SLOVENSKI STANDARD
SIST EN 2667-03:2019

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Aeronavtika - Nekovinski materiali - Penaste folije gradbenih lepil - Preskusne metode - 3. del: Ekspanzijsko razmerje in hlapna vsebina

Aerospace series - Non-metallic materials - Foaming structural adhesive films - Test methods - Part 3 : Expansion ratio and volatile content

Luft- und Raumfahrt - Nichtmetallische Werkstoffe - Schäumende Strukturklebefolien - Prüfverfahren - Teil 3: Ausdehnungsverhältnis und flüchtige Anteile

Série aérospatiale - Matériaux non-métalliques - Adhésifs structuraux expansibles en film - Méthodes d'essai - Partie 3 : Taux d'expansion et taux de matières volatiles

Ta slovenski standard je istoveten z: **EN 2667-3:2019**

ICS:

49.025.50	Lepila	Adhesives

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EUROPEAN STANDARD
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English Version

Aerospace series - Non-metallic materials - Foaming structural adhesive films - Test methods - Part 3: Expansion ratio and volatile content

Série aérospatiale - Matériaux non-métalliques - Adhésifs structuraux expansibles en film - Méthodes d'essai - Partie 3 : Taux d'expansion et taux de matières volatiles

Luft- und Raumfahrt - Nichtmetallische Werkstoffe - Strukturelle Expansionsklebstoffe in Filmform - Prüfverfahren - Teil 3: Expansionsgrade und Anteil an flüchtigen Bestandteilen

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

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Contents

Page

European foreword

This document (EN 2667-3:2019) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries 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 ASD, 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of an identical text or by endorsement, at the latest by March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.

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1 Scope

This document specifies the test method for determining the expansion ratio and the volatile content in structural foaming adhesive films.

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 2090, *Aerospace series — Aluminium alloy AL-P2024 - — T3 — Clad sheet and strip — 0,3 mm ≤ a ≤ 6 mm*

EN 2334, *Aerospace series — Chromic-sulphuric acid pickle of aluminium and aluminium alloys*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
expansion ratio
the increase in thickness after curing of a foaming adhesive film expressed as a percentage of its original, pre-cured thickness

3.2
volatile content
the decrease in mass after curing of a foaming adhesive film expressed as a percentage of its original, pre-cured mass

4 Principle

The principle of the test is to measure the thickness and weigh the foaming adhesive film before and after curing on a support material.

5 Apparatus and auxiliary equipment

Air circulating oven:

- programmable or controllable when conducting the curing cycle;
- regulating in temperature stages of ± 2 °C;
- equipped with thermoelectric couples for continuously recording the temperatures.

Balance with an accuracy of 1 mg.

Micrometer provided with a flat ended probe 6 mm in diameter for thickness measurement with an accuracy of 0,01 mm.

Desiccator.

6 Test specimens

A minimum of three (3) test specimens shall be made for each test and prepared in accordance with 6.2 to 6.5. Subclause 6.1 describes the requirements for weighing and thickness measurements.

6.1 All weighings (m) and thickness measurements (a) are to be respectively measured to the nearest 1 mg and 0,01 mm.

For 6.3 to 6.5 the thickness (a_x) the test specimen is the average of minimum four (4) measurements taken from the five (5) positions shown in Figure 1 (a_1, a_2, a_3, a_4, a_5).

See Figure 2 for 6.2 to 6.5.

6.2 Cut out as many square samples from the width of the foaming film, as test specimens needed.

Dimensions per Figure 1 — Sides $\left(100\ ^{0}_{-5}\right)$ mm.

Do not remove their separators.

Weigh and measure the thickness: m_1, a_1.

Identify each sample with a reference number.

6.3 Cut out as many square aluminium alloy sheets 2024-T3 in accordance with EN 2090, as adhesive samples, with $\left(\mathbf{120}\ ^{+5}_{0}\right)$ mm sides, sheet thickness 1 mm to 2 mm.

Degrease these sheets with an appropriate solvent in the vapour phase or pickle as per EN 2334.

Weigh and measure the thickness: m_2, a_2.

Identify each sheet.

6.4 Remove the separators on one (1) side only (separator n°1) of the squares of adhesive film.

Place these squares in the center of the aluminium alloy sheets, the side with no separator in contact with the alloy, while ensuring that no air bubbles are trapped.

Then remove the second separator (separator n°11).

Weigh and measure the thickness of each separator: m_3^1, m_3^{11}, a_3^1, a_3^{11}.

6.5 Cure each test specimen, in a horizontal position with no additional pressure at the center of an air circulating oven in conformity with the material standard or in accordance with the manufacturer's recommendations. The temperature shall be monitored and recorded using a thermoelectric couple placed in contact with the sheet as per Figure 1.

Cool in a desiccator until it reaches ambient temperature.

Weigh and measure the thicknesses: m_4, a_4.

7 Expression of results

Calculate the expansion ratio for each test specimen as follows:

$$E\,\% = \frac{a_4 - [(a_2 + a_1) - (a_3^1 + a_3^{11})]}{a_1 - (a_3^1 + a_3^{11})} \times 100$$

NOTE Where there is only one (1) separator, $(a_3^1 + a_3^{11})$ becomes a_3.

Calculate the average expansion ratio of the series of test specimens.

Calculate the volatile content for each test specimen as follows:

$$V\,\% = \frac{[m_1 - (m_3^1 + m_3^{11})] - (m_4 - m_2)}{m_1 - (m_3^1 + m_3^{11})} \times 100$$

NOTE Where there is only one (1) separator, $(m_3^1 + m_3^{11})$ becomes m_3.

Calculate the average volatile content of the series of test specimens.

8 Designation

EXAMPLE:

Number of this standard ——— **EN2667-3**

9 Test report

It shall include the following:

- reference to this standard;
- complete identification of the foaming adhesive, including the type, name and address of the manufacturer, date of manufacture, batch number and the material standard number;
- information on the surface preparation of the aluminium alloy sheets;
- processing and curing conditions (equipment, heat-up rate, curing temperature, duration and record of temperature);
- number of test specimens;
- dimensions, thicknesses and mass of each test specimen;
- individual and average values of the thicknesses recorded at the relevant points corresponding to the expansion ratio;