BRITISH STANDARD

BS EN
1301-1 : 1997

Aluminium and aluminium alloys — Drawn wire

Part 1. Technical conditions for inspection and delivery

The European Standard EN 1301-1 : 1997 has the status of a British Standard

ICS 77.150.10

National foreword

This British Standard is the English language version of EN 1301-1 : 1997. Together with BS EN 1301-2 and BS EN 1301-3, it supersedes BS 1475 : 1972.

The UK participation in its preparation was entrusted to Subcommittee NFE/35/5, Wrought aluminium and aluminium alloys, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 6, an inside back cover and a back cover.

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English version

Aluminium and aluminium alloys — Drawn wire — Part 1: Technical conditions for inspection and delivery

Aluminium et alliages d'aluminium — Fil étiré — Partie 1: Conditions techniques de contrôle et de livraison

Aluminium und Aluminiumlegierungen — Gezogene Drähte — Teil 1: Technische Lieferbedingungen

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

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 132, Aluminium and aluminium alloys, the secretariat of which is held by AFNOR.

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 January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.

Within its programme of work, Technical Committee CEN/TC 132 entrusted CEN/TC 132/WG 4, Wires and drawing stock, to prepare the following standard:

EN 1301-1 *Aluminium and aluminium alloys — Drawn wire — Part1: Technical conditions for inspection and delivery*

This standard is a part of a set of three standards. The other standards deal with:

EN 1301-2 *Aluminium and aluminium alloys — Drawn wire — Part 2: Mechanical properties*

EN 1301-3 *Aluminium and aluminium alloys — Drawn wire — Part 3: Tolerances on dimensions*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

1 Scope

This Part of EN 1301 specifies the technical conditions for inspection and delivery of aluminium and aluminium alloy drawn wire for general engineering applications including rivet manufacture (except aeronautical rivets).

It applies to drawn wire except for electrical or welding purposes.

It does not apply to drawing stock.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 515	*Aluminium and aluminium alloys — Wrought products — Temper designations*
EN 573-3	*Aluminium and aluminium alloys — Chemical composition and form of wrought products Part 3: Chemical composition*
EN 1301-2	*Aluminium and aluminium alloys — Drawn wire — Part 2: Mechanical properties*
EN 1301-3	*Aluminium and aluminium alloys — Drawn wire — Part 3: Tolerances on dimensions*
EN 10002-1	*Metallic materials — Tensile testing — Part 1: Method of test (at ambient temperature)*
EN 10204	*Metallic products — Types of inspection documents*

NOTE. Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex A.

3 Definitions

For the purposes of this Standard, the following definitions apply:

3.1 wire

A solid wrought product of uniform cross-section along its whole length, generally supplied in coiled form.

The cross-section can be in the shape of circles, ovals, squares, rectangles, equilateral triangles or regular polygons. Products with a square, rectangular, triangular, or polygonal cross-section may have corners rounded along their whole length.

NOTE. For rectangular wires:

– the thickness exceeds one-tenth of the width;

– the term 'rectangular wire' includes 'flattened circles' and 'modified rectangles', of which two opposite sides are convex arcs, the two other sides being straight, of equal length and parallel.

3.2 cast

Quantity of liquid metal in the furnace that has simultaneously undergone the same treatment before continuously casting and rolling or casting into wirebar or extrusion ingot.

3.3 manufacturing batch

Quantity of final product produced from the same cast, during the same manufacturing run and treatment charge with the same temper and diameter.

NOTE 1. By agreement between producer and purchaser, it is permitted to aggregate two or more casts to form a manufacturing batch.

NOTE 2. One manufacturing batch may contain more than one inspection lot.

3.4 inspection lot

Consignment, or part thereof, submitted for inspection, comprising products of the same grade or alloy, form, temper, dimensions, cross-section, and processed in the same manner.

NOTE. More than one manufacturing batch may be included in an inspection lot.

3.5 heat-treatment batch or lot

A quantity of products of the same grade or alloy, form, dimensions or cross-section and which is produced in the same way, heat-treated in one furnace load, or such products so solution-treated and subsequently precipitation-treated in one furnace load.

NOTE. More than one heat-treatment lot may be included in a furnace load.

3.6 sample

One or more products taken from an inspection lot.

3.7 specimen

One or more pieces taken from each product in the sample, for the purpose of producing test pieces.

3.8 test piece

A piece taken from each specimen and suitably prepared for the test.

3.9 test

An operation to which the test piece is subjected in order to measure or classify a property.

