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Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers —

Part 2: Poly(vinyl chloride) resins

Plastiques — Détermination de la viscosité des polymères en solution diluée à l'aide de viscosimètres à capillaires —

Partie 2: Résines de poly(chlorure de vinyle)

Reference number
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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 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.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces ISO 1628-2:1998, of which it constitutes a minor revision.

The change compared to the previous edition is as follows:

— Clause 2 has been updated;

— the former Table 1 has been moved to the new informative Annex A.

A list of all parts in the ISO 1628 series can be found on the ISO website.

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.

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Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers —

Part 2: Poly(vinyl chloride) resins

1 Scope

1.1 This document specifies conditions for the determination of the reduced viscosity (also known as viscosity number) and *K*-value of PVC resins. It is applicable to resins in powder form which consist of homopolymers of the monomer vinyl chloride and copolymers, terpolymers, etc., of vinyl chloride with one or more other monomers, but where vinyl chloride is the main constituent. The resins may contain small amounts of unpolymerized substances (e.g. emulsifying or suspending agents, catalyst residues, etc.) and other substances added during the course of the polymerization. This document is not applicable, however, to resins having a volatile-matter content in excess of 0,5 % ± 0,1 %, when determined in accordance with ISO 1269. In addition to this, it is not applicable to resins which are not entirely soluble in cyclohexanone.

1.2 The reduced viscosity and *K*-value of a particular resin are related to its molecular mass, but the relationship varies depending on the concentration and type(s) of other monomer(s) present. Hence, homopolymers and copolymers having the same reduced viscosity or *K*-value might not have the same molecular mass.

1.3 The values determined for reduced viscosity and *K*-value, for a particular sample of PVC resin, are influenced differently by the concentration of the solution chosen for the determination. Hence the use of the procedures described in this document only gives values for reduced viscosity and *K*-value that are comparable when the concentrations of the solutions used are identical.

1.4 Limiting viscosity number is not used for PVC resins.

1.5 The experimental procedures described in this document can also be used to characterize the polymeric fraction obtained during the chemical analysis of a PVC composition. However, the values calculated for the reduced viscosity and *K*-value in these circumstances might not indicate the actual values for the resin used to produce the composition because of the impure nature of the recovered polymer fraction.

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 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 1628-1:2009, *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers — Part 1: General principles*

ISO 3105:1994, *Glass capillary kinematic viscometers — Specifications and operating instructions*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1628-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

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

4 Principle

4.1 A test portion is dissolved in a solvent. The reduced viscosity and the *K*-value are calculated from the efflux times for the solvent and the solution in a capillary tube viscometer.

5 Materials

5.1 Cyclohexanone, having a viscosity/density ratio (kinematic viscosity) between 2,06 × 10^{-6} m^2 s^{-1} and 2,33 × 10^{-6} m^2 s^{-1} (2,06 mm^2 s^{-1} and 2,33 mm^2 s^{-1}) at 25 °C. The specified boiling point shall be 155 °C. Store the solvent in the dark in a dark-coloured bottle fitted with a ground-glass stopper. Check the kinematic viscosity before use.

6 Apparatus

6.1 The apparatus required to carry out viscosity measurements on polymers in dilute solution are in accordance with ISO 1628-1:2009, Clause 5. In addition, the following particular items are required for the procedures described in this document.

6.2 Viscometer. From the viscometers described in ISO 1628-1:2009, 5.1, model 1C, with a capillary diameter of 0,77 (1 ± 2 %) mm, from ISO 3105:1994, Table B.4, shall be used as the reference viscometer.

Other viscometers described in ISO 1628-1 may be used provided the correlation between the chosen viscometer and the reference viscometer has been established over the range of reduced viscosities and *K*-values to be measured, and the results are corrected accordingly.

6.3 Graduated flask (one-mark volumetric flask), class A, as specified in ISO 1042, with a volume of 50 ml.

NOTE The use of a flask calibrated at a temperature of 20 °C, as specified in ISO 1042, causes a systematic error which can, however, be neglected.

6.4 Filter funnel, with fritted-glass filter disc of medium porosity (pore size 40 µm to 50 µm), or **glass funnel** with paper filter.

6.5 Mechanical agitator, equipped with a heating device to keep the flask (6.3) and its contents at a temperature between 80 °C and 85 °C.

As an alternative, a rotary agitator or shaker may be placed in an oven at a temperature between 80 °C and 85 °C.

6.6 Analytical balance, accurate to 0,1 mg.

6.7 Temperature-regulated bath, capable of being set at 25,0 °C ± 0,5 °C in steps of 0,1 °C and maintaining a stability of ± 0,05 °C around the set temperature.

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