BRITISH STANDARD

BS EN 14121:2009

Aluminium and aluminium alloys — Sheet, strip and plate for electrotechnical applications

ICS 77.150.10

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 14121:2009. It supersedes BS EN 14121:2003 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NFE/35/5, Wrought Aluminium and Aluminium Alloys.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Aluminium and aluminium alloys - Sheet, strip and plate for electrotechnical applications

Aluminium et alliages d'aluminium - Tôles, bandes et tôles épaisses pour applications électrotechniques

Aluminium und Aluminiumlegierungen - Bänder, Bleche und Platten für elektrotechnische Anwendungen

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Contents

Foreword

This document (EN 14121:2009) 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of an identical text or by endorsement, at the latest by November 2009, and conflicting national standards shall be withdrawn at the latest by November 2009.

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This document will supersede EN 14121:2003.

Within its programme of work, CEN/TC 132 entrusted CEN/TC 132/WG 7 *"Sheets, strips and plates"* to revise EN 14121.

The following modifications were introduced in the standard:

— Table 1: EN AW-1370, EN AW-1370A, EN AW-6101B were added.

— Table 1: the value of the electrical conductivity of EN AW-1350 and EN AW-1350A, in temper H19, was corrected to 34,0.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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 the United Kingdom.

1 Scope

This European Standard specifies the technical conditions for inspection and delivery, the mechanical properties and electrical conductivity of wrought aluminium and aluminium alloys sheet, strip and plate for electrotechnical applications such as bus bars and other conductors, products requiring a certain minimum electrical conductivity.

It applies to products with a thickness over 0,20 mm up to and including 150 mm.

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

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

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

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 12258-1:1998 apply.

4 Ordering information

The ordering information shall define the product required and shall contain the following information:

a) form and type of product:

   1) form of the product (sheet, strip or plate);

   2) designation of the aluminium and aluminium alloy;

b) temper of the material for delivery according to EN 515 and, if different, the temper for use;

c) number of this European Standard;

d) dimensions and form of the product:

   1) thickness,

   2) width,

3) length (in the rolling direction);

e) tolerances on the dimensions and form, in accordance with EN 485-3 or EN 485-4;

f) quantity:

1) mass or number of pieces,

2) quantity tolerances, if required;

g) any requirements for inspection documents;

h) any special requirements agreed between manufacturer and purchaser. If codified product designations are used, they should be in accordance with EN 573-5.

5 Requirements

5.1 Production and manufacturing processes

Unless otherwise specified in the order, the production and manufacturing processes shall be left to the discretion of the manufacturer.

5.2 Quality control

The manufacturer shall be responsible for the performance of all inspection and tests required by this standard prior to shipment of the product.

If purchasers wish to inspect the product at the manufacturer's works, they shall notify the manufacturer at the time of ordering.

5.3 Chemical composition

The chemical composition shall comply with the requirements specified in EN 573-3.

5.4 Mechanical properties and electrical conductivity

The mechanical properties and electrical conductivity shall be in conformity with those specified in Table 1.

Table 1 — Mechanical properties and electrical conductivity

Material – temper	Specified thickness		Mechanical properties						Electrical conductivity
			Tensile strength		0,2 % proof stress	Elongation		Brinell hardness	
			R_m		$R_{p0,2}$	$A_{50\,mm}$	A	HBW[a]	20 °C
	mm		MPa		MPa	%	%		MS/m
	over	up to	min.	max.	min.	min.	min.	approx.	min.
EN AW-1350A–F EN AW-1350–F	≥ 2,5	150	65[a]	—	—	—	—	—	34,5
EN AW-1350A–O EN AW-1350–O EN AW-1350A–H111 EN AW-1350–H111	0,2 0,5 1,5 3,0 6,0 12,5	0,5 1,5 3,0 6,0 12,5 20	65 65 65 65 65 65	105 105 105 105 105 105	20 20 20 20 20 20	20 22 26 29 35 —	— — — — — 32	20 20 20 20 20 20	35,4
EN AW-1350A–H19 EN AW-1350–H19	0,2	3,0	150	—	130	1	—	45	34,0
EN AW-1350A–H24 EN AW-1350–H24	0,2 0,5 1,5 3,0	0,5 1,5 3,0 12,5	105 105 105 105	150 150 150 150	75 75 75 75	3 3 5 8	— — — —	33 33 33 33	34,5
EN AW-1350A–H26 EN AW-1350–H26	0,2 0,5 1,5	0,5 1,5 4,0	120 120 120	165 165 165	90 90 90	2 3 4	— — —	38 38 38	34,5
EN AW-1350A–H28 EN AW-1350–H28	0,2 1,5	1,5 3,0	140 140	— —	110 110	2 3	— —	41 41	34,0
EN AW-1370A–F EN AW-1370–F	≥ 2,5	150	65[a]	—	—	—	—	—	34,7
EN AW-1370A–O EN AW-1370–O EN AW-1370A–H111 EN AW-1370–H111	0,2 0,5 1,5 3,0 6,0 12,5	0,5 1,5 3,0 6,0 12,5 20	65 65 65 65 65 65	105 105 105 105 105 105	20 20 20 20 20 20	20 22 26 29 35 —	— — — — — 32	20 20 20 20 20 20	35,8
EN AW-1370A–H19 EN AW-1370–H19	0,2	3,0	150	—	130	1	—	45	34,7
EN AW-1370A–H24 EN AW-1370–H24	0,2 0,5 1,5 3,0	0,5 1,5 3,0 12,5	105 105 105 105	150 150 150 150	75 75 75 75	3 3 5 8	— — — —	33 33 33 33	34,7
EN AW-1370A–H26 EN AW-1370–H26	0,2 0,5 1,5	0,5 1,5 4,0	120 120 120	165 165 165	90 90 90	2 3 4	— — —	38 38 38	34,7
EN AW-1370A–H28 EN AW-1370–H28	0,2 1,5	1,5 3,0	140 140	— —	110 110	2 3	— —	41 41	34,2
EN AW-6101B–T7	0,4	150	170	—	120	6	—	55	32,0

