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Structural adhesives — Determination of the pot life (working life) of multi-component adhesives

Adhésifs structuraux — Détermination de la vie en pot (durée d'utilisation) des adhésifs multicomposants

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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/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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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 193, *Adhesives*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 10364:2015), which has been technically revised.

The main changes are as follows:

- ~~subclause 6.6, "subclause 6.6, Method 5: Determination by control of "snap time""~~ has been added.

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.

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Structural adhesives — Determination of the pot life (working life) of multi-component adhesives

SAFETY STATEMENT — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to determine any regulatory requirements **prior to use**.

1 Scope

This document specifies methods for determining the pot life of multi-part adhesives, in order to be able to determine whether the pot life conforms to the minimum specified working life required of an adhesive.

The different methods described in this document to measure the property do not necessarily provide identical results.

The test methods described are suitable for assessing all multi-part adhesives, and especially epoxy based and polyurethane based adhesives, but they are not suitable for some acrylic-based adhesives.

NOTE 1 Some of the methods described in this document can also be suitable for determination of working life of one-part adhesives that react to humidity (e.g. PUR prepolymers).

NOTE 2 This document can also be used for assessing non-structural adhesives.

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 472, Plastics — Vocabulary

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

ISO 15605, Adhesives — Sampling

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 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 <https://www.electropedia.org/>

3.1 pot life working life

maximum period of time during which a multi-part adhesive can be used after mixing the components

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4 Principle

This document specifies five methods for the determination of the pot life of multi-part adhesives.

In method 1, the pot life is determined from the increase in viscosity of the adhesive as it reacts. This method is not suitable for the determination of pot lives that are shorter than 5 min.

In method 2, the pot life is determined from the decrease in the mass of mixed adhesive which is extruded in unit time under standard conditions. This method is not suitable for the determination of pot lives that are shorter than 5 min.

In method 3, the pot life is determined as the time taken by the mixed adhesive to reach a specified temperature, the so-called critical temperature. This method is applicable to all multi-part systems.

In method 4, the working life of low viscose, self-levelling two-part adhesives, or one-part moisture curing adhesives is determined by means of the film formation point and the drying point. A thin weight-loaded pin ("needle") is drawn at a constant speed through a thin layer of the respective adhesive. The time at which the trace, generated by the needle, is no longer levelled out by the still flowing adhesive is defined as film formation time while the point at which the needle lifts out of the adhesive and continues gliding on the film surface without leaving any marks is defined as film drying time.

In method 5, the pot life is determined as the change in string building, called snap time.

5 Apparatus

5.1 Balance, capable of weighing up to (500 ± 0,1) g for methods 1 and 2 and up to (100 ± 0,1) g for methods 3, and 4.

5.2 Beaker, squat shape, plain bottom of appropriate size, made of a material which does not react with the adhesive under test, with a wall thickness which does not exceed 1 mm.

5.3 Spatula, made of a material which does not react with the adhesive under test.

5.4 Rotational viscometer, as specified in ISO 2555 or ISO 3219.

5.5 Water bath, capable of being maintained at constant temperature to within ±0,1 °C for methods 2 and 3 and within ±0,2 °C for method 4 throughout the temperature range 15 °C to 30 °C.

5.6 Stopwatch, uncertainty of measurement to ±1 s.

5.7 Test enclosure, capable of being maintained at the test temperature and, if necessary, at a relative humidity of (50 ± 5) %.

5.8 Disposable plastic cartridges, internal diameter 47 mm, length 210 mm, and fitted with a threaded end fitting and a piston, both cartridge, and piston being made of a material which does not react with the adhesive under test.

5.9 Stirrer, with a rigid, helical stirrer blade made of a material which does not react with the adhesive under test.

5.10 Stirrer motor, electrically or pneumatically powered, whose speed should be regulated between 0 min⁻¹ and 1 000 min⁻¹.

5.11 Extrusion nozzle, made of material which does not react with the adhesive under test, capable of being screwed onto the end fitting of the cartridge (5.8)-(5.8). The diameter of the nozzle's extrusion orifice shall be suitable for dispensing the mixed adhesive. An orifice diameter of 3 mm shall be used.

5.12 Extrusion gun, powered by compressed air, suitable for use with the cartridge (5.8)-(5.8).

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