SLOVENSKI STANDARD

SIST EN 4826:2015

01-februar-2015

Aeronavtika - Cink-nikljeva (12 %–16 % Ni) prevleka jekel z določeno natezno trdnostjo ? 1 450 MPa z bakrovimi, nikljevimi in aluminijevimi zlitinami za dele in vezne elemente

Aerospace series - Zinc-Nickel (12 %-16 % Ni) plating of steels with specified tensile strength ≤ 1 450 MPa, copper alloys, nickel alloys and aluminium alloys for parts and fasteners

Luft- und Raumfahrt - Zink-Nickel (12 % bis 16 % Ni) Stahlbeschichtung mit festgelegter Zugfestigkeit ≤ 1 450 MPa, Kupfer-, Nickel- und Aluminiumlegierungen für Verbindungsteile und Verschlüsse

Série aérospatiale - Dépôt électrolytique Zinc-Nickel (12 %-16 % Ni) sur aciers de résistance ≤ 1 450 MPa, sur alliages de cuivre, alliages de nickel et alliages d'aluminium pour pièces et éléments de fixation

Ta slovenski standard je istoveten z: **EN 4826:2014**

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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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This European Standard was approved by CEN on 28 June 2014.

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

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Contents

Foreword

This document (EN 4826:2014) 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of an identical text or by endorsement, at the latest by June 2015, and conflicting national standards shall be withdrawn at the latest by June 2015.

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1 Scope

This European Standard specifies the plating of a Zinc-Nickel (12 % to 16 %) alloy on mechanical parts and fasteners in steels (R_m ≤ 1 450 MPa), stainless steels (R_m ≤ 1 450 MPa), copper alloys, nickel alloys and aluminium alloys (not applicable for electrical components), as well as the passivation and lubricant finishing that can be associated to them. The Zinc-Nickel process is an electrolytic plating process under controlled current allowing to deposit a Zinc-Nickel layer from, most often, an alkaline electrolyte. Alkaline Zinc-Nickel is only considered in this standard.

The purpose of this standard is to give technical and quality requirements of Zinc-Nickel plating. It doesn't give complete in-house process instructions, these shall be given in the manufacturers detailed process instructions.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2832, *Aerospace series — Hydrogen embrittlement of steels — Notched specimen* test

EN 4473, *Aerospace series — Aluminium pigmented coatings for fasteners — Technical specification*

EN 9100, *Quality Management Systems — Requirements for Aviation, Space and Defence Organizations*

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

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

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

EN ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods* (ISO 3497)

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

ISO 2812 (all parts), *Paints and varnishes — Determination of resistance to liquids*

NASM 1312-5, *Fastener test methods — Method 5: Stress durability* [1)]

NASM 1312-14, *Fastener test methods — Method 14: Stress durability internally threaded fasteners* [1)]

ASTM F 519, *Standard test method for mechanical hydrogen embrittlement evaluation of plating/coating processes and service environments* [2)]

1) Published by: AIA National (US) Aerospace Industries Association of America http://www.aia-aerospace.org/

2) Published by: ASTM National (US) American Society for Testing and Materials http://www.astm.org/

3 Terms and definitions

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

3.1
batch
unless otherwise specified, it comprises parts of the same type (shape, size, material), processed at the same time in the same bath with the same de-embrittlement conditions

3.2
pre-production part
part representative of future production

3.3
electro-plating
electrolytical metal deposition

3.4
passivation
conversion performed on metal electro-deposition in order to improve corrosion resistance

3.5
lubricant top coat /finishing
additional thin organic or inorganic resin based layer in order to improve functional properties: friction

3.6
Zinc-Nickel coating system
Zinc-Nickel coating including:

- possible undercoat as strike,
- supplementary treatments as passivation and/or lubricant top coat.

See 6.1: type 1 to type 4.

