



SLOVENSKI STANDARD

oSIST prEN 12392:2008

01-september-2008

Aluminij in aluminijeve zlitine - Gnetne zlitine in zlitine za litje - Posebne zahteve za aluminijeve izdelke za izdelavo naprav, ki delajo pod tlakom

Aluminium and aluminium alloys - Wrought and cast materials - Special requirements for materials intended for pressure purpose

Aluminium und Aluminiumlegierungen - Knet- und Gusswerkstoffe - Besondere Anforderungen an Werkstoffe für die Fertigung von Druckgeräten

Aluminium et alliages d'aluminium - Matériaux corroyés et moulés - Exigences particulières pour les matériaux destinés à être utilisés sous pression

Ta slovenski standard je istoveten z: prEN 12392

ICS:

77.150.10 Aluminijski izdelki Aluminium products

oSIST prEN 12392:2008 **en,fr,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 12392:2008](#)

<https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pren-12392-2008>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 12392

June 2008

ICS 77.150.10

Will supersede EN 12392:2000

English Version

Aluminium and aluminium alloys - Wrought and cast materials - Special requirements for materials intended for pressure purpose

Aluminium et alliages d'aluminium - Matériaux corroyés et
moulés - Exigences particulières pour les matériaux
destinés à être utilisés sous pression

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 132.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
4 Materials	6
5 Order documents	6
6 Product requirements	7
6.1 Production and manufacturing methods	7
6.2 Quality control.....	8
6.3 Chemical composition	8
6.4 Mechanical properties.....	8
6.5 Tolerances on dimensions and form	9
7 Test procedures – Sampling and testing	9
7.1 General.....	9
7.2 Chemical composition	9
7.3 Tensile and hardness testing	9
8 Test frequency and specific test requirements for individual products.....	9
8.1 Sheet, strip, plate and circles	9
8.2 Forgings.....	10
8.3 Extruded and cold drawn tube (in straight lengths or coiled).....	10
8.4 Extruded profiles and hollow sections.....	11
8.5 Castings.....	11
9 Inspection documents.....	12
10 Marking of products	13
11 Packaging	13
Annex A (normative) Low and elevated temperature tensile properties for wrought products	14
Annex B (normative) Low and elevated temperature tensile properties for cast products	18
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EC Directive 97/23/EC	21
Bibliography	22

Foreword

This document (prEN 12392:2008) has been prepared by Technical Committee CEN/TC 132 "Aluminium and aluminium alloys", the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12392:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive 97/23/EC.

For relationship with EC Directive, see informative Annex ZA, which is an integral part of this document.

Within its programme of work, Technical Committee CEN/TC 132 entrusted CEN/TC 132/WG 14 "General support" to revise EN 12392:2000.

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.

CEN/TC 132 affirms its policy that in the case when a patentee refuses to grant licences on standardised standard products under reasonable and not discriminatory conditions, then this product shall be removed from the corresponding standard. (standards.iteh.ai)

[oSIST prEN 12392:2008
https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pren-12392-2008](https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pren-12392-2008)

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.

The 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 permissible alloys/tempers covered by this European Standard are those given in Tables A.1 and A.2 for wrought alloys and Tables B.1 and B.2 for castings;
- 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;
- additional requirements which are specific to pressure equipment applications.

It applies to hot-rolled plate, cold-rolled sheet/strip/circles, forgings, extruded or extruded and cold drawn rod/bar, tube, extruded open/hollow profiles and castings.

It is the sole objective of this European Standard to cover materials only for pressure purposes and it excludes any elements of fabrication or fabrication methods for pressure equipment. Such information may be found in the relevant European Standards listed in Bibliography.

2 Normative references

[oSIST prEN 12392:2008](https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pr-en-12392-2008)

[https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-](https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pr-en-12392-2008)

[16d168e80c88/osist-pr-en-12392-2008](https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pr-en-12392-2008)

The following referenced documents are indispensable for the application 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 485 (all parts), *Aluminium and aluminium alloys — Sheet, strip and plate*

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 583 (all parts), *Non-destructive testing — Ultrasonic examination — Part 1: General principles*

EN 586 (all parts), *Aluminium and aluminium alloys — Forgings*

EN 754 (all parts), *Aluminium and aluminium alloys — Cold drawn rod/bar and tube*

EN 755 (all parts), *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles*

EN 1370, *Founding — Surface roughness inspection by visual tactile comparators*

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

EN 1371-2, *Founding — Liquid penetrant inspection — Part 2: Investment castings*

