



SLOVENSKI STANDARD
oSIST prEN 2535:2020
01-oktober-2020

Aeronavtika - Usedline kadmija v vakuumu

Aerospace series - Vacuum deposition of cadmium

Luft- und Raumfahrt - Aufdampfen von Kadmium im Vakuum

Série aérospatiale - Cadmiage sous vide

Ta slovenski standard je istoveten z: prEN 2535

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ICS:

49.025.99 Drugi materiali Other materials

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EUROPEAN STANDARD
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ICS

Will supersede EN 2535:2011

English Version

Aerospace series - Vacuum deposition of cadmium

Série aérospatiale - Cadmiage sous vide

Luft- und Raumfahrt - Aufdampfen von Kadmium im Vakuum

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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prEN 2535:2020 (E)

European foreword

This document (prEN 2535:2020) 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-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 2535:2011.

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1 Scope

This document defines the method for depositing cadmium layers according to the vacuum deposition process, for use in aerospace construction.

According to this process, cadmium metal is vaporized under vacuum and deposited directly on the base material with an interlayer. The coating produced in this way is ductile and electrically conductive.

This document is applicable whenever referenced.

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 2437, *Aerospace series - Chromate conversion coatings (yellow) for aluminium and aluminium alloys*

EN 2828, *Aerospace series - Adhesion test for metallic coatings by burnishing*

EN 4729, *Aerospace series - Trivalent chromium based chemical conversion coatings for aluminium and aluminium alloys*

EN ISO 1463, *Metallic and oxide coatings - Measurement of coating thickness - Microscopical method (ISO 1463)*

EN ISO 2082, *Metallic and other inorganic coatings - Electroplated coatings of cadmium with supplementary treatments on iron or steel (ISO 2082)*

EN ISO 2177, *Metallic coatings - Measurement of coating thickness - Coulometric method by anodic dissolution (ISO 2177)*

EN ISO 2178, *Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method (ISO 2178)*

EN ISO 2819, *Metallic coatings on metallic substrates - Electrodeposited and chemically deposited coatings - Review of methods available for testing adhesion (ISO 2819)*

EN ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227)*

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

ISO 4520, *Chromate conversion coatings on electroplated zinc and cadmium coatings*

ISO 18295-1, *Customer contact centres — Part 1: Requirements for customer contact centres*

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:

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

3.1

batch

parts of the same nature (form, size, material), treated at the same time

3.2

customer

organization or person that receives a product or service

[SOURCE: ISO 18295-1]

3.3

manufacturer

company or person who manufactures parts or assembles components in accordance with the relevant standards and declares the compliance of the delivered products with all applicable provisions of the relevant standard(s)

Note 1 to entry: the manufacturer can also apply the process.

3.4

OEM

Original Equipment Manufacturer, manufacturer who has the design authority and manufactures parts or components which are purchased and retailed by the manufacturers company under the purchasing company's brand name

Note 1 to entry: the OEM can also apply the process.

3.5

pre-production part

parts manufactured according to a given definition and which are representative of the production process

3.6

processor

company or person who applies the process

3.7

R_m

ultimate tensile strength defined in the steel material standard of the "to be plated" part

4 General principles of the process

4.1 Purpose of process

This process enables any hydrogen absorption to be avoided.

It ensures protection against corrosion, in particular for steels of $R_m > 1\,450$ MPa. It may be beneficial to tensile bolts of $R_m > 1\,250$ MPa.

4.2 Thickness

Unless otherwise specified in the product standard or definition document, the thicknesses are:

- class A: 10 μm to 20 μm (normal thickness);
- class B: 7 μm to 14 μm (for parts with close tolerances or for bolts with a thread diameter $> 3,2$ mm);
- class C: 5 μm to 10 μm (for bolts with a thread diameter $\leq 3,2$ mm).

4.3 Indications for use of cadmium coatings

Direct contact of cadmium plated parts with titanium, titanium alloy surfaces shall be avoided, due to "Solid Cadmium Embrittlement" of titanium, titanium alloys by solid metal diffusion.

Direct contact of cadmium plated parts with carbon fibre reinforced laminates shall be avoided.

Direct contact of Cadmium plated parts with fuel shall be avoided due to fuel contamination with $\text{Cd}(\text{OH})_2$ cadmium corrosion residues.

Use of cadmium plated and primer coated parts is limited to 150 °C service temperature.

Use of cadmium plated, chromated fasteners and close tolerance parts (6.5.1) is limited to 235 °C service temperature.

If available, preferentially use a non-chromium (VI) passivation as post-treatment.

5 Apparatus and materials

5.1 Vacuum enclosure

The vacuum enclosure shall contain the following equipment:

- a variable heating system for vaporization of the cadmium;
- a rotating device to achieve a regular coating;
- a vaporizing dish;
- a glow system and a vacuum gauge as well as an inspection window.

Furthermore, a pump system is required, allowing a vacuum of at least $6,65 \times 10^{-3}$ Pa to be reached.

5.2 Deposition material

The cadmium used for deposition shall be at least 99,95 % pure. The mercury content shall not exceed the maximum level of 0,004 %.

The quality shall be confirmed by certificate.

prEN 2535:2020 (E)**5.3 Masking material**

The masking materials used, such as masking varnishes, lead or textile tapes, paper or aluminium foils shall not release gases during the process.

6 Process requirements**6.1 Information for the processor**

In addition to the designation in Clause 11, the following information shall be stated:

- a) number of the substrate standard and metallurgical condition of the substrate;
- b) surface to be treated;
- c) non specific coating thicknesses of the cadmium coating and tolerances;
- d) post treatment process, if post treatment by chromating does not have to be carried out;
- e) additional surface protection, preservation.

6.2 Process schedule

Unless otherwise specified, the following process schedule is mandatory:

- a) degreasing;
- b) abrasive blasting;
- c) degreasing (if necessary, e.g. to remove any abrasive residues);
- d) suspension in the device;
- e) evacuation of the enclosure;
- f) ionic etching (sputter cleaning) (if necessary);
- g) deposition;
- h) flooding and venting of the enclosure;
- i) removal;
- j) post treatment, additional protection, preservation as per 6.5.

6.3 Pre-treatment**6.3.1 General**

Chemical or electrochemical process such as acid pickling, electrolytic cathodic degreasing or processes causing hydrogen embrittlement are not permitted for steels of $R_m > 1\,450$ MPa.

6.3.2 Degreasing

The parts shall be cleaned by appropriate and qualified organic solvents.