4 Orders or tenders

The order or tender shall define the product required and shall contain the following information:

a) the form and type of product:

– the form of the product (round wire, rectangular wire, etc.);

– the designation of the aluminium or aluminium alloy (in accordance with EN 573-3);

b) the temper of the material for delivery (degree of hardness or heat-treatment condition), and, if different, the temper of use (in accordance with EN 515);

c) the number of this European Standard or a specification number or, otherwise, the properties agreed between supplier and purchaser;

d) the dimensions and shape of the product:

– diameter;

– thickness and width for rectangular wires;

– reference to a drawing if necessary;

e) tolerances on the dimensions, in accordance with EN 1301-3;

f) quantity:

– mass or length;

– tolerances on quantity if required;

g) any requirements for certificates of conformity, test and/or analysis reports or inspection certificates;

h) any special requirements agreed between the supplier and the purchaser:

– testing procedure;

– marking of products;

– surface quality;

– type of conditioning, packaging etc.

5 Requirements

5.1 Production and manufacturing processes

Unless otherwise specified in the order, the production and manufacturing processes shall be left to the discretion of the producer. Unless it is explicitly stated in the order, no obligation shall be placed on the producer to use the same processes for subsequent and similar orders.

5.2 Quality control

The producer shall be responsible for the performance of all inspection and tests required by the relevant European Standard and/or a particular specification, prior to shipment of the product. If the purchaser wishes to inspect the product at the producer's works, he shall notify the supplier at the time of placing the order.

5.3 Chemical composition

The chemical composition shall conform to EN 573-3.

If the purchaser requires content limits for elements not specified in the above standard, these limits shall be stated on the order, after agreement between the supplier and the purchaser.

5.4 Mechanical properties

The mechanical properties shall conform to EN 1301-2 or to those agreed upon between supplier and purchaser and stated on the order.

5.5 Freedom from defects

The product shall be free from defects prejudicial to its suitable and proper use. Whilst an operation designed to mask a fault is not permitted, the elimination of a superficial imperfection is permissible, provided that the tolerances on dimensions and the material properties continue to meet specifications.

5.6 Tolerances on dimensions

The tolerances on dimensions shall conform to EN 1301-3.

5.7 Other properties

Additional property requirements, such as bending, torsion, wrapping and heading ability and shearing strength, etc., shall be agreed by the supplier and the purchaser, and stated on the order.

6 Test procedure

6.1 Sampling

6.1.1 *Chemical analysis*

The specimens for chemical analysis shall be taken at the time of casting. The mould design, cooling rate, mass, etc., shall be so designed that their composition is homogeneous and perfectly adapted to the method of analysis.

6.1.2 *Specimens for mechanical testing*

6.1.2.1 *Size*

The specimens shall be sufficiently large to allow manufacture of the test pieces necessary to carry out the required tests, and shall include sufficient metal to allow manufacture of test pieces for any retests required.

6.1.2.2 *Identification of specimens*

Each specimen shall be marked in such manner that, after removal, it is still possible to identify the product from which it was taken.

If, during the course of subsequent operations, removal of the marking cannot be avoided, new marking shall be made before the original marking is removed.

6.1.2.3 *Preparation of specimens*

Specimens shall be taken from the sample after completion of all the mechanical and heat treatments that the product has to undergo before delivery, and which may influence the mechanical properties of the metal. In cases where this is not possible, the samples or specimens may be taken at an earlier stage, but they shall be subjected to the same treatment as that to which it is intended to submit the product concerned.

Cutting shall be carried out in such a manner that it does not change the characteristics of the part of the specimen from which the test pieces are to be prepared. Thus, the dimensions of the specimens shall provide an adequate machining allowance to permit removal of the zone affected by cutting.

Specimens shall not be machined or treated in any way which may altered their mechanical properties. Any straightening shall be carried out with great care, preferably by hand.

6.1.2.4 *Number of specimens*

Unless otherwise specified, the minimum sampling shall be as follows:

– for products of diameter or thickness up to and including 10 mm: one specimen from each inspection lot of 500 kg or part thereof, and not more than one specimen from one original coil;

– for products of diameter or thickness over 10 mm up to and including 20 mm: one specimen from each inspection lot up to 1000 kg or part thereof, and not more than one specimen from one original coil.

In addition, there shall not be less than one test piece representing any one inspection lot, nor less than one test piece representing any one heat-treatment batch.

6.1.3 ***Test pieces for tensile test***

6.1.3.1 *Identification of test pieces*

Each test piece shall be marked in such manner so that it is possible to identify the inspection lot from which it was taken.

If a test piece is marked by stamping, this shall not be in a place or manner which may interfere with subsequent testing.

NOTE. Where it is not convenient to mark a test piece, an identification tag may be attached.

6.1.3.2 *Machining*

Any machining necessary shall be carried out in such a manner that it does not change the characteristics of the metal in the test piece.

6.1.3.3 *Number of test pieces*

One test piece shall be taken from each specimen.

