SLOVENSKI STANDARD
SIST EN 2667-6:2004

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Aerospace series - Non-metallic materials - Foaming structural adhesives - Test methods - Part 6: Determination of water absorption

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Luft- und Raumfahrt - Nichtmetallische Werkstoffe - Strukturelle Expansionsklebstoffe - Prüfverfahren - Teil 6: Bestimmung der Wasseraufnahme

Série aérospatiale - Matériaux non-métalliques - Adhésifs structuraux expansibles - Méthodes d'essai - Partie 6: Détermination de l'absorption d'eau

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This European Standard was approved by CEN on 2 May 2001.

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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 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

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Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

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of an identical text or by endorsement, at the latest by June 2002, and conflicting national standards shall be withdrawn at the latest by June 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies the test methods for determining the water absorption of foaming structural adhesives when exposed to high humidity or immersed in water.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 2667-3 Aerospace series - Non-metallic materials - Foaming structural adhesive films - Test methods - Part 3: Expansion ratio and volatile content [1)]

3 Principle

Weighing of test pieces before and after exposure to a specified environment.

4 Apparatus and reagents

- Balance accurate to ± 1 mg
- Oven, capable of maintaining a temperature of (110 ± 3) °C and of (50 ± 3) °C.
- Humidity cabinet, capable of maintaining a uniform temperature of (50 ± 3) °C and a relative humidity of 95 % to 100 %.
- Container with distilled water
- Container with absolute alcohol
- Desiccator
- Ancillary items, such as knives, metal templates, polyester or polyvinylfluoric film, metal support material, measuring devices, sand paper.

1) Published as AECMA Prestandard at the date of publication of this standard.

5 Test pieces

5.1 They shall be cut from cured and expanded test samples (see figure 1). The edges shall be smooth and free from cracks. If necessary, finishing shall be carried out using sand paper or emery cloth or by routering.

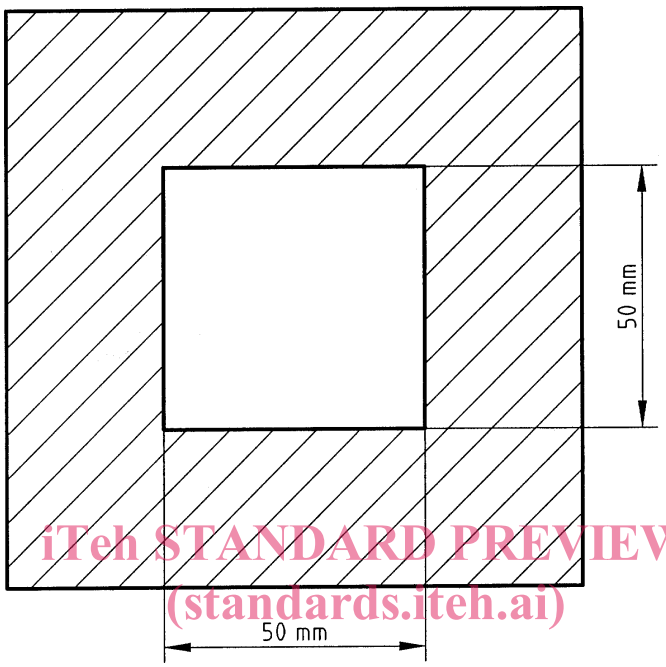

Figure 1 – Test piece

5.2 The thickness is the average of four corner-measurements. All dimensions shall be measured to ± 0,2 mm.

5.3 If test pieces to EN 2667-3 are used for the determination of water absorption, then a release film shall be used between the foaming structural adhesive film and the support material.

5.4 The number of test pieces for each test method shall be three.

5.5 Weigh the test pieces individually (mass M_{1i} in milligrammes = original mass).

6 Conditioning

The test pieces shall be conditioned for 24 h in the oven at a temperature of (110 ± 3) °C, cooled in the desiccator and immediately weighed (mass M_{2i} in milligrammes = mass after conditioning).

7 Test methods

7.1 14 days immersion

Completely immerse the test pieces in the container with distilled water maintained at a temperature of (25 ± 3) °C. At the end of the 14 days, remove the test pieces from the water, dip them in absolute alcohol, dry them for 1 min in the preheated oven at a temperature of (50 ± 3) °C, cool them in the desiccator and immediately weigh (mass M_{3i} in milligrammes = wet mass).

7.2 14 days humidity

Expose the test pieces in the humidity cabinet for 14 days to air at (50 ± 3) °C and relative humidity of 95 % to 100 %. At the end of the 14 days, remove the test pieces from the cabinet, cool them in the desiccator and immediately weigh (mass M_{3i} in milligrammes = wet mass).

7.3 Reconditioning

After 7.1 or 7.2, recondition the test pieces to 6 and immediately weigh (mass M_{4i} in milligrammes = mass after reconditioning).

If M_{4i} is lower than M_{2i}, the difference shall be considered as water soluble matter lost during the test. In this case the water absorption value is the sum of the mass increase during the test and the mass of the water soluble matter (see 8.4 and 8.5).

If M_{4i} is not lower than M_{2i}, the adhesive is considered as having no water soluble matter.

8 Expression of results

8.1 The mass loss due to conditioning, expressed in percentage, shall be calculated as follows:

$$\text{mass loss} = \frac{M_{1i} - M_{2i}}{M_{1i}} \times 100$$

8.2 The mass increase due to water absorption during the test, expressed in percentage, shall be calculated as follows:

$$\text{mass increase} = \frac{M_{3i} - M_{2i}}{M_{2i}} \times 100$$

The actual mass increase during the test, expressed in milligrammes of water per cubic centimeter of test piece, shall be calculated as follows:

$$\text{actual mass increase} = \frac{M_{3i} - M_{2i}}{V_{1i}}$$

where:

V_{1i} is the original volume of the test piece in cubic centimeters, see figure 1 and 5.2.

8.3 The soluble matter lost during the test (see 7.3), expressed in percentage, shall be calculated as follows:

$$\text{soluble matter lost} = \frac{M_{2i} - M_{4i}}{M_{2i}} \times 100$$

The actual mass of soluble matter lost during the test (see 7.3), expressed in milligrammes of water per cubic centimeter of test piece, shall be calculated as follows:

$$\text{soluble matter lost} = \frac{M_{2i} - M_{4i}}{V_{1i}}$$

8.4 The percentage of water absorption during the test is the sum of the values of 8.2 and 8.3.

8.5 The actual mass of water absorbed during the test is the sum of the values of 8.2 and 8.3.

9 Test report

It shall include the following:

- number of this standard;
- complete identification of the foaming adhesive material including the type, manufacturer, date of manufacture, batch number, material standard number, mixing procedure of foaming paste adhesive, storage conditions, expansion rate to EN 2667-3;
- curing conditions including the heat-up rate, curing time and temperature;
- dimensions of the test pieces before conditioning;
- test conditions;
- individual and mean values (see 8.1, 8.2, 8.3, 8.4 and 8.5);
- any observations concerning the test pieces such as cracking or change in appearance;
- any deviations from this standard.