SLOVENSKI STANDARD
SIST EN 4400-3:2019

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Nadomešča:
SIST EN 2070-1:2001
SIST EN 2070-1:2001/A1:2001
SIST EN 2070-3:2001

Aeronavtika - Aluminij in aluminijeve in magnezijeve zlitine - Tehnične specifikacije - 3. del: Aluminij in aluminijeve palice in profili

Aerospace series - Aluminium and aluminium- and magnesium- alloys - Technical specification - Part 3: Aluminium and aluminium alloy bar and section

Luft- und Raumfahrt - Aluminium und Aluminium- und Magnesiumlegierungen - Technische Lieferbedingungen - Teil 3: Stangen und Pressprofile aus Aluminium und Aluminiumlegierungen

Série aérospatiale - Aluminium et alliages d'aluminium et magnésium - Spécification technique - Partie 3 : Barres et profilés en aluminium et alliages d'aluminium

Ta slovenski standard je istoveten z: **EN 4400-3:2019**

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4400-3

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Supersedes EN 2070-1:1989, EN 2070-3:1989

English Version

Aerospace series - Aluminium and aluminium- and magnesium- alloys - Technical specification - Part 3: Aluminium and aluminium alloy bar and section

Série aérospatiale - Aluminium et alliages d'aluminium et magnésium - Spécification technique - Partie 3 : Barres et profilés en aluminium et alliages d'aluminium

Luft- und Raumfahrt - Aluminium und Aluminium- und Magnesiumlegierungen - Technische Lieferbedingungen - Teil 3: Stangen und Pressprofile aus Aluminium und Aluminiumlegierungen

This European Standard was approved by CEN on 28 August 2017.

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.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 4400-3:2019) 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 September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

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 2070-1:1989, EN 2070-1/A1:1993, EN 2070-3:1989.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard is part of the series of EN metallic material standards for aerospace applications. The general organization of this series is described in EN 4258.

1 Scope

This European Standard defines the requirements for the ordering, manufacture, testing, inspection and delivery of aluminium and aluminium alloy, bar and section, produced by extrusion, rolling or drawing. It shall be applied when referred to and in conjunction with the EN material standard unless otherwise specified on the drawing, order or inspection schedule.

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.

EN 515, *Aluminium and aluminium alloys — Wrought products — Temper designations*

EN 2002-001, *Aerospace series — Metallic materials — Test methods — Part 001: Tensile testing at ambient temperature*

EN 2002-6, *Aerospace series — Metallic materials — Test methods — Part 6: Bend testing* 1)

EN 2002-8, *Aerospace series — Metallic materials — Test methods — Part 8: Micrographic determination of grain size* 1)

EN 2002-022, *Test methods for metallic materials — Part 022: Plane strain fracture toughness test* 2)

EN 2004-1, *Aerospace series — Test methods for aluminium and aluminium alloy products — Part 1: Determination of electrical conductivity of wrought aluminium alloys*

EN 2004-10, *Aerospace series — Test methods for aluminium and aluminium alloy products — Part 10: Preparation of micrographic specimens for aluminium alloys* 1)

EN 2021, *Aerospace series — Metallic materials — Test methods — Shear testing for thin flat product* 1)

EN 2032-001, *Aerospace series — Metallic materials — Part 1: Conventional designation*

EN 2032-2, *Aerospace series — Metallic materials — Part 2: Coding of metallurgical condition in delivery condition*

EN 2078, *Aerospace series — Metallic materials — Manufacturing schedule, inspection schedule, inspection and test report — Definition, general principles, preparation and approval*

EN 2715, *Aerospace series — Macrographic examination of aluminium and aluminium alloy wrought products, forging stock and forgings* 1)

EN 2716, *Aerospace series — Test method — Determination of susceptibility to intergranular corrosion — Wrought aluminium alloy products — AL-P2XXX- series, AL-P7XXX- series and aluminium-lithium alloys* 1)

1) Published as ASD-STAN Prestandard at the date of publication of this European Standard by AeroSpace and Defence industries Association of Europe - Standardization (ASD-STAN), http://www.asd-stan.org

2) In preparation at the date of publication of this European Standard.

