SLOVENSKI STANDARD
oSIST prEN 4700-006:2024

01-maj-2024

Aeronavtika - Jeklo in zlitine, odporne proti vročini - Gneteni izdelki - Tehnična specifikacija - 006. del: Vzorci in izkovki za proizvodnjo

Aerospace series - Steel and heat-resisting alloys - Wrought products - Technical specification - Part 006: Pre-production and production forgings

Luft- und Raumfahrt - Stahl und Hochwarmfesten Legierungen - Umgeformte Erzeugnisse - Technische Lieferbedingungen - Teil 006: Ausfallmuster und Serienschmiedestücke

Série aérospatiale - Aciers et alliages résistant à chaud - Produits corroyés - Spécification technique - Partie 006 : Pièces types et pièces de série

Ta slovenski standard je istoveten z: **prEN 4700-006**

ICS:

49.025.10	Jekla	Steels
77.140.85	Železni in jekleni kovani izdelki	Iron and steel forgings

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 49.025.10

Will supersede EN 4700-006:2010

English Version

Aerospace series - Steel and heat-resisting alloys - Wrought products - Technical specification - Part 006: Pre-production and production forgings

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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.

This draft European Standard was established by CEN 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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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 4700-006:2024) has been prepared by 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.

This document will supersede EN 4700-006:2010.

The main changes with respect to the previous edition are as follows:

— update of Clause 2 “Normative references”;

— Table 2: addition of a note in line 17 and addition of ASTM E340 and ASTM E381 for steels in line 51.

Introduction

This document 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 document specifies the requirements for the ordering, manufacture, testing, inspection and delivery of pre-production and production forgings in steel and heat-resisting alloys.

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

EN 2002-002, *Aerospace series — Metallic materials — Test methods — Part 002: Tensile testing at elevated temperature*

EN 2002-005, *Aerospace series — Test methods for metallic materials — Part 005: Uninterrupted creep and stress-rupture testing*

EN 2002-16, *Aerospace series — Metallic materials — Test methods — Part 16: Non-destructive testing — Penetrant testing*

EN 2003-002, *Aerospace series — Steels — Test methods — Part 002: Izod impact test*

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 2950, *Aerospace series — Test method — Wrought heat resisting alloys Semi-finished products and parts — Conditions for macrographic and micrographic examination — Atlas of structures and defects*

EN 2951, *Aerospace series — Metallic materials — Micrographic determination of content of non-metallic inclusions*

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

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

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

EN 4050-1, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 1: General requirements*

[1] Published as ASD-STAN Standard at the date of publication of this document by ASD-STAN, https://www.asd-stan.org/.

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

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

EN 10027-1, *Designation systems for steels — Part 1: Steel names*

EN 10079, *Definition of steel products*

TR 2410,[2] *Aerospace series — Metallic materials — Relationship between dimensional standards and material standards*

EN ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method (ISO 148-1:2016)*

EN ISO 643, *Steels — Micrographic determination of the apparent grain size (ISO 643:2019, Corrected version 2023-11)*

EN ISO 3651-1, *Determination of resistance to intergranular corrosion of stainless steels — Part 1: Austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in nitric acid medium by measurement of loss in mass (Huey test) (ISO 3651-1:1998)*

EN ISO 3651-2, *Determination of resistance to intergranular corrosion of stainless steels — Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in media containing sulfuric acid (ISO 3651-2:1998)*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2014)*

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:2023)*

EN ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (ISO 6508-1:2023)*

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2019)*

EN ISO 6892-2, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature (ISO 6892-2:2018)*

AMS 2315,[3] *Determination of Delta Ferrite Content*

AMS 2750,[3] *Pyrometry*

ASTM E709,[4] *Standard Guide for Magnetic Particle Testing*

ASTM E1444,[4] Standard Practice for Magnetic Particle Testing

[2] Published as ASD-STAN Technical Report at the date of publication of this document by ASD-STAN, https://www.asd-stan.org/.
[3] Published by: SAE International (US) https://www.sae.org/.
[4] Published by: ASTM International (US) https://www.astm.org/.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4259 apply. For definitions specific to steel, EN 10079 applies.

