
**Aluminij in aluminijeve zlitine – Okoljski vidiki aluminijevih proizvodov –
Splošne smernice za njihovo vključitev v standarde**

Aluminium and aluminium alloys - Environmental aspects of aluminium products -
General guidelines for their inclusion in standards

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Aluminium and aluminium alloys - Environmental aspects of aluminium products - General guidelines for their inclusion in standards

Aluminium et alliages d'aluminium - Aspects environnementaux des produits d'aluminium - Lignes directrices générales pour leur intégration dans les normes

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

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

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

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Foreword

This document (prEN 15530:2006) 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.

Within its program of work, Technical Committee CEN/TC 132 entrusted CEN/TC 132/WG 14 “General support” to prepare the following standard:

prEN 00132185, *Aluminium and aluminium alloys — Environmental aspects of aluminium products — General guidelines for their inclusion in standards.*

Introduction

European standards often deal with aspects of trade, quality, health and the safety of products, processes or services. By additionally considering environmental aspects, European standardisation is extended to the frame of sustainable development.

A general guidance for the inclusion of environmental aspects in product standards is given by CEN Guide 4. This Guide covers the consideration of environmental aspects in standards dealing with aluminium products and is intended for standard writers. Its purpose is

- a) to describe the environmental aspects in product standards;
- b) to outline the relationship between product standards and the environment;
- c) to help avoid provisions in product standards that can lead to adverse environmental impacts;
- d) to emphasize that addressing environmental aspects during the development of product standards is a complex process and requires balancing competing priorities;
- e) to recommend the use of life-cycle thinking and recognized scientific techniques when addressing environmental aspects of a product being standardized.

CEN Guide 4 states that it will be supplemented by sectorial guides in order to reflect the diversity of environmental impacts that products can have. This document cannot be considered as a sectorial guide by itself, because it only considers aluminium products in different sectors (e.g. vehicles, building, packaging). But it can be used as a reference document for sectorial guides.

As depending on the way a standard is written, the provisions included and those omitted, the environmental impact of those products and processes may be influenced. The experts writing or revising the standards should be aware of the relevance of environmental aspects and possible environmental impacts. In order to achieve this, guidance how to take environmental issues systematically into account should be given.

1 Scope

This document gives guidance mainly but not exclusively at standard writers who work out standards dealing with aluminium products or dealing with semi-finished products which are intended to be used in aluminium products. It applies to all market sectors where European standards are worked out.

NOTE As an example, no European Standards for aluminium products are worked out in the automotive sector.

It provides a structure on how to identify and consider environmental aspects of aluminium products throughout their life cycle, when writing standards taking into account the specific properties of aluminium and specific aspects of the life cycle of aluminium products.

It gives guidance how the life cycle of aluminium products should be taken into account, considering the provisions given in ISO 14044.

It also explains cases where restrictions on aluminium products which are motivated by environmental considerations are not appropriate and gives guidance how to avoid unnecessary requirements.

This European Standard does not include health and safety aspects related to the production, use or recycling of aluminium products.

2 Normative references

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.

CEN Guide 4:2005, *Guide for the inclusion of environmental aspects in product standards*

EN 12258-1:1998, *Aluminium and aluminium alloys — Terms and definitions — Part 1: General terms*

EN 13430,

EN 13431,

[SIST EN 15530:2008](https://standards.iteh.ai/catalog/standards/sist/58353603-125d-4a68-8e8b-bdd162dc6d86/sist-en-15530-2008)

EN 13920-2, *Aluminium and aluminium alloys — Scrap — Part 2: Unalloyed aluminium scrap*

EN 13920-4, *Aluminium and aluminium alloys — Scrap — Part 4: Scrap consisting of one single wrought alloy*

EN 13920-5, *Aluminium and aluminium alloys — Scrap — Part 5: Scrap consisting of two or more wrought alloys of the same series*

ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO/TR 14062, *Environmental management — Integrating environmental aspects into product design and development*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12258-1:1998 and the following apply.

3.1**aluminium product**

product which contains a significant portion of aluminium in metallic form in order to achieve the desired functions

NOTE Aluminium products can be offered to a consumer or delivered to further downstream manufacturing.

3.2**standard writer**

any person taking part in the preparation of standards [CEN Guide 4:2005]

3.3**environmental aspect**

element of an organisation's activities or products or services that can interact with the environment

NOTE A significant environmental aspect has or can have a significant environmental impact.

