BRITISH STANDARD

BS EN
50182:2001

Conductors for overhead lines — Round wire concentric lay stranded conductors

The European Standard EN 50182:2001 with the incorporation of Corrigendum July 2001 has the status of a British Standard

ICS 29.060.20; 29.240.20

National foreword

This British Standard is the official English language version of EN 50182:2001 incorporating Corrigendum July 2001.

The UK participation in its preparation was entrusted to Technical Committee GEL/7, Overhead electrical conductors, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 August 2001

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EUROPEAN STANDARD **EN 50182**

NORME EUROPÉENNE

EUROPÄISCHE NORM May 2001

ICS 29.060.10

English version

Conductors for overhead lines — Round wire concentric lay stranded conductors

Conducteurs pour lignes aériennes — Conducteurs à brins circulaires, câblés en couches concentriques

Leiter für Freileitungen — Leiter aus konzentrisch verseilten runden Drähten

This European Standard was approved by CENELEC on 2000-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

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CENELEC

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

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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 50182 on 2000-11-01.

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) 2001-11-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-11-01

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given for information only. In this standard, annexes A, B, C and E are normative and annexes D and F are informative.

Contents

1 Scope

This European Standard specifies the electrical and mechanical characteristics of round wire concentric lay bare overhead electrical conductors stranded in alternate directions, with or without grease as per EN 50326, made of one or a combination of any of the following:

a) hard drawn aluminium as per EN 60889 designated AL1;

b) aluminium alloy as per EN 50183 designated AL2 to AL7;

c) zinc coated steel wire as per EN 50189 with grade and class designated ST1A, ST2B, ST3D, ST4A, ST5E, and ST6C;

d) aluminium-clad steel wire as per EN 61232 with class designation 20SA (grades A and B), 27SA, 30SA and 40SA.

Conductors made of zinc coated steel wires only are not included.

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 issue of the publication referred to applies.

EN 50183 *Conductors for overhead lines — Aluminium-magnesium-silicon alloy wires.*

EN 50189 *Conductors for overhead lines — Zinc coated steel wires.*

EN 50326[1)] *Conductors for overhead lines — Characteristics of greases.*

EN 60889 *Hard-drawn aluminium wire for overhead line conductors.*

EN 61232 *Aluminium-clad steel wires for electrical purposes.*

IEC 60050-466 *International Electrotechnical Vocabulary (IEV) — Chapter 466: Overhead Lines.*

3 Definitions

In addition to the definitions given in IEC 60050-466, the following definitions apply.

3.1
aluminium
for the purposes of this standard, aluminium is used as a generic term to mean hard drawn aluminium and aluminium alloy

3.2
direction of lay
direction of lay is defined as right hand or left hand. 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 central part of the letter S when the conductor is held vertically

3.3
lay ratio
ratio of the lay length to the external diameter of the corresponding layer of wires in the stranded conductor

[1)] At draft stage.

3.4
lot
group of conductors 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.

3.5
nominal
target value of a measurable property by which a conductor or component of a conductor is identified and to which tolerances are applied

3.6
wire
filament of drawn metal having a constant circular cross-section

3.7
rated tensile strength
estimate of the conductor breaking load calculated using the specified tensile properties of the component wires

4 Designation system

4.1 A designation system is used to identify stranded conductors made of aluminium with or without steel wires.

4.2 Homogeneous aluminium conductors are designated ALx, where x identifies the type of aluminium. Homogeneous aluminium clad steel conductors are designated yzSA where y represents the type of steel (Grade A or B, applicable to class 20SA only), and z represents the class of aluminium cladding (20, 27, 30 or 40).

4.3 Composite aluminium/zinc coated steel conductors are designated ALx/STyz, where ALx identifies the external aluminium wires (envelope), and STyz identifies the steel core. In the designation of zinc coated steel wires, y represents the type of steel (Grades 1 to 6) and z represents the class of zinc coating (A to E).

4.4 Composite aluminium/aluminium-clad steel conductors are designated ALx/yzSA, where ALx identifies the external aluminium wires (envelope), and yzSA identifies the steel core as in 4.2.

4.5 Conductors are identified as follows:

(a) a code number giving the nominal area, rounded to an integer, of the aluminium or steel as appropriate;

(b) a designation identifying the type of wires constituting the conductor. For composite conductors the first description applies to the envelope and the second to the core.

