

INTERNATIONAL STANDARD

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Paints and varnishes — Determination of the pot-life of liquid systems — Preparation and conditioning of samples and guidelines for testing

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*Peintures et vernis — Détermination du délai maximal d'utilisation après
mélange des peintures liquides — Préparation et conditionnement des
échantillons et lignes directrices pour les essais*

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INTERNATIONAL

ISO



Reference number
ISO 9514:1992(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 9514 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Sub-Committee SC 9, *General test methods for paints and varnishes*.

[ISO 9514:1992](https://standards.iteh.ai/catalog/standards/sist/3762f609-906b-42a1-a0d5-)

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Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

Paints and varnishes — Determination of the pot-life of liquid systems — Preparation and conditioning of samples and guidelines for testing

1 Scope

This International Standard is one of a series of standards dealing with the sampling and testing of paints, varnishes and related products.

This International Standard specifies a method, carried out under standard conditions, for preparing and storing a sample so that its pot-life may be assessed by measuring a particular property.

Reactive systems curing within a 3-h period of time will have the end of their pot-life so near to the gel point that they will need to be tested for that particular property in accordance with ISO 2535[2].

Special "low-temperature" grades, curing within 3 h under standard conditions, will need to be tested at a lower specified temperature, so that it is possible to investigate particular properties, as required.

The value obtained may be subject to modification by suppliers for practical reasons (e.g. starting temperature) when giving advice to users and should then be called the "practical pot-life".

The method may be carried out

- either as a pass/fail test by determining the particular property after a specified period of time, or
- as determination of the pot-life by repeating determinations at convenient intervals of time.

This International Standard is not intended for *in situ* control on products during their application. It is intended to determine "pot-life" in the laboratory.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publi-

cation, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 1512:1991, *Paints and varnishes — Sampling of products in liquid or paste form.*

ISO 1513:1992, *Paints and varnishes — Examination and preparation of samples for testing.*

ISO 3270:1984, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing.*

ISO 4618-1:1984, *Paints and varnishes — Vocabulary — Part 1: General terms.*

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1 pot-life: Maximum time during which a product supplied as separate components should be used after they have been mixed together.

[ISO 4618-1:1984]

NOTE 1 It is important that, in this definition, the words "should be used" are understood to refer to the application properties of the reactive system under test as well as the properties of the dried film.

4 Principle

The components of the reactive system are conditioned separately and then mixed; the blend is allowed to stand for specified period(s) of time under nearly adiabatic conditions (see note 3). Sub-

sequently, a sample is withdrawn from the blend and a particular property (see note 2) is measured to check compliance with the requirement for that property for the product under test.

NOTES

2 For the different reactive systems, the pot-life is dependent on a variety of properties; because of this variety, the pot-life can only be specified with reference to a particular property. Guidance on the property to be tested for various reactive systems is given in annex B.

3 This International Standard specifies the conditions for preparing and storing a sample in order to assess the pot-life; these conditions must be near to adiabatic so that they bear a close relationship to those which exist in practice.

5 Required supplementary information

For any particular application, the test method specified in this International Standard needs to be completed by supplementary information. The items of supplementary information are given in annex A.

6 Apparatus

Ordinary laboratory apparatus and glassware, together with the following.

6.1 Container, of volume approximately 500 ml, made of any suitable material and with dimensions such that the height is not more than 1,5 times the diameter.

6.2 Block, of polystyrene, polyurethane or glass foam with one or more holes to hold the container (6.1), each hole being surrounded by at least 20 mm of foam. The insulating value of the foam shall be not greater than $25 \text{ W}/(\text{m}\cdot\text{K})^1$. The depth of the hole(s) shall be equal to the height of the container. The purpose of a block of this design is to ensure that adiabatic conditions are maintained.

6.3 Thermometer, accurate to within $0,2 \text{ }^\circ\text{C}$.

6.4 Measuring apparatus, in accordance with the standard giving the relevant test method for measuring the particular property specified.

7 Sampling

Take a representative sample of the product to be tested (or of the various components of the reactive system), as described in ISO 1512. Take a sufficient quantity of sample to test in duplicate.

1) An insulating value as expressed here in watts per metre and Kelvin is also known as the K-value.

Examine and prepare each sample for testing, as described in ISO 1513.

8 Procedure

Carry out the test in duplicate.

8.1 Condition the components of the reactive system separately in accordance with ISO 3270. After conditioning at the specified temperature, the difference in temperature between the components shall not be greater than $1 \text{ }^\circ\text{C}$.

