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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 13477.8-2017

**Test method for building sealants -- Part 8: Determination of
tensile properties
(English Translation)**

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1 Scope

This Part of GB/T 13477 specifies the method for the determination of the tensile properties of building sealants.

This Part applies to the determination of the secant tensile modulus of building sealants, as well as the maximum tensile strength when extension to break, the elongation at break, and the bonding condition with substrates.

2 Normative references

The following referenced documents are indispensable for the application 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.

GB/T 13477.1 Test method for building sealants - Part 1: Specifications for test substrates (GB/T 13477.1-2002, ISO 13640:1999, MOD)

GB/T 14682 Building sealing material vocabulary (GB/T 14682-2006, ISO 6927:1981, NEQ)

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB/T 14682 apply.

4 Principle

Bond the sealant to be tested between the surfaces of two parallel substrates to make a specimen. Extend the specimen until break, plot a force value-elongation value curve, and express the tensile properties of the sealant with the calculated secant tensile modulus, maximum tensile strength, and elongation at break.

5 Standard test conditions

The standard test conditions are: temperature of $(23 \pm 2) ^\circ\text{C}$, relative humidity of $(50 \pm 5) \%$.

6.1 Bonding substrate: The cement mortar board, aluminum plate or glass plate that

comply with the provisions of GB/T 13477.1, used to prepare specimens. The shape and dimension of the substrate are shown in Figures 1 and 2. For each specimen, two substrates of the same material shall be used. Substrates of other materials and dimensions can also be selected as agreed upon by all parties, but the bonding dimension and area of the embedded sealant sample shall be the same with those shown in Figures 1 and 2.

6.2 Isolation pad: The surface shall be anti-adhesive. It is used to prepare sealant specimens with a cross-section of 12 mm x 12 mm (as shown in Figures 1 and 2).

6.3 Bond breaker: Anti-adhesive film or paper, such as polyethylene (PE) film, which

should be selected according to the recommendations of the sealant manufacturer. It is used to prepare specimens.

6.4 Tensile testing machine: It is equipped with a recording device. It is capable of extending the specimen at a speed of $(5.5 \pm 0.7) \text{ mm/min}$.

6.5 Low temperature test chamber: It can accommodate the specimen for tensile test at $(-20 \pm 2) ^\circ\text{C}$.

6.6 Blast drying oven: The temperature can be adjusted to $(70 \pm 2) ^\circ\text{C}$, for treatment of specimens according to method B (see 8.3).

6.7 Container: It is used to hold distilled water, for immersing specimens according to

method B (see 8.3).

7 Preparation of specimens

Use degreasing gauze to remove dust from the surface of the cement mortar board. Use solvents such as acetone to clean the aluminum plate and glass plate and dry them.

Prepare specimens in accordance with the instructions (e.g., whether to use primer and mixing procedure of multi-component sealants) of the sealant manufacturer.

Keep the sealant and substrates at $(23 \pm 2) ^\circ\text{C}$. Prepare 3 specimens for each category of substrate and each test temperature.

As shown in Figures 1 and 2, assemble two bonding substrates and two isolation pads on the bond breaker to form a cavity. Then the sealant sample is embedded in the cavity to make a specimen. The following matters shall be noted when embedding the sample:

- a) avoid the formation of bubbles;
- b) store in distilled water at $(23 \pm 2) ^\circ\text{C}$ for 1 d;
- c) store in a drying oven at $(70 \pm 2) ^\circ\text{C}$ for 2 d;
- d) store in distilled water at $(23 \pm 2) ^\circ\text{C}$ for 1 d.

The above procedure can also be changed to the order of c)-d)-a)-b).

The specimens treated by method B shall be placed under standard test conditions for at least 24 h before test.

NOTE: Method B is a conventional treatment procedure that uses heat and water to affect the curing speed of the specimen, and is not suitable for giving information on the durability of the sealant.

9.1 General

The test is carried out at two temperatures: $(23 \pm 2) ^\circ\text{C}$ and $(-20 \pm 2) ^\circ\text{C}$. Test 3 specimens at each test temperature.

9.2 Tensile properties at $(23 \pm 2) ^\circ\text{C}$

Remove the isolation pads on the specimen, load the specimen into the tensile testing machine, and extend the specimen to break at $(23 \pm 2) ^\circ\text{C}$ at a speed of (5.5 ± 0.7) mm/min. Record the force value-extension value curve and break type.

9.3 Tensile properties at $(-20 \pm 2) ^\circ\text{C}$

Before the test, the specimen shall be placed at a temperature of $(-20 \pm 2) ^\circ\text{C}$ for 4 h.

Remove the isolation pads on the specimen, load the specimen into the tensile testing machine, and extend the specimen to break at $(-20 \pm 2) ^\circ\text{C}$ at a speed of (5.5 ± 0.7) mm/min. Record the force value-extension value curve and break type.

10.1 Secant tensile modulus

The secant tensile modulus (σ) of each specimen at selected elongation is calculated according to formula (1). It takes the arithmetic mean of 3 specimens, accurate to 0.01

MPa.

where:

σ - the secant tensile modulus, in megapascal (MPa);

F - the force value at selected elongation, in Newton (N);

S - the initial cross-sectional area of the specimen, in square millimeters (mm²).

10.2 Maximum tensile strength

The maximum tensile strength (TS) of each specimen is calculated according to formula (2). It takes the arithmetic mean of 3 specimens, accurate to 0.01 MPa.

where:

TS - the maximum tensile strength, in megapascal (MPa);

P - the maximum pulling force value, in Newton (N);

S - the initial cross-sectional area of the specimen, in square millimeters (mm²).

10.3 Elongation at break

The elongation at break (E) of each specimen is calculated according to formula (3), expressed as a percentage. It takes the arithmetic mean of 3 specimens, accurate to 5 %.

where:

E - the elongation at break, %;

W₀ - the initial width of the specimen, in millimeters (mm);

W₁ - the width of the specimen at break, in millimeters (mm).

11 Test report

The test report shall indicate the following:

a) name of the laboratory and test date;

b) serial number of this Part;