EXAMPLES:

16-AL1:	Conductor of AL1 aluminium with an area of 15,9 mm^2, rounded to 16 mm^2.
587-AL2:	Conductor of AL2 aluminium with an area of 586,9 mm^2, rounded to 587 mm^2.
401-AL1/28-ST1A:	Conductor made of AL1 aluminium wires around a core of ST1A zinc coated steel wires with a Class A zinc coating. The integer area of AL1 wires is 401 mm^2 and that of the ST1A wires 28 mm^2.
401-AL1/28-A20SA:	Conductor made of AL1 aluminium wires around a core of grade A, class 20 aluminium-clad steel wires. The integer area of AL1 wires is 401 mm^2 and that of the A20SA wires 28 mm^2.
65-A20SA:	Conductor made of grade A, class 20 aluminium clad steel wires with an area of 65 mm^2.

5 Requirements for stranded conductor

5.1 Material

The stranded conductor shall be made from wires and with grease, whenever greased conductor is specified, as defined in clause 1.

5.2 Conductor sizes

Lists of conductor sizes in frequent use in some of the member countries are given as guidance in annex F. Conductors for existing or established designs of overhead lines as well as sizes and 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.

5.3 Surface condition

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.

5.4 Conductor diameter

The conductor diameter shall not vary from the nominal value, specified by the purchaser, by more than:

±1 % for diameters larger or equal to 10 mm;

±0,1 mm for diameters smaller than 10 mm.

5.5 Stranding

5.5.1 All wires of the conductor shall be concentrically stranded.

5.5.2 Adjacent wire layers shall be stranded with reverse lay directions. The direction of lay of the external layer shall be right hand except when otherwise specified by the purchaser.

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

5.5.4 The lay ratios for the zinc coated or aluminium-clad steel wire layers shall be as given in Table 1.

Table 1 — Lay ratios for zinc coated or aluminium-clad steel layers

Number of steel wires	Lay ratio							
	3 wire layer		6 wire layer		12 wire layer		18 wire layer	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
3	16	26	-	-	-	-	-	-
7	-	-	16	26	-	-	-	-
19	-	-	16	26	14	22	-	-
37	-	-	17	25	16	22	14	18
For zinc coated or aluminium-clad steel core constructions exceeding 37 wires, the lay ratio of the outer layer shall lie between 14 and 18, and the lay ratio of the inner layers shall lie between 16 and 26.								

5.5.5 The lay ratios for the aluminium layers of all types of conductor shall be as given in Table 2.

Table 2 — Lay ratios for aluminium layers

All inner layers		Outer layer	
Min.	Max.	Min.	Max.
10	16	10	14

5.5.6 In a multi-layer conductor, the lay ratio of any layer shall be equal to or less than the lay ratio of the layer immediately beneath it.

5.5.7 All steel wires shall lie naturally in their position in the stranded core, and where the core is cut, the wire ends shall remain in position or be readily replaced by hand and then remain approximately in position. This requirement also applies to the aluminium wires of a conductor.

5.5.8 Before stranding, aluminium and steel wires shall have approximately equal temperatures.

5.5.9 The conductor shall have the ability to be installed, using the purchaser's recommended installation method, without damage to the conductor. If required, this shall be demonstrated according to 6.4.9.

5.6 Joints

5.6.1 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 finished zinc coated or aluminium-clad steel core wire or wires during stranding.

5.6.2 No more than one jointed aluminium finished wire before stranding, as permitted in the relevant standard given in clause 2, shall be used per length of conductor.

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

5.6.4 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 short lengths of aluminium wires. Joints shall conform to the geometry of the original wire, i.e. joints shall be dressed smoothly with a diameter equal to that of the parent wires and shall not be kinked.

The number of joints in aluminium wires shall not exceed those specified in Table 3. These joints shall not be closer than 15 m from a joint in the same wire or in any other aluminium wire of the completed conductor.

Joints shall be made by electric butt welding, cold pressure welding or other methods approved by the purchaser. The first type of joint shall be electrically annealed for approximately 250 mm on both sides of the weld.

5.6.5 While the joints specified in 5.6.4 are not required to meet the requirements of unjointed wires, they shall withstand a stress of not less than 75 N/mm^2 for annealed electric butt welded joints, and not less than 130 N/mm^2 for cold pressure joints.