3.7
substrate
material upon which a coating is directly deposited, in the case of a single or first coating, the substrate is identical with the basis metal and for a subsequent coating, the intermediate coating is the substrate

3.8
UTS
R_m
Ultimate Tensile Strength

3.9
nodule
rounded projection formed on a cathode during electrode position (2.5) that may be seen without magnification

4 Purpose of process

The aim of the Zinc-Nickel plating is to ensure a protection against corrosion for steels or to reduce the effects of galvanic coupling of less noble materials in contact with the plated substrates. For improving corrosion, a passivation is performed on Zinc-Nickel coating. The Zinc-Nickel plating has also electrical conductivity properties and may also provide anti-galling properties when associated with an appropriate lubricant finishing.

5 Applicability and limitations of the process

This standard applies whenever referenced.

It is applicable on parts with or without threads, and fasteners, and on:

— low alloys steels and stainless steels R_m ≤ 1 450 MPa,

— copper alloys,

— nickel alloys,

— aluminium alloys.

The electrolytic Zinc-Nickel plating process must not be used in the following cases:

— welded parts likely to entrap electrolyte,

— cavities, holes, recesses for which processing limitations may result in uncontrolled or incomplete,

— coverage,

— springs with diameter ≤ 1 mm.

Zinc-Nickel plating can withstand the following service temperatures:

— 120 °C for parts coated with lubricant top coat,

— 250 °C for parts coated with trivalent chromium passivation.

6 Coating system classification

6.1 System types

Zinc-Nickel coating system is classified by the four following types, depending on the supplementary finishing:

Type 1 (T1): Zinc-Nickel (12 % to 16 %) alloy as plated.

Type 2 (T2): Zinc-Nickel (12 % to 16 %) alloy as plated and trivalent chromium passivation in order to improve corrosion resistance.

Type 3 (T3): Zinc-Nickel (12 % to 16 %) alloy as plated, trivalent chromium passivation and friction control lubricant for improving corrosion resistance and reaching consistent coefficient of friction of 0.08 to 0.14.

Type 4 (T4): Zinc-Nickel (12 % to 16 %) alloy as plated, trivalent chromium passivation and friction control lubricant for improving corrosion resistance and reaching consistent coefficient of friction of 0.12 to 0.18.

6.2 Coating thicknesses

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

— Class A: 4 µm to 7 µm [typical thickness for screws with diameter < 3,5 mm and tight fits (bushes)].

— Class B: 7 µm to 13 µm (typical thickness for parts with tigh tolerances or threaded, and screws with diameter > 3,5 mm).

— Class C: 10 µm to 20 µm (typical thickness for other cases for maximum corrosion resistance).

— It is permissible that thicknesses obtained on parts exceed the maximum thickness values given above provided that the final sizes required by the plan and drawings are satisfied and that the thickness is not exceeding 20 % of the maximum thickness.

— For internally threaded parts, a maximum limit of 13 µm (class B) above the minimum shall be allowed on the external surfaces.

— The thickness tolerances are those of the Zinc-Nickel electrolytic plating (type 1) and/or Zinc-Nickel coating system (type 2, 3 and 4): Possible undercoat (e.g. strike in order to improve adhesion on stainless steels), Passivation and lubricant finishing thicknesses are considered to be insignificant. For fasteners, the possible undercoat, the passivation or lubricant finishing thicknesses shall not alter mountability, see dimensional test, subclause 8.3.

7 Requirements

7.1 Process requirements

7.1.1 Information for the processor

— process designation, see Clause 9;

— bare substrate standard reference and heat treatment;

— areas to be plated;

— plated thickness measuring points;

— duration and temperature of stress relief and de-embrittlement treatments;

— electrical contact points or areas where these are not permitted;

— specification for testing on parts and/or samples.

7.1.2 Condition of parts prior to the treatment

Welding, soldering/brazing, mechanical operations and heat treatments shall have been completed.

Stress relief may be required for parts which have been cold worked or machined after the heat treatment operation.

When shot peening is specified, it shall be performed after the stress relief operations.