EUROPEAN STANDARD

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English Version

# Paints and varnishes - Determination of the pot life of multicomponent coating systems - Preparation and conditioning of samples and guidelines for testing (ISO 9514:2019)

Peintures et vernis - Détermination du délai maximal d'utilisation après mélange des systèmes de revêtement multicomposants - Préparation et conditionnement des échantillons et lignes directrices pour les essais (ISO 9514:2019)

Beschichtungsstoffe - Bestimmung der Verarbeitungszeit von Mehrkomponenten-Beschichtungssystemen - Vorbereitung und Konditionierung von Proben und Leitfaden für die Prüfung (ISO 9514:2019)

This European Standard was approved by CEN on 10 June 2019.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**



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# European foreword

This document (EN ISO 9514:2019) has been prepared by Technical Committee ISO/TC 35 "Paints and varnishes" in collaboration with Technical Committee CEN/TC 139 “Paints and varnishes” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 9514:2005.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**Endorsement notice**

The text of ISO 9514:2019 has been approved by CEN as EN ISO 9514:2019 without any modification.

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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).

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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*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This third edition cancels and replaces the second edition (ISO 9514:2005), of which it constitutes a minor revision.

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

— reference to "low temperature" coating systems have been deleted because they are not defined and it is not clear which systems are covered;

— the description of the conditioning chamber (former 6.2) has been deleted;

— the clause (former Clause 10) on precision has been deleted because no precision data on pot life determined by a specific test method are available;

— poly(vinyl butyrate) and alkyd melamines (acid-catalysed) have been deleted from Table A.1;

— the text of the former notes to the principle bave been moved to the new introduction;

— the text has been editorially revised;

— the normative references have been updated;

— the required supplementary information (former Annex A) have been included in the test report.

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

This document specifies the conditions for preparing and storing a sample in order to assess the pot-life. These conditions are near to adiabatic so that they bear a close relationship to those which exist in practice, e.g. mixing fairly large volumes of liquid reactive systems for use.

The pot life is dependent on a variety of properties, depending on the reactive system involved. Because of this variety, the pot-life can only be specified with reference to a particular property. Guidance on the property/ies to be tested for various reactive systems is given in Annex A.

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# Paints and varnishes – Determination of the pot life of multicomponent coating systems – Preparation and conditioning of samples and guidelines for testing

## 1 Scope

This document specifies a method, carried out under standard conditions, for preparing and storing a sample of a multicomponent coating system and subsequently assessing its pot-life by measuring a particular property/ies.

Reactive systems curing within a short period of time, e.g. 3 h, 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.

The method can be carried out either as a pass/fail test by determining the particular property/ies after a specified period of time, or as determination of the pot life by repeating determinations at convenient intervals of time.

This document is not intended for in situ control of products during their application. It is intended to determine "pot life" in the laboratory.

The value obtained from this test method can 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".

## 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 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 2535, *Plastics — Unsaturated-polyester resins — Measurement of gel time at ambient temperature*

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

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**
**pot life**
maximum time during which a coating material supplied as separate components should be used after the components have been mixed together

Note 1 to entry: The term pot life can relate to the maximum time after mixing that the applied coating material retains good dry film properties and/or the maximum time after mixing that a liquid coating material retains good application properties.

[SOURCE: ISO 4618:2014, 2.201]

## 4 Principle

The components of the liquid system are conditioned separately and then mixed; the blend is allowed to stand for (a) specified period(s) of time under nearly adiabatic conditions. Subsequently, a sample is withdrawn from the blend and (a) particular property/ies is/are measured to check compliance with the requirement for that property for the product under test.

## 5 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

**5.1 Container,** of volume approximately 500 ml, made of any suitable material and with dimensions such that the height is 1 to 1,5 times the diameter.

**5.2 Thermometer,** capable of measuring to the nearest 0,2 °C.

**5.3 Timer.**

## 6 Sampling

Take a representative sample of each component of the product to be tested, as described in ISO 15528. Take sufficient quantities to test in duplicate.

