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Building and civil engineering sealants — Determination of change in mass and volume

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Foreword

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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).

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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 59, *Buildings and civil engineering works*, Subcommittee SC 8, *Sealants*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/SS B02, *Structures*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 10563:2017), of which it constitutes a minor revision. The changes are as follows:

— the title has been revised from *Buildings and civil engineering works — Sealants— Determination of change in mass and volume*;

— "mass and" has been added before "volume" twice in the note in the Scope;

— "shall be taken as the test results" has been replaced by "shall be calculated" in 8.1 and 8.2;

— the list items in Clause 9 have been 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.

Building and civil engineering sealants — Determination of change in mass and volume

1 Scope

This document specifies a method for the determination of the change of mass and the change of volume of self-levelling and non-sagging sealants used in joints in building construction.

NOTE This test procedure is not intended to determine the absolute maximum value of loss of mass and volume of a tested sealant, but it is an indicative measurement of the loss of mass and volume under specified parameters.

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, *Building 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 terminology 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/

4 Principle

Test specimens consist of either metal rings filled with non-sagging sealant or metal moulds filled with self-levelling sealant. The rings or moulds are weighed in air and in water, before and after filling, before and after specific conditioning. The change in mass and in volume of the tested sealant is calculated.

5 Apparatus and materials

5.1 Rings of non-corrosive metal for non-sagging sealant, having the following dimensions:

— inner diameter, (30 ± 1) mm;

— height, (10 ± 0,1) mm.

A hook or loop is fixed to each ring to suspend it from a string for the weighing procedure.

5.2 Anti-adherent substrate for non-sagging sealant, for the preparation of test specimens, e.g. wet paper.

5.3 Moulds of non-corrosive metal for self-levelling sealant, having the following dimensions:

— inner diameter, (30 ± 1) mm;

— inner depth, (10 ± 0,1) mm.

5.4 Balance, with an accuracy of 0,01 g, capable of being used to weigh the test specimens in air and immersed in test liquid.

5.5 Test liquid, at a temperature of (23 ± 2) °C, consisting of water with the addition of up to 0,25 % (by mass) of a low-foam surfactant. In the case of water-sensitive sealants, laboratory grade 2,2,4-trimethylpentane (iso-octane) shall be used.

5.6 Preconditioning chamber, capable of being controlled at (23 ± 2) °C and (50 ± 10) % relative humidity.

5.7 Ventilated oven, with a volume of (200 ± 100) l, capable of being controlled at (70 ± 2) °C.

5.8 Container, for the immersion of the test specimens in the test liquid.

6 Preparation of test specimens

6.1 For non-sagging sealant

The sealant and the metal rings (5.1) shall be brought to (23 ± 2) °C. Three test specimens shall be prepared for each property to be tested.

Each metal ring shall be weighed in air (mass m_1) using the balance (5.4), and, for the volume test, also in the test liquid (5.5) (mass m_2).

The rings shall be set on the anti-adherent substrate (5.2) and filled with the sealant to be tested using the following procedure:

a) The formation of air bubbles shall be avoided.

b) The sealant shall be pressed on the inner surfaces of the metal rings to ensure intimate contact.

c) The sealant surface shall be tooled so that it is flush with the upper rim of the metal rings.

The test specimens shall be removed immediately from the anti-adherent substrate such that the reverse side of the sealant is flush.

The filled rings shall be weighed immediately in air (mass m_3), and, for the volume change, also in the test liquid (mass m_4). For water-borne sealants, these measurements shall be carried out after 60 min and shall be completed within 30 s.

6.2 For self-levelling sealant

The sealant and the metal moulds (5.3) shall be brought to (23 ± 2) °C. Three test specimens shall be prepared for each property to be tested.

Each metal mould shall be weighed in air (mass m_1) using the balance (5.4), and, for the volume test, also in the test liquid (5.5) (mass m_2).

