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SIST EN 13494:2019

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EUROPEAN STANDARD

EN 13494

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2019

ICS 91.100.60

Supersedes EN 13494:2002

English Version

## Thermal insulation products for building applications - Determination of the tensile bond strength of the adhesive and of the base coat to the thermal insulation material

Produits isolants thermiques pour le bâtiment -  
Détermination de l'adhérence par traction de la colle  
ou de la couche de base sur le matériau isolant  
thermique

Wärmedämmstoffe für das Bauwesen - Bestimmung  
der Haftzugfestigkeit zwischen  
Klebmasse/Klebemörtel und Wärmedämmstoff sowie  
zwischen Unterputz und Wärmedämmstoff

This European Standard was approved by CEN on 19 May 2019.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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## European foreword

This document (EN 13494:2019) has been prepared by Technical Committee CEN/TC 88 "Thermal insulating materials and products", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13494:2002.

EN 13494:2019 includes the following significant technical changes with respect to EN 13494:2002:

	2002	2019
Scope	adhesive or base coat	adhesive, reinforced base coat or rendering system
Principle	Test specimen is cut through	Overall test specimen is normally not cut through, but this variant is possible
Rigid plates / Pull head plates and (individual) test specimen dimensions	(200 ± 2 mm) only	(50 ± 1 mm), (100 ± 1 mm), (150 ± 1 mm) or (200 ± 1 mm)
Saw	Mechanical driven circular or band saw	Circular saw, angle grinder or an oscillating cutting device
tensile testing machine	Rate of displacement of (10 ± 1) mm/min	Rate of displacement of (10 ± 1) mm/min or average load increase of 50 N/s
Specimen securing frame	absent	present
Minimum dimensions of test specimen	500 mm x 1000 mm x 60 mm	Depending on the thickness of the thermal insulation used for the overall test specimen
Thermal insulation	No minimum thickness	Minimum thickness of 50 mm
Test procedure	According EN 1607	Normally as described in Figure 2, but according EN 1607 is possible, if the overall test specimen is cut through
Calculation an expression of results	Rounded to the nearest 0,1 kPa	Rounded to the nearest 1 kPa

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**EN 13494:2019 (E)****1 Scope**

This document specifies the test apparatus, materials and procedures for determining the tensile bond strength of an adhesive, a reinforced base coat or a rendering system to a thermal insulation product for use as components in external thermal insulation composite systems (ETICS).

The test method described in this document is not applicable to PU foam adhesives. For testing such products see EN 17101.

**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.

EN 1602, *Thermal insulating products for building applications — Determination of the apparent density*

EN 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

EN 17237,<sup>1</sup> *Thermal insulation products for buildings — External thermal insulation composite systems with renders (ETICS) — Specification*

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**3 Terms and definitions, symbols and units** ([standards.iteh.ai](https://standards.iteh.ai))**3.1 Terms and definitions**

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[https://standards.iteh.ai/catalog/standards/sist/86456f01-0000-4d4f-816a-](https://standards.iteh.ai/catalog/standards/sist/86456f01-0000-4d4f-816a-71515144e531/sist-en-13494-2019)

For the purposes of this document, the terms and definitions given in EN 17237 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1.1****individual test specimen**

test specimen which is cut out of the overall test specimen

**3.2 Symbols and units**

For the purposes of this document, the following symbols apply.

- $\sigma$  is the tensile bond strength, kPa;
- $F$  is the tensile load at failure, kN;
- $A$  is the cross-sectional area of the plate, m<sup>2</sup>.

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<sup>1</sup> Under preparation. Stage at time of publication: prEN 17237:2018.

## 4 Principle

The tensile bond strength of the adhesive, the reinforced base coat or the rendering system to the thermal insulation product is determined by applying a direct tensile load perpendicular to the faces of the individual test specimen.

## 5 Test apparatus/materials

### 5.1 Glue

The glue shall be capable of providing a strong bond between the metal pull head plates, the adhesive, the reinforced base coat or the rendering system. The glue shall also be capable of achieving a strong bond between the optional substrate and the thermal insulation product. Solvent free epoxy or polyurethane glue has been found suitable for this purpose. The glue shall not damage or react chemically with the adhesive, thermal insulation product, the reinforced base coat or the rendering system. It shall not influence the results.

### 5.2 Pull head plates

The square metal pull head plates with a thickness of at least 5 mm shall have dimensions of  $(50 \pm 1)$  mm  $\times$   $(50 \pm 1)$  mm,  $(100 \pm 1)$  mm  $\times$   $(100 \pm 1)$  mm,  $(150 \pm 1)$  mm  $\times$   $(150 \pm 1)$  mm or  $(200 \pm 1)$  mm  $\times$   $(200 \pm 1)$  mm. The pull head plates shall have sufficient rigidity to prevent any negative influence on the test results. They shall have a central fitting for the connection to the tensile testing machine via a self-aligning attachment (universal coupling) to ensure that an even distribution of tensile stress is applied to the individual test specimen during test. The face of the pull head plates to which the glue is to be applied shall be flat to a tolerance of  $\pm 0,5$  mm per 100 mm length.

### 5.3 Cutting device

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Circular saw, angle grinder or an oscillating cutting device incorporating guides to facilitate a straight cut.

