



SLOVENSKI STANDARD

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Nadomešča:
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Aluminij in aluminijeve zlitine - Specifikacije za gnetene in ulite polizdelke za gradnjo ladij in čolnov

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

Aluminium und Aluminiumlegierungen - Spezifikationen für Knetzeugnisse und Gussstücke für Seewasseranwendungen (Schiffbau, Meeres- und Offshoretechnik)

Aluminium et alliages d'aluminium - Spécifications de produits corroyés et des pièces moulées pour applications marines (construction navale, maritime et offshore)

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EUROPEAN STANDARD

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

Aluminium et alliages d'aluminium - Spécifications des produits corroyés et des pièces moulées pour applications marines (construction navale, maritime et offshore)

Aluminium und Aluminiumlegierungen - Spezifikationen für Knetzeugnisse und Gussstücke für Seewasseranwendungen (Schiffbau, Meeres- und Offshoretechnik)

This European Standard was approved by CEN on 22 August 2013.

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

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 13195:2013) 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 April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

CEN/TC 132 affirms its policy that if a patentee refuses to grant licences on standardized products under reasonable and not discriminatory conditions, this product will be removed from the corresponding document.

This document supersedes EN 13195:2009.

The main changes in this revision are the addition of the alloy EN AW-5456 in 6.4, in Table 1, in A.2.2.1, in A.2.2.3 and in Table A.1.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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EN 13195:2013 (E)**1 Scope**

This European Standard specifies properties and technical conditions for inspection and delivery of wrought and cast aluminium and aluminium alloy products recommended for marine applications, including shipbuilding and offshore applications.

Additional information is given about high magnesium alloys, with special regard to their sensitivity to intergranular and exfoliation corrosion.

This European Standard is intended to be used in conjunction with relevant European, national or international regulations as applicable, to which it comes in support.

For products intended to be used in marine constructions to be classified by a Classification Society, the relevant requirements of this Society apply.

This European Standard covers:

- wrought products in aluminium alloys (see Clause 6);
- castings in aluminium alloys (see Clause 7).

Information is given in Annex A to guide the user in the selection of aluminium and aluminium alloys and tempers for various applications.

This European Standard does not cover:

- execution and design, covered by the rules of the Classification Societies or EN 1090-3 and EN 1999-1-1 to EN 1999-1-5;
- welding, covered by EN 1011-4.

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 485-1, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 1: Technical conditions for inspection and delivery*

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

- EN 586-1, *Aluminium and aluminium alloys — Forgings — Part 1: Technical conditions for inspection and delivery*
- EN 586-2, *Aluminium and aluminium alloys — Forgings — Part 2: Mechanical properties and additional property requirements*
- EN 586-3, *Aluminium and aluminium alloys — Forgings — Part 3: Tolerances on dimensions and form*
- EN 754-1, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 1: Technical conditions for inspection and delivery*
- EN 754-2, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 2: Mechanical properties*
- EN 754-3, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 3: Round bars, tolerances on dimensions and form*
- EN 754-4, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 4: Square bars, tolerances on dimensions and form*
- EN 754-5, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 5: Rectangular bars, tolerances on dimensions and form*
- EN 754-6, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 6: Hexagonal bars, tolerances on dimensions and form*
- EN 754-7, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 7: Seamless tubes, tolerances on dimensions and form*
- EN 754-8, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 8: Porthole tubes, tolerances on dimensions and form*
- EN 755-1, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 1: Technical conditions for inspection and delivery*
- EN 755-2, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 2: Mechanical properties*
- EN 755-3, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 3: Round bars, tolerances on dimensions and form*
- EN 755-4, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 4: Square bars, tolerances on dimensions and form*
- EN 755-5, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 5: Rectangular bars, tolerances on dimensions and form*
- EN 755-6, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 6: Hexagonal bars, tolerances on dimensions and form*
- EN 755-7, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 7: Seamless tubes, tolerances on dimensions and form*
- EN 755-8, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 8: Porthole tubes, tolerances on dimensions and form*
- EN 755-9, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 9: Profiles, tolerances on dimensions and form*