The moulds shall be filled with the sealant to be tested using the following procedure:

a) The formation of air bubbles shall be avoided.

b) The sealant shall be pressed on the inner surfaces of the metal moulds to ensure intimate contact.

c) The sealant surface shall be tooled so that it is flush with the upper rim of the metal moulds.

The filled moulds shall be weighed immediately in air (mass m_3), and, for the volume change, also in the test liquid (mass m_4). For water-borne sealants, these measurements shall be carried out after 60 min and shall be completed within 30 s.

7 Test procedure

7.1 General

During the test procedure, the test specimens shall be positioned:

— either vertically for non-sagging sealant, or

— horizontally for self-levelling sealant.

7.2 Preconditioning

The test specimens shall be conditioned in the chamber (5.6) at (23 ± 2) °C and (50 ± 10) % relative humidity, during 28 days ± 3 h.

7.3 Specific conditioning

After preconditioning according to 7.2, the test specimens are placed in the ventilated oven (5.7), using the following procedure:

a) In case of several tested sealants, only the same chemical family sealants shall be placed in the oven in the same conditioning time.

b) All test specimens shall be placed in the same shelf, at mid height, in the oven.

c) All test specimens shall be placed at a minimum distance of 8 cm from the internal wall of the oven.

d) Each test specimen shall be placed at a minimum distance of 8 cm from another test specimen.

Condition the test specimens in the ventilated oven regulated at (70 ± 2) °C, during 7 d ± 2 h. The door of the oven shall be maintained in a closed position during the specific conditioning.

After the specific conditioning in the oven, the test specimens shall be stored in the chamber (5.6) at (23 ± 2) °C and (50 ± 10) % relative humidity, during (24 ± 2) h.

The test specimens shall be weighed immediately in air (mass m_5) and, for the volume change, also in the test liquid (mass m_6).

8 Calculation and expression of results

8.1 Change in mass

For each test specimen, the change in mass, Δm, expressed as a percentage, shall be calculated using Formula (1), rounded to the nearest 0,1 %:

$$\Delta m = \frac{m_5 - m_3}{m_3 - m_1} \times 100 \quad (1)$$

where

m_1 is the mass, expressed in grams, of the metal ring or metal mould before filling with the sealant, measured in air (see Clause 6);

m_3 is the mass, expressed in grams, of the test specimen immediately after preparation, measured in air (see Clause 6);

m_5 is the mass, expressed in grams, of the test specimen immediately after conditioning, measured in air (see 7.3).

The arithmetic mean of the change in mass of the three specimens shall be calculated, rounded to the nearest 0,1 %.

8.2 Change in volume

For each test specimen, the change in volume, ΔV, expressed as a percentage, shall be calculated using Formula (2), rounded to the nearest 0,1 %:

$$\Delta V = \frac{(m_5 - m_6) - (m_3 - m_4)}{(m_3 - m_4) - (m_1 - m_2)} \times 100 \quad (2)$$

where

m_2 is the mass, expressed in grams, of the metal ring before filling with the sealant, measured in the test liquid (see Clause 6);

m_4 is the mass, expressed in grams, of the test specimen immediately after preparation, measured in the test liquid (see Clause 6);

m_6 is the mass, expressed in grams, immediately after conditioning, measured in the test liquid (see 7.3);

m_1, m_3, m_5 are defined in 8.1.

The arithmetic mean of the change in volume of the three specimens shall be calculated, rounded to the nearest 0,1 %.

9 Test report

The test report shall include the following information:

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

b) a reference to this document, i.e. ISO 10563;

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

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

e) the parameters of the ventilated oven (mechanically or naturally ventilated; air exchange rate, if known) and its flap position (open or closed);

f) the individual values of the change in mass for each test specimen;

g) the arithmetic means of the change in mass, as a percentage;

h) the individual values of the change in volume for each test specimen;

i) the arithmetic mean of the change in volume, as a percentage;

j) any deviations from this document.

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