SLOVENSKI STANDARD
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Aluminij in aluminijeve zlitine - Pločevine, trakovi in plošče - 1. del: Tehnični pogoji za pregled in dobavo

Aluminium and aluminium alloys - Sheet, strip and plate - Part 1: Technical conditions for inspection and delivery

Aluminium und Aluminiumlegierungen - Bänder, Bleche und Platten - Teil 1: Technische Lieferbedingungen

Aluminium et alliages d'aluminium - Tôles, bandes et tôles épaisses - Partie 1: Conditions techniques de contrôle et de livraison

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Aluminium et alliages d'aluminium - Tôles, bandes et tôles épaisses - Partie 1: Conditions techniques de contrôle et de livraison

Aluminium und Aluminiumlegierungen - Bänder, Bleche und Platten - Teil 1: Technische Lieferbedingungen

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European foreword

This document (EN 485-1:2016) 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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.

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 485-1:2008+A1:2009.

EN 485 comprises the following parts under the general title “*Aluminium and aluminium alloys — Sheet, strip and plate*”:

— *Part 1: Technical conditions for inspection and delivery*

— *Part 2: Mechanical properties*

— *Part 3: Tolerances on dimensions and form for hot-rolled products*

— *Part 4: Tolerances on shape and dimensions for cold-rolled products*

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1 Scope

This document specifies the technical conditions for inspection and delivery of wrought aluminium and wrought aluminium alloy sheet, strip and plate for general applications. It also includes provisions for ordering and testing.

It applies to products with a thickness over 0,20 mm up to and including 400 mm.

For many special applications of aluminium strip, sheet and plate, specific European Standards exist, where different or additional requirements are formulated and the appropriate alloys and tempers are selected: see Annex A. Most of these special European Standards refer to provisions of this document.

The selection of the relevant special European Standards is under the responsibility of the purchaser.

Whenever the application involves special properties, such as corrosion resistance, toughness, fatigue strength, surface appearance and welding properties, the user should consult the supplier and consider the relevant special European Standard, as applicable.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 485-2, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties*

EN 485-3, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 3: Tolerances on dimensions and form for hot-rolled products*

EN 485-4, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 4: Tolerances on shape and dimensions for cold-rolled products*

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

EN 541, *Aluminium and aluminium alloys - Rolled products for cans, closures and lids - Specifications*

EN 573-3, *Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products*

EN 602, *Aluminium and aluminium alloys - Wrought products - Chemical composition of semi-finished products used for the fabrication of articles for use in contact with foodstuff*

EN 603 (all parts), *Aluminium and aluminium alloys — Wrought forging stock*

EN 683-1, *Aluminium and aluminium alloys - Finstock - Part 1: Technical conditions for inspection and delivery*

EN 851, *Aluminium and aluminium alloys - Circle and circle stock for the production of culinary utensils - Specifications*

EN 941, *Aluminium and aluminium alloys - Circle and circle stock for the production of general applications - Specifications*

EN 1386, *Aluminium and aluminium alloys - Tread plate - Specifications*

EN 1396, *Aluminium and aluminium alloys - Coil coated sheet and strip for general applications - Specifications*

EN 1669, *Aluminium and aluminium alloys - Test methods - Earing test for sheet and strip*

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

EN 10204, *Metallic products - Types of inspection documents*

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

EN 12392, *Aluminium and aluminium alloys - Wrought products and cast products - Special requirements for products intended for the production of pressure equipment*

EN 12482-1, *Aluminium and aluminium alloys - Reroll stock for general applications - Part 1: Specifications for hot rolled reroll stock*

EN 12482-2, *Aluminium and aluminium alloys - Reroll stock for general applications - Part 2: Specifications for cold rolled reroll stock*

EN 13195, *Aluminium and aluminium alloys - Specifications for wrought and cast products for marine applications (shipbuilding, marine and offshore)*

EN 13981-2, *Aluminium and aluminium alloys - Products for structural railway applications - Technical conditions for inspection and delivery - Part 2: Plates and sheets*

EN 14121, *Aluminium and aluminium alloys - Sheet, strip and plate for electrotechnical applications*

EN 14242, *Aluminium and aluminium alloys - Chemical analysis - Inductively coupled plasma optical emission spectral analysis*

