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

*Plastiques — Résines d'homopolymères et de copolymères de
chlorure de vinyle à usages généraux — Détermination de la prise de
plastifiant à température ambiante*

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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 document 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 SC9, *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 fourth edition cancels and replaces the third edition (ISO 4608:1998), which has been technically revised.

The main changes are:

- the mandatory [Clause 3](#) on terms and definitions has been added and subsequent clauses have been renumbered;
- the plasticizer Bis-(3,5,5-trimethylhexyl) phthalate [Diisononylphthalate (DINP)] has been added;
- the CAS number has been included for unambiguous reference to plasticizers;
- in [5.7.1](#), a NOTE has been added informing about stop of DOP use in Europe due to hazardous substance classification.

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.

Introduction

The results of this test method give a general indication of the plasticizer absorption of a resin at room temperature. They indicate the usefulness of resins for the manufacture of plasticised dry blends, particularly when taken in conjunction with the results of plasticizer absorption tests under hot conditions.

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

1 Scope

This document specifies a method for determining the plasticizer absorption at room temperature. It is applicable to PVC general-purpose resins and filler resins designated "G" and "F" in ISO 24024-1^[1].

This document can be used to determine the quantity of plasticizer absorbed by a resin at room temperature to give a dry mixture.

2 Normative reference

The following documents are referred to in the text in such a way that some or all of their content constituted 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 1385-1, *Phthalate esters for industrial use — Methods of test — Part 1: General*

ISO 8655-2, *Piston-operated volumetric apparatus — Part 2: Pipettes*

3 Terms and definition

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Principle

An excess of plasticizer is added to a specified amount of resin. The mixture is then centrifuged under defined conditions and the amount of plasticizer retained by the resin determined.

5 Apparatus and materials

Ordinary laboratory apparatus, plus the following:

5.1 Balance, having an accuracy of $\pm 0,1$ mg.

5.2 Burette, for example 50 cm³, graduated at 0,1 cm³ intervals or dispenser, for example 50 cm³, accuracy according to ISO 8655-2.

5.3 Centrifuge, whose rotor turns in a horizontal plane and which has an acceleration under the test conditions of 24 500 m·s⁻² to 29 500 m·s⁻² measured at the bottoms of the tubes, with, if necessary,

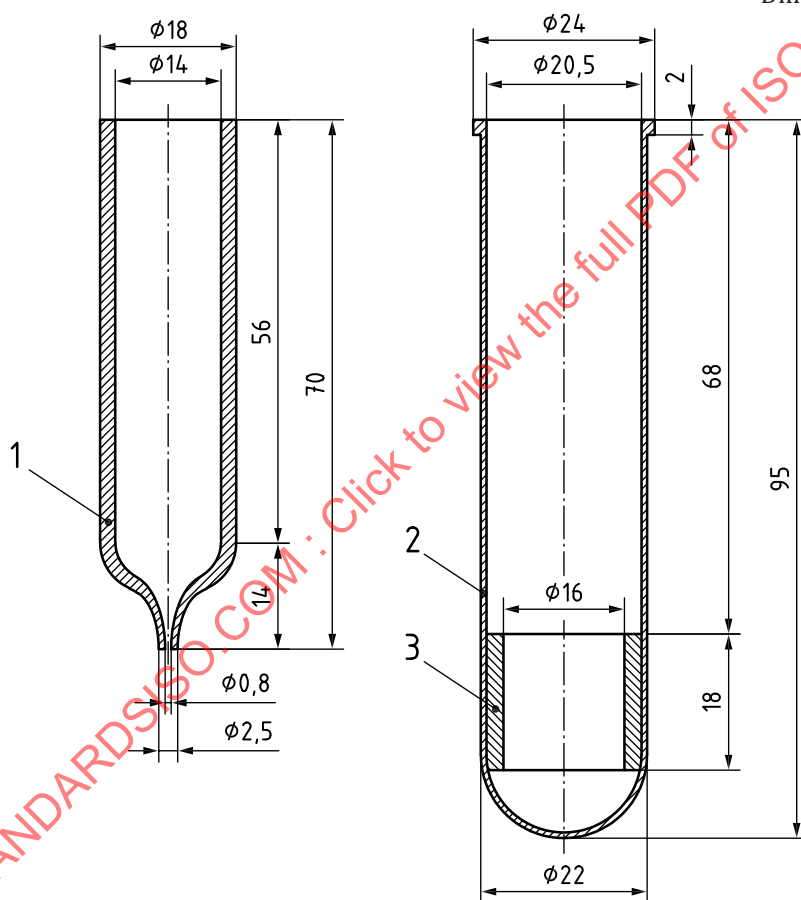
a cooling system to prevent the temperature of the mixture from exceeding 30 °C at the end of centrifuging for 60 min.

