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Karakterizacija enokomponentnih pen (OCF) - 1. del: Izkoristek

Characterization of One Component Foam (OCF) - Part 1: Yield

Charakterisierung von Einkomponentenschäumen - Teil 1: Ausbeute

Caractérisation des mousses monocomposants - Partie 1 : Rendement

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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 17333-1:2018) 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* (this document)

— *Part 2: Expansion*

— *Part 3: Application*

— *Part 4: Mechanical Strength*

— *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).

1 Scope

This document specifies test methods for the evaluation of the yield characteristics properties for moisture curing, self-curing or water drying foams dispensed from single pressurized containers.

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:

— determination of the apparent density of an OCF extruded in a joint and calculation of the theoretical foam volume (yield) in running meters of the whole can;

— determination of the total foam volume for the whole OCF container;

— determination of the real volume of cured foam, respecting eventual cavities inside the foam structure;

— determination of the density of a cured OCF for identification purposes only.

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 923, *Adhesives - Terms and definitions*

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
density (free foamed)
density of cured foam after expanding without physical constraints

3.2
density (joint)
density of cured foam after expanding in a joint

3.3
joint
void into which froth is dispensed

3.4
longitudinal yield
length of a joint with fixed dimensions that can be filled with one container of foam

3.5
one component foam (OCF)
moisture curing or water drying foam as well as self-curing activatable foam dispensed from single pressurized containers

3.6
pressurized containers
pressurized container according to EN 14847 and EN 15006

3.7
self-curing activatable foam
one container foam with internal cartridge containing reactive components

4 Test methods

4.1 Method 1 – Joint density and yield

4.1.1 Principle

The foam is dispensed into a joint with fixed dimensions. The density of the cured foam is calculated using the weight and volume of the foam. The theoretical joint yield is calculated by measuring the amount sprayed.

NOTE Joint density can differ from the free foamed density determined by Method 4 in 4.4.

4.1.2 Equipment

For each joint:

4.1.2.1 **2 gypsum boards,** measuring 500 mm × 100 mm × 12,5 mm.

4.1.2.2 **2 spacers,** not water absorbing, not adherent (e. g. PE, PTFE, on which polyurethane does not adhere), thickness 30 mm.

4.1.2.3 **Joint mould,** size 500 mm × 100 mm × 55 mm.

4.1.2.4 **Paper or uncoated carton.**

Additional tools:

4.1.2.5 **Weighing scale** with an accuracy of 0,1 g.

4.1.2.6 **Knife.**

4.1.2.7 **Conditioning chamber** capable of being controlled at (23 ± 2) °C and (50 ± 5) % RH.

4.1.3 Sampling

4.1.3.1 Conditioning

The test conditions shall be (23 ± 2) °C and (50 ± 5) % relative humidity unless indicated otherwise. Bring the test container, gypsum board and paper to the test conditions for at least 24 h.

4.1.3.2 Test pieces

A minimum of three samples shall be subjected to the tests given in this section to obtain accurate estimations of material properties.

4.1.4 Test procedure

a) Build three horizontal joints using the plaster boards and spacers (see Figure 1). The inner dimensions of each joint shall be 30 mm × 100 mm × 500 mm.

b) Measure the weight of the paper w_p and insert the sheets in the joints.

c) Mount the dispenser tool on the test container and note the initial container mass with the dispenser tool (m_i).

d) Do not pre-moisten the joint.

e) Shake an unused foam container vigorously 20 times and discard the first (40 ± 10) g of foam. Weigh the container with the dispenser tool again and note the mass m_0.

f) Fill the first joint according to manufacturer's instruction whilst avoiding overexpansion. Typical filling levels are 70 % to 80 % of joint height for gun foams and 40 % to 50 % for straw foams.

g) Weigh the container with the dispenser tool and note the mass (m_n).

h) Repeat the steps f) to g) twice with the remainder of the container (container half empty and the last 10 % of the container) to fill all three joints. Write down new values for m_0, m_n, w_f and V_f for both measurements.

   If container is emptied before all three joints are filled only include the full joints in the calculations.

i) Allow the foam to cure in the joint for at least 24 h at test conditions.

j) Measure the mass of the foam piece including the paper (w_f).

k) Determine the volume (V_f) of the foam piece including the paper using Method 3 in 4.3.

l) Extrude the foam until the container is empty and note the weight of the empty container (m_e).

