



SLOVENSKI STANDARD

SIST EN 2535:2011

01-november-2011

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: **EN 2535:2011**

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ICS:

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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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 2535

June 2011

ICS 49.040

English Version

Aerospace series - Vacuum deposition of cadmium

Série aérospatiale - Cadmiage sous vide

Luft- und Raumfahrt - Aufdampfen von Kadmium im
Vakuum

This European Standard was approved by CEN on 12 February 2011.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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EN 2535:2011 (E)**Foreword**

This document (EN 2535:2011) 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of an identical text or by endorsement, at the latest by December 2011, and conflicting national standards shall be withdrawn at the latest by December 2011.

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.

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

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1 Scope

This European Standard 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 vaporised under vacuum and deposited directly on the base material with an interlayer. The coating produced in this way is ductile and electrically conductive.

This standard should be applicable whenever referenced.

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

EN 9100, *Aerospace series - Quality management systems - Requirements (based on ISO 9001:2000) and Quality systems - Model for quality assurance in design, development, production, installation and servicing (based on ISO 9001:1994)*

EN ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method*

EN ISO 2082, *Metallic and other inorganic coatings - Electroplated coatings of cadmium with supplementary treatments on iron or steel (ISO 2082:2008)*

EN ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution (ISO 2177:2003)*

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EN ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method (ISO 2178:1982)*

EN ISO 2819, *Metallic coatings on metallic substrates — Electrodeposited and chemically deposited coatings — Review of methods available for testing adhesion (ISO 2819:1980)*

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

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

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

3 Purpose of process

This process enables any hydrogen absorption to be avoided.

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

4 Limitation of process use

The contact of cadmium-plated parts with titanium, titanium alloys, fuels and fuel line shall be avoided at temperature < 150 °C.

EN 2535:2011 (E)**5 Terms and definitions**

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

5.1**batch**

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

5.2**pre-production part**

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

5.3 **R_m max.**

maximum value of the tensile strength range which is defined in the standard on the steel to be treated

6 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)

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7 Apparatus and materials

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7.1 Vacuum enclosure

The vacuum enclosure shall contain the following equipment:

- a variable heating system for vaporisation of the cadmium;
- a rotating device to achieve a regular coating;
- a vaporising 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.

7.2 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.

7.3 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.

8 Information for the processor

In addition to the designation in clause 19, 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) if post-treatment by chromating does not have to be carried out.

9 Condition of parts prior to processing

9.1 General

Unless otherwise specified, all machining operations, moulding, brazing and welding treatments as well as heat treatments, shall be completed before plating.

9.2 Stress relief treatment

The conditions for stress relief treatment of steel parts shall be determined according to the nature and hardness of the material. A slight discoloration by superficial oxidation is permitted. Shot peening, if required, shall be carried out after stress relief treatment.

10 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) chromating;
- k) preservation or application of paint.