Special "low-temperature" grades, curing within 3 h under standard conditions, shall be tested at a lower specified temperature, so that it is possible to investigate particular properties, as required.

8.2 Mix the components in accordance with the instructions given for the particular system and to give a convenient quantity of blend for testing.

Put (300 ± 3) ml of the blend into each container.

Close the container(s) (if applicable) and put it (them) into the hole(s) in the foam block.

If application properties are to be assessed, it may be necessary to use a larger sample. For example for airless spraying, the minimum sample amount shall be 5 litres. In the case of this larger sample, it is not necessary for it to be insulated.

8.3 If the pass/fail test is to be carried out, allow the blend to stand for the specified pot-life time and subsequently measure the particular property under investigation.

If the pot-life is to be determined, allow the blend to stand for the periods of time chosen for the determination. After each period of time, withdraw a sample from the container and measure the particular property under investigation.

9 Expression of results

The pot-life is exceeded when the value of the property under investigation no longer complies with the requirements of the product standard or the working document.

In the case of a pass/fail test, report the result of the (duplicate) determination as "fail" if in one or both of the tests the pot-life is exceeded.

In the case of the determination of the pot-life, report as the pot-life the period of time preceding the shortest period of time after which the pot-life is exceeded.

10 Precision

Repeatability and reproducibility data will normally be given in the test method(s) for the property under investigation.

In the case of the determination of the pot-life, in time, the intervals between the periods of time chosen for the test (see 8.3) determine to a large extent the "precision" of the method.

11 Test report

The test report shall contain at least the following information:

- a) all details necessary to identify the product tested;
- b) a reference to this International Standard (ISO 9514);
- c) the items of supplementary information referred to in annex A;
- d) a reference to the international or national standard, product specification or other document supplying the information referred to in c);
- e) the results of the duplicate determinations as required by the documents referred to in d), and the results of the test, as indicated in clause 9;
- f) any deviation from the test method specified;
- g) the date of the test.

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Annex A
(normative)

Required supplementary information

The items of supplementary information listed in this annex shall be supplied as appropriate to enable the method to be carried out.

The information required should preferably be agreed between the interested parties and may be derived, in part or totally, from an international or national standard or other document related to the product under test.

a) Proportions in which the components of the reactive system are to be mixed.

b) Instructions for mixing the reactive system and the quantity of the blend used per container.

c) The particular property to be measured to determine the pot-life of the reactive system.

d) Instructions for modifying the product for the required application, e.g. brushing, spraying, dipping, etc.

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Annex B (informative)

Guide to reactive systems tested

This annex is intended as a guide to the testing of various reactive systems, giving the properties to be measured and the limits which will ensure acceptable performance under standard conditions

(see ISO 3270). The guide is based on practical information from participating member bodies. For the full titles of the ISO standards referred to, see annex C.

Reactive system	Property measured	End of pot-life	Test method
Unsaturated polyester (catalysed)	Viscosity	Gel point	ISO 2535
Epoxy resins			
— water-borne	Gloss (film formation)	50 % of original	ISO 2813
— solvent-borne	Viscosity	10 % solvent for correction	ISO 2884
— solvent-free	Heat of reaction	40 °C end-temperature	—
— modified (e.g. tar)	Applicability (appearance)	Film defects (optical)	—
Polyurethanes			
— solvent-borne	Adhesion	Difference compared with "fresh" blend	ISO 4624/ ISO 2409
— solvent-free	Viscosity	Gel point	ISO 2535
— moisture-curing	Homogeneity	Skin/gel formation	ISO 1513
Poly(vinyl butyrate)	Adhesion to non-ferrous substrates	Decrease compared with "fresh" blend	ISO 2409
Alkyd melamines (acid-catalysed)	Clarity	Haze	—
Silicates	Homogeneity	Skin/ crust formation	ISO 1513

Annex C
(informative)

Bibliography

- [1] ISO 2409:1992, *Paints and varnishes — Cross-cut test.* *films at 20 degrees, 60 degrees and 85 degrees.*
- [2] ISO 2535:1974, *Plastics — Unsaturated polyester resins — Measurement of gel time at 25 °C.*
- [3] ISO 2813:—²⁾, *Paints and varnishes — Determination of specular gloss of non-metallic paint*
- [4] ISO 2884:1974, *Paints and varnishes — Determination of viscosity at a high rate of shear.*
- [5] ISO 4624:1978, *Paints and varnishes — Pull-off test for adhesion.*

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2) To be published. (Revision of ISO 2813:1978)

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