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

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 1559-1, *Founding — Technical conditions of delivery — Part 1: General*

EN 1559-4, *Founding — Technical conditions of delivery — Part 4: Additional requirements for aluminium alloy castings*

EN 1592-1, *Aluminium and aluminium alloys — HF seam welded tubes — Part 1: Technical conditions for inspection and delivery*

EN 1592-2, *Aluminium and aluminium alloys — HF seam welded tubes — Part 2: Mechanical properties*

EN 1592-3, *Aluminium and aluminium alloys — HF seam welded tubes — Part 3: Tolerances on dimensions and form for circular tubes*

EN 1592-4, *Aluminium and aluminium alloys — HF seam welded tubes — Part 4: Tolerances on dimensions and form for square, rectangular and shaped tubes*

EN 1706, *Aluminium and aluminium alloys — Castings — Chemical composition and mechanical properties*

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

EN 12258-1:2012, *Aluminium and aluminium alloys — Terms and definitions — Part 1: General terms*

ASTM B928/B928M, *Standard Specification for High Magnesium Aluminum-Alloy Sheet and Plate for Marine Service and Similar Environments*

ASTM G66, *Standard Test Method for Visual Assessment of Exfoliation Corrosion Susceptibility of 5xxx Series Aluminium 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 12258-1:2012 apply.

4 Selection of materials

Aluminium alloys recommended for wrought products are given in Table 1. The chemical composition of these alloys shall be as specified in EN 573-3. For each wrought alloy and product form available, the recommended tempers are given in Table 1. The available product form of each alloy shall be as given in EN 573-3. Temper designations for wrought products shall be used as specified in EN 515. An explanation of the specified tempers for the relevant products is given in Annex C.

The series 5xxx alloys for marine applications shall be used only in the tempers specified in Table 1.

Aluminium alloys recommended for castings are given in Table 2. The chemical composition of these alloys shall be as specified in EN 1706. The recommended tempers are given in Table 2 for each alloy and casting process type available.

Further information on materials selection and the proper use of certain alloys and tempers is given in Annex A.

5 Ordering information

The ordering information for the various products shall be as specified in the relevant European Standards for general engineering applications: EN 485-1, EN 586-1, EN 754-1, EN 755-1, EN 1301-1 and EN 1592-1.

It shall be indicated on the order document whether frequent direct contact with seawater is expected for the product. When relevant the manufacturer shall specify which corrosion test method has been applied.

It shall be indicated on the order document whether or not the constructions in which the ordered products are incorporated are intended to be inspected by a Classification Society, together with a reference of additional relevant standard(s) of this Classification Society.

Classification Societies may put stricter requirements.

An inspection certificate 3.1 in accordance with EN 10204 shall be issued.

6 Wrought aluminium alloy products for marine applications

6.1 Technical conditions for inspection and delivery

The technical conditions for inspection and delivery for the various products shall be as specified in the European Standards for general engineering applications: EN 485-1, EN 586-1, EN 754-1, EN 755-1, EN 1301-1 and EN 1592-1.

6.2 Mechanical properties

The mechanical properties of the different products shall be as specified in the following European Standards for general engineering applications: EN 485-2, EN 586-2, EN 754-2, EN 755-2, EN 1301-2 and EN 1592-2.

For aluminium alloy EN AW-5383 for extruded products, the mechanical properties shall be as specified in Annex B.

6.3 Tolerances on dimensions and form

The tolerances on dimensions and form for each form of product shall be as specified in the following European Standards for general engineering applications: EN 485-3, EN 485-4, EN 586-3, EN 754-3, EN 754-4, EN 754-5, EN 754-6, EN 754-7, EN 754-8, EN 755-3, EN 755-4, EN 755-5, EN 755-6, EN 755-7, EN 755-8, EN 755-9, EN 1301-3, EN 1592-3 and EN 1592-4.

