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Building and civil engineering sealants — Determination of cured thickness of one-component sealant —

Part 1: Taper-shaped groove test method

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Contents

Page

Foreword

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This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 8, *Sealants*.

A list of all parts in the ISO 24070 series can be found on the ISO website.

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.

Building and civil engineering sealants — Determination of cured thickness of one-component sealant —

Part 1:
Taper-shaped groove test method

1 Scope

This document specifies a method for the determination of the cured thickness depth of cure of one-component sealants using a taper-wedge-shaped groove test method.

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 6927, *Buildings and civil engineering sealants — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6927 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/

4 Principle

The cured thickness is determined by:

— filling the one-component sealant into a taper-shaped groove that is provided in an anti-adherent material or in a material that is made anti-adherent with the help of a release spray;

— tooling the sealant flat with the surface of the taper-shaped groove;

— allowing the sealant to cure under specified conditions for a specified period of time; and

— removing the cured sealant from the groove by pulling the sealant strand perpendicular to the groove at the flat end of the tapered groove until adhesion of the still uncured sealant section to the bottom and/or walls of the tapered groove is observed.

At the location where the first indication of uncured sealant occurs in the taper-shaped groove, the maximum depth of the cured section of the sealant (cured thickness) and the distance from the upper end of the taper- shaped groove are determined after specified period(s) of time.

5 Apparatus and materials

5.1 Substrate with taper-shaped groove

The substrate is a plate- or bar-shaped jig into which a smooth, linear recess (taper-shaped groove) of rectangular cross-section has been cut that tapers off at a constant angle from 10 mm to 0 mm depth over the total length of the groove of 300 mm. The internal dimensions of the taper-shaped groove shall correspond to those shown in Figure 1. Different internal dimensions of the taper-shaped groove may be chosen, as agreed between the parties concerned; however, in any case, 300 mm shall be the minimum length of the taper-shaped groove.

The substrate shall consist of a dimensionally stable, non-porous, low-permeability material, which is either inherently anti-adherent (e.g. solid polytetrafluorethylene, PTFE) or made anti-adherent by using a suitable release spray. The potential use of cleaning solvent(s) and release spray shall not interfere with the cure of the sealant. Cleaning solvents, such as acetone, that fully volatilize and do not swell the substrate shall be used.

Typically, substrates are made of solid PTFE or stainless steel. The use of a suitable release agent can also be advisable on inherently anti-adherent substrates, as the release properties of these substrates degrade with repeated cleaning and use.

Dimensions in millimetres

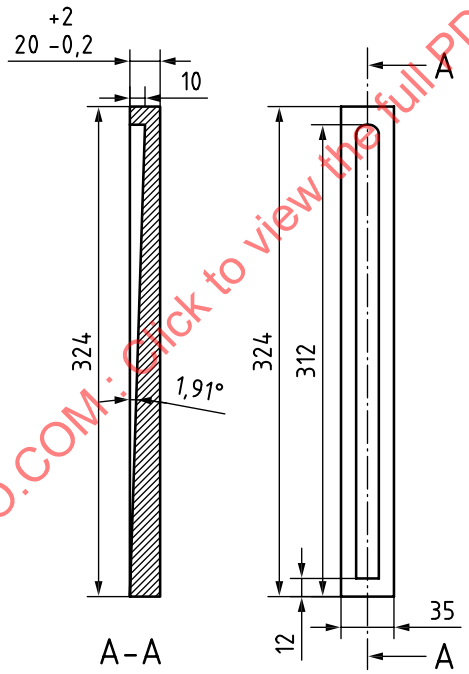


Figure 1 — Standardized internal dimensions of taper-wedge-shaped groove in testing jig

For convenience, depth-markings may be applied on the jig along the length of the groove.

5.2 Scraper

The scraper is a spatula or other tooling implement to smooth and shape the sealant surface by removing excess material. The width of the scraper shall exceed the width of the tapered groove by a minimum of 20 mm.

5.3 Thickness calliper

The thickness calliper has a reading accuracy of 0,1 mm for measuring the thickness of the fully cured sealant cross-section.