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

- EN 1779, *Non destructive testing — Leak testing — Criteria for method and technique selection*
- EN 2101, *Aerospace series — Chromic acid anodizing of aluminium and wrought aluminium alloys*
- EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2005)*
- EN ISO 8492, *Metallic materials — Tube — Flattening test (ISO 8492:1998)*
- EN ISO 8493, *Metallic materials — Tube — Drift expanding test (ISO 8493:1998)*
- EN ISO 8496, *Metallic materials — Tube — Ring tensile test (ISO 8496:1998)*
- EN 10002-1, *Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature*
- EN 10204:2004, *Metallic products — Types of inspection documents*
- EN 12020-1, *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, *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, *Aluminium and aluminium alloys — Terms and definitions — Part 1: General terms*
- EN 12680-1, *Founding — Ultrasonic examination — Part 1: Steel castings for general purposes*
- prEN 13957¹⁾, *Aluminium and aluminium alloys — Extruded round, coiled tube for general applications — Specification*
- prEN 13958¹⁾, *Aluminium and aluminium alloys — Cold drawn, round, coiled tube for general applications — Specification*
- EN 14361, *Aluminium and aluminium alloys — Chemical analysis — Sampling from metal melts*
- ISO 8062, *Castings — System of dimensional tolerances and machining allowances*
- ASTM E112-96(2004), *Standard Methods for Determining Average Grain Size*
- ASTM E215-98(2004), *Standard Practice for Standardizing Equipment for Electromagnetic Examination of Seamless Aluminum-Alloy Tube*
- ASTM B594-06, *Standard Practice for Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications*

3 Terms and definitions

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

1) Under preparation.

prEN 12392:2008 (E)**4 Materials**

The materials covered by this document shall be used in a wide range of pressure equipment operating over diverse range of both pressure and temperature. The range of applications extends from relatively low pressure automotive equipment, such as heat exchangers, to heavy duty applications including unfired pressure vessels. As a result, it is necessary for this document to detail an extensive range of aluminium alloy forms, alloys and tempers as follows.

- Sheet, strip, circles and plate (EN 485).
- Forgings (EN 586).
- Cold drawn rod/bar and tube (EN 754).
- Extruded rod/bar, tube and profiles (EN 755).
- Precision profiles (EN 12020-1 and EN 12020-2).
- Extruded coiled tube (prEN 13957).
- Cold drawn coiled tube (prEN 13958).
- Castings (EN 1706).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

5 Order documents

The order or tender documents shall define the product required and contain the following minimum information.

oSIST prEN 12392:2008

- <https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-104105e0e384/sist-pr-en-12392-2008>
- a) The type and form of the product. In the case of tube whether extruded, cold drawn or coiled, it is also essential to state the method of extrusion to be used, i.e. seamless or porthole.
 - b) The alloy to be used and the reference to EN 573-3 for wrought products and to EN 1706 for castings as appropriate.
 - c) The temper of the material for delivery in accordance with EN 515 for wrought products and EN 1706 for castings.
 - d) The reference to this European Standard.
 - e) The dimensions and shape of the particular product required:
 - plate: width, thickness and length;
 - sheet: width, thickness and length;
 - strip: width, thickness and coil dimensions;
 - circles: diameter and thickness;
 - forgings: reference to a drawing;

- round tube: method of production, outside or inside diameter²⁾, wall thickness²⁾ and length;
 - coiled round tube: outside or inside diameter²⁾, wall thickness²⁾, coil dimensions and tube length if required in straight lengths;
 - round bar: diameter and length;
 - square and hexagonal bar: width across flats and length;
 - rectangular bar: width, thickness and length;
 - extruded profiles and hollow sections: drawing of cross section and length;
 - castings: reference to a drawing.
- f) The product tolerances on dimensions and form together with particular reference to the relevant European standard for the specific product concerned.
- g) Quantity required, whether weight, number of pieces, total length and the quantity tolerance on the total amount of the order.
- h) Product certification requirement with particular reference to EN 10204.
- i) Identification marking requirements.
- j) Any other special requirements agreed between supplier and purchaser. Reference to design standard, test methods, test frequency, reference to drawings, part numbers or any other special requirements.
- k) Surface finish requirements particularly details of any surface treatments to be carried out.
- l) Surface protection, oil requirements. <http://www.standards.it/en/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pren-12392-2008>
- m) Packaging methods to be used.
- n) Any additional inspection to be carried out prior to delivery.

6 Product requirements

6.1 Production and manufacturing methods

6.1.1 General

Unless otherwise agreed between supplier and purchaser, the production and manufacturing methods used shall be left to the discretion of the supplier. In addition, there shall be no obligation on the supplier to use the same processes or process route for subsequent or similar orders.