[EN ISO 14001:2004]

3.4**environmental impact**

any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspect [EN ISO 14001:2004]

3.5**life cycle**

consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to their final disposal [ISO 14044:2005]

4 General guidance**4.1 Practical procedure how to introduce provisions dealing with environmental aspects into standards**

4.1.1 Many standards about aluminium products exist without any provisions to make the user aware about environmental aspects. This need not lead directly to products which are faulty from the environmental standpoint, because the designer has other incentives to consider environmental aspects, such as economic considerations, legal requirements etc. However, the inclusion of such provisions encourages the consideration of environmental aspects in cases where such incentives do not exist.

4.1.2 In many cases it is sufficient to include the necessary provisions when revising standards about aluminium products by the inclusion of a new clause or subclause where the relevant environmental aspects are formulated. Usually such provisions have the character of a guidance.

NOTE In EN 13981-1:2004 requirements and guidance on aluminium profiles for railway application are formulated, without mentioning possible environmental aspects. For the next revision of this standard it would be advisable to include the following additional clause, reflecting the provisions of 5.2.1:

Environmental considerations

The design of profiles for railway cars and the joining technique should consider that the mass of the railway car is of great environmental importance, as mass savings generate savings of electricity or diesel during the whole use stage of the railway car. As an example, each kg of mass saved in a railway car saves about 60 kg to 80 kg CO₂ equivalents of green-house gas for long distance trains and 100 kg to 150 kg CO₂ equivalents of green-house gas for short distance trains, trams and subway trains.

4.1.3 This document is a guide to assess environmental aspects of standards for the use of aluminium within the different market sectors. The aim is to provide a helpful tool for technical experts in the production chain of the aluminium product which are involved in standardisation but are not necessarily environmental experts. This document can be used by the TCs and WGs within the sectors as a tool to take the potential environmental aspects related to their standards into account.

4.1.4 Environmental impacts related to a product can be affected due to product standardization. This aspect shall be balanced against other factors, such as

- product function;
- performance;
- safety and health;
- cost;
- marketability;
- quality;
- legal and regulatory requirements.

4.2 The life cycle approach for aluminium products

4.2.1 Any inclusion of environmental aspects into product standards shall consider the life cycle of the product. This means that all stages of the life cycle of the relevant aluminium product, including

- production of the product from raw material,
 - use of the product,
 - end-of-life of the product
- shall be considered, e.g. within a life cycle assessment (LCA) in order to identify significant environmental aspects.

4.2.2 Standard writers shall be aware of the consequences of the provisions, based on environmental considerations, which they include into standards. Especially, it makes no sense to require a high content of recycled aluminium in an aluminium product, because recycled aluminium usually has the same inherent properties as primary aluminium and would be missing in another product. Instead, standard writers should consider design for (end-of-life) recycling, i.e. make sure that a high portion of the aluminium is recycled.

4.2.3 Key features how to treat aluminium in LCAs, based on ISO 14044, with special regard to recycling issues, are given in Annex A.

4.3 Techniques for identifying and assessing environmental impacts

4.3.1 For the design of aluminium products, the guidance given in ISO/TR 14062 should be considered.

4.3.2 For the most important sectors where aluminium is used, i.e. transport, building and packaging, the most important environmental aspects to be considered are specified in clause 5.

4.3.3 In accordance with CEN Guide Nr. 4, additional environmental aspects, specific for the relevant design and product life cycle, have to be identified by screening procedures as laid down in Annex B.

4.4 Heavy metals and other hazardous substances

4.4.1 There is a need to protect the environment against heavy metals such as lead, cadmium and mercury as they show ecotoxic effects including bioaccumulation. However, if such metals exist as impurities in aluminium, they are present in solid solution in the metallic grid or as dispersed constituents of a size smaller than 1 µm. As aluminium does not corrode under normal conditions, such impurities do not leach out when aluminium is exposed to atmosphere or neutral water during its use or in rare cases where it is littered or land-filled after the end-of-life of a product.

NOTE Aluminium is not considered as a hazardous substance by European legislation.

4.4.2 Standard writers should consider that too strict limitations of impurities can hamper the recycling of aluminium.

EXAMPLE Mixed shredded scrap can easily be recycled into foundry alloys when the lead limit for such alloys is 0,35 % by mass, see EN 1676. With lower limits, aluminium recycling is hampered.

4.4.3 Hexavalent and trivalent chromium is used for the pre-treatment of surfaces before coating. Standard writers should consider that for life times of the coated surface below 15–20 years, chromium can be substituted for pre-treatment by other substances. For higher intended life times, substitutes according to the state of the art can compromise the total life time of the product, so a substitute may not be appropriate.

