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Driers for paints and varnishes

Siccatifs pour peintures et vernis

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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).

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).

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.

This document was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*.

This third edition cancels and replaces the second edition (ISO 4619:1998), which has been technically revised. The main changes compared to the previous edition are as follows:

— the concentration of phenolphthalein indicator solution in 7.7.2.6 has been reduced to 0,5 % following actual requirements;

— the determination of lead has been deleted;

— the normative references have been updated;

— the text has been editorially revised.

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.

Driers for paints and varnishes

CAUTION — The procedures described in this document are intended to be carried out by qualified chemist or by other suitably trained and/or supervised personnel. The substances and procedures used in this document can be injurious to health if adequate precautions are not taken. It is the responsibility of the user of this document to establish appropriate health and safety practices prior to its use.

Attention is particularly drawn to the health hazards of heavy metals which might be a constituent of driers (e.g. cobalt, cerium, zirconium, vanadium).

1 Scope

This document specifies the requirements and the corresponding test methods for driers for paints, varnishes and related products. It applies to driers in the solid or liquid form. It does not apply to emulsifiable driers.

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 150, *Raw, refined and boiled linseed oil for paints and varnishes — Specifications and methods of test*

ISO 1523, *Determination of flash point — Closed cup equilibrium method*

ISO 2592, *Petroleum and related products — Determination of flash and fire points — Cleveland open cup method*

ISO 2811-1, *Paints and varnishes — Determination of density — Part 1: Pycnometer method*

ISO 3251, *Paints, varnishes and plastics — Determination of non-volatile-matter content*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and the following 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/

3.1
drier
compound, usually a metallic soap, that is added to products drying by oxidation in order to accelerate this process

4 Descriptions

4.1 Solid driers

Solid driers are materials which can be manufactured in a hard, soft (highly viscous) or powder form.

4.2 Liquid driers

Liquid driers are materials which are supplied as solutions in organic solvents, usually white spirit.

All these types of driers, when dissolved in solvents (normally hydrocarbons), impart specific drying properties depending on the metal used.

4.3 Metals used

The following metals are normally used: cobalt, manganese, zinc, calcium, cerium (or other rare earths), iron, zirconium, vanadium, barium, aluminium, strontium, etc.

NOTE In this document, methods for determination of metal content are given only for those metals which are in common use.

4.4 Acids used

The following acids are used: fatty acids of linseed oils, tall-oil fatty acids, resinic acids, naphthenic acids, 2-ethylhexanoic acid, fatty iso-acids with 9 carbon atoms, other fatty acids with 9 to 11 carbon atoms, etc.

5 Requirements and test methods

5.1 Driers for paints shall conform to the requirements given in Table 1.

Table 1 — Requirements and test methods

Characteristic		Requirement	Test method	
			Solid driers	Liquid driers
Appearance		Clear and uniform; no suspended matter or sediment	7.1	8.1
Consistency, if required		As agreed between the interested parties	To be agreed between the interested parties	—
Colour		As agreed between the interested parties	7.2	8.2
Solubility (miscibility) in solvent, raw linseed oil and other drying media		No separation or deposit	7.3	8.3
Stability of solution		Clear solution; no clouding, gelation or sedimentation	7.4	8.4
Suspended solid matter	of liquid driers % (mass fraction)	max. 0,1	—	7.5
	of solid driers	As agreed between the interested parties	7.5	—

[a] Tolerance (absolute value) on the metal content declared or agreed.

Table 1 *(continued)*

Characteristic		Requirement	Test method	
			Solid driers	Liquid driers
Viscosity, only for liquid driers		As agreed between the interested parties	—	8.5
Volatile matter at 105 °C		As agreed between the interested parties	7.6	7.6
Flashpoint		As agreed between the interested parties	ISO 2592	ISO 1523
Density		As agreed between the interested parties	To be agreed between the interested parties	ISO 2811-1
Acidity or basicity		As agreed between the interested parties	7.7	7.7
Drying characteristics		As agreed between the interested parties	To be agreed between the interested parties	To be agreed between the interested parties
Metal content (range)	up to 10 % (mass fraction)	±0,2 % (mass fraction)[a]	Clause 9 or Clause 10	
	above 10 % (mass fraction) to 20 % (mass fraction)	±0,3 % (mass fraction)[a]		
	above 20 % (mass fraction) to 30 % (mass fraction)	±0,4 % (mass fraction)[a]		
	above 30 % (mass fraction)	±0,5 % (mass fraction)[a]		

[a] Tolerance (absolute value) on the metal content declared or agreed.

