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**Plastics — Homopolymer and  
copolymer resins of vinyl chloride —**

**Part 2:  
Preparation of test samples and  
determination of properties**

*Plastiques — Résines d'homopolymères et de copolymères de chlorure  
de vinyle —*

*Partie 2: Préparation des échantillons pour essai et détermination des  
propriétés*

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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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

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](http://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 first edition of ISO 24024-2 cancels and replaces ISO 1060-2:1998, which has been technically revised.

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

- the dated normative references have been replaced with undated reference.

A list of all parts in the ISO 24024 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](http://www.iso.org/members.html).

# Plastics — Homopolymer and copolymer resins of vinyl chloride —

## Part 2: Preparation of test samples and determination of properties

### 1 Scope

This document specifies the methods of preparation of test samples and the test methods to be used in determining the properties of PVC resins. Requirements for handling test material and for conditioning the material before testing are given here. In addition, properties and test methods which are suitable and necessary to characterize PVC resins are listed.

### 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 60, *Plastics — Determination of apparent density of material that can be poured from a specified funnel*

ISO 1068, *Plastics — Homopolymer and copolymer resins of vinyl chloride — Determination of compacted apparent bulk density*

ISO 1158, *Plastics — Vinyl chloride homopolymers and copolymers — Determination of chlorine content*

ISO 1264, *Plastics — Homopolymer and copolymer resins of vinyl chloride — Determination of pH of aqueous extract*

ISO 1265, *Plastics — Poly(vinyl chloride) resins — Determination of number of impurities and foreign particles*

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

ISO 1385-1, *Phthalate esters for industrial use — Methods of test — Part 1: General*

ISO 1624, *Plastics — Vinyl chloride homopolymer and copolymer resins — Sieve analysis in water*

ISO 1628-2, *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers — Part 2: Poly(vinyl chloride) resins*

ISO 2555, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity using a single cylinder type rotational viscometer method*

ISO 2591-1, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

ISO 3219, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate*

ISO 3451-5, *Plastics — Determination of ash — Part 5: Poly(vinyl chloride)*

ISO 4574, *Plastics — PVC resins for general use — Determination of hot plasticizer absorption*

ISO 4575, *Plastics — Poly(vinyl chloride) pastes — Determination of apparent viscosity using the Severs rheometer*

ISO 4608, *Plastics — Homopolymer and copolymer resins of vinyl chloride for general use — Determination of plasticizer absorption at room temperature*

ISO 4610, *Plastics — Vinyl chloride homopolymer and copolymer resins — Sieve analysis using air-jet sieve apparatus*

ISO 4612, *Plastics — Preparation of PVC pastes for test purposes — Planetary-mixer method*

ISO 6186, *Plastics — Determination of pourability*

ISO 6401, *Plastics — Poly(vinyl chloride) — Determination of residual vinyl chloride monomer — Gas-chromatographic method*

ISO 11468, *Plastics — Preparation of PVC pastes for test purposes — Dissolver method*

### **3 Terms and definitions**

No terms and definitions are listed in this document.

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 Preparation of test samples**

#### **4.1 Sampling**

The sample of resin taken should be generally representative of the resin whose properties are to be determined and be sufficiently large to provide the number of test samples required by the test methods concerned.

In order to obtain reproducible and comparable test results, it is necessary to use the methods of sample preparation and conditioning and the test procedures specified herein. Values determined will not necessarily be identical to those obtained using different test samples, or test samples prepared using different procedures.

#### **4.2 Preparation of standard pastes**

In order to carry out certain tests on paste resins, it is necessary to prepare standard pastes from the test sample concerned.