Table 3 — Number of joints permitted in a given length

Conductor length L (m)				Number of joints permitted
Number of aluminium layers				
1	2	3	4	
$L \leq 1\,500$	-	-	-	2
$1\,500 < L \leq 2\,000$	$L \leq 1\,500$	-	-	3
$L > 2\,000$	$1\,500 < L \leq 2\,000$	$L \leq 1\,500$	-	4
-	$2\,000 < L \leq 2\,500$	$1\,500 < L \leq 2\,000$	$L \leq 1\,500$	5
-	$L > 2\,500$	$2\,000 < L \leq 2\,500$	$1\,500 < L \leq 2\,000$	6
-	-	$2\,500 < L \leq 3\,000$	$2\,000 < L \leq 2\,500$	7
-	-	$3\,000 < L \leq 3\,500$	$2\,500 < L \leq 3\,000$	8
-	-	$L > 3\,500$	$3\,000 < L \leq 3\,500$	9
-	-	-	$3\,500 < L \leq 4\,000$	10
-	-	-	$L > 4\,000$	11

5.7 Conductor mass per unit length

5.7.1 The conductor masses given in the tables of annex F have been calculated for each size and stranding of conductor using densities for the aluminium, aluminium clad steel and zinc coated steel wires as given in the standards listed in clause 2. The masses do not include the mass of grease. The calculation of cross-sectional areas for aluminium, aluminium clad steel and zinc coated steel are based on the nominal diameter.

5.7.2 With the exception of the centre wire, all wires are longer than the stranded conductor and the increase in mass depends on the lay ratio used.

The increments, in per cent, for mass due to stranding, shall be as given in Table 4, which have been calculated using the commonly used lay ratios for each applicable layer of aluminium or steel wire given in annex D.

Where an oversize centre wire (king wire) is used, the appropriate increase in mass shall be applied.

5.7.3 The mass per unit length of the conductor without grease shall not vary from its nominal value by more than ±2 %.

Table 4 — Increments due to stranding

Stranding of conductor				Increment (Increase) (%)			
Aluminium		Steel		Mass		Electrical resistance	
No. of wires	No. of layers *	No. of wires	No. of layers *	Aluminium	Zn coated or Al clad steel	Aluminium	Aluminium-clad steel
7	1	-	-	1,11	-	1,11	-
19	2	-	-	1,68	-	1,68	-
37	3	-	-	2,03	-	2,03	-
61	4	-	-	2,36	-	2,36	-
91	5	-	-	2,78	-	2,78	-
127	6	-	-	2,75	-	2,75	-
6	1	1	-	1,39	-	1,39	-
8	1	1	-	1,66	-	1,66	-
18	2	1	-	1,82	-	1,82	-
9	1	3	1	1,91	0,34	1,91	0,34
6	1	7	1	1,51	0,52	1,51	0,52
10	1	7	1	2,01	0,52	2,01	0,52
12	1	7	1	2,17	0,52	2,17	0,52
14	1	7	1	2,30	0,52	2,30	0,52
18	2	7	1	1,94	0,52	1,94	0,52
22	2	7	1	2,07	0,52	2,07	0,52
24	2	7	1	2,13	0,52	2,13	0,52
26	2	7	1	2,18	0,52	2,18	0,52
28	2	7	1	2,22	0,52	2,22	0,52
30	2	7	1	2,26	0,52	2,26	0,52
32	2	7	1	2,30	0,52	2,30	0,52
36	2	7	1	2,37	0,52	2,37	0,52
42	3	7	1	2,20	0,52	2,20	0,52
45	3	7	1	2,23	0,52	2,23	0,52
48	3	7	1	2,26	0,52	2,26	0,52
54	3	7	1	2,31	0,52	2,31	0,52
72	4	7	1	2,40	0,52	2,40	0,52
84	4	7	1	2,46	0,52	2,46	0,52
14	1	19	2	2,50	0,82	2,50	0,82
15	1	19	2	2,56	0,82	2,56	0,82
16	1	19	2	2,61	0,82	2,61	0,82
18	1	19	2	2,70	0,82	2,70	0,82
30	2	19	2	2,36	0,86	2,36	0,86
32	2	19	2	2,41	0,86	2,41	0,86
36	2	19	2	2,48	0,86	2,48	0,86
42	2	19	2	2,57	0,86	2,57	0,86
54	3	19	2	2,26	0,79	2,26	0,79
38 + 22	3	19	2	2,22	0,79	2,22	0,79
42 + 20	3	19	2	2,18	0,79	2,18	0,79
66	3	19	2	2,34	0,79	2,34	0,79
78	3	19	2	2,40	0,79	2,40	0,79
96	4	19	2	2,46	0,79	2,46	0,79
100	4	19	2	2,47	0,79	2,47	0,79
18	1	37	3	2,70	1,09	2,70	1,09
24	1	37	3	2,91	1,09	2,91	1,09
72	3	37	3	2,43	0,96	2,43	0,96
54 + 66	4	37	3	2,32	0,86	2,32	0,86
150	5	37	3	2,38	0,86	2,38	0,86

