



SLOVENSKI STANDARD

oSIST prEN 4473:2023

01-maj-2023

Aeronavtika - Organski premazi, pigmentirani z aluminijem, za vezne elemente - Tehnična specifikacija

Aerospace series - Aluminium pigmented organic coatings for fasteners - Technical specification

Luft und Raumfahrt - Aluminium pigmentierte organische Beschichtungen für Verbindungselemente - Technische Lieferbedingungen

Série aérospatiale - Revêtements aluminio-organiques pour éléments de fixation - Spécification technique

Ta slovenski standard je istoveten z: **prEN 4473**

ICS:

49.025.20	Aluminij	Aluminium
49.030.01	Vezni elementi na splošno	Fasteners in general
49.040	Prevleke in z njimi povezani postopki, ki se uporabljajo v letalski in vesoljski industriji	Coatings and related processes used in aerospace industry

oSIST prEN 4473:2023

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 4473

March 2023

ICS 49.040

Will supersede EN 4473:2010

English Version

Aerospace series - Aluminium pigmented organic coatings for fasteners - Technical specification

Série aérospatiale - Revêtements aluminés organiques
pour pièces de fixations - Spécification technique

Luft und Raumfahrt - Aluminium pigmentierte
organische Beschichtungen für Verbindungselemente -
Technische Lieferbedingungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Technical requirements	6
4.1 General	6
4.2 Classification	6
4.3 Product composition and application	6
4.4 Coating performance	6
Annex A (normative) Performance requirements	8
Annex B (normative) Test coupons for galvanic compatibility	13
Annex C (normative) Test coupons for paint adhesion	14
Annex D (normative) Test coupons for electrical conductivity tests	15
Bibliography	16

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European foreword

This document (prEN 4473:2023) 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 document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 4473:2010.

The main changes compared to the previous edition are as follows:

- re-write to new layout;
- clarify some test requirements, e.g. coating adhesion on fasteners, measurement of coating thickness.

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prEN 4473:2023 (E)**1 Scope**

This document defines the performance requirements for aluminium pigmented organic coatings to be applied on titanium, titanium alloys, nickel or cobalt based alloys and corrosion resistant steels.

This specification does not cover electrical bonding and lightning strike applications of this coating. Additional qualification tests will be agreed with the OEM upon qualification.

NOTE This coating is not recommended for use on non-corrosion resistant steel fasteners.

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 4474, *Aerospace series - Aluminium pigmented coatings - Coating methods*

prEN 6117, *Aerospace series — Specification for lubrication of fasteners with acetyl alcohol*¹

EN ISO 2812-1, *Paints and varnishes - Determination of resistance to liquids - Part 1: Immersion in liquids other than water (ISO 2812-1)*

ISO 2409, *Paints and varnishes — Cross-cut test*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

MIL-A-8625, *Anodic coatings for aluminium and aluminium alloys*²

NASM 1312-5, *Fastener Test Methods; Method 5: Stress durability*³

NASM 1312-12, *Fasteners Test Methods, Method 12: Thickness of metallic coatings*²

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 production lot

parts subjected to the same aluminium pigmented coating application at the same time under the same condition

¹ Published as ASD-STAN Prestandard at the date of publication of this standard by AeroSpace and Defence Industries Association of Europe – Standardization (ASD-STAN) (www.asd-stan.org).

² Published by: Department of Defense (DOD), the Pentagon, Washington, D.C. 20301 USA.

³ Published by: Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, USA.

