terms and definitions has been added in clause 3;

— the information in Clause 4 on measuring at other temperatures and humidities specified in this standard has been amended;

— Figure 1 has been corrected;

— information on conduction of measurements in a fume cupboard has been added to Clause 4.

Introduction

The first edition of this International Standard, published in 1972, specified only one flow cup of orifice diameter 4 mm. The second edition specified three flow cups of orifice diameter 3 mm, 4 mm and 6 mm. The third edition corrected errors in Figures 2 and 4 and the equations for those figures. The fourth edition specified four flow cups of orifice diameter 3 mm, 4 mm, 5 mm and 6 mm. In the fifth edition the curves in Figures 2 to 5 have been placed in a single figure (Figure 2) and the equations for the conversion of flow time to kinematic viscosity and vice versa represented by the curves in these figures have been moved from the figures to a table (Table 1). The procedure for checking the flow cups for wear and tear has been revised to include two alternative methods (one using a certified reference material or secondary working standard, the other using a certified flow cup) and has been moved to an informative annex. The main changes made in this sixth edition are given in the foreword.

As is well known, many countries over the years have developed their own standard flow cups and the difficulty in correlation between them has led to considerable confusion in comparing values. The standardization of an improved design of flow cup has been recommended after careful consideration, by an expert working group, of the role of flow cups for the measurement of the flow time of paints, varnishes and related products.

Paints and varnishes — Determination of flow time by use of flow cups

1 Scope

1.1 This document specifies a method for determining the flow time of paints, varnishes and related products that can be used to control consistency.

1.2 Four flow cups of similar dimensions, but having orifice diameters of 3 mm, 4 mm, 5 mm and 6 mm, are specified. Two methods for checking the flow cups for wear and tear are given (see Annex A).

Flow cups with a replaceable jet are not covered by this International Standard as the close tolerances on the supply of the material under test to the jet are not met.

Commonly used dipping flow cups are also not covered by this International Standard. In general, the fabrication tolerances for such flow cups are greater than those of the flow cups specified in this International Standard. Therefore flow time determinations with dipping flow cups give a precision which is lower than that obtained with the flow cups specified in this International Standard (see Clause 9).

1.3 The method is limited to testing materials for which the breakpoint of the flow from the orifice of the flow cup can be determined with certainty. This point is difficult to determine and reproduce for materials with flow times near the upper limit of the measurement range (100 s) due to slowing-down effects.

1.4 Flow times are reproducible only for products of Newtonian or near-Newtonian flow properties. This effectively limits their practical use. Nevertheless, for checking purposes, these flow cups do serve a useful purpose. Furthermore, the measurement of flow time is often used to confirm the application consistency.

Paints often contain flow-arresting agents to confer increased viscosity. Such paints exhibit non-Newtonian flow properties. Their viscosity during application can only be properly assessed using viscometers such as that described in ISO 3219.

Resins and varnishes can exhibit Newtonian or near-Newtonian flow at much higher viscosities than most paints and, where this applies, flow cups can provide a useful means of controlling the consistency. To meet this requirement, this International Standard provides flow cups suitable for viscosities up to about 700 mm^2/s.

With thixotropic materials, stirring or other such mechanical disturbance immediately before testing will reduce the flow time compared with that for an unstirred sample. With such materials, uncertain and variable flow time values are obtained with all the flow cups. The repeatability and reproducibility limits given in Clause 9 cannot be achieved in the determination of the flow time of such materials.

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 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Terms and definitions

For the purposes of this document, the terms and definitions conducted in a fume cupboard 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 http://www.iso.org/obp

3.1
flow time
t
time that elapses from the moment when the material under test starts to flow from the orifice of the filled flow cup to the moment when the flow stream of material first breaks off close to the orifice

3.2
Newtonian flow
type of flow exhibited by a material in which, at a constant temperature, the ratio of the shear stress to the shear rate does not vary either with time or with the shear rate

Note 1 to entry: Note1 to entry: When variations in this ratio are small, the effect on viscosity of mechanical disturbance, such as stirring, is negligible and the material is said to have near-Newtonian flow.

3.3
non-Newtonian flow
type of flow exhibited by a material in which, at a constant temperature, the ratio of the shear stress to the shear rate varies either with time or with shear rate

3.4
kinematic viscosity
ν
ratio of the dynamic viscosity to the density of the liquid

Note 1 to entry: The SI base unit for kinematic viscosity is metres squared per second (m^2/s).

4 Temperature considerations

Temperature and humidity are important parameters affecting test results. Deviations from the requirements specified can lead to results that are not comparable. However, the interested parties may agree upon alternative parameters and these parameters shall be reported.

The effect of temperature on flow time is highly significant with respect to application properties and varies with the type of product.

For reference purposes, (23,0 ± 0,5) °C is specified as the test temperature in this International Standard. However, it might be more convenient to carry out comparative testing at some other agreed temperature (for example, 25 °C) because of prevailing temperature conditions (see also Annex B).

For control by flow time, the test sample and flow cup shall be conditioned to an agreed or specified temperature and it shall be ensured that the temperature variation does not exceed 0,5 °C during testing. The flow cup shall be in a place which is free from draughts.

If testing is conducted in a fume cupboard and the air suction is left on, this shall be noted in the test report.