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Karakterizacija enokomponentnih pen (OCF) - 4. del: Mehanska trdnost

Characterization of One Component Foam (OCF) - Part 4: Mechanical strength

Charakterisierung von Einkomponentenschäumen - Teil 4: Mechanische Festigkeit

Caractérisation des mousses monocomposants - Partie 4 : Résistance mécanique

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Characterization of One Component Foam (OCF) - Part 4: Mechanical strength

Caractérisation des mousses monocomposants - Partie
4 : Résistance mécanique

Charakterisierung von Einkomponentenschäumen -
Teil 4: Mechanische Festigkeit

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 193.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 17333-4:2018) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by UNE.

This document is currently submitted to the CEN Enquiry.

This document is one of the product European Standards within the framework series of EN 17333 on Characterization of *One Component Foam (OCF)*, as follows:

- *Part 1: Yield*
- *Part 2: Expansion*
- *Part 3: Application*
- *Part 4: Mechanical Strength* (this document)
- *Part 5: Insulation*

This document is one of a series of standards which specify test methods for determining the properties of one component foams (OCFs).

STANDARD PREVIEW
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SIST EN 17333-4:2020

<https://standards.iteh.ai/catalog/standards/sist/17b177ee-c121-4837-b10e-fcd158449e92/sist-en-17333-4-2020>

1 Scope

This document specifies test methods for the evaluation of the mechanical properties for moisture curing, self-curing or water drying foams dispensed from single pressurized containers used as an insulating air sealant and adhesive for both building and non-building applications.

This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.

The following test methods are described:

- Compression strength: This test method describes how to determine the compressive strength of a cured foam. It gives an indication of the foams resistance against area distributed pressure. The maximum endurable stress is determined.
- Movement capability: This test method describes how to determine the movement capability of cured foam. The result gives an indication of the degree of flexibility of the cured foam.
- Bonding strength: The method displays the measurement of the bonding power of a One Component (Foam) Adhesive, dispensed from a pressurized can, between two substrates with direct contact.
- Tensile strength: This test method describes how to determine the maximum stress a cured foam can withstand while being stretched before breaking. The result gives an indication of the elasticity of the cured foam.
- Shear strength: This method displays the behavior of a foam system towards shear forces. It shows the strength and the bonding power of the foam as the sandwich element between wooden plates. The test is conducted according to EN 12090.

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 205:2016, *Adhesives - Wood adhesives for non-structural applications - Determination of tensile shear strength of lap joints*

EN 312, *Particleboards - Specifications*

EN 923, *Adhesives - Terms and definitions*

EN ISO 844, *Rigid cellular plastics - Determination of compression properties (ISO 844:2014)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 923 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**one component foam**

moisture curing or water drying foam as well as self-curing activatable foam dispensed from single pressurized containers

3.2**tensile testing machine**

equipment where samples are subjected to a controlled and recorded tension

3.3**straw dispensing**

one component or two component foams for the processing with an adapter tube

3.4**gun dispensing**

one component foams for the processing with a PU foam application gun

4 Test methods**4.1 Compression strength****4.1.1 Principle**

The test specimen is prepared by foaming between two particle boards. After the full curing, the specimen is compressed by a tensile testing machine to at least 10 % of its initial thickness. The compressive strength is obtained at 10 % compression.

4.1.2 Equipment

For each specimen (in total 6 specimens required):

4.1.2.1 Two P3 or P5 particle boards (compliant with EN 312) with dimensions of 50 mm × 90 mm × 10 mm (length × width × thickness).

4.1.2.2 2 spacers, not water absorbing, not adherent, (e.g. PE, PTFE, on which polyurethane does not adhere), size 30 mm × 20 mm × 50 mm.

4.1.2.3 2 screw clamps.

4.1.2.4 Knife.

4.1.2.5 Tensile testing machine.

4.1.2.6 Conditioning chamber or lab facilities, capable of being controlled at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{RH}$.

4.1.3 Sampling**4.1.3.1 Conditioning**

Bring the test container and the particle boards to the test temperature $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{RH}$ for at least 24 h.

4.1.3.2 Test pieces preparation

— Attach the spacers between the particle boards and fix them with screw clamps. The cavity in the assembled joint should measure 50 mm × 50 mm × 30 mm (see Figure 1).

