SLOVENSKI STANDARD
oSIST prEN 4908:2023

01-april-2023

Aeronavtika - Postopek kemične pretvorbe magnezija in magnezijevih zlitin brez šestvalentnega kroma

Aerospace series - Hexavalent chromium free chemical conversion process of magnesium and magnesium alloys

Luft- und Raumfahrt - Chrom(VI)-freies chemisches Umwandlungsverfahren von Magnesium und Magnesiumlegierungen

Série aérospatiale - Procédé de conversion chimique sans chrome hexavalent du magnésium et des alliages de magnésium

Ta slovenski standard je istoveten z: **prEN 4908**

ICS:

49.025.15	Neželezove zlitine na splošno	Non-ferrous alloys in general
77.120.20	Magnezij in magnezijeve zlitine	Magnesium and magnesium alloys

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ICS

English Version

Aerospace series - Hexavalent chromium free chemical conversion process of magnesium and magnesium alloys

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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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 4908:2023) 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.

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.

1 Scope

This document specifies the requirements for the hexavalent chromium free chemical conversion process of magnesium and magnesium alloys to ensure an adhesion base before bonding and painting.

The purpose of this document is to specify design, quality and manufacturing requirements. It does not specify complete in-house process instructions; these are specified in the processors detailed process instructions.

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.

prEN 4902, Aerospace series — Surface treatments — Definitions and test methods[1]

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

EN ISO 2812-2, *Paints and varnishes - Determination of resistance to liquids - Part 2: Water immersion method (ISO 2812-2)*

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

ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus[2]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4902 and the following 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
OEM
producer who has the design authority and manufactures products or components that are purchased by a company and retailed under that purchasing company's brand name

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

3.2
manufacturer
company or person who makes, manufactures, assembles components

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

3.3
processor
company or person who applies the process

[1] In preparation at the date of publication of this standard.
[2] Published by ASTM International, available at: https://www.astm.org/.

3.4
process instruction
document that describes the application scopes, detailed process (e.g. key parameters, detailed steps), quality management, environmental and safety regulations

3.5
batch
unless otherwise specified, it comprises parts of the same type (i.e. shape, size, material), processed at the same time in the same bath

4 General principle of the process

4.1 Purpose of the process

The treatment consists of a superficial chemical transformation of the magnesium alloy parts obtained by hexavalent chromium free chemical conversion process.

It is used to ensure an adhesion base before bonding and painting.

It is used either for local application or by immersion.

4.2 Limitations

All the heat treatment, shaping, brazing, welding and machining operations shall be carried out before chemical conversion of the parts.

Before applying the conversion process, the surfaces of the parts shall be free from etching and corrosion pitting.

5 Process requirements

5.1 Information for the processor

— Part number;

— Quantity of parts to be processed;

— Alloy to be processed.

5.2 Process schedule

It shall, as a minimum, have the following steps:

— alkaline degreasing;

— pickling;

— phosphate and permanganate based chemical conversion;

— post-treatment (such as paint, as per the requirement of the drawing).

5.3 Process conditions

5.3.1 Tooling

The tools, bars, and metal masking tooling shall be free of oxidation/corrosion or any other damage which may be detrimental to the treatment during use. The part racks and tools shall be designed and set up in such a manner as to:

— avoid any retention of air or treatment solution in the parts;

— facilitate neutralization and removal of solutions during rinsing operations;

— remain inert and not contaminate solutions of the process.

5.3.2 Masking

The parts shall be at least degreased prior to masking.

Component areas which shall not be coated shall be masked with suitable material.

The areas of the assemblies containing parts made of materials other than magnesium and its alloys shall be masked during the chemical conversion treatment.

5.3.3 Surface preparation

5.3.3.1 Degreasing

Before applying the conversion process, the surfaces of the parts shall be clean, perfectly wettable.

The key operating parameters (e.g. nature of the product, temperature, time, pH) shall be set in a procedure that will be approved by the OEM.