For designation purposes, one of two standard paste formulations, A and B, shall be used, but formulation A should be used in preference. Formulation B should be used when the resin to be designated does not form a paste with formulation A or if the temperature exceeds 35 °C during the preparation of the paste. Formulation B should also be used when it is not possible to measure the viscosities of the paste at both shear rates with formulation A.

|                       |                                                         |
|-----------------------|---------------------------------------------------------|
| <b>Formulation A:</b> | 100 parts by mass of resin                              |
|                       | 60 parts by mass of bis-(2-ethylhexyl) phthalate (DOP)  |
| <b>Formulation B:</b> | 100 parts by mass of resin                              |
|                       | 100 parts by mass of bis-(2-ethylhexyl) phthalate (DOP) |

The pastes shall be prepared in accordance with ISO 4612 (method B) or ISO 11468 except in cases of dispute when they shall be prepared by method B of ISO 4612.

When measured at 20 °C by the methods described in ISO 1385-1, the density, refractive index and dynamic viscosity of the DOP plasticizer used shall have the following values:

|                   |                                                    |
|-------------------|----------------------------------------------------|
| density           | 0,982 g/cm <sup>3</sup> to 0,984 g/cm <sup>3</sup> |
| refractive index  | 1,486 to 1,487                                     |
| dynamic viscosity | 77 mPa·s to 83 mPa·s                               |

## 5 Conditioning of test samples

Condition test samples prior to testing wherever specified in the test method or product specification.

## 6 Determination of properties

In the determination of properties and the presentation of results, the standards, methods and special conditions listed in [Table 1](#) shall apply.

For the designation of general-purpose resins, retention on a 63 µm mesh sieve shall be determined in accordance with ISO 4610 while, for paste resins and filler resins, it shall be determined in accordance with ISO 1624.

Table 1 — Properties and test procedures

| Properties                                                                                                  | Standard   | Units                                        |
|-------------------------------------------------------------------------------------------------------------|------------|----------------------------------------------|
| <b>Properties of powder</b>                                                                                 |            |                                              |
| Apparent density <sup>a</sup>                                                                               | ISO 60     | g/ml                                         |
| Compacted apparent bulk density                                                                             | ISO 1068   | g/ml                                         |
| Impurities and foreign particles                                                                            | ISO 1265   | number of specks per 100 squares of the grid |
| Sieve analysis in water <sup>a</sup>                                                                        | ISO 1624   | %                                            |
| Methods using test sieves of woven wire cloth                                                               | ISO 2591-1 | % or other appropriate unit                  |
| Plasticizer absorption at room temperature <sup>a</sup>                                                     | ISO 4608   | parts per 100 parts of resin by mass         |
| Sieve analysis using air-jet sieve apparatus <sup>a</sup>                                                   | ISO 4610   | %                                            |
| Hot plasticizer absorption                                                                                  | ISO 4574   | parts per 100 parts of resin by mass         |
| Pourability                                                                                                 | ISO 6186   | s                                            |
| <b>Chemical properties</b>                                                                                  |            |                                              |
| Chlorine content                                                                                            | ISO 1158   | %                                            |
| pH of aqueous extract                                                                                       | ISO 1264   | —                                            |
| Volatile matter (including water)                                                                           | ISO 1269   | %                                            |
| Reduced viscosity <sup>a</sup>                                                                              | ISO 1628-2 | ml/g                                         |
| K value                                                                                                     |            | -                                            |
| Ash                                                                                                         | ISO 3451-5 | %                                            |
| Residual vinyl chloride monomer                                                                             | ISO 6401   | mg/kg                                        |
| <b>Viscosity of pastes</b>                                                                                  |            |                                              |
| The pastes used for all viscosity determinations shall be prepared in accordance with ISO 4612 or ISO 11468 |            |                                              |
| Apparent viscosity using a single cylinder type rotational viscometer method                                | ISO 2555   | Pa·s                                         |
| Viscosity with a rotational viscometer working at defined shear rate <sup>a b</sup>                         | ISO 3219   | Pa·s                                         |
| Apparent viscosity using the Severs rheometer                                                               | ISO 4575   | Pa·s                                         |
| <sup>a</sup> Designatory property.                                                                          |            |                                              |
| <sup>b</sup> In cases of dispute, method B of ISO 4612 shall be used for paste preparation.                 |            |                                              |