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

## 7 Procedure

Carry out the test in duplicate.

Condition the components of the liquid 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 °C.

Note the time, and mix the components in accordance with the instructions given for the particular system and to give a convenient quantity of blend for testing. Report the proportions of the components in the mixture.

Put (300 ± 3) ml of the blend into a container. Close the container, if applicable, and put it into the conditioning chamber.

If application properties are to be assessed, it is necessary to prepare a volume of blend approximately equal to the volume in which the paint will be supplied for use.

Annex A gives guidance on the properties that can be measured.

If a 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/ies under investigation.

If the pot life itself is to be determined, allow the blend to stand for the periods of time chosen for the determination. After each period of time, i.e. at defined intervals, withdraw a sample from the container and measure the particular property/ies under investigation.

The pot life is exceeded when the value of the property/ies under investigation, e.g. gloss, no longer complies with the requirements of the product standard or the working document.

## 8 Expression of results

For a pass/fail test, report the result of the duplicate determination as "fail" if, in one or both of the determinations, the requirements for the measured property/ies were not met after the specified time.

For the determination of the pot life, report the longest period of time for which the specific property/ies still met the requirements in both of the duplicate determinations.

## 9 Test report

The test report shall contain at least the following information:

a) all information necessary for identification of the product tested;

b) a reference to this document, i.e. ISO 9514:2019;

c) the proportions in which the components of the system are to be mixed;

d) the instructions for mixing the reactive system, the quantity of the blend to be used and the volume of the container;

e) the conditions of temperature and relative humidity under which the test is to be carried out (if different from standard conditions);

f) the particular property/ies to be measured to determine the pot life of the reactive system;

g) the instructions for modifying the product for the required application (brushing, spraying, dipping, etc.);

h) information about the conditioning;

i) the results of the test, as indicated in Clause 8;

j) any deviations from the procedure specified;

k) any unusual features (anomalies) observed during the test;

l) the date of the test.

# Annex A
(informative)

# Guidance to testing of liquid systems

Table A.1 is intended as a guidance 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 guidance is based on practical information from ISO member bodies.

**Table A.1 — Guidance to testing of liquid systems**

| Reactive system | Property measured | End of pot-life | Test method |
|---|---|---|---|
| Unsaturated polyester (catalysed) | Viscosity | Gel point | ISO 2535 |
| Epoxy resins (water-borne) | Gloss | 50 % of starting value (or as otherwise agreed) | ISO 2813 |
| Epoxy resins (solvent-borne) | Viscosity | Percentage increase or set limit (as agreed) | ISO 2884-1 |
| | Application | a) Limit of acceptable application by specified method<br>b) Presence of defects in film (assessed visually) | |
| Silicone elastomers | Viscosity | Percentage increase or set limit (as agreed) | ISO 2884-1 |
| | Application | a) Limit of acceptable application by specified method<br>b) Presence of defects in film (assessed visually) | |
| Polyurethanes | Adhesion | Difference compared with "fresh" blend | ISO 4624 |
| | Viscosity | a) Percentage increase or set limit (as agreed) | ISO 2884-1 |
| | | b) Gel point | ISO 2535<br>ISO 2884-1 |
| | Homogeneity | Skin/gel formation | ISO 1513 |
| Silicates | 1 Homogeneity | Skin/crust formation | ISO 1513 |
| | 2 Solvent resistance | Difference compared with "fresh" blend | ISO 2812 (all parts) |

# Bibliography

[1] ISO 2812 (all parts), *Paints and varnishes — Determination of resistance to liquids*

[2] ISO 2813, *Paints and varnishes — Determination of gloss value at 20°, 60° and 85°*

[3] ISO 2884-1, *Paints and varnishes — Determination of viscosity using rotary viscometers — Part 1: Cone-and-plate viscometer operated at a high rate of shear*

[5] ISO 4624, *Paints and varnishes — Pull-off test for adhesion*