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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



7/762/CD

COMMITTEE DRAFT (CD)

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SECRETARIAT:

China

SECRETARY:

Mr Qiu Zheng

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 11, TC 122

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

Electricity transmission and distribution

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TITLE:

Concentric lay overhead electrical stranded conductors

NOTE FROM TC/SC OFFICERS:

The comments on this Committee Draft will be discussed at the TC7/MT2 meeting (Face-to-face and Virtual) to be held in Langen, Germany from 2025-11-12 to 2025-11-14.

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Link to Committee Draft (CD) online document:

<https://osd.iec.ch/#/editor/archive/139f8f23-9dd2-b21c-e063-1710000ab1a0/en/CD/1>

How to access

This link leads you to the Online Standards Development (OSD) platform for National Mirror Committee's (NMC) comments. The project draft may be found further down this document.

Resource materials

We recommend NCs to review the available materials to better understand the member commenting on the OSD platform. This includes the:

- [OSD NC roles overview](#)
- [How to add and submit comments to the IEC](#)

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Should you require any assistance, please contact the [IEC IT Helpdesk](#).

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

Concentric lay overhead electrical stranded conductors

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This XXX edition cancels and replaces the XXX edition published in [publication_date], Amendment 1:[publication_date] and Amendment 2:[publication_date]. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) ...;

The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

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

The language used for the development of this International Standard is English [change language if necessary].

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

1 Scope

This International Standard specifies the designation system, requirement, test methods, inspection rules, marks and packaging of concentric lay overhead stranded conductors made of combinations of any of the following metal wires:

- a) round or formed conductive wires as per IEC 62641,
- b) round wires as per IEC 63248.

This International Standard does not refer to gap-conductors as per IEC 62420.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61284:202X, *Overhead lines - Requirements and tests for fittings*

IEC 61394, *Overhead lines - Requirements for greases for aluminium, aluminium alloy and steel bare conductors*

IEC 61395:1998, *Overhead electrical conductors - Creep test procedures for stranded conductors*

IEC TR 61597, *Overhead electrical conductors - Calculation methods for stranded bare conductors*

IEC 62567:2013, *Overhead lines - Methods for testing self-damping characteristics of conductors*

IEC 62568:2015, *Overhead lines - Method for fatigue testing of conductors*

IEC 62641, *Conductors for overhead lines - Aluminium and aluminium alloy wires for concentric lay stranded conductors*

IEC 63248, *Conductors for overhead lines - Coated or clad metallic wire for concentric lay stranded conductors*

ISO 2176:1995, *Petroleum products — Lubricating grease — Determination of dropping point*

ISO 9227:2022, *Corrosion tests in artificial atmospheres - Salt spray tests*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. The terms and the definitions listed here are those which differ from or do not appear in IEC 60050-466.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>

- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

aluminium

all types of aluminium and aluminium alloys listed.

3.2

conductor

concentric lay stranded conductor of an overhead line, intended as a wire or combination of wires not insulated one from another and being laid helically in opposite directions, suitable for carrying an electric current.

3.3

direction of lay

direction of twist of a layer of wires as it moves away from the viewer. A right-hand lay is a clockwise direction and a left-hand lay is an anti-clockwise direction.

Note 1 to entry: With right-hand lay, the wires conform to the direction of the central part of the letter Z when the conductor is held vertically. With left-hand lay, the wires conform to the direction of the central part of the letter S when the conductor is held vertically.

3.4

equivalent diameter

diameter of a circle which would have the same cross-sectional area, mass per unit length and electrical resistance of a given formed wire

$$D_{\text{eq}} = \sqrt{\frac{4}{\pi} S} \quad (1)$$

where S is the cross-sectional area of the formed wire.

3.5

formed wire

filament of extruded, drawn or rolled metal having a constant non-circular cross-section.

3.6

inertness

the property of the wires to remain in their position after cut.

3.7

lay length

axial length of one complete turn of the helix formed by an individual wire in a stranded conductor.

3.8

lay ratio

ratio of the lay length to the external diameter of the corresponding layer of wires in the stranded conductor.

3.9

lot

group of conductors manufactured by the same manufacturer under similar conditions of production. A lot may consist of a part of or the whole of the purchased quantity.

3.10

nominal

name or identifying value of a measurable property by which a conductor or component of a conductor is identified and to which tolerances are applied. When a property is tested, it shall be intended as the target value.