5.4 Ruler

A ruler with an accuracy of 1 mm for measuring the length of the sealant section that is considered fully cured sealant.

6 Conditioning

Condition the test jig with the taper-shaped groove and supplies of the sealant in the original closed container(s) for a minimum of 16 h at (23 ± 2) °C and (50 ± 10) % RH (relative humidity).

7 Preparation of test specimen

Prepare three test specimens by filling the groove with sealant from the deepest end, while ensuring that no air pockets are formed. Level the sealant flush with the face of the tapered groove using the scraper, drawing it across the filled groove so that excess sealant is removed.

8 Test procedure

8.1 General

The sealant shall be exposed to standard conditions, i.e. (23 ± 2) °C and (50 ± 10) % RH, during cure and testing. Other permissible climate conditions for sealant curing and testing may be chosen as agreed between the parties concerned.

NOTE 1 Typically, for health and safety reasons, the sealant test jig specimens are allowed to cure in a well-ventilated environment. Since the rate of air exchange in the proximity of the curing sealant specimens can affect cure speed, it is possible that the results obtained in the well-ventilated laboratory environment are not fully transferrable to the curing progress observed in the field.

At any time during the curing process, as agreed between the parties concerned, when information on the cured thickness is desired, remove the cured sealant from the groove by pulling the sealant strand perpendicular to the groove at the flat end of the tapered groove until adhesion of the still uncured ("wet") sealant section to the bottom and/or walls of the tapered groove is first observed.

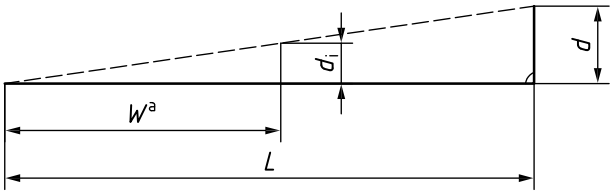
NOTE 2 Typically, a duration of 24 h, 48 h, 72 h or longer is chosen for the curing process.

8.2 Direct measurement

At the location, where adhesion of the still uncured sealant section to the bottom and/or walls of the tapered groove is first observed, measure and record the maximum depth of the cured sealant (cured thickness) with the thickness calliper (5.3) after carefully removing any uncured sealant paste with the scraper (5.2) from the cured sealant section.

8.3 Indirect measurement

Measure and record the distance between the location, where adhesion of the still uncured sealant section to the bottom and/or walls of the tapered groove is first observed, and the highest end of the groove using the ruler (5.4) (see Figure 2).



Key

d_i thickness of cured sealant, in millimetre

W distance from the highest end of the taper-shaped groove to the point where adhesion of the still uncured sealant section to the bottom and/or walls of the groove is first observed, in millimetre

L length of groove, in millimetre (standard length: 300 mm)

d maximum depth of groove, in millimetre (standard depth: 10 mm)

[a] This quantity, W, is required for the indirect determination (calculation) of cured thickness of cure.

Figure 2 — Principle of indirect determination of cured thickness

9 Calculation and expression of the test result

9.1 General

The cured thickness of cure shall be expressed as the thickness (in millimetres) of cured sealant section observed at the location where adhesion of the still uncured sealant section to the bottom and/or walls of the tapered groove is first observed and the duration of the curing period (cure duration) shall be provided.

EXAMPLE Cured thickness: 3,5 mm in 24 h

Cured thickness can be determined directly (9.1), by measurement of the cured layer thickness, or determined indirectly by calculation (9.2).

NOTE Generally, the calculation method is expected to be more accurate.

9.2 Direct measurement

Report the cured thickness, expressed in millimetre, measured with the thickness calliper (see Clause 8).

9.3 Indirect determination (calculation)

Calculate the cured thickness, expressed in millimetre, using Formula (1) (see Figure 2):

$$d_i = \frac{W \times d}{L} \quad (1)$$

10 Test report

The test report shall contain the following information:

a) test laboratory's name and date of test;

b) a reference to this document, i.e. ISO 24070-1:2021;

c) name, type (chemical family) and colour of sealant;

d) batch of sealant from which the test specimens were produced;