SLOVENSKI STANDARD
SIST EN 541:2007

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Nadomeġļa:
SIST EN 541:1998

Aluminij in aluminijeve zlitine - Valjani polizdelki za ploļ evinke, zapirala in pokrove - Specifikacije

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

Aluminium und Aluminiumlegierungen - Walzerzeugnisse für Dosen, Verschlüsse und Deckel - Spezifikationen

Aluminium et alliages d'aluminium - Produits laminés pour boîtes, capsules rigides et couvercles - Spécifications

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

Aluminium et alliages d'aluminium - Produits laminés pour boîtes, capsules rigides et couvercles - Spécifications

Aluminium und Aluminiumlegierungen - Walzerzeugnisse für Dosen, Verschlüsse und Deckel - Spezifikationen

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Foreword

This document (EN 541:2006) 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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

This document supersedes EN 541:1995.

Within its programme of work, Technical Committee CEN/TC 132 entrusted CEN/TC 132/WG 7 "Sheet, strip and plates" to revise EN 541:1995.

The following technical changes have been made:

General: Normative references updated

Table 1: New alloy added — EN AW-5006

Clause 8: Amended

Annex D: Added

Bibliography: Added

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1 Scope

This document specifies the technical conditions for inspection and delivery, mechanical properties, dimensional tolerances and other requirements for rolled products made from wrought aluminium and wrought aluminium alloys with thicknesses from 0,150 mm to 0,500 mm for manufacturing rigid cans, closures, lids and tabs.

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.

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*

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 10002-1, *Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature*

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

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

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
sheet
flat rolled product of rectangular cross section with uniform thickness, supplied in straight lengths (i.e. flat) with trimmed edges

3.2
length of sheet
length is always the dimension in the rolling direction

3.3
width of sheet
width is always the dimension at right angles to the rolling direction

NOTE See 6.2.2, Figure 1.

3.4
strip
flat rolled product of rectangular cross section with uniform thickness, supplied in coils usually with trimmed edges

NOTE Strip is sometimes called “coil”.

3.5
master coil
coil produced from one ingot

3.6
inspection lot
consignment, or part thereof, submitted for inspection, comprising products of the same grade or alloy, form, temper, size, shape, thickness or cross section and processed in the same manner

3.7
sample
one or more products taken from an inspection lot

3.8
specimen
one or more pieces taken from each product in the sample, e.g. for the purpose of producing test pieces

3.9
test piece
piece taken from a specimen and suitably prepared for testing

3.10
test
operation to which the test piece is subjected in order to measure or classify a property

3.11
order document
document or set of documents agreed between the supplier and purchaser at the time of ordering

NOTE 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 Technical conditions for inspection and delivery

4.1 Ordering information

The order document shall define the product required and shall contain the following information:

a) type and form of the product:

- form of the product (sheet or strip);
- surface finish (see Clause 7);
- application;
- designation of the aluminium or aluminium alloy in accordance with EN 573-3;

b) metallurgical temper of the material:

- temper designation in accordance with EN 515 (see also Annex C);
- for H1x tempers: delivery in accordance with Table 1 and/or Table 2;

c) number of this standard or a specification number or, where none exists, the properties agreed between the supplier and purchaser;

d) dimensions of the product, (in millimetres):

- thickness (to three decimal places);
- width;
- length;

— internal and external diameters of the coil or reel;
— core size and type;

For the further processing of the sheet, usually one dimension is critical, demanding a tight tolerance. As the width tolerance is usually the tighter one, the purchaser shall state the critical dimension as the width of the sheet.

Designation of the sheet dimension shall always be in the following sequence: thickness × width × length.

It is recommended that the width be indicated by a *W* after the actual dimension if the width is greater than the length, (see 6.2.2, Figure 1).

EXAMPLE 0,300 mm × 750 mm × 1 000 mm
0,300 mm × 1 000 mm (*W*) × 750 mm

e) quantity:

— mass, area or number of pieces;

f) any requirements for inspection documents;

g) any special requirements for packaging:

— mass per coil and per packaging unit;
— number of sheets per stack;
— position of coil axis (vertical or horizontal);
— direction of winding (see Clause 10);
— design of pallet;

h) any special requirements agreed between supplier and purchaser:

— marking of products;
— flagging of joints.

4.2 Requirements

4.2.1 Production and manufacturing processes

Unless otherwise specified in the order, the production and manufacturing processes shall be left to the discretion of the manufacturer. Any changes in the processes for subsequent and similar orders which significantly affect the properties of the product, whether or not specified in this standard, shall be agreed by the purchaser.

4.2.2 Quality control

The supplier shall be responsible for the performance of all inspection and tests required by this European Standard and/or the particular specification prior to the shipment of the product.

4.2.3 Chemical composition

The chemical composition shall comply with the requirements as specified in EN 573-3 and for alloy EN AW-5006 as specified in Annex D and EN 602.

