SLOVENSKI STANDARD
SIST EN 4707:2020

01-marec-2020

Nadomešča:
SIST EN 4707:2014

Aeronavtika - Kislinsko luženje aluminija in aluminijeve zlitine brez heksavalentnega kroma

Aerospace series - Acid pickling of aluminium and aluminium alloys without hexavalent chromium

Luft- und Raumfahrt - Saures Beizen von Aluminium und Aluminiumlegierungen ohne hexavalentem Chrom

Série aérospatiale - Décapage acide de l'aluminium et des alliages d'aluminium sans chrome hexavalent

Ta slovenski standard je istoveten z: **EN 4707:2020**

ICS:

25.220.20	Površinska obdelava	Surface treatment
49.025.20	Aluminij	Aluminium

SIST EN 4707:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4707

January 2020

ICS 25.220.20; 49.025.20

Supersedes EN 4707:2014

English Version

Aerospace series - Acid pickling of aluminium and aluminium alloys without hexavalent chromium

Série aérospatiale - Décapage acide de l'aluminium et des alliages d'aluminium sans chrome hexavalent

Luft- und Raumfahrt - Saures Beizen von Aluminium und Aluminiumlegierungen ohne hexavalentem Chrom

This European Standard was approved by CEN on 22 April 2019.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

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

Ref. No. EN 4707:2020 E

Contents

Page

European foreword

This document (EN 4707:2020) 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, 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 July 2020, and conflicting national standards shall be withdrawn at the latest by July 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 4707:2014.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies the acid pickling of aluminium and aluminium alloys free from hexavalent chromium.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Purpose of process

4.1 Pre-treatment before penetrant testing/penetrant inspection.

4.2 Pre-treatment before anodizing.

4.3 Final treatment for parts prior to adhesive bonding application.

4.4 Final treatment before welding or brazing.

4.5 Pre-treatment before chemical milling.

4.6 Final treatment for parts prior to painting application.

4.7 Pre-treatment for parts prior to surface conversion coatings.

4.8 Desmutting, after alkaline etching or acid pickling.

5 Information for the processor

- designation, see 9.5;
- number of the material standard and metallurgical condition of the latter;
- sequence of operations;
- areas to be processed;
- treatment.

6 Condition of parts prior to processing

Fabrication of the parts shall have been completed before pickling.

7 Process requirements

7.1 Process conditions

7.1.1 Toolings

Toolings, fixturings, and metal tooling masking must be protected from the corrosion and/or free from corrosion or another deterioration detrimental to the treatment during their use.

Design of the toolings and racking must be achieved in order to:

- avoid any retention of air or solution on the parts;
- allow the neutralisation and the suppression of the solutions during rinsing operations;
- avoid any accidental contact during treatment between parts and tank equipment, and between various parts.

7.1.2 Tanks and racks

Materials used must be resistant to temperature and chemically compatible with the products involved in the sequence of operations.

7.2 Process schedule

7.2.1 General

The pickling process shall be performed according to Table 1.

Table 1

Process schedule		Post Pickling processes							
		Penetrant testing/ penetrant inspection	**Anodizing**	**Bonding**	**Welding or brazing**	**Preparation before masking for chemical milling**	**Painting/ organic film application**	**Surface conversion coatings**	**Desmutting, after etching or pickling**
Pre-treatments – Subclause 7.2.2		Applicable	Applicable	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
Pickling – Subclause 7.2.3		Applicable	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
Post-treatments	Rinsing – Subclause 7.2.4	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
	Drying – Subclause 7.2.5	Applicable	Not applicable	Applicable	Applicable	Applicable	Applicable	Not applicable	Not applicable
Post pickling maximum lead-time		< 16 h [a]	Immediately in process	< 8 h	< 8 h [a]	< 8 h [a] or Immediately in process	< 16 h [a]	Immediately in process	Immediately in process

[a] Recommended (in case of over lead time an appropriate storage and a visual inspection (according to 8.1.3) should be carried out before and after the post pickling process).

7.2.2 Pre-treatments

Heavily oiled contaminated parts shall be emulsion cleaned, vapour degreased or solvent cleaned.

If there is a significant natural oxide film (e.g.: laminated parts or oxidized parts), carry out abrasive blasting or chemical deoxidizing.

Sequence of operations

1) Pre-degreasing:
   - alkaline degreasing (with rinsings);
   - or solvent;
   - or vapour solvent.

NOTE If necessary (laminated parts/oxidized parts), carry out a chemical deoxidizing (with rinsings) or abrasive blasting after pre-degreasing.

2) A second alkaline degreasing shall be performed after pre-degreasing, if necessary.

The alkaline degreasing shall be:

- corrosion inhibited;
- preferably silicate free and borate free type (especially for dye penetrant inspection).

Generally alkaline solutions with pH between 9 (nine) and 11 are considered as degreasing-etching solutions, whereas those with pH between 7 (seven) and 9 (nine), are considered only as degreasing solutions.

For the parts to be bonded, a silicated free alkaline solution is mandatory.

3) After alkaline degreasing/cleaning, the parts shall be thoroughly water rinsed and inspected for water break. Cleaning shall be repeated if break occurs.

7.2.3 Treatment

Immediately after pre-treatments, the parts shall be pickled in one of the solutions specified below.

To ensure a well pickled surface, excessive bath loading and shielding of parts by each other shall be avoided:

Type of substances that can be used in pickling:

- Type A: Nitric or sulfonitric;
- Type B: Phosphosulfonitric;
- Type C: Sulfonitro-ferric fluoride free;
- Type D: Sulfonitro-ferric with fluoride.

Table A.1 specifies pickling bath to be used depending on the application.

7.2.4 Rinsing

After each treatment bath, water rinsing is mandatory. This operation has to be composed by at least one recycled rinsing. Recycled rinsing is generally completed by non-recycled or low-flow rate rinsing. Several quality of rinsing water can be used for rinsing but the water used before surface treatment (see Table 1) shall have a conductivity not more than 20 µS/cm.

Rinsing shall be carried out consecutively to the pickling step in running water with a temperature not exceeding 40 °C.

7.2.5 Drying

The parts shall be dried except for those submitted for subsequent chemical treatment, anodizing or desmutting/chemical conversion.

The temperature shall not exceed 80 °C.

After drying, parts shall be protected against contamination.

In case of bonding and paint applications, parts shall be stored under clean, dry conditions.

8 Required characteristics and inspection

8.1 Parts

8.1.1 Inspection before treatment

By visual inspection, make sure that the parts to be protected/treated are free from defects such as: scratches, corrosion pits, cracks, etc. prejudicial to the appearance or the effectiveness of the protection. Adherent chips and metal particles must be removed beforehand using a clean cloth.

8.1.2 Cleanliness

During the degreasing phases, each final rinsing operation must be followed by a water break test in order to evaluate the wettability (and the cleanliness) of the surfaces.

This test consists of covering the parts with a uniform water film. This water film must cover the parts for at least 30 s at ambient temperature without any discontinuity in the film. Otherwise, degreasing phases have to be repeated.

This test is optional for automatic lines.

8.1.3 Inspection after treatment

When subjected to visual inspection, the pickled surfaces shall be of a homogeneous appearance and free from pitting, stains and contamination.

8.2 Process

8.2.1 Air used for drying or other operations shall be substantially dry and free from oil.

8.2.2 Chemical analysis of the pickling solutions (and of the different baths involved in the sequence of operations) shall be carried out at regular intervals to determine the content of active products, heavy metal (e.g. iron, copper), chloride, etc., when requested.