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Building construction — Sealants — Determination of adhesion/cohesion properties after exposure to artificial light through glass

Construction immobilière — Mastics — Détermination des propriétés d'adhésivité/cohésion après exposition à la lumière artificielle à travers le verre

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Foreword

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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 11431 was prepared by Technical Committee ISO/TC 59, *Building construction*, Sub-Committee SC 8, *Jointing products*.

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Building construction — Sealants — Determination of adhesion/cohesion properties after exposure to artificial light through glass

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1 Scope

This International Standard specifies a method for the determination of the adhesion/cohesion properties of sealants after exposure to artificial light through glass, to water or humidity, and to elevated temperature.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, 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 4665-3:1987, *Rubber, vulcanized — Resistance to weathering — Part 3: Methods of exposure to artificial light.*

ISO 6927:1981, *Building construction — Jointing products — Sealants — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 6927 apply.

4 Principle

Test specimens and reference specimens are prepared in which the sealant to be tested adheres to two parallel contact surfaces. After submission of the test specimens to the simultaneous influence of artificial light, water or humidity and elevated temperature under defined conditions, test specimens and reference specimens are extended to a defined width. After maintenance of the extension for a defined time, any breaks in adhesion or cohesion are recorded.

5 Apparatus

5.1 Clear float glass supports, for the preparation of test specimens and reference specimens (two supports are required for each specimen), of dimensions as shown in figure 1.

5.2 Spacers, for the preparation of the specimens, of dimensions 12 mm × 12 mm × 12,5 mm, with non-adherent surface (see figure 1).

NOTE 1 If the spacers are made of a material to which the sealant adheres, their surfaces should be made non-adherent, e.g. by a thin wax coating.

5.3 Non-adherent substrate, for the preparation of test specimens, e.g. polytetrafluoroethylene (PTFE) film or vellum paper, preferably on the advice of the sealant manufacturer.

5.4 Ventilated convection-type oven, capable of being maintained at 70 °C ± 2 °C, and having an air exchange rate of 30 ± 5 times per hour, for conditioning according to method B.

5.5 Container, filled with distilled water, for conditioning according to method B.

5.6 Water container with heating device, for immersing the test specimens, capable of maintaining a water temperature of 45 °C ± 2 °C, for testing according to procedure 1.

5.7 Climatic chamber, for holding the artificial light source and the test specimens, capable of being maintained at a temperature of 45 °C ± 2 °C and a minimum relative humidity of 95 %, for testing according to procedure 2.

5.8 Artificial light source, for xenon arc lamp in accordance with ISO 4665-3:1987, 4.1.2.

5.9 Black panel thermometer, with a blackened absorbing metal plate that approximates the absorption characteristics of a "black body". The plate shall be at least 1 mm thick and of a size suitable for the test specimen holders. The temperature of the metal plate is measured by a suitable thermometer or thermocouple with good thermal contact. For measuring the test temperature, the metal plate shall be mounted in a test specimen holder with the blackened side of the metal plate facing the artificial light source.

Readings shall only be taken after sufficient time has elapsed for the temperature to become steady. The temperature shall be controlled by adjusting the air exchange rate.

NOTE 2 Temperature control may be achieved by means of a thermostat, the sensor of which is placed in the climatic chamber.

5.10 Test machine, with recording device, capable of extending the test specimens at a rate of 5 mm/min to 6 mm/min.

5.11 Spacers, with a width of 19,2 mm or 24 mm, to hold the specimens at an extension of 160 % or 200 %, respectively.

6 Preparation of test specimens and reference specimens

Six test specimens and three reference specimens shall be prepared.

For each test specimen, two supports (5.1) and two spacers (5.2) shall be assembled (see figure 1) and set up on the non-adherent substrate (5.3), which should be wetted by water containing a detergent to facilitate their subsequent removal.

The instructions of the sealant manufacturer shall be followed concerning, for instance, whether a primer is to be used.

The hollow volume formed by the supports and spacers shall be filled with the sealant which has been conditioned for 24 h at 23 °C ± 2 °C. The following precautions shall be taken:

a) avoid the formation of air bubbles;

b) press the sealant to the inner surfaces of the supports;

c) trim the sealant surface so that it is flush with the faces of the supports and spacers.

The specimens shall be set on edge on one of the supports and the non-adherent substrate shall be removed as soon as possible. The specimens shall remain in this position with the spacers in place for another 48 h to allow curing or optimum drying of the sealant.