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/

4 Wording of order

The order shall clearly indicate:

— quantities to be supplied;

— dates of delivery;

— material standard number;

— delivery condition and metallurgical code of products;

— dimensions and tolerances or reference to an appropriate dimensional standard;

— product designation, when required;

— forwarding address;

— nature and type of packing, if required;

— surface protection, if appropriate;

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

5 Health and safety

The products in the delivery condition shall fulfil the current health and safety laws of the area of the country where it is to be delivered.

A product safety data sheet shall be available.

6 Technical requirements

6.1 General

The product shall satisfy the requirements of the order, drawing inspection schedule or material standard: see Table 2, line 5.

The order, drawing or inspection schedule shall specify the tests to be performed upon (i) pre-forgings for qualification and/or requalification (ii) serial production forgings for process control testing (Procedure X: see 6.4) and (iii) batch release when cut-up testing or forgings is required. Unless otherwise specified on the order, drawing or inspection schedule, acceptance criteria for the tests are stated in the material standard, the requirements for each line of which are detailed in Table 2 and Table 3 of this technical specification. Table 2 related to lines 1 to 29 (inclusive) of the material standard and Table 3 relates to lines 30 onwards in which the subline format is also used. If a particular test is needed but not shown in a specific line in Table 2 and Table 3, the requirement shall be specified on the order, drawing, inspection schedule or material standard.

6.2 Qualification requirements

See line 100 in Table 3 of this document.

Qualification shall normally comprise assessment of pre-production forgings. See Table 2, sub-line 4.2.

6.3 Re-qualification requirements

Re-qualification of serial production forgings may be required, in the following cases:

— modification of the drawing;

— use of forging stock from a different source;

— modifications to the forging stock form and/or manufacturer route;

— modifications to an existing die;

— use of a new (replacement) die;

— modifications to the forging manufacturing route;

— when a significant time interval (usually several years) had elapsed between forging campaigns for a specific part number;

— when required by the purchaser for any other reason.

Re-qualification testing requirements, especially location of test pieces, shall be identical to those used for the initial qualification of the pre-production forgings unless otherwise specified on the order, drawing or inspection schedule.

6.4 Release requirements

Release testing shall be the responsibility of the manufacturer. The sampling procedure for release testing shall be one of the following, as specified on the order, drawing or inspection schedule. Where no procedure is specified, procedure A shall be used:

— procedure A: separate forged test samples shall be procedure produced from the same batch of forging stock as that used to make the serial production forgings. Procedure A may be used alone unless denoted AX on the drawing, order or inspection schedule in which case it shall be applied only in conjunction with procedure X (see subclause 6.5);

— procedure B: separate forged heat treatment control test samples shall be prepared which conform to the same material standard as the production forgings, but from a different batch of forging stock. Procedure B shall only be used when full heat treatment of the serial production forgings is carried out by the manufacturer and only in conjunction with procedure X (see subclause 6.5);

— procedure C: integral test samples shall be removed from each forgings. The order, drawing of inspection schedule shall specify how many test samples shall be tested per batch. Procedure C may be used alone unless denoted CX on the drawing, order or inspection schedule in which case it shall be applied only in conjunction with procedure X (see subclause 6.5);

— procedure D: test samples shall be machined from forging(s) selected from each production batch and at locations specified on the order, drawing or inspection schedule.

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

6.5 Process control testing (procedure X)

Procedure X is process control procedure consisting of periodic “cut-up” testing to ensure that the serial production forgings continued to conform to the specified requirements.

If procedure X is invoked by the order, drawing or inspection/manufacturing schedule and/or if procedures B, AX or CX are used for release tests (see subclause 6.4), forgings shall be selected from series production at the frequency stated therein. It is recommended that the maximum number of forgings manufactured between repeat “cut-up” testing conforming to procedure X shall be as stated in the following Table 1:

Table 1 — Number of forgings

Mass of forging	Number of forgings
kg	
≤ 1	≤ 2 000
1 < mass ≤ 2	≤ 1 000
2 < mass ≤ 5	≤ 400
5 < mass ≤ 25	≤ 200
> 25	As stated on the order, drawing, inspection schedule

The testing requirements, including the location, type and size of test pieces shall be identical to those used for qualification of the pre-production.