Deviating centrifuging conditions, i.e. deviating acceleration, deviating time and smaller centrifuge tubes (see 5.4) may be used, provided that it has been verified that the results obtained are equivalent.

5.4 Centrifuge tubes, to fit the centrifuge used, each consisting either of a tube, made of glass or another material, with a conical bottom pierced by a hole of about 0,8 mm diameter (see Figure 1) or of a cylindrical tube fitted at one end with a sieve plate on which a filter paper can be placed (see Figure 2). The sieve plate is pierced by holes of diameter approximately 0,8 mm. The holes are arranged concentrically approximately 4 mm apart.

5.5 Sheaths, made of polyamide, polyethylene or any other suitable material, to fit the centrifuge used, with a reduction tube at the bottom to support the centrifuge tube (see Figure 1 or 2).

Dimensions in millimetres

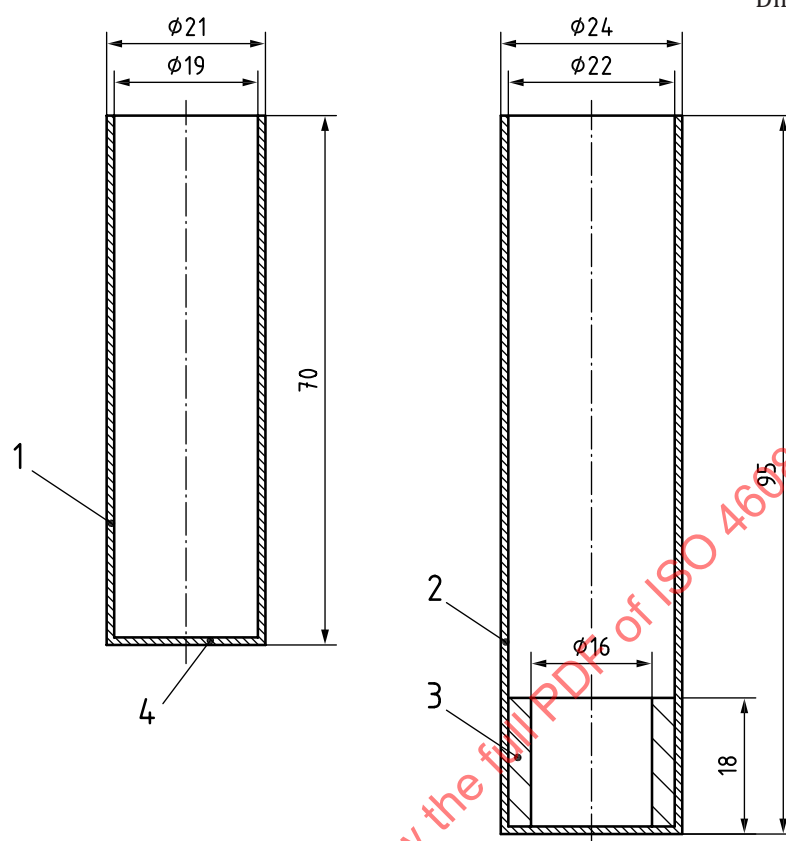


Key

- 1 centrifuge tube
- 2 sheath
- 3 reduction tube

Figure 1 — Example of centrifuge tube (without sieve plate) and sheath

Dimensions in millimetres

**Key**

- 1 centrifuge tube
- 2 sheath
- 3 reduction tube
- 4 sieve plate

Figure 2 — Example of centrifuge tube (with sieve plate) and sheath

5.6 Cotton wool, pharmaceutical quality, having a plasticizer absorption measured under the test conditions (see 6.1) of approximately 10 %, or, if a centrifuge tube with a sieve plate is used, filter paper, with a diameter is equal to the inner diameter of the centrifuge tube.

NOTE Filter paper of grammage of 60 g/m² to 80 g/m² has been found useful.

