



# SLOVENSKI STANDARD

## oSIST prEN 4474:2023

01-maj-2023

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### Aeronavtika - Organski premazi, pigmentirani z aluminijem - Premazne metode

Aerospace series - Aluminium pigmented organic coatings - Coating methods

Luft- und Raumfahrt - Aluminiumpigmentierte organische Beschichtungen - Beschichtungsverfahren

Série aérospatiale - Revêtements alumino-organiques - Méthodes d'application

Ta slovenski standard je istoveten z: **prEN 4474**

#### ICS:

49.025.20	Aluminij	Aluminium
49.040	Prevleke in z njimi povezani postopki, ki se uporabljajo v letalski in vesoljski industriji	Coatings and related processes used in aerospace industry

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**en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
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English Version

## Aerospace series - Aluminium pigmented organic coatings - Coating methods

Série aérospatiale - Revêtements aluminos-organiques -  
Méthodes d'application

Luft- und Raumfahrt - Aluminiumpigmentierte  
organische Beschichtungen - Beschichtungsverfahren

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.

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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

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<b>Contents</b>	<b>Page</b>
European foreword .....	3
<b>1</b> Scope.....	<b>4</b>
<b>2</b> Normative references.....	<b>4</b>
<b>3</b> Terms and definitions .....	<b>4</b>
<b>4</b> Equipment .....	<b>5</b>
4.1 For application by dipping .....	5
4.2 For application by spraying .....	5
4.3 For curing.....	5
<b>5</b> Surface preparation .....	<b>5</b>
<b>6</b> Coating application .....	<b>5</b>
6.1 General.....	5
6.2 Application by dipping.....	6
6.3 Application by spraying.....	6
6.4 Other application methods.....	6
<b>7</b> Coating removal .....	<b>7</b>
<b>8</b> Quality assurance .....	<b>7</b>
8.1 Fastener lot release requirements .....	7
8.2 Process validation .....	7
<b>Annex A (normative) Quality assurance tests and sampling .....</b>	<b>8</b>
<b>Annex B (informative) Standard evolution form.....</b>	<b>10</b>
<b>Bibliography .....</b>	<b>11</b>

## European foreword

This document (prEN 4474:2023) 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 4474:2016.

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

- Subclause 8.1: removed anodization per ISO 8080;
- Subclause 9.1 a): “within 24 h after surface preparation” replaced by “if possible within 24 h after surface preparation”;
- Subclause 9.1 b): removed requirements for humidity and temperature;
- Subclause 12.3: added 5 µm to 20 µm on internally threaded fasteners.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

[oSIST prEN 4474:2023](https://standards.iteh.ai/catalog/standards/sist/109b4305-48da-4168-bcbf-edad09e59409/osist-pren-4474-2023)

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**prEN 4474:2023 (E)****1 Scope**

This document defines the application method and quality assurance for aluminium pigmented coatings as per EN 4473 which may be applied to fasteners or other parts in titanium, titanium alloys, nickel or cobalt based alloys and corrosion resisting steels.

**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 ISO 2409, *Paints and varnishes - Cross-cut test (ISO 2409)*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

NASM 1312-12, *Fastener Test Methods, Method 12, Thickness of Metallic Coatings*

**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 conditions

**3.2****pre-production parts**

parts representing future production parts

**3.3****scratch**

gouged out or scoring of the coating or base material

**3.4****sampling plan**

plan according to which one or more samples are taken in order to obtain information and to reach a decision, if possible

**3.5****Acceptable Quality Limit****AQL**

maximum percent defective (or the maximum number of defects per hundred units) that, for purposes of sampling inspection, can be considered satisfactory as a process average

Note 1 to entry: Variant: quality level which in a sampling plan corresponds to a specified but relatively high probability of acceptance.

### 3.6

#### functional surfaces

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

- pins, bolts, lockbolts, screws, blind fasteners: 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

## 4 Equipment

### 4.1 For application by dipping

For application by dipping, a container with a lid, stirring device and temperature control shall be used. The equipment shall be capable of applying the specified thickness, for example by controlling the speed of immersion and removal and by draining or centrifuging the fasteners.

### 4.2 For application by spraying

A dry, contaminant free spray nozzle shall be used, with settings adapted to the characteristics of the coating product used and to the geometry of the fasteners to be coated.

Preferably, a mechanical stirring device should be included in the reservoir.

NOTE A device allowing for rotation of the fasteners to be coated and the automatic displacement of the gun will give a more uniform application.

### 4.3 For curing

Drying and curing shall be performed as per manufacturer's instructions.

For curing, a furnace capable of curing temperatures prescribed by the coating manufacturer and controlled by periodical calibration shall be used.

## 5 Surface preparation

Unless otherwise specified, degreasing followed by abrasive blasting and/or chemical activation (or equivalent) shall be performed.