4.2.4 Freedom from defects

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

4.3 Test procedure

4.3.1 Sampling

4.3.1.1 Samples for chemical analysis

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

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

4.3.1.2 Specimens for mechanical testing

4.3.1.2.1 Number of specimens

Unless otherwise specified, at least one specimen shall be taken from each master coil of an inspection lot.

4.3.1.2.2 Location and size

Specimens shall be taken from samples in such a way that it is possible to orientate the test pieces parallel with the rolling direction (longitudinal direction).

The specimens shall be sufficiently large enough to allow the manufacture of the test pieces necessary to carry out the required tests and shall include sufficient metal to allow the manufacture of test pieces for any retests required.

4.3.1.2.3 Identification of specimens

Each specimen shall be marked in such a way that, after removal, it is still possible to identify the product from which it was taken and its location and orientation.

4.3.1.3 Test pieces for tensile testing

4.3.1.3.1 Number of test pieces

One test piece shall be taken from each specimen for the tensile test. The shapes and dimensions for tensile test pieces shall comply with EN 10002-1.

4.3.1.3.2 Identification of the test pieces

Each test piece shall be marked in such a manner that it is possible to identify the inspection lot from which it was taken and if required, its location and orientation in the product.

4.3.1.3.3 Machining

Any machining necessary shall be carried out in such a manner that it does not change the characteristics of the metal in the test piece.

4.3.1.4 Test pieces for other tests

For any other tests (e.g. earing, thickness or weight of coatings, lubricants) the procedures shall be agreed between the supplier and purchaser.

4.3.2 Test methods

4.3.2.1 Chemical composition

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

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

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

4.3.2.2 Tensile test

The tensile test shall be carried out in accordance with EN 10002-1 on test pieces with a reduced section 12,5 mm wide taken parallel with the rolling direction (longitudinal direction). The elongation shall be measured on an original gauge length of 50 mm. Mechanical properties after simulated lacquer stoving shall be determined after heat treating the test pieces at 205 °C for 20 min in a laboratory furnace.

For determination of compliance, yield strength and tensile strength values shall be rounded to the nearest 1 MPa and elongation values to the nearest 0,1 % using the rounding rules given in Annex B.

4.3.2.3 Measurement of dimensions

The dimensions shall be measured by measuring instruments that are accurate to 1/5 of the relevant tolerance.

All dimensions shall be checked at the ambient temperature of the workshop or laboratory, and, in case of dispute, at a temperature of (20 ± 2) °C.

4.3.2.4 Earing test (anisotropy)

The earing test shall be carried out either in accordance with the relevant European Standard or as agreed between the supplier and purchaser.

4.3.2.5 Other tests

If other mechanical or physical tests are required (e.g. thickness of coatings, lubricants), these tests shall be carried out either in accordance with the relevant European Standards or as agreed between supplier and purchaser.

4.3.3 Retests

4.3.3.1 Mechanical properties

If any of the test pieces first selected fail to meet the requirements for the mechanical tests, the following procedure shall be applied:

— If an error is clearly identified, either in the test piece preparation or in the test procedure, then the corresponding result shall be disregarded and the testing resumed as initially required.

— If this is not the case, then two further specimens shall be taken from the same lot, one being from the same unit of the product (sheet, strip, etc.) from which the original specimen was taken, unless that piece of product has been withdrawn by the supplier.

If both test pieces form these additional specimens comply with the requirement, the lot which they represent shall be deemed to comply with this standard.

Should one test piece fail:

— lot shall be deemed not to comply with this standard;

— or, where applicable, the lot may be submitted to additional thermal treatment(s) and then retested as a new lot.

4.3.3.2 Other properties

The retests of other properties shall be agreed between the supplier and purchaser.

5 Mechanical properties

5.1 Tensile

When ordering materials in the cold rolled condition, the supplier and purchaser shall agree upon delivery either in accordance with Table 1 and/or Table 2.

NOTE All sheet and strip conforming to this standard are preferably supplied in the materials and with the mechanical properties specified in Tables 1 and 2. Materials which are delivered with an uncoated surface are generally coated by the purchaser (except tab stock). The mechanical properties of these materials can change as a result of stoving conditions (temperature and time), depending on the temper of the material.

In general, only materials in the cold rolled condition show a significant drop in strength values. In the partially annealed condition the mechanical properties undergo only minor changes during lacquer stoving and remain within the listed range after simulated stoving treatment of 205 °C for 20 min.

Processing the material and stability of the final product depends on the mechanical properties after lacquer stoving. Table 2, therefore, shows for the “cold rolled” materials of Table 1 and the guaranteed mechanical properties after a simulated stoving treatment of 205 °C for 20 min. This thermal treatment approximates most of the real lacquering conditions in use today in sheet lacquering and decorating.

5.2 Earing

If required, limiting values for earing shall be agreed between the supplier and purchaser.