SLOVENSKI STANDARD
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Aerospace series - Chromic acid anodizing of aluminium and wrought aluminium alloys

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Luft- und Raumfahrt - Chromsäure-Anodisieren von Aluminium und Aluminium-Knetlegierungen

Série aérospatiale - Anodisation chromique de l'aluminium et des alliages d'aluminium corroyés

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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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English version

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat : Rue de Stassart, 36, B—1050 Bruxelles

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FOREWORD

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope and field of application

This standard specifies the required characteristics for the performance of chromic acid anodizing with or without sealing as well as quality assurance of the coating obtained.

It applies to parts in aluminium and wrought aluminium alloys of category 1 and 2 (see clause 4) used in aerospace construction when reference is made to this standard.

2 Purpose of anodizing

2.1 Type A : Unsealed anodizing

It is used either as a surface preparation before paint application or as a preparation to a macrographic examination (structural condition, presence of metallurgical defects).

2.2 Type B : Sealed anodizing

It is intended for corrosion protection. It shall be with or without colouring and used with or without additional painting.

3 References

ISO 1463-1982	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method
ISO 2085-1976	Anodizing of aluminium and its alloys - Check of continuity of thin anodic oxide coatings - Copper sulphate test
ISO 2106-1982	Anodizing of aluminium and its alloys - Determination of mass per unit area (surface density) of anodic oxide coatings - Gravimetric method
ISO 2143-1981	Anodizing of aluminium and its alloys - Estimation of loss of absorptive power of anodic oxide coatings after sealing - Dye spot test with prior acid treatment
ISO 2360-1982	Non-conductive coatings on non-magnetic basis metals - Measurement of coating thickness - Eddy current method
ISO 2376-1972	Anodization (anodic oxidation) of aluminium and its alloys - Insulation check by measurement of breakdown potential
ISO 3768-1976	Metallic coatings - Neutral salt spray test (NSS test)
EN 2334	Aerospace series - Acid chromate pickle for aluminium alloys 1).

1) In preparation at the date of publication of this standard.

4 Material categories

4.1 Category 1

Pure aluminium, clad alloys, alloys characterised by the absence of copper or with a copper content limited to 1 %.

4.2 Category 2

Non-clad alloys containing > 1 % copper :

- Category 2 A : solution heat treated, quenched and naturally aged condition
- Category 2 B : solution heat treated, quenched plus artificially aged condition.

5 Supporting jig

The supporting jig (e.g. in aluminium alloy or titanium) shall provide effective electrical contact with the parts. This contact is preferably achieved at several points to ensure better current distribution.

6 Processing sequence

6.1 Cleaning (see annex A)

The cleaning method used shall be appropriate for the contamination experienced on the materials treated.

Solvent degreasing followed by cleaning in an alkaline bath is generally the most effective method.

6.2 Pickling (see annex A)

The pickling operation shall remove natural oxides in order to obtain correct anodizing; it shall neither degrade the metallurgical properties of the material nor the material fatigue behaviour, nor initiate pitting.

It shall not degrade the dimensional tolerances and surface roughness specified.

As a general rule, pickling is conducted in a sulphuric-chromic acid bath, but in exceptional cases, for certain alloys of category 2, alkaline pickling may be used.

6.3 Rinsing

All rinsing operations before anodizing shall be effective and complete. For example, they may be performed by immersion followed by running water spray. It is recommended that rinsing in ordinary water is followed by rinsing in deionized or distilled water.

6.4 Anodizing

6.4.1 Electrolyte

Aqueous solution of chromic acid (99,5 % min. CrO_3) at a concentration of 30 g/l to 150 g/l to which certain additional agents such as oxalic acid may be added.

The impurity content shall be less than :

- Chlorides : 200 mg/l expressed as NaCl,
- Sulphates : 500 mg/l expressed as H_2SO_4.

The chromic acid anodizing bath shall be made up with deionized water of a resistivity of more than 10^5 Ω.cm unless sufficiently pure ordinary water is available.

6.4.2 Treatment conditions

The anodizing parameters (temperature, voltage, time) shall be adapted to the material and its category in accordance with the bath composition.

The control system shall make it possible to maintain the treatment temperature within a tolerance of ± 2 °C in a suitably agitated bath.

NOTE : The treatment of materials of different categories in one anodizing batch shall be avoided.

6.5 Unsealed anodizing

In this case, it is necessary to take great precautions to avoid contamination of the oxide coating during handling.

If a paint finish is required, it shall be applied as soon as possible and 16 h max. after anodizing.

6.6 Sealed anodizing

The sealing quality stipulated in this standard requires the use of water having a resistivity greater than 10^5 Ω.cm when made up.

The pH shall be between 5,5 and 6,9.

The temperature of the sealing bath shall not be less than 97 °C.

For alloys of category 2, sealing shall preferably be applied with the addition in deionized water of not less than 30 mg/l potassium dichromate, with a resistivity greater than 10^5 Ω.cm.

6.7 Removal of the anodic coating (see annex A)

The method used to remove the anodic coating shall be such that, when reanodized, the dimensions and surface roughness shall conform with the values specified.

7 Quality assurance

The required quality is achieved by carrying out at the same time tests on the bath efficiency and inspection of treated parts as follows :

7.1 Check for bath efficiency

The following tests shall be conducted for qualification of a new installation and for continuous quality monitoring :

7.1.1 Chemical analysis of the bath on make up and during operation (see clause 6.4.1),

7.1.2 Measurement of resistivity and pH of the sealing bath (see clause 6.6).