SLOVENSKI STANDARD
SIST EN 17333-1:2020

01-junij-2020

Karakterizacija enokomponentnih pen - 1. del: Značilnosti izkoristka pene

Characterization of One Component Foam - Part 1: Foam yield characteristics

Charakterisierung von Einkomponentenschäumen - Teil 1: Ausbeute

Caractérisation des mousses monocomposants - Partie 1 : Rendement

Ta slovenski standard je istoveten z: **EN 17333-1:2020**

ICS:

83.180	Lepila	Adhesives

SIST EN 17333-1:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 17333-1

March 2020

ICS 83.180

English Version

Characterisation of one component foam - Part 1: Foam yield characteristics

Caractérisation des mousses monocomposants - Partie 1 : Caractéristiques de rendement des mousses

Charakterisierung von Einkomponentenschäumen - Teil 1: Schaumausbeute

This European Standard was approved by CEN on 1 December 2019.

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

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Ref. No. EN 17333-1:2020 E

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European foreword

This document (EN 17333-1:2020) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by UNE.

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of an identical text or by endorsement, at the latest by September 2020, and conflicting national standards shall be withdrawn at the latest by September 2020.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 is one of the product European Standards within the framework series of EN 17333 on Characterization of one component foam, as follows:

— *Part 1: Foam yield characteristics* (this document);

— *Part 2: Expansion characteristics*;

— *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).

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies test methods for the evaluation of the foam yield characteristics for moisture curing, self-curing activatable or water drying foams dispensed from single pressurized foam 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 document to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.

The following test methods are described:

— Method 1 – Determination of the apparent density of an OCF extruded in a joint and calculation of the theoretical foam yield in running meters of the whole can.

— Method 2 – Determination of the real yield of cured foam, respecting eventual cavities inside the foam structure.

— Method 3 – Determination of the free foamed density of a cured OCF for identification purposes only.

— Method 4 – Determination of the total foam yield for the whole OCF container for moisture and self-curing foam that can be measured by water displacement.

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*

EN 15006, *Metal aerosol containers - Aluminium containers - Dimensions of the 25,4 mm aperture*

EN 14847, *Aerosol containers - Tinplate containers - Dimensions of the 25,4 mm aperture*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp/ui

— IEC Electropedia: available at http://www.electropedia.org/

3.1
one component foam
(OCF)
moisture curing or water drying foam as well as self-curing activatable foam dispensed from a single pressurised foam container

3.2
free foamed density
density of cured foam after expanding without physical constraints

3.3
joint foamed density
mass per unit volume of cured foam after expanding in a joint

3.4
joint
void into which froth is dispensed

3.5
joint foam yield
length of a joint with pre-defined dimensions, that may be filled by the froth extruded from single pressurized foam container

3.6
pressurised foam container
pressurised can according to EN 14847 and EN 15006

3.7
test container
pressurised can according to EN 14847 and EN 15006 used for testing purposes

3.8
self-curing activatable foam
one component foam with internal cartridge containing reactive components

3.9
fully cured or dried foam
cross-linked foam which reaches its serviceable properties as claimed by the manufacturer

3.10
straw foam
one component or two component foam for the extrusion with an adapter tube

3.11
gun foam
one component foam for the extrusion with a foam application gun

4 Test methods

4.1 Method 1 – Joint foamed density and foam yield

4.1.1 Principle

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

NOTE Joint density can differ from the free foamed density determined by Method 3 in 4.3.

4.1.2 Equipment

For each joint:

4.1.2.1 2 gypsum boards, with dimensions 420 mm × 100 mm × 12,5 mm.

4.1.2.2 2 spacers, not water absorbing, not adherent (e.g. polyethylene (PE), polytetrafluoroethylene (PTFE), on which polyurethane (PU) does not adhere), dimensions: 100 mm × 30 mm × 30 mm.

4.1.2.3 Joint mould of inner dimensions 360 mm × 100 mm × 30 mm.

4.1.2.4 Uncoated paper, recommended A3 typewriter

Additional tools:

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

4.1.2.6 Sharp and clean knife blade.

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 measurements of material properties.

4.1.4 Test procedure

a) Build three horizontal joints using the gypsum boards and spacers (see Figures 1 to 3). The inner dimensions of each joint shall be minimum 360 mm × 100 mm × 30 mm.

b) Weigh the paper w_p and insert the sheets in the joints.

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

d) Do not pre-moisten the joint.

e) Shake an unused test container vigorously 20 times and discard the first (40 ± 10) g of foam. Weigh the test 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 (80 ± 10) % of joint height for gun foams and (60 ± 10) % for straw foams.