EN 2720, *Aerospace series — Test method for metallic materials — Testing of susceptibility to exfoliation corrosion in 2XXX and 7XXX series wrought aluminium alloy products for aerospace constructions* 1)

EN 3874, *Aerospace series — Test methods for metallic materials — Constant amplitude force-controlled low cycle fatigue testing* 1)

EN 3987, *Aerospace series — Test method for metallic materials — Constant amplitude force-controlled high cycle fatigue testing*

EN 3988, *Aerospace series — Test methods for metallic materials — Constant amplitude strain-controlled low cycle fatigue testing* 1)

EN 4050-4, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 4: Acceptance criteria*

EN 4258, *Aerospace series — Metallic materials — General organization of standardization — Links between types of EN standards and their use*

EN 4259, *Aerospace series — Metallic materials — Definition of general terms* 1)

EN 4268, *Aerospace series — Metallic materials — Heat treatment facilities — General requirements*

EN 4522, *Aerospace series — Metallic materials — Test methods — Pin-type bearing test of yield strength* 1)

EN 4523, *Aerospace series — Metallic materials — Test methods — Compression testing* 1)

EN 4524, *Aerospace series — Metallic materials — Test methods — Measurement of fatigue crack growth rates* 1)

EN 4525, *Aerospace series — Aluminium and aluminium alloys — Test methods — Shear testing* 1)

EN 4527, *Aerospace series — Aluminium and aluminium alloy products — Test methods — Determining susceptibility to stress-corrosion cracking* 1)

EN 6018, *Aerospace series — Test methods for metallic materials — Determination of density according to displacement method*

EN 6072, *Aerospace series — Metallic materials — Test methods — Constant amplitude fatigue testing*

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

EN 9133, *Aerospace series — Quality Management Systems — Qualification Procedure for Aerospace Standard Products*

EN 12258-1, *Aluminium and aluminium alloys — Terms and definitions — Part 1: General terms*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1)*

TR 2410, *Aerospace series — Metallic materials — Relationship between dimensional standards and material standards* 3)

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3) Published as ASD-STAN Technical Report at the date of publication of this European Standard by AeroSpace and Defence industries Association of Europe - Standardization (ASD-STAN), http://www.asd-stan.org

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4259 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

For definitions of temper designation, see EN 515.

For definitions specific to aluminium alloys, see EN 12258-1 and with the following additions for aluminium alloy bar and section:

3.1
batch
as defined in EN 4259 with the following additions:

	Temper	
	O, F, H	TXXX
Mass [a] or No. of final lengths [a]	≤ 3 000 kg ≤ 250	≤ 2 000 kg ≤ 200

[a] Whichever is the smaller.

3.2
controlled stretching
stretching performed after solution heat treatment and quenching for the purpose of reducing internal stresses and/or deviation from straightness/flatness or may be critical to the achievement of the specified mechanical properties

Note 1 to entry: The stretching is defined by a minimum and maximum permanent elongation stated in the material standard.

Note 2 to entry: In certain cases controlled stretching is also critical to the achievement of mechanical properties.

4 Wording of order

The order shall clearly indicate:

a) quantities to be supplied;

b) dates of delivery;

c) material standard number;

d) delivery condition;

e) dimensions and tolerances or reference to an appropriate dimensional standard;

f) forwarding address;

g) nature and type of packing, if required;

h) surface protection, if appropriate;

i) definition and frequency of any special tests and their retest procedures, if required.

5 Health and safety

Products in the delivery condition shall fulfil the health and safety laws of the area of the country when and where they are to be delivered.

A product safety data sheet shall be available.

6 Technical requirements

6.1 General

The product shall be manufactured in accordance with the requirements of the relevant material standard and the applicable requirements of this technical specification. A manufacturing schedule shall be established and applied in accordance with EN 2078.