6.1.3.4 *Type and location of test pieces*

The unmachined wire shall be considered as the test piece.

6.2 Methods of test

6.2.1 ***Chemical composition***

Methods of analysis shall be at the discretion of the producer. In case of dispute concerning the chemical composition, referee analysis shall be carried out by the methods specified in the relevant European Standard and the results obtained by this method shall be accepted.

6.2.2 ***Tensile test***

The tensile test shall be carried out in accordance with EN 10002-1.

6.2.3 ***Measurement of dimensions***

All dimensions shall be checked at the ambient temperature of the workshop or laboratory, and in case of dispute, at a temperature between 15 °C and 35 °C.

6.2.4 ***Surface finish***

Unless otherwise specified, examination of surface appearance shall be carried out before delivery without the assistance of magnifying apparatus.

6.2.5 ***Other tests***

If other mechanical or physical tests are required, these shall be agreed between supplier and purchaser. These tests shall be carried out either in accordance with the existing European Standards or agreed upon by supplier and purchaser.

NOTE. For guidance on testing the standards listed in annexA should be consulted.

6.3 Retests

6.3.1 ***Mechanical properties***

If any of the test pieces first selected fails to meet the requirements for the mechanical test, the following procedure shall be applied:

– if an error is clearly identified, either in the test piece preparation or in the test procedure, the corresponding results shall be disregarded and the testing resumed as initially required;

– if this is not the case then two further specimens shall be taken, one from a different coil or reel or bundle of the same lot, one from the same coil from which the original specimen was taken, unless that coil has been withdrawn by the supplier;

– if both test pieces from these additional specimens meet the requirements, the lot which they represent shall be deemed conform to this European Standard.

Should one test piece fail:

– the lot shall be deemed not to conform to this European Standard; or

– where applicable, the lot may be submitted to additional thermal treatment(s) and then retested as a new lot.

6.3.2 ***Other properties***

The same procedure shall apply to other properties unless otherwise agreed between supplier and purchaser.

7 Inspection documents

7.1 General

If requested by the purchaser on the order, the supplier shall provide one or more of the following documents as applicable.

7.2 Documents established on the basis of inspections and tests performed by qualified personnel who are involved in the manufacturing process and/or belong to the quality control department

7.2.1 *Certificate of conformity*

Document by which the producer certifies that, after the inspections and results of representative tests, the products for delivery comply with the relevant standards and with the additional requirements in the order, if any.

7.2.2 *Test report*

Document by which the producer certifies that the products for delivery comply with the requirements specified on the order. This document details the results of the current production controls carried out on identical products made using the same method as products for delivery but not necessarily on the products for delivery themselves.

7.2.3 *Specific test report*

Document by which the producer certifies that the products for delivery comply with the requirements specified on the order. This document details the chemical composition and the results of prescribed mechanical tests and of any other test specified on the order. It is established on the basis of tests carried out on specimens taken from among the products for delivery themselves. The delivery of such a certificate generally implies inspection tests on individual lots.

7.3 Documents established on the basis of inspections and tests performed or supervised by qualified personnel organizationally independent from the manufacturing department, according to the requirements specified on the order and carried out on the products for delivery or on the relevant inspection lot

Inspection certificates in accordance with EN 10204:

–'3.1.A': Certificate issued and validated by an inspector designated by the official regulations, in accordance with these and the corresponding technical rules;

– '3.1.B': Certificate issued by the department independant of the manufacturing process and validated by an authorized representative of the producer independant of the manufacturing department;

– '3.1.C': Certificate issued and validated by an authorized representative of the purchaser, in accordance with the specifications of the order.

8 Marking

Marking of products shall be undertaken when agreed upon between supplier and purchaser and stated on the order. This marking shall not adversely affect the final use of the product.

9 Packing

Unless otherwise specified in European Standards relating to special products or specified on the order, the method of packing shall be determined by the supplier who shall take all suitable precautions to ensure that, under the usual conditions of transportation, the products are delivered in a condition suitable for use.

10 Arbitration

In cases of dispute concerning conformity with the requirements of this European Standard or specification cited on the order, before rejecting the products, testing and examination shall be carried out by an arbitrator chosen by mutual agreement between supplier and purchaser. The arbitrator's decision shall be final.

Annex A (informative)

Bibliography

In the preparation of this European Standard, use was made of a number of documents for reference purposes. These informative references are cited at the appropriate places in the text and the publications are listed hereafter.

ISO/R 2101 *Aluminium and aluminium alloys — Shear test for rivet wire and rivets*

ISO 7800 *Metallic materials — Wire — Simple torsion test*

ISO 7801 *Metallic materials — Wire — Reverse bend test*

ISO 7802 *Metallic materials — Wire — Wrapping test*

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