SLOVENSKI STANDARD
SIST EN ISO 9371:1999

01-maj-1999

Polimerni materiali ï Fenolne smole v tekoļ i obliki ali v raztopini ï Doloļ evanje viskoznosti (ISO 9371:1990)

Plastics - Phenolic resins in the liquid state or in solution - Determination of viscosity (ISO 9371:1990)

Kunststoffe - Phenolharze, flüssig oder Lösung - Bestimmung der Viskosität (ISO 9371:1990)

Plastiques - Résines phénoliqes liquides ou en suspension - Détermination de la viscosité (ISO 9371:1990)

Ta slovenski standard je istoveten z: **EN ISO 9371:1995**

ICS:

83.080.10	Duromeri	Thermosetting materials

SIST EN ISO 9371:1999 **en**

EUROPEAN STANDARD

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EN ISO 9371

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Descriptors: phenolic resins, plastics, viscosity, viscosity measurement

English version

Plastics - Phenolic resins in the liquid state or in solution - Determination of viscosity (ISO 9371:1990)

Plastiques - Résines phénoliques liquides ou en suspension - Détermination de la viscosité (ISO 9371:1990)

Kunststoffe - Phenolharze, flüssig oder Lösung - Bestimmung der Viskosität (ISO 9371:1990)

This European Standard was approved by CEN on 1995-01-12. 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.

The European Standards exist 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

The text of the International Standard from ISO/TC 61 "Plastics" of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Committee CEN/TC 249 "Plastics".

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 January 1996, and conflicting national standards shall be withdrawn at the latest by January 1996.

According to CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 9371:1990 has been approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

ISO 9371

First edition
1990-12-15

Plastics — Phenolic resins in the liquid state or in solution — Determination of viscosity

Plastiques — Résines phénoliques liquides ou en solution — Détermination de la viscosité

Reference number
ISO 9371:1990(E)

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.

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.

International Standard ISO 9371 was prepared by Technical Committee ISO/TC 61, *Plastics*.

Annexes A and B form an integral part of this International Standard.

International Organization for Standardization
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Plastics — Phenolic resins in the liquid state or in solution — Determination of viscosity

1 Scope

This International Standard specifies four methods for the determination of the viscosity of phenolic resins, either as a liquid or in solution.

It describes the following two types of method:

a) Reference methods:

1) Determination using a viscometer with a definite speed gradient

2) Determination using an Ubbelohde capillary viscometer

b) Comparative test methods:

1) Determination using a rotary viscometer

2) Determination using a Hoeppler dropping-ball viscometer

Other methods may be used as long as it is verified that the same test results are obtained.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2555:1989, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity by the Brookfield Test method.*

ISO 3105:1976, *Glass capillary kinematic viscometers — Specification and operating instructions.*

ISO 3219:1977, *Plastics — Polymers in the liquid, emulsified or dispersed state — Determination of viscosity with a rotational viscometer working at defined shear rate.*

3 General (valid for all four methods)

Test temperature

Unless specified otherwise, determinations shall be performed at 23 °C within the tolerance allowed in the method used.

Dissolving solid resins

The solvent used and the concentration chosen shall be agreed between the parties concerned.

Expression of results

Dynamic viscosities shall be expressed in millipascal seconds (mPa·s), kinematic viscosities in square millimetres per second (mm^2/s).

4 Reference methods

4.1 Viscosity determination using a viscometer with definite speed gradient

The specifications of ISO 3219 shall be followed, either to determine the viscosity at a definite speed gradient, or to perform a rheological study of the resin and, in particular, to obtain a curve of viscosity as a function of the speed gradient.

4.2 Determination using an Ubbelohde capillary viscometer

4.2.1 Scope

This sub-clause specifies a method of test, for reference purposes, for the determination of the kinematic viscosity of liquid phenolic resins, or resins dissolved in an appropriate solvent at a given concentration chosen by agreement between the parties concerned. The method is suitable for determining kinematic viscosity over the range 2 mm²/s to 10 000 mm²/s.

NOTE 1 Kinematic viscosity is a property of newtonian fluids. As resins and resin solutions are non-newtonian, the determination of the viscosity by this method will give an apparent viscosity which will depend on the specific conditions used.

4.2.2 Normative reference

ISO 653:1980, *Long solid-stem thermometers for precision use*.

4.2.3 Principle

The determination involves measuring the time required by a fixed volume of liquid resin or resin solution, contained in the bulb of a glass viscometer, to flow under gravity through a calibrated capillary under a reproducible driving head of liquid at a closely controlled temperature.

4.2.4 Apparatus

4.2.4.1 Ubbelohde viscometer, with design details and construction as shown in figure 1. Table 1 gives the approximate *C*-constants (see annex A), the diameter of the capillaries and the corresponding viscosity ranges. Bulb C has a volume of 4 ml for a viscometer whose constant is between 0,01 mm²/s² and 0,05 mm²/s², 5 ml for a constant from 0,2 mm²/s² to 1,0 mm²/s² and 6 ml for a constant between 3,0 mm²/s² to 10,0 mm²/s².