NOTE The term “hexavalent chromium” is not applicable for the chemical analysis of metals as specified in EN 573-3 or EN 1676.

4.4.4 Other hazardous substances are possible in converted aluminium products and are specified in the relevant literature, e.g. in EN 13428 for packaging applications and in the public pages of www.mdsystem.com for transport applications.

5 Overview of environmental aspects of aluminium products in different sectors

5.1 General

5.1.1 Environmental aspects have to be considered in standards mainly for cases where requirements are specified for aluminium products with a clearly defined application. It is difficult to include environmental aspects into standards which specify properties of semi-finished products for general applications.

5.1.2 As an example, weight saving, i.e. the avoidance of unnecessary material, should be a general requirement for the design stage of a product. However, the environmental benefits of weight saving are much higher for vehicles and moving parts of machines.

5.1.3 As another example, aluminium is characterised by design flexibility which enables integrated solutions, e.g. complex profile sections including cables or air exchange systems besides the main task of being a curtain wall. This reduces the overall consumption of material used, which results in a lower overall environmental impact of the final product, e.g. the building.

5.2 Aluminium products in the transport sector

5.2.1 Energy savings by light-weighting

5.2.1.1 Usually, the main environmental aspects of products in this market sector are related with the energy consumption and the emissions in the use stage. The energy consumption of a vehicle depends on its mass. Each kg weight saving in a vehicle saves between 20 kg and more than 150 kg of green-house gases during its life time, for fast ferry-boats even 1 000 kg. Over the life time of an aircraft, a weight reduction of 1 kg achieves green-house gas savings of 10–20 t of CO₂ equivalents (1), (2).

5.2.1.2 Standards writers should apply appropriate models for the use stage which consider:

- use patterns (e.g. average number of km per vehicle and year);
- physical interrelations describing the energy consumption, e.g. influence of air friction which does not depend on mass;
- sensitivity analyses, e.g. by use of different scenarios.

5.2.1.3 An important requirement for appropriate models for the use stage is the transparency of the assumptions used.

5.2.1.4 For light-weight construction of vehicles, thin-walled castings and wrought products of high-strength alloys with complex shape, high stiffness and good fatigue properties are required. Standard writers should consider the mechanical properties and the formability of the alloys.

5.2.1.5 Because of energy consumption in the use stage, vehicle weight savings obtained by narrow thickness tolerances are of added importance. Wide tolerances mean extra mass in the case of positive deviations from the specified minimum gauge. Standards on dimension tolerance should specify narrow tolerance ranges, as far as technically and economically feasible. Such tolerance ranges may be smaller than those specified in European Standards for general applications.

5.2.1.6 For products where a choice between different materials, e.g. different aluminium alloys, is possible, the environmental advantages of a light-weight solution should be considered.

5.2.2 Recycling

5.2.2.1 Recycling usually consists of four steps, namely dismantling, shredding, sorting and remelting. Standards writers should be aware of the details of these recycling steps for the relevant type of vehicle and should adapt underlying LCA studies accordingly.

5.2.2.2 In order to facilitate dismantling, standards dealing with joining of aluminium parts of a vehicle with parts consisting of other materials should consider easy dismantling in the recycling phase.

5.2.2.3 If shredding is an intended recycling step, standards dealing with joining of aluminium parts of a vehicle with parts consisting of other materials should consider that shredding should separate the different materials and a minimum of shredded pieces which consist of different materials should occur. Dismantled components of vehicles can still consist of different materials, in addition to aluminium. If such additional materials are cast iron, steel, glass, ceramics and plastics, they can be removed by shredding followed by magnetic sorting, eddy-current sorting and sink-float sorting. Special care for design for recycling is necessary when aluminium is combined with other non-ferrous metals.

5.2.2.4 It should be intended to recycle components of vehicles to wrought alloys, if they are fabricated from wrought alloys. For this purpose, standards should consider that dismantled components should be made of one single alloy, i.e. fit into one of the scrap categories as defined by EN 13920-2 or EN 13920-4. If this is not feasible, they should be made of different alloys of the same alloy class, i.e. fit into the scrap category as defined by EN 13920-5.

5.2.2.5 Further guidance about scrap management is given by EN 13920-1, EN 13920-3, EN 13920-6, EN 13920-7, EN 13920-8, EN 13920-9, EN 13920-10, EN 13920-11, EN 13920-12, EN 13920-13, EN 13920-14, EN 13920-15, EN 13920-16.