Dimensions in millimetres

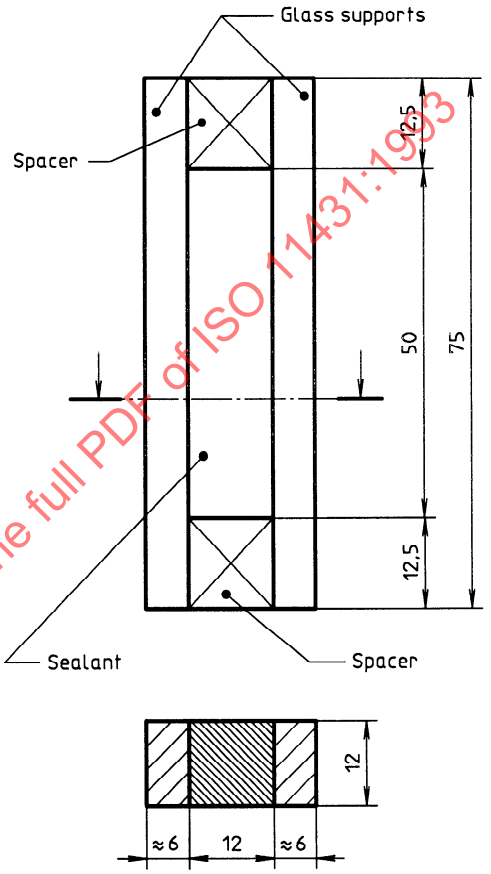

Figure 1 — Assembly for test and reference specimens

7 Conditioning

7.1 General

Test specimens and reference specimens shall be conditioned either in accordance with method A or method B, as agreed between the parties concerned.

7.2 Method A

The specimens shall be conditioned for 28 days at 23 °C ± 2 °C and (50 ± 5) % relative humidity.

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7.3 Method B

The specimens shall be conditioned according to method A and shall then be subjected three times to the following storage cycle:

a) 3 days in the oven (5.4) at 70 °C ± 2 °C;

b) 1 day in a container (5.5) filled with distilled water at a temperature of 23 °C ± 1 °C;

c) 2 days in the oven at 70 °C ± 2 °C;

d) 1 day in distilled water at a temperature of 23 °C ± 1 °C.

Alternatively, this cycle may be performed in the order c) to d) to a) to b).

NOTE 3 Method B is a commonly used conditioning procedure using the influence of heat and water. It is not suitable for giving information on the durability of the sealant.

8 Test procedures

8.1 General

After conditioning and removal of the spacers, test the six test specimens according to either procedure 1 or procedure 2. Store the three reference specimens for 22 days at 23 °C ± 2 °C and at (50 ± 5) % relative humidity.

8.2 Procedure 1

Store the six test specimens for 21 days in the container (5.6) filled with distilled water at a temperature of 45 °C ± 2°C, in such a way that one glass surface of each test specimen remains above the water level (see figure 2). During storage, expose three of the test specimens to radiation by the artificial light source (5.8) ensuring that the radiation is perpendicular to the interfaces between the sealant and the supports. The remaining three test specimens are masked initially so that they are not affected by the radiation.

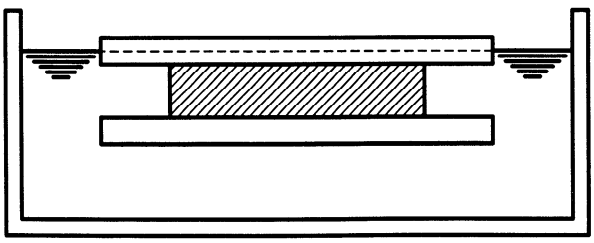

Figure 2 — Water immersion of test specimen

8.3 Procedure 2

Store the six test specimens for 21 days in a climatic chamber (5.7) at a temperature of 45 °C ± 2 °C (measured on the black panel) and a relative humidity of more than 95 %. During storage, expose three of the test specimens to radiation by the artificial light source (5.8) ensuring that the radiation is perpendicular to the interfaces between the sealant and the supports. The remaining three test specimens are masked initially so that they are not affected by the radiation.

8.4 Extension

After testing according to procedure 1 or procedure 2, store the six test specimens for 24 h at 23 °C ± 2 °C and (50 ± 5) % relative humidity.

Subsequently, place the six test specimens and the three reference specimens on the test machine (5.10) and extend them to 160 % or 200 % of their original width at a rate of 5 mm/min to 6 mm/min. Maintain the extension for 24 h using appropriate spacer bars.

Table 1 gives the joint widths, l_1, in millimetres, after extension of the test specimens having an initial width, l_0, of 12 mm.

Table 1 — Joint widths after extension

Ratio l_1/l_0	Final joint width, l_1
%	mm
160	19,2
200	24

Examine the joint for any break in adhesion or cohesion.

9 Test report

The test report shall include the following information:

a) reference to this International Standard;

b) name and type of sealant;

c) batch of sealant from which the specimens were produced, if possible;

d) the primer used, if applicable;

e) the method of conditioning used (see clause 7);

f) the test procedure used;

g) the extension used (see clause 8);

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h) all details of any break in adhesion or cohesion;

i) any differences in the appearance of the test specimens in comparison with the reference specimens;

j) any deviations from the specified test conditions.

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