[a] For information only.

5.5 Freedom from defects

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

It shall have a smooth and clean surface. However, small surface defects such as light scratches, indentations, laminations, stripes, roll marks, discoloration's and non-uniform surface appearance resulting from heat treatment, etc., which cannot always be totally avoided, are generally permitted on both sides of the product.

Whilst an operation designed to mask a fault is not permitted, the elimination of a superficial fault is permissible, provided that the dimensional tolerances and material properties continue to meet the specifications.

5.6 Tolerances on dimensions and form

The tolerances on dimensions and form shall be in conformity with EN 485-3 or EN 485-4. Other tolerances on dimensions and form shall be agreed between manufacturer and purchaser.

5.7 Other properties

Additional requirements for properties such as hardness, bending ability etc., shall be agreed between manufacturer and purchaser.

6 Test methods

6.1 Chemical composition

The methods of analysis shall be at the discretion of the manufacturer. In case of dispute concerning the chemical composition, a referee analysis shall be carried out by methods agreed between manufacturer and purchaser. The results obtained by these methods shall be accepted.

6.2 Tensile test

The tensile test shall be carried out in accordance with EN 10002-1.

6.3 Electrical conductivity

The determination of electrical conductivity shall be carried out in accordance with a documented procedure giving details, such as a temperature between 15 °C and 25 °C. This procedure shall address the precision of the measurements and possible errors.

Induction methods can be used for measurement of electrical conductivity, according to EN 2004-1, but for thin products, care shall be taken to avoid inaccuracy due to the penetration depth of the electrical field.

6.4 Measurement of dimensions

The dimensions shall be measured by means of measuring instruments which are of an accuracy consistent with that of dimensions and the dimensional tolerances.

All dimensions shall be checked at the ambient temperature in the workshop or laboratory, and, in case of dispute, at a temperature between 15 °C and 25 °C.

6.5 Surface finish

Unless otherwise specified, examination of surface finish shall be carried out without the assistance of magnifying apparatus on products before delivery.

6.6 Other tests

If other mechanical or physical tests are required, these shall be agreed between manufacturer and purchaser. These tests shall be carried out either in accordance with the existing European Standards or agreed upon by manufacturer and purchaser. The following standards may be used as guidelines:

a) the Brinell hardness (HBW) in accordance with EN ISO 6506-1;

b) erichsen test: in accordance with ISO 8490;

c) earing test: in accordance with EN 1669.

7 Inspection documents

When requested by the purchaser and agreed by the manufacturer, the manufacturer shall provide the appropriate inspection document in accordance with EN 10204.

8 Marking of products

Marking of products shall be undertaken when agreed between manufacturer and purchaser and stated on the order. This marking shall not adversely affect the final use of the product.

9 Packing

Unless otherwise specified in European Standards relating to special products or specified in the order, the method of packing shall be determined by the manufacturer who shall take all suitable precautions to ensure that, under the usual conditions of transportation, the products will be delivered in a condition suitable for use.

10 Arbitration

In cases of dispute concerning conformity with the requirements of this European Standard and before any decision is made to reject the products, testing and examination shall be carried out by an arbitrator chosen by mutual agreement between manufacturer and purchaser.

The arbitrator's decision shall be final.

Bibliography

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

[2] EN 573-5, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 5: Codification of standardized wrought products*

[3] EN 1669, *Aluminium and aluminium alloys — Test methods — Earing test for sheet and strip*

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

[5] EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2005)*

[6] ISO 8490, *Metallic materials — Sheet and strip — Modified Erichsen cupping test*

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