EN 14286, *Aluminium and aluminium alloys - Weldable rolled products for tanks for the storage and transportation of dangerous goods*

EN 14287, *Aluminium and aluminium alloys - Specific requirements on the chemical composition of products intended to be used for the manufacture of packaging and packaging components*

EN 14361, *Aluminium and aluminium alloys - Chemical analysis - Sampling from metal melts*

EN 14392, *Aluminium and aluminium alloys - Requirements for anodised products for use in contact with foodstuff*

EN 15088, *Aluminium and aluminium alloys - Structural products for construction works - Technical conditions for inspection and delivery*

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

EN ISO 7438, *Metallic materials - Bend test (ISO 7438)*

EN ISO 20482, *Metallic materials - Sheet and strip - Erichsen cupping test (ISO 20482)*

ISO 9591, *Corrosion of aluminium alloys — Determination of resistance to stress corrosion cracking*

ASTM G34, *Standard Test Method for Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)*

ASTM G47, *Standard Test Method for Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products*

ASTM G66, *Standard Test Method for Visual Assessment of Exfoliation Corrosion Susceptibility of 5XXX Series Aluminum Alloys (ASSET Test)*

ASTM G67, *Standard Test Method for Determining the Susceptibility to Intergranular Corrosion of 5XXX Series Aluminum Alloys by Mass Loss After Exposure to Nitric Acid (NAMLT Test)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12258-1 and the following apply.

3.1
sheet/plate
flat rolled product of rectangular cross-section with uniform thickness between 0,20 mm and 6 mm for sheet or above 6 mm for plate, supplied in straight lengths (i.e. flat) usually with trimmed or sawn edges

Note 1 to entry: For sheet, the thickness does not exceed one-tenth of the width.

Note 2 to entry: Corrugated, embossed (with patterns, for example grooves, ribs, checkers, tears, buttons, lozenges), coated, edge conditioned and perforated products in this general form when derived from sheet as defined above are classified as sheet.

Note 3 to entry: Flat sheets and plates material between 3 mm and 15 mm are sometimes called “shate”.

3.2
strip

flat rolled product of rectangular cross-section with uniform thickness over 0,20 mm, supplied in coils usually with trimmed edges

Note 1 to entry: The thickness does not exceed one-tenth of the width.

Note 2 to entry: Corrugated, embossed (with patterns, for example grooves, ribs, checkers, tears, buttons, lozenges), coated, edge conditioned and perforated products in this general form when derived from sheet as defined above are classified as sheet.

Note 3 to entry: “Strip” is sometimes called “coil”.

3.3
order document
document or set of documents agreed between supplier and purchaser at the time of ordering

Note 1 to entry: An order document can be an order of the purchaser confirmed by the supplier or a quotation of the supplier confirmed by the purchaser.

4 Ordering information

The order document shall contain the following:

a) form and type of product:

— form of the product (sheet, strip, plate, etc.);

— designation of the aluminium or aluminium alloy;

b) temper of the material for delivery according to EN 515 and, if different, the temper for use;

c) reference to this European Standard;

d) specification of mechanical properties, if additional to or different from EN 485-2 or as disclosed in any application standard (see Annex A);

e) reference to the standard for tolerances of form and dimensions (e.g. EN 485-3, EN 485-4 or as disclosed in any application standard (see Annex A));

f) dimensions of the product:

— thickness;

— width;

— length of sheet and plate, as applicable (in the rolling direction);

— internal and external diameters of the coil, or dimension and type of the core, as applicable.

NOTE 1 Unless otherwise agreed, the length is the largest dimension of the sheet or plate and corresponds to the rolling direction.

g) quantity:

— mass or number of pieces;

— quantity tolerances if required;

h) any requirements for inspection documents;

i) any other test, in addition to chemical analysis and tensile testing;

j) any additional requirements, such as:

— quality assurance;

— specific inspection schemes;

— marking of products;

— references of drawing, etc.;

— special packing requirements;

k) for products intended for decorative anodizing by the purchaser, the order document shall also contain the following:

— statement that the product is intended to be anodized;

— intended particular surface treatment (according to the relevant standard);

— whether a decorative appearance after anodizing is required for both sides and, if only one side, its position with respect to the strip (inside or outside of the coil) or the sheet or plate (upside or downside).