In specific cases, the permissible under-thicknesses of sheet, strip and plate can be agreed between supplier and purchaser (see Table 3), while the total tolerance range shall conform to the requirements of the relevant parts of EN 485 (Part 3 or 4).

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6.4 Special requirements for corrosion-testing of EN AW-5059, EN AW-5083, EN AW-5086, EN AW-5383, EN AW-5456 alloys

H116 applies to products made of those alloys of the 5xxx group in which the magnesium content is 3 % nominal or more. These products are strain-hardened at the last operation to specified stable tensile property limits, and to meet specified levels of corrosion resistance in accelerated-type corrosion tests. Corrosion tests include inter-granular and exfoliation tests. This temper is suitable for continuous service at temperatures not greater than 65 °C (150 °F).

H321 applies to products made of those alloys of the 5xxx group in which the magnesium content is 3 % nominal or more. These products are thermally stabilised at the last operation to specified stable tensile property limits, and to meet specified levels of corrosion resistance in accelerated-type corrosion tests. Corrosion tests include inter-granular and exfoliation tests. This temper is suitable for continuous service at temperatures not greater than 65 °C (150 °F).

Alloys supplied in the H116 or H321 temper in the form of sheet, strip and plate shall be subjected to testing as specified in EN 485-2 supplemented to assess their resistance to intergranular corrosion susceptibility based on ASTM G67 (NAMLT Test) and to exfoliation corrosion susceptibility based on ASTM G66 (ASSET Test).

EN AW-5383 alloys supplied in the H112 temper in the form of extrusions can be subjected to testing to assess their resistance to intergranular corrosion susceptibility based on ASTM G67 (NAMLT Test) and to exfoliation corrosion susceptibility based on ASTM G66 (ASSET Test), when agreed upon between manufacturer and purchaser.

The manufacturers shall establish the relationship between microstructure and resistance to corrosion. A reference photomicrograph taken at 500x, shall be established for each of the alloy-tempers and thickness ranges relevant. The reference photographs shall be taken from samples which have exhibited no evidence of exfoliation corrosion and a pitting rating of PB or better, when subjected to the test described in ASTM G66 (ASSET). The samples shall also have exhibited resistance to intergranular corrosion at a mass loss no greater than 15 mg/cm², when subjected to the test described in ASTM G67. Upon satisfactory establishment of the relationship between microstructure and resistance to corrosion, the master photomicrographs shall be approved. Production practices shall not be changed after approval of the reference micrographs.

NOTE Pitting rating of PB is described in ASTM G66.

For batch acceptance of 5xxx-alloys in the H116 and H321 tempers, metallographic examination of one sample selected from mid-width at one end of a coil or random sheet or plate shall be carried out. The microstructure of the sample shall be compared to the reference photomicrograph of acceptable material. A longitudinal section perpendicular to the rolled surface shall be prepared for metallographic examination. If the microstructure shows evidence of continuous grain boundary network of aluminium-magnesium precipitate in excess of the reference photomicrographs of acceptable material, the batch shall either be rejected or tested for exfoliation-corrosion resistance and intergranular corrosion resistance. The corrosion tests shall be in accordance with ASTM G66 and ASTM G67. If the results from testing satisfy the acceptance criteria the batch is accepted, else it shall be rejected.

As an alternative to metallographic examination, each batch may be tested for exfoliation corrosion resistance and intergranular corrosion resistance, in accordance with ASTM G66 and ASTM G67. The pass/fail requirements for the alternative to metallographic examination shall be in accordance with ASTM B928/B928M.

7 Castings

7.1 Mechanical properties

The mechanical properties of sand, chill (permanent mould), investment or pressure die castings shall be in accordance with EN 1706.

7.2 Technical conditions for delivery of castings

The technical conditions for delivery of aluminium castings shall be in accordance with EN 1559-1 and EN 1559-4.

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