BS EN 4700-003:2025

BSI Standards Publication

Aerospace series — Steel and heat-resisting alloys for wrought products — Technical specification

Part 003: Tubes

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National foreword

This British Standard is the UK implementation of EN 4700-003:2025. It supersedes BS EN 4700-003:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/61, Metallic materials for aerospace purposes.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2025

ISBN 978 0 539 30602 6

ICS 49.025.10

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2025.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4700-003

December 2025

ICS 49.025.10

Supersedes EN 4700-003:2010

English Version

Aerospace series - Steel and heat-resisting alloys for wrought products - Technical specification - Part 003: Tubes

Série aérospatiale - Acier et alliages résistant à chaud pour les produits corroyés - Spécification technique - Partie 003 : Tubes

Luft- und Raumfahrt - Stahl und Hochwarmfesten Legierungen - Umgeformte Erzeugnisse - Technische Lieferbedingungen - Teil 003: Rohre

This European Standard was approved by CEN on 8 September 2025.

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Ref. No. EN 4700-003:2025 E

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European foreword

This document (EN 4700-003:2025) 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 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2026, and conflicting national standards shall be withdrawn at the latest by June 2026.

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 4700-003:2010.

EN 4700-003:2025 includes the following significant technical changes with respect to EN 4700-003:2010:

- update of Clause 2 “Normative references”;
- Table 1: addition of a note in line 17 and addition of ASTM E340 and ASTM E381 for steels in line 51.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this document: 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, Türkiye and the United Kingdom.

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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.

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1 Scope

This document specifies the requirements for the ordering, manufacture, testing, inspection and delivery of steel and heat-resisting alloy tubes. It is presupposed to 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 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 2002-17,[1] *Aerospace series — Test methods for metallic materials — Tube used under pressure — Part 17: Integrity test*

EN 2002-18,[1] *Aerospace series — Test methods for metallic materials — Part 18: Hydraulic distension test for tube*

EN 2002-20,[1] *Aerospace series — Test methods for metallic materials — Part 20: Eddy current testing of circular cross-section tubes*

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 4259:2022, *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*

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

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

EN ISO 643, *Steels — Micrographic determination of the apparent grain size* (ISO 643)

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)

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)

EN ISO 3887, *Steels — Determination of the depth of decarburization* (ISO 3887)

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

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

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

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

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

AMS 2315,[3] *Determination of delta ferrite content*

AMS 2750,[3] *Pyrometry*

ASTM A604,[4] *Standard practice for macroetch testing of consumable electrode remelted steel bars and billets*

ASTM E340,[4] *Standard practice for macroetching metals and alloys*

ASTM E381,[4] *Standard method of macroetch testing steel bars, billets, blooms and forgings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4259:2022 and the following 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/

[2] Published as ASD-STAN TR, available at: https://www.asd-stan.org/.
[3] Published by Society of Automotive Engineers (SAE), available at: https://www.sae.org/.
[4] Published by American Society for Testing and Materials (ASTM International), available at: https://www.astm.org/.

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3.1
batch
quantity of bars and sections consisting of the same nominal dimensions or having the same heat treatment condition

Note 1 to entry: For the general case, see EN 4259:2022.

Note 2 to entry: For heat treatment using a continuous furnace, a continuous run of less than or equal to eight hours (or: ≤ 8 h) may be considered as the same heat treatment charge.

[SOURCE: EN 4259:2022, Table 1, No. 4, modified – Addition of Note 1 to entry]

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 and metallurgical code of products;

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

f) product designation, when required;

g) forwarding address;

h) nature and type of packing, if required;

i) surface protection, if appropriate;

j) 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 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 specification. A manufacturing schedule shall be established and applied in accordance with EN 2078.

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 this document, any product that is found at a later stage to contain such defects shall be rejected.

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Unless otherwise specified, the requirements in Table 1 and Table 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 Table 1 and Table 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 Table 1 and Table 2. Unless otherwise agreed between the manufacturer and purchaser the qualification phase shall be run on the first three batches, coming from at least two casts.

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 by the order, 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.

Table 1 and Table 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 in subclause 6.3.5.

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 first one.

For tubes with hardness results below the minimum or above the maximum value, the softest or hardest tube, as appropriate, shall be submitted to a tensile test. If the results comply with the specified tensile requirements, all tubes shall be accepted.

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, 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 one or more tests are unsatisfactory, the batch shall be:

— rejected;

— 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 and cleanness inspection. The reheat treatment shall be stated on the release test certificate.

For cleanness inspection, if the material fails the requirement the product may be cut back before retesting.

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For deformation under pressure, test samples from 25 % of the tubes in the batch shall be tested. All samples shall meet the requirements.

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 and shall be mutually agreed by the manufacturer and the purchaser.

6.3.5 Capability clause

Where the capability clause is invoked and where sufficient statistical evidence exists, the test need not be carried out (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 sufficient statistical evidence does not exist, the test shall be carried out at a frequency agreed between the manufacturer and the purchaser.

6.3.6 Statistical process control

Reduction in the extent of release testing, other than that specified in subclause 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) material standard number;

d) method of melting;

e) delivery condition and metallurgical code of the product;

f) quantity and dimensions;

g) manufacturing and inspection schedule reference;

h) cast and batch number;

i) all heat treatment, including re-heat treatment and, where appropriate, straightening and stress relieving parameters, applied to the batch;

j) test samples heat treatment;

k) results of the tests and retests if any.

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