Products intended to form a specific area after anodizing (such as a façade) should be ordered in a single batch.

The order document should indicate the intended application.

NOTE 2 The codification scheme specified in EN 573–5 will preferably be used.

5 Requirements

5.1 Responsibilities of the supplier and manufacturer

The supplier shall be responsible that all inspections and tests required by the relevant standard and/or the particular specification have been performed, prior to shipment of the product.

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

5.2 Requirements on product properties

5.2.1 Chemical composition

The chemical composition shall comply with the requirements as specified in EN 573-3.

If the purchaser requires content limits for elements not specified in the above standard, these limits shall be stated in the order document.

5.2.2 Mechanical properties

The mechanical properties determined by the tensile test shall be in conformity with those specified in EN 485-2, if not otherwise stated in the order document. Other properties such as hardness, bending ability, isotropy, etc. can be specified in the order document.

5.2.3 Corrosion behaviour

Products made of 5xxx alloys with nominal magnesium content equal to or higher than 3 % in the H116 and H321 tempers shall be capable of exhibiting no exfoliation corrosion susceptibility according to ASTM G66 accelerated test and inter-granular corrosion susceptibility according to ASTM G67. The release criteria for these tests are described in EN 13195.

Plate exhibit made of alloys EN AW-7010 and EN AW-7075 in the T73 and T7351 tempers and over 25 mm in thickness, shall exhibit no evidence of stress-corrosion cracking when tested in accordance with ASTM G47 or in ISO 9591.

Products made of alloys EN AW-7010 and EN AW-7075 in the tempers T76 and T7651 shall be capable of exhibiting no evidence of exfoliation corrosion in excess of grade EB, as defined in ASTM G34, when subjected to the test specified in 6.10.2.

5.2.4 Freedom from defects

The product shall be free from defects prejudicial to its suitable and proper use.

It shall have a smooth and clean surface. However small surface imperfections such as light scratches, indentations, laminations, stripes, roll marks, discolorations and non-uniform surface appearance resulting

from heat treatment, etc., which cannot always be totally avoided, are generally permitted on both sides of the product.

Whilst an operation designed to mask a defect is not permitted, superficial defects may be eliminated, provided that the dimensional tolerances and material properties continue to meet the specifications.

For products intended for decorative anodizing, the superficial imperfections (discolouration, mechanical or structural imperfections) may not be so extensive as to impair the decorative appearance after the agreed surface treatment. Limiting samples can be agreed between supplier and purchaser.

5.2.5 Tolerances on dimensions and form

The dimensions and form tolerances shall be in conformity with EN 485-3 and EN 485-4, unless otherwise agreed upon between supplier and purchaser and stated in the order document. Unless otherwise agreed upon, the purchaser may reject only those products having dimensions not complying with the specified tolerances.

6 Test methods

6.1 General

If the purchaser wishes to inspect the product at the supplier's works, the purchaser shall notify the supplier at the time of placing the order.

6.2 Chemical analysis

Sampling shall be carried out at the time of casting according to EN 14361. The average content accuracy to each sample shall be within the specification for the chemical composition.

NOTE 1 EN 14361 includes criteria how to determine number, volume and shape of sample, about time and location of sampling and about the design and maintenance of the tools, in order to make sure that the average chemical composition of the sample is representative of the average chemical composition of the whole melt.

The range of application and accuracy of the test procedure used shall be validated and proved by the supplier.

NOTE 2 For the fast determination of the chemical composition different spectral analysis methods are used (e.g. S-OES, XRF, GDOES). For S-OES see EN 14726.

In case of dispute concerning the chemical composition, an additional analysis shall be carried out in accordance with EN 14242.

6.3 Tensile test

6.3.1 General

The tensile test shall be carried out in accordance with EN ISO 6892-1, the testing method shall be agreed between the supplier and the purchaser.

Specimens shall be taken from the sample after completion of all the mechanical and thermal treatments that the product has to undergo prior to delivery, and which can influence the mechanical properties of the metal. In cases where this is not possible, the 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 at the zone affected by cutting.