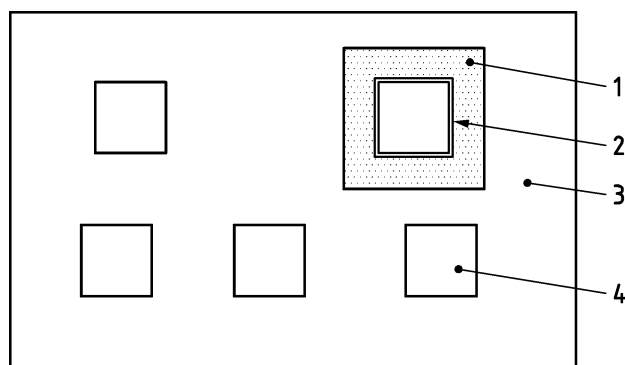
### 5.4 Tensile testing machine

Tensile testing machine, appropriate for the range of force and displacement involved and having a constant rate of displacement of  $(10 \pm 1)$  mm/min or an average load increase of 50 N/s. It shall be capable of measuring the force to an accuracy of  $\pm 1$  %.

### 5.5 Specimen securing frame

The frame is used in conjunction with the tensile testing machine to clamp the individual test specimen to the base of the machine and to ensure the applied load is distributed evenly onto the surface of the specimen. The frame is made of metal plates with a minimum thickness of 5 mm. The size of the frame should allow it to sit within the upper surface area of the test specimen. The square recess of the frame shall be  $(10 \pm 1)$  mm larger than the individual test specimen.

Figure 1 shows a specimen securing frame for the tensile testing machine on the overall specimen with individual test specimens.

**Key**

- 1 frame
- 2 gap between frame and individual test specimen/pull head plate
- 3 overall test specimen
- 4 individual test specimen

**Figure 1 — Specimen securing frame for the tensile testing machine on overall specimen with individual test specimens**

## 6 Samples and test specimens

### 6.1 Preparation of the overall test specimen

The minimum thickness of the insulation product used for the preparation of the overall test specimen shall be at least 50 mm.

The adhesive, the reinforced base coat or the rendering system is applied according to the manufacturer's instructions. The thickness and the mass per unit area of the adhesive, the reinforced base coat and the rendering system shall be measured and conform to the system holder's instructions. The thickness shall not vary by more than  $\pm 0,5$  mm.

Insulation products shall be glued to the rigid substrate unless otherwise specified in the relevant product standard.

The adhesive, the reinforced base coat or the rendering system shall be allowed to cure and/or dry in accordance with the manufacturer's instructions.

### 6.2 Preparation of individual test specimens

Five squares are cut as individual test specimens through the adhesive, the reinforced base coat or the rendering system according to Figure 1 using the cutting device. The dimension of the individual test specimen shall be chosen according to the dimension of the pull head plates.

The minimum distance between any edge of the overall test specimen and any edge of the individual specimen shall be no less than the thickness of the thermal insulation product.

The minimum distance between two individual test specimens shall be no less than the thickness of the thermal insulation product.

The individual test specimen shall not include any mechanical fixing devices.

The depth of the cut shall be at least 3 mm below the upper surface of the insulation product.

The surface of the individual test specimen shall be prepared in order to allow a load application perpendicular to the face of the individual test specimen. The pull head plates shall be glued to the



surface of the individual test specimen. If the cut goes fully through the insulation product, the test specimen shall be prepared and tested according to EN 1607.

The thickness of the adhesive, the reinforced base coat or the rendering system shall be recorded in increments of 0,5 mm.

NOTE Additional individual test specimens can be cut and prepared if rejections of measurements according to 7.3 are expected.

### 6.3 Conditioning of the test specimens

The specimens shall be conditioned according to the relevant product standard.

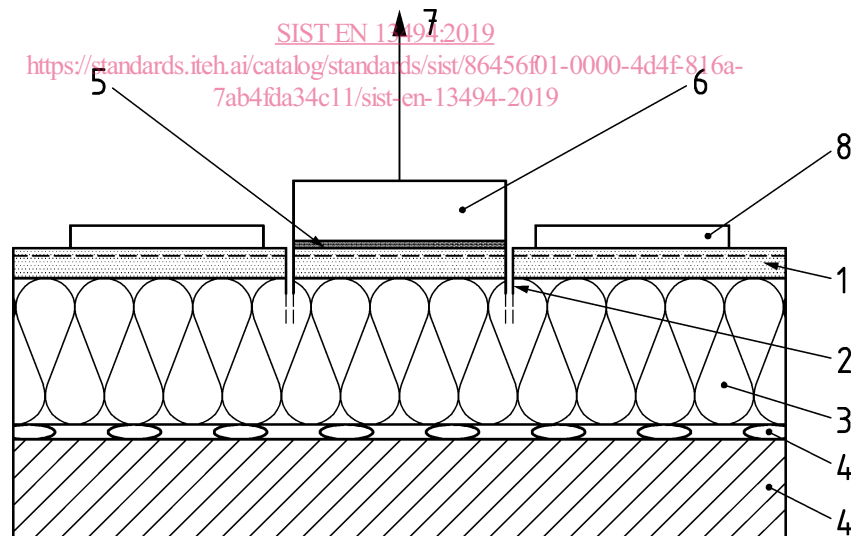
## 7 Procedure

### 7.1 Test conditions

The test shall be performed at  $(23 \pm 5) ^\circ\text{C}$ .

### 7.2 Attachment of the pull off tester to the individual test specimen

After the glue layers between the adhesive/reinforced base coat/rendering system and the pull head plates and where used; between the substrate and the thermal insulation product have cured, place the frame onto the surface of the overall test specimen. Fix the frame according to Figure 1 to prevent upward movement of the overall test specimen during load application. Attach the universal coupling of the tensile testing machine to the central fitting of the pull head plate according to Figure 2.



#### Key

- |   |   |   |  |
|---|---|---|--|
| 1 | adhesive or reinforced basecoat or rendering system | 5 | glue   |
| 2 | cut grooves   | 6 | pull head plate  |
| 3 | insulation product                                  | 7 | load   |
| 4 | rigid substrate with glue (optional)                | 8 | frame to prevent upward movement of the specimen perimeter |

Figure 2 — Test setup