The product shall satisfy the requirements of the material standard and/or order. Instructions for the use of the material standard are contained in EN 4258. Unless otherwise specified, the requirements in Tables 1 and 2 shall apply in conjunction with those of the relevant material standard. Table 1 relates to lines 1 to 29 (inclusive) of the material standard and Table 2 relates to lines 30 onwards in which the sub-line format is also used. Lines 2 to 98 may also be opened in line 100 if the material standard details specific qualification requirements. If a specific line number is not shown in Tables 1 and 2, the requirement is stated in the material standard and/or order.

6.2 Qualification requirements

Qualification requirements when invoked by the material standard and/or order are detailed in Tables 1 and 2. Unless otherwise agreed between the manufacturer and purchaser the qualification phase shall be as shown below:

Qualification phase	
Starting	Intermediate
1st, 2nd and 3rd batches	4th and 5th batches

6.3 Release requirements

6.3.1 Release tests

Release testing shall be the responsibility of the manufacturer.

The purchaser reserves the right to perform any of the inspections and/or tests required by the material standard and/or order.

The test samples shall be representative of the product.

When required, the manufacturer shall inform the purchaser of the planned dates for extraction of samples and release testing in order that these operations may be witnessed.

Tables 1 and 2 detail the requirements for each line of the material standard. Unless otherwise specifically requested by the purchaser, a particular inspection and/or test for release shall be carried out if corresponding acceptance criteria and/or values are stated in the applicable material standard, but see also 6.3.5 "Capability clause".

6.3.2 Retests

If any requirement is not met, retests shall be carried out under the following conditions unless otherwise stated in the material standard or order.

If the test procedure or test piece preparation is faulty, testing shall be re-applied at the original frequency after rectification of the original cause of failure on a test sample located near the original one.

When failure cannot be attributed to faulty testing, or test piece preparation, further test samples shall be selected at twice the original frequency from the product, 1 (one) of which shall be that on which the original results were obtained unless already withdrawn by the manufacturer after suitable identification of the cause of failure. If all retest results are satisfactory, the batch shall be accepted. If 1 (one) or more tests are unsatisfactory, the batch shall be:

- rejected, or
- 100 % retested and the conforming products accepted, or
- partially or fully re-heat treated if heat treatment can rectify the cause of the failure and tested as a completely new batch except for chemical composition. The re-heat treatment shall be stated on the inspection and test report. No product or test sample shall be re-heat treated more than twice.

6.3.3 Rejection

Any failure to meet the requirements of the material standard shall be cause for rejection.

6.3.4 Special tests

Special tests additional to those detailed in the material standard may be required by the purchaser. In such cases, the nature of the test, method, frequency and acceptance criteria shall be specified on the order or inspection schedule and shall be mutually agreed by the manufacturer and the purchaser.

6.3.5 Capability clause

Where sufficient statistical evidence exists that the required acceptance criteria can be routinely achieved **and** with the agreement of the purchaser, the "capability clause" may be invoked when and where stated in the material standard and / or this technical specification. In such cases, the test need not be carried out for release purposes unless specifically requested by the purchaser. However, this in no way reduces the obligations of the manufacturer to fulfil the requirements. If subsequent testing indicates that the product does not comply with the requirements, the batch shall be rejected.

If the "capability clause" **is** invoked but sufficient statistical evidence does **not** exist, the test shall be carried out for release purposes at a frequency agreed between the manufacturer and purchaser.

6.3.6 Statistical process control

Reduction in the extent of release testing, other than that defined in 6.3.5 above may be negotiated with the purchaser on the basis of appropriate statistical process control and/or statistical data.

6.3.7 Inspection and test report

The manufacturer shall furnish, with each delivery, a report conforming to the requirements of EN 2078 stating the following:

a) manufacturer's name and address;

b) order number;

c) the following statement: "This product has been tested according to EN 4400-3";

d) material standard number;

e) delivery condition and metallurgical code of the product;

f) quantity and dimensions;

g) manufacturing and inspection schedule reference, if appropriate;

h) cast and batch number;

i) batch and/or test sample heat treatment, if required by the purchaser;

j) results of all tests and chemical analysis and re-tests.

6.4 Traceability

Each product shall be traceable to the cast, production batch and/or heat treatment batch at all stages of manufacture, testing and delivery.