5.2 Driers named according to the commercial name of the main acid used shall contain at least 90 % of this acid, except for driers based on naphthenic acids, which shall contain at least 70 % of these acids, expressed as a percentage of the total mass of acid present.

NOTE The type and content of the acids can be determined by gas-chromatographic (GC) analysis, except in the case of naphthenic acids.

6 Sampling

Take a representative sample of the drier to be tested, as specified in ISO 15528.

7 Methods of test for solid driers

During the analysis, use only reagents of recognized analytical grade and only water of at least grade 3 purity in accordance with ISO 3696.

7.1 Appearance and consistency

Examine the sample visually for uniformity. If the consistency is specified, a method for its determination shall be agreed between the interested parties.

7.2 Colour

Dissolve 1 part by mass of the drier in 1 part by mass of white spirit or other agreed solvent and compare the colour against an agreed sample or colour standard.

7.3 Solubility (miscibility) in solvents, raw linseed oil or other drying media

Slowly heat, raising the temperature at a rate of 1 °C/min, 5 g of the drier and 20 g of an agreed solvent (or drying medium) under reflux on a sand bath, with stirring, until a homogeneous solution is obtained.

Allow to cool to room temperature and examine the solution for clarity, clouding and any separation or deposit.

7.4 Stability of solution

Allow 3 portions of the solution obtained by the method specified in 7.3 to stand for 7 days in stoppered bottles, one at each of the following temperatures:

a) 0 °C;

b) ambient temperature;

c) 50 °C.

After 1 day and again after 7 days, examine the solutions for clarity, clouding sedimentation or gelation. The bottle used for the test at 50 °C shall be able to withstand the pressure generated.

7.5 Suspended solid matter

Weigh, to the nearest 0,1 g, 5 g of solid drier (or 10 g of liquid drier) into a glass flask and dissolve in (or dilute with) 100 g of white spirit or an agreed solvent. Stopper the flask, allow to stand at ambient temperature for 3 days, then filter off the sediment or suspended matter using a glass filter crucible of porosity P 16 (see ISO 4793). Wash the residue on the filter with the solvent and dry it at 105 °C for 3 h. Cool to ambient temperature and weigh to the nearest 1 mg.

Calculate the suspended solid matter SSM, as a percentage mass fraction, using Formula (1):

$$\mathrm{SSM} = \frac{m_1}{m_0} \times 100 \qquad (1)$$

where

m_0 is the mass, in grams, of the test portion;

m_1 is the mass, in grams, of the residue.

7.6 Volatile matter

Proceed in accordance with ISO 3251, taking a flat-bottomed glass of aluminium dish and a test portion of (1,00 ± 0,02) g. Place the dish with the test portion in the air oven, maintained at (105 ± 2) °C. Leave it in the oven at this temperature for 3 h.

7.7 Acidity

7.7.1 Principle

A solution of the drier in toluene/propan-2-ol is passed through a strong acid cation exchanger and the total acid in the eluate is determined. From the total acid determined, the acid combined with the metal is subtracted.

If a negative value for the acidity is obtained, the drier tested is a basic drier.

The method is suitable for driers containing barium, calcium, cobalt or zinc as metals, but is not applicable to driers containing cerium, iron, manganese or zirconium as metals.

In such cases, the method shall be agreed between the interested parties.

7.7.2 Reagents

7.7.2.1 Cation exchanger: a strong-acid, ring-sulfonated polystyrene resin (for example, Merck 1, Dowex 50, Amberlite IR 120)[1)].

7.7.2.2 Propan-2-ol.

7.7.2.3 Toluene.

7.7.2.4 Hydrochloric acid, approximately 5 % (mass fraction) solution.

7.7.2.5 Potassium hydroxide, approximately 0,2 mol/l standard volumetric solution in 96 % (volume fraction) ethanol.

7.7.2.6 Phenolphthalein, 0,5 % (mass fraction) solution in 96 % (volume fraction) ethanol.

7.7.3 Apparatus

Ordinary laboratory apparatus and glassware, and the following.

7.7.3.1 Suitable ion-exchange column, as shown in Figure 1, for instance.

1) These are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.