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IEC 62004

First edition
2007-02

Thermal-resistant aluminium alloy wire for overhead line conductor

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**THERMAL-RESISTANT ALUMINIUM ALLOY WIRE
FOR OVERHEAD LINE CONDUCTOR**

FOREWORD

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International Standard IEC 62004 has been prepared by IEC technical committee 7: Overhead electrical conductors.

The text of this standard is based on the following documents:

FDIS	Report on voting
7/569/FDIS	7/571/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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THERMAL-RESISTANT ALUMINIUM ALLOY WIRE FOR OVERHEAD LINE CONDUCTOR

1 Scope

This International Standard is applicable to thermal-resistant aluminium alloy wires before stranding for manufacture of stranded conductors for overhead lines. It specifies the mechanical, electrical and thermal resistant properties of wires in the diameter range commercially available.

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.

IEC 60468:1974, *Method of measurement of resistivity of metallic materials*

IEC 60104:1987, *Aluminium-magnesium silicon alloy wire for overhead line conductors*

IEC 60889:1987, *Hard-drawn aluminium wire for overhead line conductors*

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3 Terms and definitions

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

3.1

diameter

mean of two measured values at right angles taken at the same cross section

NOTE For non-round wires, the equivalent diameter of the round wire with the same section is used.

3.2

type

thermal-resistant aluminium alloy wires defined as “AT1”, “AT2”, “AT3” and “AT4”

3.3

thermal-resistant aluminium alloy wire

all types of aluminium-zirconium alloy wire, used at operation temperature higher than that of conventional aluminium-magnesium-silicon alloy wire, as specified in IEC 60104, or hard-drawn aluminium wire for overhead line conductors, as specified in IEC 60889, with an allowable operating temperature as described in Table 1

4 Designation

The wire designations included in this standard are as follows:

- thermal-resistant aluminium alloy wire with maximum allowable continuous operating temperature of 150 °C, designated AT1;
- extra high-strength, thermal-resistant aluminium alloy wire with maximum allowable continuous operating temperature of 150 °C, designated AT2;

- super thermal-resistant aluminium alloy wire with maximum allowable continuous operating temperature of 210 °C, designated AT3;
- extra thermal-resistant aluminium alloy wire with maximum allowable continuous operating temperature of 230 °C, designated AT4.

5 Values for thermal-resistant aluminium alloy wire

For calculation purposes, the values given in Table 1 shall be used for thermal-resistant aluminium alloy wire.

Table 1 – Values for thermal-resistant aluminium alloy wire

Type	AT1	AT2	AT3	AT4
Density at 20 °C (g/cm ³)	2,703	2,703	2,703	2,703
Allowable continuous operating temperature (40 years) (°C)	150	150	210	230
Allowable operating temperature in 400 h (°C)	180	180	240	310
Coefficient of linear expansion (/ °C)	23 × 10 ⁻⁶			
Constant-mass temperature coefficient of resistance at 20 °C (/ °C)	0,004 0	0,003 6	0,004 0	0,003 8

6 Requirement

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6.1 Material

The wires shall be of aluminium-zirconium alloy having a composition appropriate to the mechanical, electrical and thermal-resistant properties specified hereunder for type AT1, AT2, AT3 and AT4, respectively.

6.2 Freedom from defects

The wires shall be smooth and free from all imperfections such as cracks, roughness, grooves, inclusions or other defects which may endanger the performance of the product.

6.3 Diameter and tolerance on diameter

The nominal diameter of the wires shall be expressed in millimetres to two decimal places. Each measured value of wire diameter shall not depart from the nominal diameter by more than the amounts given in Table 2.

For the purpose of checking compliance with the above requirement, the diameter shall be determined by the mean of the two measurements at right angles taken at the same cross-section.

Table 2 – Diameter and tolerance on diameter

Nominal diameter		Tolerance
Over (mm)	Up to and including (mm)	
–	3,00	± 0,03 mm
3,00	–	±1 %

6.4 Tensile stress

The wire shall comply with the requirements given in Table 3. The tensile stress of a single wire shall be computed by dividing the breaking load by the cross-sectional area. The cross-sectional area shall be determined using the measured diameter of the test specimen.

For non-round wire, shaped before stranding, its equivalent diameter of the round wire with the same section shall be used and the calculation result of tensile stress shall comply with the requirements given in Table 3.

The tensile stress of the non-round wire shaped during stranding may be measured after unstranding, whose value shall be not less than 95 % of the applicable stress requirements given in Table 3.

6.5 Elongation

Each measured value of wire elongation shall not be less than the amounts given in Table 3.

Table 3 – Tensile stress and elongation of wires (before stranding)

Type	Nominal diameter mm		Tensile stress minimum MPa	minimum Elongation %
	Over	Up to and including		
AT1	–	2,60 ^a	169	1,5
	2,60	2,90	166	1,6
	2,90	3,50	162	1,7
	3,50	3,80		1,8
	3,80	4,00	159	1,9
	4,00	4,50 ^a		2,0
AT2	–	2,60 ^a	248	1,5
	2,60	2,90	245	1,6
	2,90	3,50	241	1,7
	3,50	3,80		1,8
	3,80	4,00	238	1,9
	4,00	4,50 ^a	225	2,0
AT3	–	2,30 ^a	176	1,5
	2,30	2,60	169	
	2,60	2,90	166	1,6
	2,90	3,50	162	1,7
	3,50	3,80		1,8
	3,80	4,00	159	1,9
AT4	–	2,60 ^a	169	1,5
	2,60	2,90	165	1,6
	2,90	3,50	162	1,7
	3,50	3,80		1,8
	3,80	4,00	159	1,9
	4,00	4,50 ^a		2,0

^a For nominal diameters below 2,60 mm or above 4,50 mm, the requirement shall be agreed between the purchaser and the manufacturer.