

ALUMIINIUM JA ALUMIINIUMSULAMID.
SURVETÖÖDELDAVAD TOOTED JA VALUTOOTED.
ERINÕUDED SURVESEADMETE VALMISTAMISEKS
MÕELDUD TOODETELE

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 12392:2016+A1:2022 sisaldab Euroopa standardi EN 12392:2016+A1:2022 ingliskeelset teksti.	This Estonian standard EVS-EN 12392:2016+A1:2022 consists of the English text of the European standard EN 12392:2016+A1:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
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English Version

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

Aluminium et alliages d'aluminium - Produits corroyés
et moulés - Exigences particulières pour les produits
destinés à la fabrication des appareils à pression

Aluminium und Aluminium-Legierungen - Knet- und
Gusserzeugnisse - Besondere Anforderungen an
Erzeugnisse für die Fertigung von Druckgeräten

This European Standard was approved by CEN on 18 January 2016 and includes Amendment 1 approved by CEN on 21 February 2022.

This European Standard was corrected and reissued by the CEN-CENELEC Management Centre on 3 August 2022.

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



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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (EN 12392:2016+A1:2022) 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of an identical text or by endorsement, at the latest by January 2023, and conflicting national standards shall be withdrawn at the latest by January 2023.

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 A1 EN 12392:2016 A1.

This document includes Amendment 1 approved by CEN on 21 February 2022.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive A1 2014/68/EU A1, see informative Annex ZA, which is an integral part of this document.

Comparing to EN 12392:2000 the following modifications were implemented in EN 12392:2016:

- modification of the scope (extension to cast aluminium and aluminium alloys) (Clause 1);
- new normative references (Clause 2);
- new definitions (Clause 3): melt, casting, forging, tube;
- modification of Clause 4 “Materials” which covers Wrought products and Cast products;
- modification of Clause 5 “Technical conditions for inspection and delivery”: new requirements for Manufacturing methods, Orders or tenders, Test procedures, Inspection documents, Marking, Packaging;
- modification of Clause 6 “Mechanical properties”: different specifications are included at room temperature and low and elevated temperature properties;
- modification of Clause 7 “Tolerances on dimensions and form”: inclusions of Tables 1 to 37;
- deletion of Clause 8 “Elevated temperature properties” (initially in 2000 version);
- new Annex A (Informative) “Materials and application range”;
- new Annex B (Informative) “Tensile properties at low and high temperature”;
- new Annex ZA (Informative) “Relationship with EU Directive 2014/68”;
- new references into Bibliography.

■ A1 This Amendment 1 to EN 12392:2016 covers the following major subjects:

- replacement of all textual elements considered as business relationship items such as “to be agreed between customer and supplier” and not allowed in harmonized standards by formal textual elements allowed for harmonized standards and worded as “to be defined before placing an order” and/or “to be stated on the order”;
- introduction of new alloys together with relevant information at specific related sections and/or tables;
- re-introduction of famous and very used A/A50 conversion table for elongation;
- application of most recent European legislation directive (Annex ZA). ■ A1

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, 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, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the material requirements and testing procedures applicable to wrought and cast aluminium and aluminium alloys intended for use in the production of pressure equipment.

This European Standard covers:

- the products forms, grades and tempers of wrought and cast aluminium and aluminium alloys which may be used for such applications together with data for wrought and cast alloys over their permissible working temperature ranges;
- ~~the technical conditions for inspection and delivery, mechanical property limits and tolerances on form and dimensions by reference to the appropriate European standards for the relevant wrought and cast aluminium and aluminium alloys, and~~
- additional requirements which are specific to pressure equipment applications.

~~It applies to hot-rolled plate, cold-rolled sheet/ strip/ circles, extruded or extruded and cold drawn rod/bar, tube, extruded open / hollow profiles, forgings and castings. The materials and application ranges covered by this document are those given in Annex A, Table A.1 for wrought alloys and Table A.2 for castings.~~

It is the sole objective of this standard to cover materials only for pressure purposes and it excludes any elements of fabrication or fabrication methods for pressure equipment; such information can be found in the relevant standards listed in the “Bibliography” section.

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 485-1:2016, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 1: Technical conditions for inspection and delivery*

EN 485-3:2003, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 3: Tolerances on dimensions and form for hot-rolled products*

EN 485-4:1993, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 4: Tolerances on shape and dimensions for cold-rolled products*

EN 586-1:1997, *Aluminium and aluminium alloys — Forgings — Part 1: Technical conditions for inspection and delivery*

EN 586-3:2001, *Aluminium and aluminium alloys — Forgings — Part 3: Tolerances on dimensions and form*

EN 754-1:2016, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 1: Technical conditions for inspection and delivery*

EN 754-2:2016, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 2: Mechanical properties*

EN 754-3:2008, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 3: Round bars, tolerances on dimensions and form*

EN 754-4:2008, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 4: Square bars, tolerances on dimensions and form*

EN 754-5:2008, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 5: Rectangular bars, tolerances on dimensions and form*

EN 754-6:2008, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 6: Hexagonal bars, tolerances on dimensions and form*

EN 754-7:2016, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 7: Seamless tubes, tolerances on dimensions and form*