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- Prepare 6 joints.
- Self curing and water-based foams shall be tested in not moistured conditions. Moisture curing foams can be additionally pre-moisturised. In the latter case, the clamped boards are immersed in water for 20 s, taken out and stored horizontally for 2 min, until excess water has dripped off. The foaming must have started within the next 30 s.
- Shake the unused foam container vigorously 20 times.
- Discard the first $40 \text{ g} \pm 10 \text{ g}$ of foam.
- Fill the joint¹⁾ in horizontal direction to allow foam expand freely on both sides (see Figure 2).
- Allow the foam to cure for 24 h at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$.
- Cut the excess foam after 24 h (see Figure 3).
- The sample is to be stored at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$ for 6 more days.

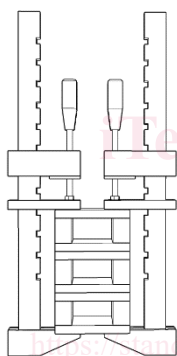


Figure 1 — Specimen preparation

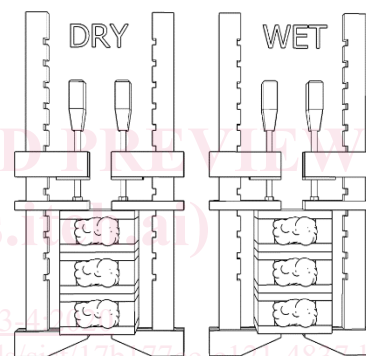


Figure 2 — Dry and wet application of PU-foam

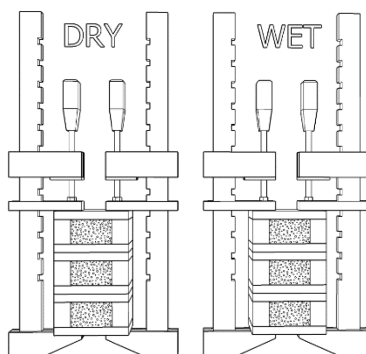


Figure 3 — Samples after cutting off the excessive foam

1) Typically filling volume of a foam gun is $85 \% \pm 5$, and for a straw dispenser $65 \% \pm 5$.

4.1.4 Test procedure

Remove screw clamps and spacers. Insert the specimen into the tensile testing machine like shown in Figure 4. Start the measurement within 5 min after removing the clamps and spacers.

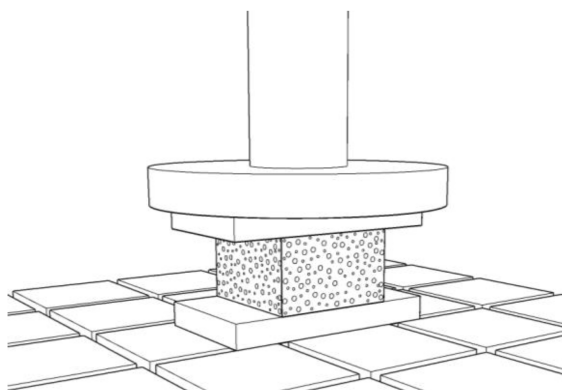


Figure 4 — Specimen in the tensile testing machine

Testing is performed according to EN ISO 844. The force is applied through a moving compressive plate perpendicular to the wooden board. The cross head velocity of the tensile machine is 3 mm/min. The compression strength is taken as stress at 10 % compression, in relation to the foam thickness (i.e. strain).

The point where the compression distance of 10 % (and the relevant part of the record) starts is at 2 N above the ground level.

4.1.5 Expression of results

Take the mean value of the measurements, report whether the specimen was moisturized or not. The compression force, usually obtained in Newton (N), is divided by the foam area. Report the compression length in % (preferably 10 %, corresponds to 3 mm compression for the given foam thickness of 30 mm).

4.1.6 Test report

The test report shall include the following information:

- a) a reference to this European Standard;
- b) the name and address of the testing laboratory;
- c) the number and date of the test report;
- d) the name and signature of the operator or signatory of the report;
- e) product identification given by the test sponsor:
 - 1) product name, manufacturer or supplier,
 - 2) batch number or identification code,
 - 3) origin of the sample(s),
 - 4) way of dispensing, e.g. dispensing gun or tube,

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- 5) packaging: volume,
- 6) expiry date and/or production date;
- f) test procedure for test performed according to 4.1:
 - 1) date of test,
 - 2) performer,
 - 3) any deviation from 4.1;
- g) results of test:
 - 1) test results (individual, mean values and chart of results),
 - 2) observations (if any).

