



SLOVENSKI STANDARD

SIST EN 2243-4:2006

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Aerospace series - Non-metallic materials - Structural adhesives - Test method - Part 4:
Metal-honeycomb core flatwise tensile test

Luft- und Raumfahrt - Nichtmetallische Werkstoffe - Strukturelle Klebstoffsysteme -
Prüfverfahren - Teil 4: Zugversuch senkrecht zur Deckschicht für Wabenkernverbunde

iTeh STANDARD PREVIEW

(non-metallics systems)
Série aérospatiale - Matériaux non-métalliques - Systeme d'adhésifs structuraux -
Méthodes d'essai - Partie 4 : Essai de traction perpendiculaire pour métal-nid d'abeilles

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English Version

Aerospace series - Non-metallic materials - Structural adhesives
- Test method - Part 4: Metal-honeycomb core flatwise tensile
test

Série aérospatiale - Matériaux non-métalliques - Système
d'adhésifs structuraux - Méthodes d'essai - Partie 4 : Essai
de traction perpendiculaire pour métal-nid d'abeilles

Luft- und Raumfahrt - Nichtmetallische Werkstoffe -
Strukturelle Klebstoffsysteme - Prüfverfahren - Teil 4:
Zugversuch senkrecht zur Deckschicht für
Wabenkernverbunde

This European Standard was approved by CEN on 26 September 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard (EN 2243-4:2005) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 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 April 2006, and conflicting national standards shall be withdrawn at the latest by April 2006.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This European Standard supersedes EN 2243-4:1991.

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

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Introduction

This standard is part of the series of EN non-metallic material standards for aerospace applications. The general organization of this series is described in EN 4385. This standard is a level 3 document as defined in EN 4385.

1 Scope

This standard defines the general requirements for the determination of strength of structural adhesives by testing in tension metal to honeycomb core joints, at ambient or other temperatures.

Two types of test pieces are defined:

Type A: direct bonding of honeycomb to facing blocks;

Type B: bonding of honeycomb between the two facing sheets, then bonding of the whole to the facing blocks.

2 Normative references

The following referenced documents are indispensable for the application 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 ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*.

EN 2090, *Aerospace series — Aluminium alloy AL-P2024- — T3 — Clad sheet and strip — $0,3 \text{ mm} \leq a \leq 6 \text{ mm}$* .¹⁾

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

EN 2419, *Aerospace series — Aluminium alloy AL-P2024- — T351 — Plate — $6 \text{ mm} < a \leq 80 \text{ mm}$* .¹⁾

EN 2497, *Aerospace series — Dry abrasive blasting of titanium and titanium alloys*.

EN 2540, *Aerospace series — Steel FE-PM3902 (X7CrNiAl17-7) — Air melted — Solution treated and precipitation hardened — Sheet and strip — $a \leq 6 \text{ mm}$ — $1\,240 \text{ MPa} \leq R_m \leq 1\,450 \text{ MPa}$* .¹⁾

EN 3456, *Aerospace series — Titanium alloy TI-P64001 — Annealed — Sheet and strip, hot rolled — $a \leq 6 \text{ mm}$* .¹⁾

EN 3464, *Aerospace series — Titanium alloy TI-P64001 — Annealed — Plate — $6 \text{ mm} < a \leq 100 \text{ mm}$* .¹⁾

EN 3487, *Aerospace series — Steel FE-PA13 — Softened — $500 \leq R_m \leq 700 \text{ MPa}$ — Bar for machining — $D_e \leq 100 \text{ mm}$* .¹⁾

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

EN 4385, *Aerospace series — Non-metallic materials — General organisation of standardisation — Links between types of standards.*¹⁾

EN 4606, *Aerospace series — Aluminium honeycomb core.*²⁾

3 Definitions, symbols and abbreviations

3.1 Definitions

Not applicable

3.2 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

R tensile strength (in mega pascals);

F load at failure (in newtons);

L_i dimensions (in millimetres).

4 Health and safety

This standard does not necessarily include all health and safety requirements, associated with its use.

Persons using this standard shall be familiar with normal laboratory/test house practices.

It is the responsibility of the user to establish satisfactory health and safety practices and to ensure conformity with any European, national or local laws/regulations.

5 Principle/Technique

Not applicable

6 Resources

6.1 Apparatus

All test equipment shall be calibrated at intervals not exceeding 12 months.

6.1.1 Tensile testing machine

The tensile testing machine shall conform to class 1 of EN ISO 7500-1. The failing load of the test specimen shall be within 10 % and 90 % of the upper limit of the selected loading range of the machine.

2) In preparation at the date of publication of this standard.

6.1.2 Recorder

It shall record continuously the displacement relative to the load applied throughout the test until total failure occurs.

6.2 Materials/Reagents

Not applicable

6.3 Qualification of personnel

Not applicable

7 Test samples/Test pieces

7.1 Materials

7.1.1 For test temperatures up to 150 °C

Honeycomb core: see EN 4606.

Aluminium alloy EN 2419 (facing blocks) or EN 2090 (facing sheets).

7.1.2 For test temperatures above 150 °C

Honeycomb core: see EN 4606.

Corrosion resisting steel EN 2540 (facing sheets) or EN 3487 (facing blocks) or titanium alloy EN 3456 and EN 3464.

NOTE 1 These are the preferred (reference) alloys for high temperature test, but aluminium alloys defined in 7.1.1 can also be used.

NOTE 2 The same material has to be used for all the tests if results have to be compared.

7.2 Surface preparation before bonding

EN 2334 or EN 2497 according to the material, or another specified preparation.

7.3 Bonding

The application and curing of the adhesive system (adhesive and primer) shall be carried out according to the material standard unless otherwise agreed with the adhesive system manufacturer.

7.4 Dimensions of panels (type B test piece)

The test panel shall be of sufficient size to permit the manufacture of at least one test piece (see Figure 1).

7.5 Storage of test panels after bonding

They shall be stored under the following conditions:

- temperature : (23 ± 2) °C;
- relative humidity : (50 ± 5) %.

7.6 Cutting of panels and preparation of type B test pieces

The panels shall be cut into test pieces (see Figure 1).

The panels made with high temperature curing adhesives shall be cut only after a storage period of 16 hours (see note 1).

NOTE 1 For batch acceptance testing, this 16 hours period can be omitted. Nevertheless, for temperature curing adhesive, care shall be taken to cut panels only when their temperature is down to ambient.

Perform the cutting operation so as to avoid overheating (≤ 50 °C) or mechanical damage to the joint (see note 2).

NOTE 2 A fine-tooth, circular or band-saw has been found suitable for this purpose.

Cutting shall be straight and parallel.

The use of cooling liquids is not permitted, unless otherwise specified.

Test piece shall be bonded onto blocks by using a cold curing type adhesive.

The application and curing of the adhesive system (adhesive and primer) shall be carried out according to its material standard, and care shall be taken to avoid any mechanical or thermal effect that could damage the joint to be tested.

7.7 Test pieces

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7.7.1 Dimensions

See Figure 1.

7.7.2 Number of specimen

See material standard.

7.7.3 Identification

Each test piece shall be marked to identify the panel from which it was cut and its position in the panel.

8 Testing procedure

8.1 Dimensions measurement

Measure the specimen side dimensions L_1 and L_2 with an accuracy of $\pm 0,1$ mm.