EN 754-8:2016, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 8: Porthole tubes, tolerances on dimensions and form*

EN 755-1:2016, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 1: Technical conditions for inspection and delivery*

EN 755-2:2016, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 2: Mechanical properties*

EN 755-3:2008, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 3: Round bars, tolerances on dimensions and form*

EN 755-4:2008, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 4: Square bars, tolerances on dimensions and form*

EN 755-5:2008, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 5: Rectangular bars, tolerances on dimensions and form*

EN 755-6:2008, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 6: Hexagonal bars, tolerances on dimensions and form*

EN 755-7:2016, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 7: Seamless tubes, tolerances on dimensions and form*

EN 755-8:2016, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 8: Porthole tubes, tolerances on dimensions and form*

EN 755-9:2016, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 9: Profiles, tolerances on dimensions and form*

EN 941:2014, *Aluminium and aluminium alloys — Circle and circle stock for the production of general applications — Specifications*

EN 1370:2011, *Founding — Examination of surface condition*

EN 1371-1:2011, *Founding — Liquid penetrant testing — Part 1: Sand, gravity die and low pressure die castings*

EN 1559-1:2011, *Founding — Technical conditions of delivery — Part 1: General*

EN 1559-4:2015, *Founding — Technical conditions of delivery — Part 4: Additional requirements for aluminium alloy castings*

EN 1779:1999, *Non-destructive testing — Leak testing — Criteria for method and technique selection*

EN 2004-1:1993, *Aerospace series — Test methods for aluminium and aluminium alloy products — Part 1: Determination of electrical conductivity of wrought aluminium alloy products*

EN 2101:1991, *Aerospace series — Chromic acid anodizing of aluminium and wrought aluminium alloys*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 12020-1:2008, *Aluminium and aluminium alloys — Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 — Part 1: Technical conditions for inspection and delivery*

EN 12020-2:2016, *Aluminium and aluminium alloys — Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 — Part 2: Tolerances on dimensions and form*

EN 12020-2:2016/AC:2017, *Aluminium and aluminium alloys — Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 — Part 2: Tolerances on dimensions and form*

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

EN 12681:2003, *Founding — Radiographic examination*

EN 13957:2008, *Aluminium and aluminium alloys — Extruded round, coiled tube for general applications — Specification*

EN 13958:2008, *Aluminium and aluminium alloys — Cold drawn, round, coiled tube for general applications — Specification*

EN 14361:2004, *Aluminium and aluminium alloys — Chemical analysis — Sampling from metal melts*

EN 14726:2019, *Aluminium and aluminium alloys — Chemical analysis — Guideline for spark optical emission spectrometric analysis*

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

EN ISO 3452-1:2021, *Non-destructive testing — Penetrant testing — Part 1: General principles (ISO 3452-1:2021)*

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

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

EN ISO 8062:2007, *Castings — System of dimensional tolerances and machining allowances (ISO 8062)*

EN ISO 8492:2013, *Metallic materials — Tube — Flattening test (ISO 8492:2013)*

EN ISO 8493:2004, *Metallic materials — Tube — Drift-expanding test (ISO 8493:1998)*

EN ISO 8495:2013, *Metallic materials — Tube — Ring-expanding test (ISO 8495:2013)*

EN ISO 8496:2013, *Metallic materials — Tube — Ring tensile test (ISO 8496:2013)*

ISO 9591:2004, *Corrosion of aluminium alloys — Determination of resistance to stress corrosion cracking*

ASTM B548:2003, *Standard Test Method for Ultrasonic Inspection of Aluminium-Alloy Plate for Pressure Vessels*

ASTM B594:2019, *Standard Practice for Ultrasonic Inspection of Aluminium-Alloy Wrought Products*

ASTM E112:2013, *Standard Test Methods for Determining Average Grain Size*

ASTM E215:2016, *Standard Practice for Standardizing Equipment for Electromagnetic Testing of Seamless Aluminum-Alloy Tube* ^{A1}

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

heat-treatment batch or lot

quantity of products of the same alloy or purity grade of alloy, form, thickness or cross-section and produced in the same way and heat-treated in one furnace load; or such products solution-treated and subsequently precipitation treated in one furnace load

Note 1 to entry: More than one solution-treatment batch can be included in one ageing furnace load.

Note 2 to entry: For heat treatment in a continuous furnace (vertical or horizontal), the products continuously heat-treated during a specified time (e.g. 8 h) can be considered as one heat treatment lot.

Note 3 to entry: For forgings, a heat-treatment lot may consist of a group of forgings of similar size and shape.

3.2

inspection lot

consignment, or a part thereof, submitted for inspection, comprising products of the same grade or alloy, form, thickness or cross-section, and processed in the same manner

Note 1 to entry: For forgings, an inspection lot may consist of a group of forgings of similar size and shape.

3.3

melt

quantity of molten metal that has simultaneously undergone the same preparatory treatment in the furnace before the casting operation

3.4

cast

quantity of products cast simultaneously from the same melt

3.5

casting

product at or near finished shape, formed by solidification of the metal in a mould or a die

^{A1}

Note 1 to entry: Casting is also the process in which molten metal is poured into a mould and solidified. ^{A1}