Alternative materials to cotton wool, for example glass wool and PTFE-coated polyester felt, may be used if it can be shown that they produce equivalent results.

5.7 Plasticizers

The following plasticizers are covered by this document:

5.7.1 Bis-(2-ethylhexyl) phthalate [Dioctylphthalate (DOP)]

When tested using the methods specified in ISO 1385-1 at 20 °C, the DOP plasticizer used shall have the following properties:

CAS number	117-81-7
Density	0,982 g/cm ³ to 0,984 g/cm ³
Refractive index	1,486 to 1,487
Dynamic viscosity	77 mPa·s to 83 mPa·s

NOTE DOP is no longer used in Europe. According to the harmonised classification and labelling (CLP00) approved by the European Union and additional classification provided by companies to ECHA in REACH registrations, this substance can damage fertility and can damage the unborn child. Additionally, it is very toxic to aquatic life.

5.7.2 Bis-(3,5,5-trimethylhexyl) phthalate [Diisononylphthalate (DINP)]

When tested using the methods specified in ISO 1385-1 at 20 °C, the DINP plasticizer used shall have the following properties:

CAS-Number	28553-12-0 or 68515-48-0
Density	0,970 g/cm ³ to 0,977 g/cm ³
Refractive index	1,484 to 1,488
Dynamic viscosity	68 mPa·s to 82 mPa·s

6 Procedure

6.1 Measurement of plasticizer absorbed by the cotton wool or filter paper

Following the procedure indicated in 6.2, carry out a blank test with a piece of cotton wool having a mass of 100 mg ± 2 mg or with a filter paper (if a centrifuge tube with a sieve plate is used), but without any resin.

Determine the amount of plasticizer absorbed by the cotton wool or filter paper, in grams.

6.2 Determination

Weigh a piece of cotton wool (100 mg ± 2 mg), place it in the centrifuge tube and pack it down slightly. When working with a centrifuge tube with a sieve plate, place a filter paper on the sieve plate. Weigh the tube and cotton wool or filter paper to the nearest 0,1 mg.

Weigh directly into the tube 2,000 g ± 0,200 g to the nearest 0,1 mg of the resin under test. From the burette, run into the tube 4 cm³ of plasticizer and allow it to stand for about 10 min.

If smaller centrifuge tubes are used (see 5.3), the following smaller quantities of material may be used:

- 1 g of resin under test;
- 2 cm³ of plasticizer.

Put the tube into its sheath and place the whole into one of the compartments of the centrifuge rotor (the other compartments being occupied by tubes containing other resin samples, all the tubes being balanced).

Set the centrifuge to give an acceleration of 24 500 m·s⁻² to 29 500 m·s⁻² at the bottoms of the tubes for 60 min. If necessary, switch on the cooling device during centrifuging. The temperature shall not exceed 30 °C.

Take the tube from its sheath, carefully wipe it to remove any plasticizer on the outside and weigh it to the nearest 0,1 mg.

7 Expression of results

The room temperature plasticizer absorption is given by [Formula \(1\)](#):

$$w_P = \frac{(m_3 - m_0) - m_2}{m_2 - m_1} \cdot 100 \quad (1)$$

where

- w_P is the amount of plasticizer, expressed as parts of plasticizer absorbed per 100 parts of resin (p.h.r.);
- m_0 is the mass, in grams, of plasticizer absorbed by the cotton wool or filter paper in the blank test (see [6.1](#));
- m_1 is the mass, in grams, of the centrifuge tube plus cotton wool or filter paper (see [6.2](#));
- m_2 is the mass, in grams, of the centrifuge tube plus cotton wool or filter paper and resin sample (see [6.2](#));
- m_3 is the mass, in grams, of the centrifuge tube plus cotton wool or filter paper, resin and plasticizer absorbed, after centrifuging (see [6.2](#)).

8 Test report

The test report shall include the following information:

- a) a reference to this document, including the year of publication, i.e. ISO 4608:2023;
- b) all details necessary for identification of the sample tested, including the type of plasticizer;
- c) the centrifuging conditions (acceleration and time), if different from those specified in [6.2](#);
- d) the quantities of resin and plasticizer used, if different from those specified in [6.2](#);
- e) the result of the test;
- f) any deviations from the procedure;
- g) any unusual features observed;
- h) the date of the test.