

SLOVENSKI STANDARD

SIST EN 4400-6:2019

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Nadomešča:

SIST EN 2070-1:2001

SIST EN 2070-1:2001/A1:2001

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SIST EN 2082-1:2001

SIST EN 2082-1:2001/A1:2001

SIST EN 2082-2:2001

**Aeronavtika - Aluminij in aluminijeve in magnezijeve zlitine - Tehnične
specifikacije - 6. del: Aluminijevi kovni materiali**

(standards.iteh.ai)

Aerospace series - Aluminium and aluminium- and magnesium- alloys - Technical
specification - Part 6: Aluminium alloy forging stock

<https://standards.iteh.ai/catalog/standards/sist/ea8fba51-5979-41f0-b66a-3ee05b1c94ef/sist-en-4400-6-2019>

Luft- und Raumfahrt - Aluminium und Aluminium- und Magnesiumlegierungen -
Technische Lieferbedingungen - Teil 6: Schmiedevormaterial aus Aluminiumlegierungen

Série aérospatiale - Aluminium et alliages d'aluminium et magnésium - Spécification
technique - Partie 6 : Produits destinés à la forge en alliage d'aluminium

Ta slovenski standard je istoveten z: EN 4400-6:2019

ICS:

49.025.20	Aluminij	Aluminium
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EUROPEAN STANDARD

EN 4400-6

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 49.025.20

Supersedes EN 2070-1:1989, EN 2070-7:1989, EN
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English Version

Aerospace series - Aluminium and aluminium- and magnesium- alloys - Technical specification - Part 6: Aluminium alloy forging stock

Série aérospatiale - Aluminium et alliages d'aluminium
et magnésium - Spécification technique - Partie 6 :
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Luft- und Raumfahrt - Aluminium und Aluminium- und
Magnesiumlegierungen - Technische
Lieferbedingungen - Teil 6: Schmiedevormaterial aus
Aluminiumlegierungen

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

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

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European foreword

This document (EN 4400-6:2019) 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 2070-1A1:1993, EN 2070-7:1989, EN 2082-1:1989, EN 2082-2:1989.

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.

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EN 4400-6:2019 (E)

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.

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1 Scope

This European Standard defines the requirements for the ordering, manufacture, testing, inspection and delivery of aluminium alloy wrought forging stock (produced by extrusion or hot rolling) and cast forging stock. It shall be applied when referred to and in conjunction with the EN material standard, normally when the forging stock manufacturer is not the producer of the corresponding forgings.

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 2002-1, *Aerospace series — Metallic materials — Test methods — Part 001: Tensile testing at ambient temperature*

EN 2032-001, *Aerospace series — Metallic materials — Part 001: 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⁾ [SIST EN 4400-6:2019](https://standards.iteh.ai/catalog/standards/sist/ea8fba51-5979-41f0-b66a-6107b40f8301/en-2715-2019)

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 4400-7, *Aerospace series — Aluminium and aluminium and magnesium alloys — Technical specification — Part 7: Aluminium alloy forgings*

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*

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>

EN 4400-6:2019 (E)**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.

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; <https://standards.iteh.ai/catalog/standards/sist/ea8fba51-5979-41f0-b66a-3ee05b1c94ef/sist-en-4400-6-2019>
- g) nature and type of packing, if required;
- h) definition and frequency of any special tests and their retest procedures, if required.

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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 and shall be free from irregularities prejudicial to the subsequent manufacture or use of this product. Notwithstanding previous acceptance complying with the material standard and this technical specification, any product that is found, at a later stage, to contain such discontinuities shall be rejected.

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.

The requirements of the order and/or material standard shall over-ride the requirements of this technical specification.

6.2 Qualification requirements

See line 100 in Table 2 of this technical specification.

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 and 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.

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.

EN 4400-6:2019 (E)**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 may be required by the purchaser. In such cases, the nature of the test, method, frequency and technical requirements shall be specified on the order or inspection schedule or forging drawing 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 (usually tensile testing of forging stock) **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 and, if appropriate, identification of the plant;
- b) order number;
- c) the following statement: "This product has been tested according to EN 4400-6";
- 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, if any.

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.

Table 1 — Technical requirements for lines 1 to 29, where appropriate (1 of 8)

Material standard line reference		Requirements	Frequency of testing
No.	Title		
1	Material designation	See EN 2032-001.	–
2	Chemical composition	<p>The test samples used for chemical analysis shall be representative of the product and shall be taken from the molten metal. Any subsequent analytical checks taken from the solid product shall take into consideration the heterogeneity normal to the alloy. The method of chemical analysis shall be at the discretion of the manufacturer unless otherwise stated in the material standard or order. In cases of dispute, the method of chemical analysis shall be agreed between the manufacturer and purchaser.</p> <p>The measured chemical composition shall meet the requirements of the material standard and shall be stated in the inspection and test report.</p>	1 (one) per cast
3	Method of melting	At the discretion of the manufacturer or unless otherwise stated in the material standard.	–
4.1	Form	Cast ingot, extruded rod/bar/section or hot rolled plate.	–
4.2	Method of production	<p>Casting, extrusion or rolling</p> <p>The product shall satisfy the requirements of the relevant material standard and this technical specification. The manufacturer shall define the raw materials, processes and inspection requirements in a manufacturing schedule in accordance with EN 2078 and EN 9133. The manufacturer shall make this available to the purchaser upon request. Changes to any manufacturing schedule agreed during qualification of the pre-production forgings and which may adversely affect the quality of the product shall be advised by the manufacturer and shall be subject to written approval from the purchaser.</p> <p>Each product shall be traceable to the cast/production batch at all stages of manufacture, testing and delivery.</p>	–
4.3	Limit dimension(s)	Minimum and/or maximum size of the product expressed as the nominal thickness, a or diameter D . See also line 96.	–
5	Technical specification	Reference to this technical specification EN 4400-6. In cases of conflict, the requirements of the material standard shall take precedence over those of this technical specification. See also EN 4258.	–