6.1.2 Comment on the methods of tube extrusion

Some further explanation is necessary in the case of extruded and extruded/ cold drawn tube where either the porthole or seamless methods of extrusion are available for use. It is suggested that the porthole method may be used for relatively low pressure equipment, such as automotive heat exchangers etc.

2) Two of these dimensions may be given with tolerances, but not all three.

prEN 12392:2008 (E)

When the porthole method is used, then the recommended method of testing the weld integrity is EN ISO 8492 and the frequency of testing shall be agreed between the supplier and purchaser.

Other methods may be used if both the method and test frequency is agreed between the supplier and purchaser.

The porthole extruded alloys that may be used in conjunction with this document shall be restricted to those listed in EN 754-8 and EN 755-8.

6.2 Quality control

The manufacturer/supplier shall be responsible for the performance of all inspection and tests required by the relevant European standard and/or the particular specification prior to shipment of the product. If the purchaser wishes to carry out an inspection prior to shipment, this shall be agreed with the supplier and the request stated on the original order.

6.3 Chemical composition

The chemical composition limits shall comply with those given in EN 573-3 for wrought products and EN 1706 for castings for the particular alloy concerned. If the purchaser requires limits for elements other than those specified in these European Standards, then these special limits shall be agreed with the supplier and stated on the original order. Specific examples are as follows.

- a) A maximum lead content of 150 ug/g or any other agreed value for fracture toughness safety sensitive applications.
- b) A maximum hydrogen content of 0.2 ml/100 g determined by the hot extraction method at the melt (measured ing/casting stage) for applications that involve fusion welding. Other methods of determining the hydrogen content may be used if both the method and maximum hydrogen content is agreed between supplier and purchaser.

iTeh STANDARD PREVIEW

<https://standards.iteh.ai/catalog/standards/sist/103ff2a2-22d3-4a01-b482-16d168e80c88/osist-pren-12392-2008>

6.4 Mechanical properties

The mechanical property limits for a given alloy and temper shall be in compliance with the appropriate European Standards for that particular product:

- prEN 485-2:2008 for sheet, strip, plate and circles;
- EN 586-2:1994 for forgings;
- EN 754-2:2008 for cold drawn rod/bar and tube;
- EN 755-2:2008 for extruded rod/bar, tube and profiles;
- EN 1706:1998 for castings.

NOTE 1 For wrought products all hardness values quoted are for information only, unless otherwise agreed between supplier and purchaser.

NOTE 2 It is important to recognise that welding of all strain hardened tempers (eg H**/ H***) and heat treated tempers (T** and T***) results in a significant change (normally a reduction) in mechanical properties as a result of the welding operation.

6.5 Tolerances on dimensions and form

Tolerances on dimensions and form shall be in accordance with the appropriate European Standards for the wrought or cast product in question, e.g. EN 755-3 to EN 755-9 inclusive for extruded products and ISO 8062 for castings.

7 Test procedures – Sampling and testing

7.1 General

This Clause covers only chemical composition and tensile/hardness testing which are common to all the products. The remaining test procedures and methods are given in the clauses dealing with the individual products.

Regarding the standards to be used for testing, EN or EN ISO standards shall be used whenever possible. However, other standards, such as ASTM, may be used when EN or EN ISO are not available or not considered appropriate.

7.2 Chemical composition

The samples for chemical analysis shall be taken at the time of casting in accordance with EN 14361. The methods of analysis used should be at the discretion of the supplier or by agreement between the supplier and purchaser.

7.3 Tensile and hardness testing

The methods used shall be in compliance with EN 10002-1 for tensile testing and EN ISO 6506-1 for Brinell hardness testing. Other methods of hardness testing, e.g. Webster method, may be used subject to agreement between supplier and purchaser. This agreement shall also include the frequency of testing and the minimum acceptable value for that particular method.

8 Test frequency and specific test requirements for individual products

8.1 Sheet, strip, plate and circles

8.1.1 Tensile test

A minimum of one test piece shall be taken from each cast represented in each inspection or heat treatment lot of 10 000 kg or a part thereof. For a single plate or coil weighing more than 10 000 kg, only one test piece shall be taken from the plate or coil in question.

8.1.2 Bend test

When specified and agreed between supplier and purchaser, a bend test shall be carried out in accordance with EN 485-2.

8.1.3 Ultrasonic test

When specified and agreed between supplier and purchaser, ultrasonic test shall be carried out in accordance with ASTM B594, Class A.