3.11

maximum conductor continuous operating temperature (T_C)

maximum continuous temperature at which the conductor can be operated without significant reduction of its rated tensile strength during its expected lifetime. This temperature is the minimum of the corresponding temperatures of the wires that make up the conductor itself, if it is not limited by specific requirements relating to the fittings.

Note 1 to entry: The expected lifetime is defined between 30 to 80 years (typically 40 years) depending on technology and environmental conditions.

3.12

maximum conductor peak load (emergency operating) temperature (T_P)

maximum temperature at which the conductor can be exposed without significant reduction of its rated tensile strength during a cumulative period of time (peak loads). This temperature is the minimum of the corresponding temperatures of the wires that make up the conductor itself, if it is not limited by specific requirements relating to the fittings.

Note 1 to entry: Cumulative duration of peak loads shall not exceed a limit time (400 to 1000 h) for Type 0 and Type 1 conductors.

3.13

rated tensile strength

RTS

breaking load of an unaged conductor, calculated from the specified tensile properties of the constituent wires.

3.14

round wire (or wire)

filament of extruded or drawn metal having a constant cross-section and a circular shape.

3.15

sample

one or more specimens taken from a production unit and considered to have properties representative of a batch.

3.16

specimen

a length or a component of the conductor taken for test purposes

3.17

steel

all types of steel and FeNi36 listed

3.18

type of conductor

classification of a combination of materials for the outer layer and/or the inner layer, based on operating temperatures and required tests.

4 Designation system

A designation system is used to identify stranded conductors made of aluminium wires (round or formed) and/or steel wires.

4.1 Conductor composition

Homogeneous aluminium conductors are designated Ax, where Ax identifies the type of aluminium.

Combined aluminium conductors are designated Ax/Ay, where Ax identifies external wires (or the envelope) and Ay identifies internal wires (or the core).

Combined aluminium-steel conductors are designated Ax/Sy, where Ax identifies the external aluminium wires (envelope), and Sy identifies the steel core.

If aluminium wires are formed, a “F” follows the identification of the type of aluminium: AxF for homogeneous conductors, AxF/Ay for combined aluminium conductors and AxF/Sy for combined aluminium-steel conductors.

Examples are given in [Figure 1](#).

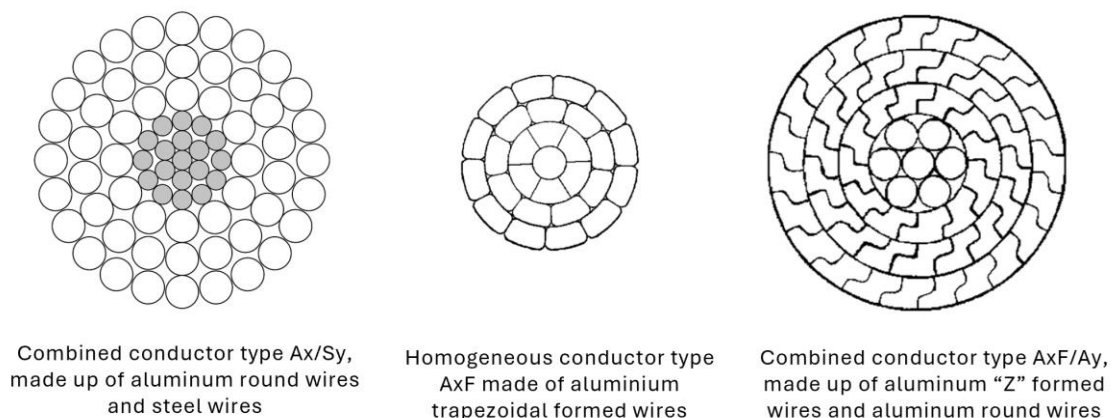


Figure 1 – Examples of conductors' compositions

NOTE Equivalent identification rules shall be applied to ALx aluminium alloys and thermoresistant aluminium alloys, defining ALx, ALx/ALy, ALx/Sy, Ax/ALy and ALxF/Sy conductors or ATx, ATx/ATy, ATx/Sy, ATx/ATy and ATxF/Sy conductors.

Other possible conductor types and design not included above are not excluded.

