INTERNATIONAL STANDARD

ISO 1628-2

Second edition
1998-12-01

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
ISO 1628-2:1998(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 1628-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 1628-2:1988) which has been modified to include:

— the determination of the K-value;

— a limit on the volatile-matter content of resins that can be tested using this part of ISO 1628;

— revised viscometer specifications;

— a reference viscometer;

— a precision statement.

ISO 1628 consists of the following parts, under the general title *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers:*

— *Part 1: General principles*

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

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— *Part 2: Poly(vinyl chloride) resins*

— *Part 3: Polyethylenes and polypropylenes*

— *Part 4: Polycarbonate (PC) moulding and extrusion materials*

— *Part 5: Thermoplastic polyester (TP) homopolymers and copolymers*

— *Part 6: Methyl methacrylate polymers*

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This part of ISO 1628 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 part of ISO 1628 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.

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 may not have the same molecular mass.

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 part of ISO 1628 will only give values for reduced viscosity and K-value that are comparable when the concentrations of the solutions used are identical.

Limiting viscosity number is not used for PVC resins.

The experimental procedures described in this part of ISO 1628 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 may 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 standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 1628. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 1628 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 1042:1998, *Laboratory glassware — One-mark volumetric flasks.*

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

Part 2:

ISO 1269:1980, *Plastics — Homopolymer and copolymer resins of vinyl chloride — Determination of volatile matter (including water).*

ISO 1628-1:1998, *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.*

3 Definitions

The terms used in this part of ISO 1628 are defined in ISO 1628-1:1998, clause 3, and, in particular, definitions 3.3. (reduced viscosity) and 3.3.6 (*K*-value).

4 Principle

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 $2{,}06 \times 10^{-6}$ m^2 s^{-1} and $2{,}33 \times 10^{-6}$ 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

The apparatus required to carry out viscosity measurements on polymers in dilute solution is described in ISO 1628-1:1998, clause 5. In addition, the following particular items are required for the procedures described in this part of ISO 1628:

6.1 Viscometer: From the viscometers described in subclause 5.1 of ISO 1628-1:1998, model 1C, with a capillary diameter of 0,77 mm ± 2 %, from table B.4 of ISO 3105:1994, 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.

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

NOTE 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.

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

6.4 Mechanical agitator, equipped with a heating device to keep the flask (6.2) 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.

6.5 Analytical balance, accurate to 0,1 mg.

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