The viscometer shall be fitted with supports designed to hold the various tubes which make up the viscometer in a vertical position as required by the method.

The filler marks (G and H) on bulb A indicate the minimum and maximum quantities providing the pressure necessary for correct functioning.

4.2.4.2 Thermoregulated bath, of such a design that the viscometer can be immersed in it so that bulb C above the top of the capillary is at least 30 mm below the surface of the liquid in the bath, but the tube and thermometer are both visible. A rigid support shall be provided to maintain the tube vertically to within 1°.

The bath shall be fitted with a heater and stirrer capable, between them, of maintaining the bath at a temperature of 23 °C ± 0,1 °C along the entire length of the viscometer and from one viscometer tube to another.

Table 1 — Dimensions, approximate *C*-constants and kinematic-viscosity ranges of the Ubbelohde viscometer

Approximate *C*-constant mm²/s²	Internal diameter of capillary mm (± 2 %)	Volume of bulb C ml (± 5 %)	Utilisation range Kinematic viscosity mm²/s *)
0,01	0,58	4	2 to 10
0,03	0,78	4	6 to 30
0,05	0,88	4	10 to 50
0,1	1,03	5	20 to 100
0,3	1,36	5	60 to 300
0,5	1,55	5	100 to 500
1,0	1,83	5	200 to 1 000
3,0	2,43	6	600 to 3 000
5,0	2,75	6	1 000 to 5 000
10,0	3,27	6	2 000 to 10 000

*) 1 mm²/s = 1 cSt

Dimensions in millimetres

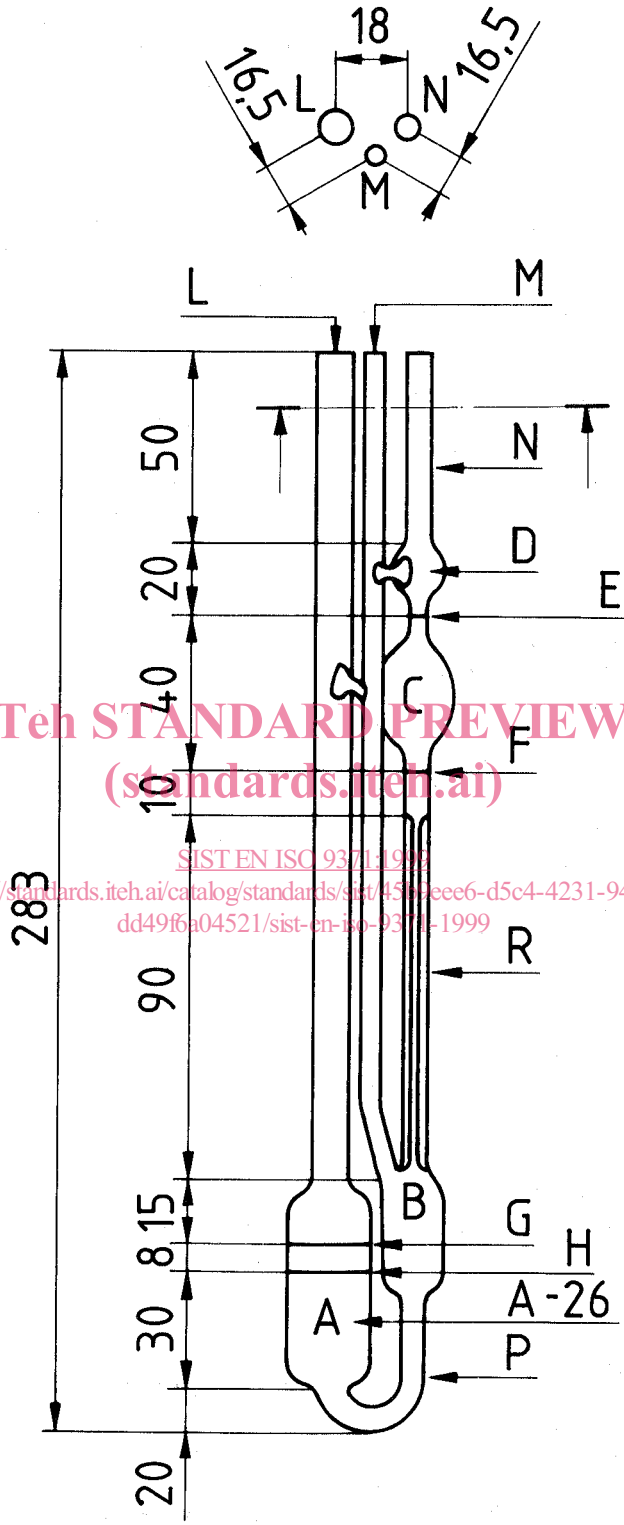

Figure 1 — Details of Ubbelohde viscometer