4.2 Conductor designation

Conductors are identified as follows:

- a designation identifying the type of wires constituting the envelope,
- the letter “F” (if the envelope is made up formed wires),
- the sign “/” and a designation identifying the type of wires constituting the core (if present),
- the sign “-”,
- a code number giving the actual section of the envelope, expressed in mm² and rounded to an integer,

- f) the sign “/” and a code number giving the actual section of the core (if present), expressed in mm² and rounded to an integer,
- g) the sign “-”,
- h) a code number giving the overall diameter (rounded to two decimal figures) expressed in mm and multiplied by 100.

envelope material (F if formed) / core material - envelope actual section / core actual section - overall diameter x 100

EXAMPLE EXAMPLES:

– A3-530-2989

conductor with overall diameter equal to 29,89 mm, composed by A3 round wires with a cross-sectional area rounded to 530 mm²,

– A1/S1A-520/66-3150

conductor with overall diameter equal to 31,50 mm composed by:

- an envelope made up of A1 round wires with a cross-sectional area rounded to 520 mm²,

- a core made up of S1A round wires with a cross-sectional area rounded to 66 mm²,

– AT3F/ACI17SA-144/34-1600

conductor with overall diameter equal to 16,00 mm composed by:

- an envelope made up of AT3 formed wires with a cross-sectional area rounded to 144 mm²,

- a core made up of ACI17SA round wires with a cross-sectional area rounded to 34 mm².

5 Requirements for stranded conductors

5.1 Material

Stranded conductors shall be made up of wires as per IEC 62641 and/or IEC 63248.

5.2 Formed wires

Two production processes are recognized in this standard for conductors with aluminium formed wires:

- a) wires are formed in one process and stranded in another,
- b) wires are first formed and then stranded in a single process.

In any of these cases, materials shall comply with IEC 62641.

In the first case, the tests shall be performed on the formed wires prior to stranding and the properties shall be based on the equivalent wire diameters. In the second case, the tests shall be performed on the round wires prior to forming and stranding and properties shall be based on the round wire diameter prior to forming.

5.3 Conductor sizes and properties

Criteria for calculation of conductor size and properties are given in chapter 6 of this standard.

A list of conductor sizes is given in [Annex E](#) as guidance and example of calculation.

Conductors with strandings not included in this standard may be designed and supplied as agreed upon by the manufacturer and purchaser and the relevant requirements of this standard shall apply.

5.4 Surface

The surface of the conductor shall be free from all imperfections visible to the unaided eye (normal corrective lenses accepted), such as nicks, indentations, etc, not consistent with good commercial practice.

5.5 Stranding

All wires of the conductor shall be concentrically stranded.

Consequent wire layers shall be stranded with reverse lay directions. The direction lay of the external layer shall be “right-hand” except when specifically indicated in the purchase order.

The wires in each layer shall be evenly and closely stranded around the underlying layer.

Adequate production process shall ensure inertness of the conductor. All wires shall lie naturally in their position in the conductor, and where the conductor is cut, the wire ends shall remain in position or be readily replaced by hand and then remain approximately in position

In a conductor having multiple layers of steel and/or aluminium wires, the lay ratio of any layer shall be not greater than the lay ratio of the layer immediately beneath it. The lay ratios for steel wire layers and aluminium wire layers shall be included into the ranges detailed respectively into [Table 1](#) and [Table 2](#).

Table 1 – Lay ratio ranges for steel wire layers

Number of steel wires	6 wire layer		12 wire layer		18 wire layer	
	min	max	min	max	min	max
7	16	26	-	-	-	-
19	16	26	14	22	-	-
37	17	25	16	22	14	18

Table 2 – Lay ratio ranges for aluminium wire layers

Inner layer(s)		Outer layer	
min	max	min	max
10	16	10	14

5.6 Joints

For conductors containing only one steel wire there shall be no joints made after heat treatment of the wire or rod. There shall be no joints of any kind made in the steel core wire or wires during stranding.

No more than one jointed aluminium finished wire shall be used per length of conductor.

During stranding, no aluminium wire welds shall be made for the purpose of achieving the required conductor length.

Joints are permitted in aluminium wires unavoidably broken during stranding, provided such breaks are not associated with either inherently defective wire or with the use of insufficient lengths of aluminium wires. Joints shall conform to the geometry of original wire, i.e. joints shall be dressed smoothly with a diameter within the tolerance of the parent wires and shall not be kinked.