5.3.3.2 Mechanical preparation

For local applications where parts are prepared by mechanical surface roughening, a rinsing with deionized water shall be performed to remove contamination (abrasive residues) from the surface to be processed.

The key operating parameters (nature of the product and operating method) shall be set in a procedure that will be approved by the OEM.

5.3.3.3 Chemical pickling

For magnesium alloys with silver, a specific preparation is recommended depending on the process applied.

The stripping should be carried out using a solution without hexavalent chromium.

The pickling carried out shall make it possible to remove the natural oxides in order to obtain a correct chemical conversion. It shall not cause the appearance of intergranular corrosion or pits.

The roughness characteristics and the dimension after pickling shall comply with the technical definition of the article.

The key operating parameters (e.g. nature of the product, time, temperature) shall be set in a procedure that will be approved by the OEM. Also, the pickling(s) to be carried out shall be specified in a process instruction per alloy.

The chemical pickling operation shall always be followed by rinsing with deionized water.

5.3.4 Conversion

Conversion by immersion or touching up shall immediately follow the surface preparation, with no break in wettability between the chemical preparation and the conversion treatment.

The key operating parameters (e.g. composition of the conversion solution, temperature, time, pH) shall be set in a procedure that will be approved by the OEM.

After the conversion treatment, rinsing with deionized water is required, followed by drying.

5.3.5 Drying

The parts after conversion shall be dried. Unless otherwise specified in the part technical definition, the choice of drying process (e.g. oven, infrared lamp, dry oil-free compressed air) and operating conditions are left to the initiative of the supplier provided that the part surface temperature does not exceed 60 °C.

5.3.6 Post-treatment

For parts to be painted, painting shall be performed 72 h after the end of the conversion treatment at the latest.

For other applications, the timeframe between conversion and application of post-treatment shall be agreed by the OEM.

5.4 Reworks

5.4.1 Full rework

The stripping shall be carried out following confirmation and requirements between manufacturer and purchaser.

Complete touch up is authorized in the following conditions:

— removal of the chemical conversion coating according to 5.5;

— preparation and conversion under the initially validated conditions.

5.4.2 Local rework

The local rework process shall be approved by the OEM before application.

Acceptance will be decided based on the area and extent of the reworked surface.

The subcontractor shall document in his request: the total area of the local rework, the method and the operating conditions.

5.5 Removal

The recommended removal processes are:

— manual grinding using a fine pumice stone or grinding paper compatible with the requirements of surface roughness, if any, and that will not damage the coating (for total or local reworks);

— immersion in a chemical bath (chemical composition and operating conditions to be validated by the OEM).

6 Test specimens requirements

6.1 Test specimens specification

6.1.1 General

Except otherwise specified, samples shall be in magnesium alloy Mg4Y3Nd-T6 or Mg3Nd1Gd-T6 with a minimum thickness of 4 mm. The minimum surface area to be tested should be 1 dm^2 per face and machined to achieve a maximum roughness (R_a) of 0,8 µm. Another magnesium grade or surface finish may be proposed provided that it is explicitly approved by the OEM during qualification.

6.1.2 Number of test specimens for qualification and periodic testing

Requirements for qualification and periodic testing shall be in accordance with 6.1.1 and Table 1.

Table 1

Characteristic	Qualification	Periodic testing	Number of test specimens
Visual appearance	X	Monthly	—
Adhesion (of treatment)	X	Monthly	1
Adhesion (of post-treatment)	X	Monthly	2 for qualification (dry test + water immersion test). 1 for periodic (dry test).
Corrosion resistance	X	Monthly	3
Key X: to be applied.			

6.2 Qualification tests

The requirements of Table A.1 for test methods and associated acceptance criteria shall be applied.

6.3 Periodic testing

The requirements of Table A.1 for test methods and associated acceptance criteria shall be applied.

7 Parts requirements

7.1 Sampling plan for serial inspections

The requirements of Table 2 shall be applied.