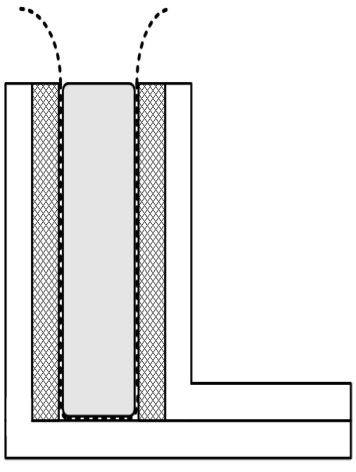

Figure 1 — Joint set up

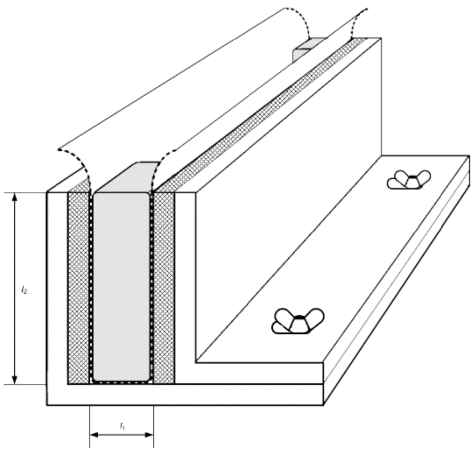

Figure 2 — Joint with cured foam

4.1.5 Expression of results

For each of the joints, calculate the joint density of the foam using Formula (1):

$$\rho_{jf} = \frac{w_f - w_p}{V_f} \quad (1)$$

where

ρ_{jf} is the density of the foam in the joint [kg m^{-3}];

w_f is the mass of the foam and the paper [g];

w_p is the mass of paper [g];

V_f is the volume of the foam piece [dm^3].

Similarly, for each of the joints, calculate the longitudinal joint yield using Formula (2):

$$Y_m = \frac{m_i - m_e}{m_0 - m_n} \times V_f \times \frac{1}{1\,000\,ab} \quad (2)$$

where

Y_m is the longitudinal yield of the foam in the joint [m];

m_i is the initial mass of the container and dispenser tool [g];

m_e is the mass of the empty container and dispenser tool [g];

m_0 is the mass of the container and dispenser tool before filling the joint [g];

m_n is the mass of the container and dispenser tool after filling the joint [g];

V_f is the volume of the foam piece [dm^3];

a is the width of the joint [mm];

b is the height of the joint [mm].

4.1.6 Test report

Report the following quantities:

a) temperature and relative humidity during the experiment;

b) joint density of each joint;

c) average joint density, calculated as arithmetic mean of the three individual joint densities;

d) longitudinal yield and joint dimensions of each joint;

e) average longitudinal yield of the foam, calculated as arithmetic mean of the three individual longitudinal yields;

f) observations and/or comments (if any).

The products tested in compliance with this document shall be referenced with the following items.

The test report shall include the following information:

g) a reference to this European Standard;

h) the name and address of the testing laboratory;

i) the number and date of the test report;

j) the name and signature of the operator or signatory of the report;

k) 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,

   5) packaging: volume,

   6) expiry date and/or production date;

l) test procedure for test performed according to Clause 4.1:

   1) date of test,

   2) performer,

   3) any deviation from Clause 4.1.

4.2 Method 2 – Total foam yield

4.2.1 Principle

A full foam container is emptied into a box with defined dimensions. The foam volume (yield) is determined by water displacement of the cured foam.

This method is suitable for determining total foam yield of moisture and self curing foam that can be measured by water displacement.

4.2.2 Equipment

4.2.2.1 **Dimensionally stable box** capable of accommodating different volumes with a suitable non-adherent liner (e.g. polypropylene) with dimensions depending on the test container. Indicative values are shown below:

4.2.2.2 **Expected cured foam** volume > 30 l: 400 mm × 400 mm × 400 mm (size 1).

4.2.2.3 **Expected cured foam** volume 15 to 30 l: 300 mm × 300 mm × 300 mm (size 2).

4.2.2.4 **Expected cured foam** volume < 15 l: 250 mm × 250 mm × 250 mm (size 3).

4.2.2.5 **Water atomizer.**