3.2**product**

commercial chemical solution that constitutes the aluminium pigmented coating

3.3**blister**

local convexity caused by a sub-surface inclusion of gas or liquid

3.4**nodule**

localized build-up or unmixed solid particles

3.5**pit**

void, hole in the surface as caused, for example, by corrosion

3.6**porosity**

fine holes or pores within the coating

3.7**functional surfaces**

defined as surfaces in contact with mating structure and threaded portion such as:

- pins, bolts, lockbolts, screws: under head bearing surface, shank, lead-in radius and thread surface if applicable;
- nuts, threaded collars: bearing surfaces, thread surface;
- spherical washers: bearing surfaces;
- swaged collars: all surfaces

3.8**generic part**

family of similar fasteners such as:

- pins, bolts, screws and lockbolts;
- nuts and threaded collars;
- swaged collars;
- solid rivets;
- blind bolts;
- bushes;
- washers

prEN 4473:2023 (E)**4 Technical requirements****4.1 General**

This document covers organic resin coatings pigmented with aluminium powder. Aluminium pigmented coatings provide:

- Friction reduction in threads and interference fit assemblies;
- Galvanic corrosion protection between fasteners and the structure in which the fasteners are installed;
- Protection against aggressive chemicals used in operations and maintenance.

TR 4676 provides a list of commercial aluminium pigmented coating products widely used in the aerospace industry. This list is non-exhaustive and the use of different products may vary for each OEM and their specific applications.

4.2 Classification

Aluminium pigmented coatings are classified according to the following types:

Type I: Aluminium pigmented coatings containing hexavalent chromium, for use with cetyl alcohol.

Type II: Hexavalent chromium free aluminium pigmented coatings, for use with cetyl alcohol.

Type III: Aluminium pigmented coatings containing hexavalent chromium, for use without lubricant.

Type IV: Hexavalent chromium free aluminium pigmented coatings, for use without lubricant.

If no dedicated type is specified in the drawing, type II or IV shall be used depending on the need for lubrication (to be confirmed with the OEM).

4.3 Product composition and application

The manufacturing method and product composition is defined by the product manufacturer. The latter should peremptorily notify its users of any change subsequent to qualification.

The product shall not contain lead or graphite. Type II and IV shall not contain hexavalent chromium.

Unless otherwise specified, product application shall be carried out in accordance with EN 4474.

4.4 Coating performance

- a) Qualification of a new coating product as per EN 4473.

Qualification tests as per Table A.1 shall be performed to each individual coating product-material type (e.g. titanium alloys, corrosion resistant steels, Ni and Co-based alloys), combination with the mandated body, unless otherwise specified.

- b) Qualification of fasteners or other parts coated with a qualified coating product as per EN 4473.

Unless otherwise specified, qualification tests shall be performed as per Table A.1.

All the tests required by this paragraph shall be carried out on coated fasteners, unless otherwise agreed with the mandated body.

- c) Lot release of qualified fasteners or other parts coated with a qualified coating product as per EN 4473.

Each lot of coated fasteners (or other parts) manufactured shall be subject to the acceptance tests and sampling devised in EN 4474 by the supplier before delivery. The results of these tests shall be given on the acceptance report for each lot of coated fastener (or other parts).

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Annex A (normative)

Performance requirements

Table A.1 — (continuous)

Characteristic	Inspection	Acceptance criteria (all test parts shall conform)	Required	Quantity of test parts
A1.1 Appearance	Visual examination	The coating shall be smooth, uniform colour, and shall be free of pinholes, porosity, blisters, nodules, pits, or other imperfections.	a), b)	10
A1.2 Thickness	Determination of coating thickness shall be made by any of the methods specified in NASM 1312-12. In case of conflict, the micrographic examination shall be chosen.	<u>Parts with external functional surfaces only:</u> The coating thickness shall be between 5 µm and 13 µm on all functional surfaces as defined in 3.7. <u>Parts with external and internal functional surfaces:</u> The coating thickness shall be between 5 µm and 20 µm on all functional surfaces as defined in 3.7.	a), b)	10
A1.3 Adhesion	ISO 2409 – Tape method If the fastener geometry does not allow the ISO2409 cross-cut, the coating shall be cut through to the base material on the largest plain surface of the part using a sharp cutter. Press the tape firmly to the cut on the plain surface of the fastener and remove the tape in one abrupt motion perpendicular to the fastener surface. Any evidence of coating separation when examined at 4X magnification is cause for rejection.	The coating shall remain continuously bonded to the base material. EN ISO 2409 Class 0.	a), b)	5