
Vodniki za nadzemne vode – Žice iz zlitine aluminij-magnezij-silicij

Conductors for overhead lines - Aluminium-magnesium-silicon alloy wires

Leiter für Freileitungen - Drähte aus Aluminium-Magnesium-Silizium-Legierung

Conducteurs pour lignes aériennes - Fils en alliage d'aluminium-magnésium-silicium

Ta slovenski standard je istoveten z: EN 50183:2000

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50183

January 2000

ICS 29.240.20

English version

**Conductors for overhead lines
Aluminium-magnesium-silicon alloy wires**

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Fils en alliage d'aluminium-
magnésium-silicium

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 7, Overhead electrical conductors.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50183 on 1999-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2000-10-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2002-10-01

Annexes designated "normative" are part of the body of the standard;
In this standard, annex A is normative.

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1 Scope

This standard is applicable to heat treated aluminium-magnesium-silicon alloy wires for the manufacture of stranded conductors for overhead power transmission purposes. It specifies the mechanical and electrical properties of wires in the range of 1,50 mm to 5,00 mm diameter.

The types are designated AL2 to AL7.

Additional properties may be agreed between the purchaser and the manufacturer.

2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1715-2	<i>Aluminium and aluminium alloys — Drawing Stock — Part 2: Specific requirements for electrical applications</i>
EN 10002-1	<i>Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature</i>
EN 10204	<i>Metallic products — Types of inspection documents</i>
IEC 60468	<i>Method of measurement of resistivity of metallic materials</i>
IEC 60050-466	<i>International Electrotechnical Vocabulary (IEV) — Chapter 466: Overhead Lines</i>
ISO 7801	<i>Metallic materials — Wire — Reverse bend test</i>
ISO 7802	<i>Metallic materials — Wire — Wrapping test</i>

3 Definitions

In addition to the definitions given in IEC 60050-466, the following definition applies:

3.1 lot

a group of reels or coils manufactured by the same manufacturer under similar conditions of production

NOTE 1 A lot may consist of part of or all the purchased quantity.

NOTE 2 The constitution of a lot may be agreed between the purchaser and the manufacturer.

4 Material

The wires shall be processed from drawing stock specified in EN 1715-2 and shall receive an ageing treatment as the final operation.

5 Values for aluminium-magnesium-silicon alloy wires

For calculation purposes the following values for aluminium-magnesium-silicon alloy wires conforming to this standard shall be used:

Density at 20°C	2,70 kg/dm ³
Coefficient of linear expansion	$23 \times 10^{-6} \text{ K}^{-1}$
Constant-mass temperature coefficient of resistance at 20°C	$3,6 \times 10^{-3} \text{ K}^{-1}$
Modulus of elasticity	68 000 N/mm ²

NOTE For more accurate calculations, measured values may be used for density, coefficient of linear expansion, constant-mass temperature coefficient, and modulus of elasticity.

Resistivity at 20°C	The maximum given in Table 1 for individual wires or, where stated, the maximum value allowed for the mean of a lot.
Tensile strength	The minimum given in Table 1 for individual wires.

Table 1 - Final properties of heat treated wires

Type	Nominal conductivity	Nominal diameter		Minimum tensile strength		Minimum elongation after fracture on 250 mm	Maximum resistivity	
		Over	Up to and including	of individual wires	Mean of a lot		of individual wires	Mean of a lot
	% IACS	mm	mm	N/mm ²	N/mm ²		nΩ·m	nΩ·m
AL2	52,5	1,50	3,50	325	-	3,0	32,84	-
		3,50	5,00	315	-	3,0	32,84	-
AL3	53,0	1,50	5,00	295	-	3,5	32,53	-
AL4	52,9	1,50	3,50	325	342	3,0	32,9	32,6
		3,50	5,00	315	330	3,0	32,9	32,6
AL5	55,25	1,50	5,00	295	-	3,5	32,2	31,2
AL6	55,6	1,50	3,50	314	-	3,5	31,5	31,0
		3,50	5,00	304	-	3,5	31,5	31,0
AL7	57,5	1,50	2,50	300	-	3,0	30,5	30,0
		2,50	3,00	290	-	3,0	30,5	30,0
		3,00	3,50	275	-	3,0	30,5	30,0
		3,50	4,00	265	-	3,0	30,5	30,0
		4,00	5,00	255	-	3,0	30,5	30,0

6 Diameter and tolerance on diameter

The diameter of the wire, expressed to two decimal places, shall not depart from the nominal diameter by more than the tolerance given in Table 2.

Table 2 - Wire diameter

Nominal diameter mm		Tolerance
Over	Up to and including	
1,50	3,00	$\pm 0,03$ mm
3,00	5,00	± 1 %

7 Wire surface

The wire surface shall be smooth, free from cracks, holes, inclusions of impurities (copper particles in particular), and any other imperfections which may detract from its functional performance as a wire for an electrical conductor.

8 Length and tolerance on length

Unless otherwise agreed between the purchaser and the manufacturer, wires shall be supplied with a minimum length specified by the purchaser with a permitted variation of -0, +4%. Random lengths shorter or longer than this requirement are only acceptable if prior agreement between the purchaser and the manufacturer is made.

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9 Joints

Joints may be made prior to final drawing. A joint may also be made in the finished wire provided that the mass of the coil is 500 kg or , and:

- (a) there is no more than one joint in such coils, and
- (b) not more than 10 % of coils in a lot contain a joint.

When requested by the purchaser, the manufacturer shall provide evidence that the joints have a tensile strength of not less than 130 N/mm².

The coils containing a joint made in the finished wire shall be clearly identified.

10 Sampling

One sample for tests shall be taken by the manufacturer from at least 10% of the individual lengths of wire. In cases of wire supply in large quantities and where the manufacturer has a demonstrated capability of meeting or exceeding the requirements, the number of test samples may be reduced, with the agreement of the purchaser and the manufacturer, to a level which ensures that each production lot of wire is given adequate monitoring.

11 Tests

11.1 Visual test

When inspected with the naked, or normally corrected eye the surface of the wire shall be free from cracks, holes, inclusions of impurities (copper particles in particular).

11.2 Diameter

The minimum and maximum diameter shall be determined at the same cross section. Each of these measurements shall lie within the tolerance given in Table 2.

For calculation of the cross-sectional area, the mean value of the two measurements shall be used.

11.3 Tensile and elongation tests

One specimen cut from each of the samples taken in accordance with clause 10 shall be subjected, without machining, to a tensile test as described in EN 10002-1. The rate of separation of the jaws of the testing machine shall be not less than 25 mm/min. and not greater than 100 mm/min.

The permanent elongation after fracture (A_{250}), over an original gauge length of 250 mm shall be measured after the fractured ends have been fitted together.

The tensile strength and elongation shall be not less than the appropriate value given in Table 1.

By agreement, the elongation at fracture may be measured, when the manufacturer shall provide evidence to the satisfaction of the purchaser that the requirements of this standard are met.

The determination of the elongation, at or after fracture, shall be valid whatever the position of the fracture if the specified value is reached. If the specified value is not reached, the determination shall be valid only if the fracture occurs between the gauge marks and not closer than 25 mm to either mark.

11.4 Wrapping test

One specimen cut from each of the samples taken according to clause 10 shall be subjected to a wrapping test as described in ISO 7802.

Eight turns shall be wrapped around a mandrel of diameter equal to the wire diameter at a speed not exceeding sixty turns per minute. The wire shall not break.

11.5 Bend test

When agreed between the purchaser and the manufacturer, the bend test described in ISO 7801 shall be carried out.

The radius of former and the number of bends that are required before breaking are given in Table 3.