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TM 1002:2014

Determination of the density of foam in a joint to calculate the Joint Yield of an OCF[1] Canister Foam

1. Scope

This test method describes how to determine the apparent density of an OCF sprayed in a joint and how to calculate from this the theoretical foam volume (yield) in running meters of the whole can.

2. Short description of the procedure

The liquid foam is sprayed into a joint with fixed dimensions. The weight and dimensions of the cured foam gives the foam density. By measuring the amount sprayed we can calculate the theoretical foam yield.

3. Background and purpose

The yield of an OCF canister is often important to customers buying the product. Information on labels concerning yield are often derived from laboratory tests that were completed under ideal circumstances, i.e. to obtain the highest possible yield. The purpose of this test procedure is to determine a realistic, achievable foam yield of a PU-foam canister when it is used in joints. The value should be reported in metres for a joint with specific width and height. Since numerous joint dimensions can be calculated, the specific width (a) and height (b) of the joint in mm, has to be mentioned together with the result.

4. Equipment

For each measurement:

- 2 plaster boards, size: 500 mm x 100 mm x 12.5 mm (length x height x thickness)
- 2 spacers, size: 30 mm
- Joint mould, size 500 mm x 100 mm x 55 mm
- Paper or uncoated carton

Further tools:

- Scales, accuracy 0.1 g
- Sharp cutter
- Controlled climate chamber, providing norm climate

[1] **OCF**: Generic for moisture curing One Component Foams dispensed from pressurised containers (“aerosol cans”) as well as self-curing two component foams dispensed from pressurised containers (“1,5 component foams”)

5. Procedure

5.1 Preparation

a) Test conditions: 23°C, 50 % r. h. (norm climate)
b) Acclimatise the test canister, plaster board and paper to the test climate for at least 24 h.
c) Build a horizontal joint, perpendicular to the flat, with a width of 30 mm, depth of 100 mm and a length of 500 mm, with the plaster boards at the sides.
d) Take the paper and draw orientation lines to indicate a 40 mm height of the joint (see Figure 1). Place the paper in the joint to give the test apparatus as in Figure 2.

5.2 Experimental procedure

a) Mount the dispenser tool (straw or gun) and note the initial canister weight (m_i).
b) Don't pre-moisten the joint.
c) Shake the canister vigorously 20 times.
d) Discard the first 50 g of foam and weigh the canister again (m_o).
e) Avoiding overexpansion of the cured foam, fill according to manufacturer's instructions (typical: gun foam 70 - 80 %, straw foam 40 – 50 % of joint height).
f) Weigh the canister again (m_n).
g) Let the foam cure for at least 24 hours at 23°C and 50 % r. h.
h) Determine the weight (W_f) of the foam piece including the paper.
i) Determine the volume (V_f) of the foam piece including the paper, e. g. with Archimedes' method or by water displacement (see TM 1007).
j) Repeat the procedure (steps c – i) - if possible - twice, with the second (can half empty) and third part (last 10% of the can content). For both new tests one should get new figures for m_o, m_n and V_f.
k) Spray the canister until empty (until spitting) and note the weight of the empty canister (m_e).

Figure 1: Typewriter paper insert with orientation lines

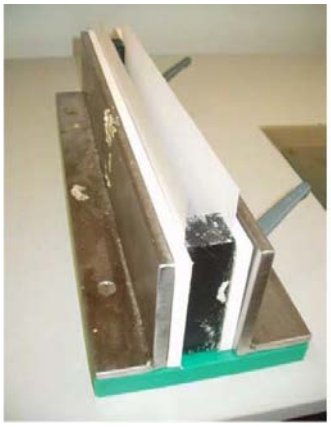

Figure 2: Build joint.

Figure 3: Joint with cured foam.

5.3 Evaluation

The density of the foam in the joint can be calculated as follows:

$$s.g._{joint} = \frac{(W_f - x)}{V_f}$$

where:

$s.g._{joint}$	is the calculated density of the foam in the joint (g/L)
V_f	is the volume of the foam piece (L)
W_f	is the weight of the foam piece (g)
x	is the correction for the used paper still on the foam piece (g); this weight can be calculated using the specific weight (g/m²) of the paper, or can be measured by weighing a paper sheet of the same quality and dimensions

The “longitudinal” yield can be calculated using the equation:

$$Y(m)_{a,b\ mm^2\ joint} = \frac{(m_i - m_e)}{(m_o - m_n)} \cdot V_f \cdot \frac{10^3}{a \cdot b}$$

where:

$Y_{(m)}$	is the yield in running metres for a joint size of *a* mm x *b* mm
m_i	is the initial canister weight, including tool (straw or gun) (g)
m_e	is the emptied canister weight, including tool (straw or gun) (g)
m_o	is the canister weight just before joint filling, including tool (straw or gun) (g)
m_n	is the canister weight just after joint filling, including tool (straw or gun) (g)
V_f	is the volume of the foam piece (L)
a	is the width of the joint to calculate, expressed in mm
b	is the heigth of the joint to calculate, expressed in mm

5.4 Results

The joint yield must be expressed, for comparison reasons, in meter length for a standard joint of 20 mm (*a*) width and 50 mm (*b*) depth. For other joint dimensions, *a* and *b* should be adapted accordingly.

When two or more measurements are done for the same one canister (see point 5.2 j), the test results for both density and running meters at the mean values of the two or more measurements. The width (a) and height (b) of the joint for which the running meter yield calculation is made, are always noted as well.

6. Revision

Version	Date	Remarks
3	20 November 2014	Released at the OCF TTF meeting on 04 June 2014.
4	8 May 2017	Added specifications and consistency in use of units of measurement.

7. Contact

FEICA – Association of the European Adhesive & Sealant Industry
Avenue Edmond van Nieuwenhuyse, 4
B– 1160 Brussels, Belgium
Tel: +32 (0)2 676 73 20 | Fax: +32 (0)2 676 73 99
info@feica.eu | www.feica.eu

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