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

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

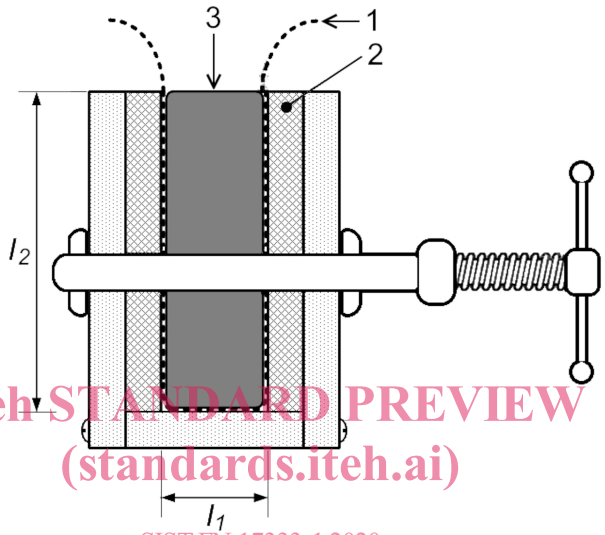
NOTE If test container is emptied before all three joints are filled only include the full joints in the calculations.

i) Extrude the foam until the test container is empty and note the weight of the empty test container with the dispenser tool (m_e).

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

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

l) Determine the volume (V_f) of the single foam piece including the paper using the principles of Method 3 in 4.3. Write down new values for w_f and V_f for both measurements.



Key

1 paper inlay

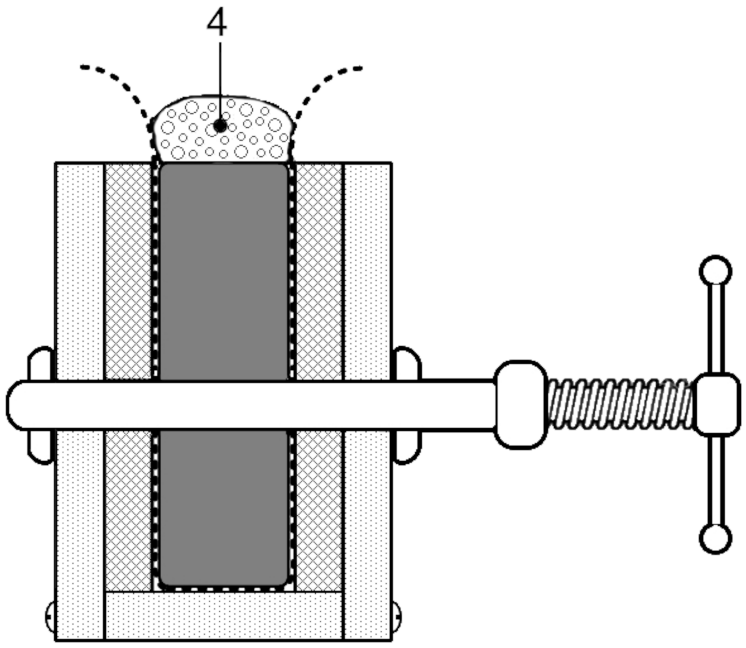
2 gypsum board

3 spacer

l_1 30 mm

l_2 100 mm

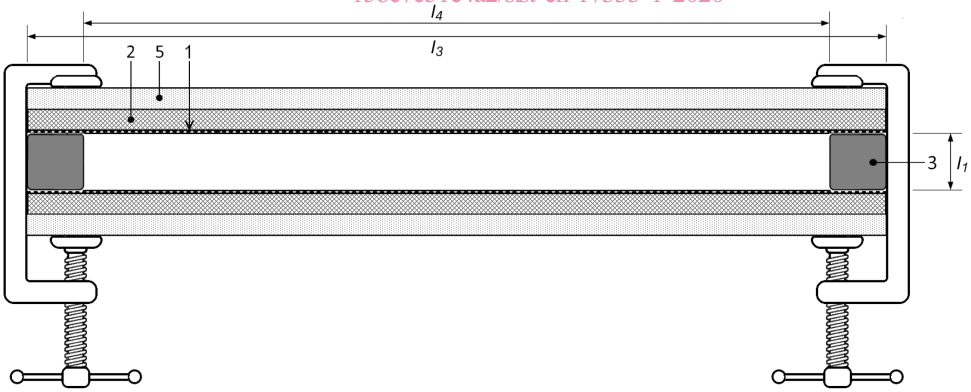
Figure 1 — Joint empty – front view



Key

4 PU foam

Figure 2 — Joint with foam – front view



Key

1 paper inlay

2 gypsum board

3 spacer

5 joint mould

l_1 30 mm

l_3 420 mm

l_4 360 mm

Figure 3 — Empty joint – top view

4.1.5 Expression of results

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

$$\rho_{\text{jf}} = \frac{w_{\text{f}} - w_{\text{p}}}{V_{\text{f}}} \tag{1}$$

where

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

w_{f} is the mass of the foam and the paper [kg];

w_{p} is the mass of paper [kg];

V_{f} is the volume of the foam piece [m^3].

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

$$Y_{\text{m}} = \frac{m_{\text{i}} - m_{\text{e}}}{m_0 - m_{\text{n}}} \times V_{\text{f}} \times \frac{1}{ab} \tag{2}$$

where

Y_{m} is the longitudinal yield of the foam in the joint [m];

m_{i} is the initial mass of the test container and dispenser tool [kg];

m_{e} is the mass of the empty test container and dispenser tool [kg];

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

m_{n} is the mass of the test container and dispenser tool after filling the joint [kg];

V_{f} is the volume of the foam piece [m^3];

a is the width of the joint [m];

b is the height of the joint [m].

4.1.6 Test report

Report the following quantities:

a) temperature and relative humidity during the test;

b) joint density of each joint;

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

d) longitudinal foam yield and joint dimensions of each joint;

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

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