NOTE The surface roughness is an important factor affecting adhesion and behaviour of the coating in service. The optimal abrasion process and its parameters can vary with size and base material of the fasteners treated.

## 6 Coating application

### 6.1 General

Product shelf life shall be defined by the product manufacturer. Products are to be applied under consideration of manufacturers' application, processing instructions and under respect of local, national and European safety, health and environmental protection regulations.

It is recommended to apply the coating:

**prEN 4474:2023 (E)**

- if possible, within 24 h after surface preparation. Precautions shall be taken to prevent contamination or corrosion of the fasteners awaiting treatment;
- in a clean and dry environment, avoiding any operations liable to contaminate the surfaces to be treated.

Product may be applied in several layers but shall only have one curing (polymerization). Intermediate heating (flash-off) is acceptable for each layer if the technical data sheet of the product does not state otherwise.

**6.2 Application by dipping**

Dipping shall be performed as follows:

- adjust the viscosity of the solution (see EN ISO 2431 or EN ISO 2884-1) to the value given by the manufacturer of the product to be deposited;
- if necessary, pre-heat the fasteners between 50 °C and 100 °C;
- immerse the fasteners at a speed determined by tests on pre-production fasteners;
- keep the fasteners immersed for 2 s to 10 s;
- remove the fasteners at a speed determined by tests on pre-production fasteners;
- drain fasteners;
- dry fasteners avoiding handling them;
- the coating shall be cured in an oven. The temperature and duration shall comply with the values defined by the technical data sheet of the coating manufacturer.

**6.3 Application by spraying**

Spraying shall be performed as follows:

- adjust the viscosity of the solution (see ISO 2431 or ISO 2884-1) to the value given by the manufacturer;
- if necessary, pre-heat the fasteners to approx. 50 °C;
- produce the coating by applying successive passes. The gun setting and its distance shall be determined by tests on pre-production fasteners;
- dry fasteners avoiding handling them;
- the coating shall be cured in an oven. The temperature and duration shall comply with the values given by the technical data sheet of the coating manufacturer.

**6.4 Other application methods**

Other application methods producing the equivalent quality of deposit may be used as long as the requirements of this specification are achieved (e.g. barrel deposition).



## 7 Coating removal

Prior to curing, the coating shall be removed using thinner or other solvents. After curing, the following processes are generally used separately or as a combination:

- removal by dry or wet blasting with appropriate media;
- chemical removal by pickling using products which will not impact the mechanical properties of the base material (e.g. embrittlement). The chemical treatment should comply with the local environmental regulations.

After removal of the coating, the fasteners shall be subjected to a visual and dimensional inspection.

## 8 Quality assurance

### 8.1 Fastener lot release requirements

Each lot of fasteners manufactured shall be subject to acceptance tests before delivery as per Table A.1. The results of these tests shall be given on the acceptance report of each production lot.

### 8.2 Process validation

Before beginning production, the processor shall apply the coating on fasteners and/or test pieces as agreed between the purchaser and processor. All the tests required by this document (Table A.1 in Annex A) shall be carried out on these coated fasteners and/or test pieces, unless otherwise agreed between the purchaser and processor.

Process approval shall be carried out for each combination of coating product and processor.

If the test results pass the acceptance criteria, written approval to commence production shall be granted. The process schedule shall not be changed thereafter without the prior agreement of the purchaser.

<https://standards.iteh.ai/catalog/standards/sist/109b4305-48da-4168-bcbf-edad09e59409/osist-pren-4474-2023>

## Annex A (normative)

### Quality assurance tests and sampling

**Table A.1 — Quality assurance tests and sampling**

Characteristic	Inspection <sup>a</sup>	Acceptance criteria	Sampling
A.1.1 Visual appearance	Visual inspection	The coating shall be smooth, uniform colour, and shall be free of pinholes, porosity, blisters, nodules, pits, or other imperfections.	Unless otherwise specified, sampling in accordance with ISO 2859-1: — sample size code letter, Table 1 (ISO 2859-1), special inspection level S3; — simple sampling plan for normal inspection; — Acceptance Quality Limit (AQL) 1,5.
A.1.2 Thickness	Determination of coating thickness shall be made by any of the methods specified in NASM 1312-12. It is also allowed to apply any mechanical or optical testing capable to measure the difference between the diameter before coating/after coating. It is not expected to measure the same samples (before and after). Parts with internal functional surfaces shall be inspected only by micrographic examination, unless otherwise agreed with the purchaser. 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 3.6. <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 3.6. Specified thickness required on all cylindrical surfaces. All other surfaces shall have a full coating coverage, no requirement for recesses and safety holes. If no or not large enough cylindrical area is present on the part, specified thickness shall be ensured by a representative traveller of representative diameter.	