4.2 Tensile strength**4.2.1 Principle**

All test specimens are prepared by foaming between two plates. After fully curing, these plates are teared perpendicularly by a tensile testing machine until the sample fractures or breaks. The tensile strength is the maximum force withstood by the specimen.

4.2.2 Equipment

For each specimen (in total six specimens are required):

4.2.2.1 Two P3 or P5 particle boards (compliant with EN 312) with dimensions of 50 mm × 200 mm × 10 mm (length × width × thickness).

4.2.2.2 Two P3 or P5 particle boards (compliant with EN 312) with dimensions of 80 mm × 200 mm × 10 mm (length × width × thickness).

4.2.2.3 2 spacers, not water absorbing, not adherent, (e. g. PE, PTFE, on which polyurethane does not adhere), size: 50 mm × 20 mm × 20 mm.

4.2.2.4 2 screw clamps.

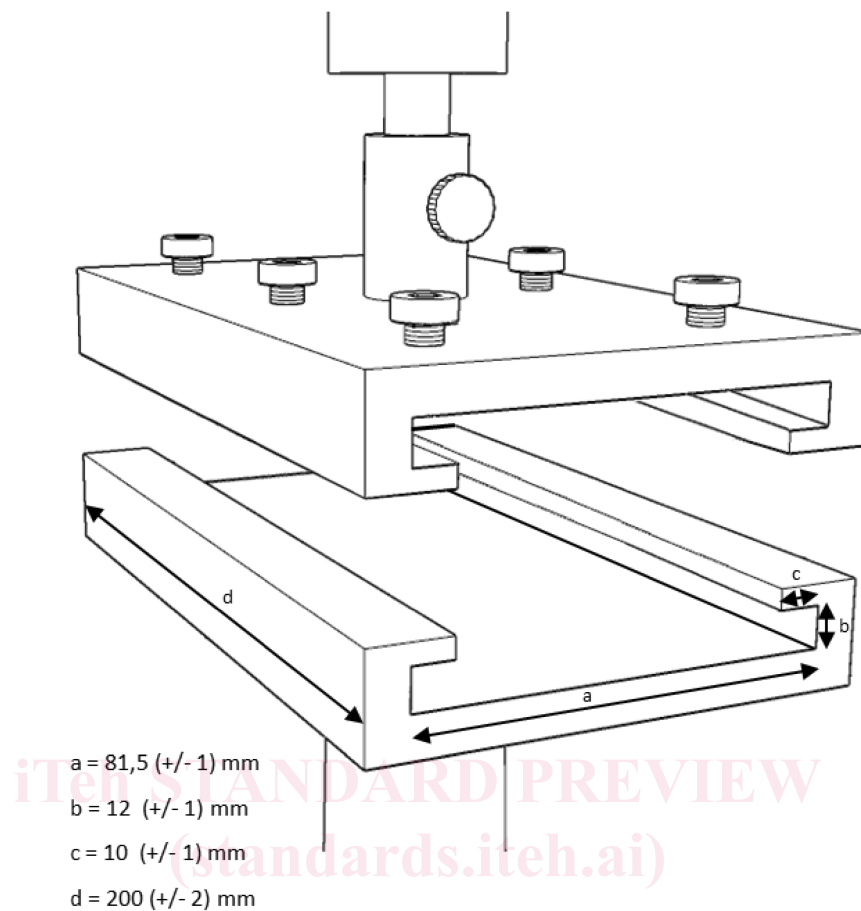
Other equipment:

4.2.2.5 PU adhesive.

4.2.2.6 Knife.

4.2.2.7 Tensile testing machine.

4.2.2.8 2 specimen grips for fixing the specimen to the tensile testing machine.



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Figure 5 — Specimen grips

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4.2.2.9 Conditioning chamber capable of being controlled at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$.

4.2.3 Sampling

4.2.3.1 Conditioning

Bring the test container and the particle boards to the test temperature $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \% \text{ RH}$ for at least 24 h.

4.2.3.2 Test pieces preparation

- Attach the spacers between the two smaller panels and fix them with screw clamps. The cavity in the assembled joint should measure $50 \text{ mm} \times 160 \text{ mm} \times 20 \text{ mm}$.
- Prepare a minimum of six joints.
- Moisten three of the six joints. The clamped boards are immersed in water for 20 s, taken out and stored horizontally for 2 min, until excess water has dripped off. The foaming must start within the next 30 s.
- Shake an unused foam container vigorously 20 times.
- Discard the first $40 \text{ g} \pm 10 \text{ g}$ of foam.