* Number of layers of each type of wire, not including the centre wire.

5.8 Grease

5.8.1 Whenever a greased conductor is specified, the grease shall meet the requirements of EN 50326 and shall be applied before the closing die.

5.8.2 Greases with different designations or from different manufacturers shall not be mixed within a length of conductor.

5.8.3 The mass of grease shall not vary by more than ±20 % from the calculated value obtained using the method described in annex B.

5.9 Conductor rated tensile strength

5.9.1 The rated tensile strength of a homogeneous aluminium or aluminium clad steel conductor shall be taken as the sum of the minimum tensile strength of all the wires as defined in 5.9.3.

5.9.2 The rated tensile strength of composite ALx/STyz or ALx/yzSA conductors shall be the sum of the minimum tensile strength of the aluminium portion plus the minimum tensile strength of steel (zinc coated or aluminium clad) corresponding to an elongation compatible with that of aluminium at rupture load. For purpose of specification and practicability, this strength is taken as the tensile stress corresponding to 1 % elongation in a 250 mm gauge length before stranding.

5.9.3 The minimum tensile strength of any single wire is the product of its nominal area and the appropriate minimum stress given in the standards referenced in clause 2.

5.10 Nominal d.c. resistance

The nominal d.c. resistance at 20 °C of a conductor, expressed in Ω/km to three significant figures, is based on the resistivity value for calculation purposes and on the nominal diameter of the aluminium and aluminium clad steel wires referenced in clause 2, increased by the increments in Table 4 of this standard. For ALx/yzSA and yzSA conductors the Tables in annex F give two resistance values, a value calculated using both the aluminium and steel portions of the aluminium clad steel wires, and a value calculated using the aluminium portion only.

6 Tests

6.1 Classification of tests

Type tests are intended to verify the main characteristics of a conductor which depend mainly on its design. These tests are normally performed only once for a given conductor construction.

Sample tests are intended to guarantee the quality of conductors and compliance with the requirements of this standard.

Both type and sample tests are listed in Table 5.

Table 5 — Type and sample tests for conductors

		Type test	Sample test	Clause
Conductor	- surface condition	x	x	6.4.1
	- diameter	x	x	6.4.2
	- inertness	x	x	6.4.3
	- lay ratio and direction of lay	x	x	6.4.4
	- number and type of wires	x	x	6.4.5
	- mass per unit length	x	x	6.4.6
	- stress-strain curve	(1)	-	6.4.7
	- tensile breaking strength	(1)	-	6.4.8
	- stringing test	(1)	-	6.4.9
Aluminium wires	- diameter	x	x	6.5.2
	- tensile strength	x	x	6.5.2
	- elongation (2)	x	x	6.5.2
	- resistivity	x	x	6.5.2
	- wrapping test	x	x	6.5.2
	- welding	x	-	6.5.3
Zinc coated	- diameter	x	x	6.5.2
steel wires	- tensile strength	x	x	6.5.2
	- stress at 1 % extension	x	x	6.5.2
	- elongation or torsion test	x	x	6.5.2
	- wrapping test	x	x	6.5.2
	- mass of zinc	x	x	6.5.2
	- zinc dip test	x	x	6.5.2
	- adhesion of zinc coating	x	x	6.5.2
Aluminium-clad	- diameter	x	x	6.5.2
steel wires	- tensile strength	x	x	6.5.2
	- stress at 1 % extension	x	x	6.5.2
	- elongation	x	x	6.5.2
	- torsion	x	x	6.5.2
	- cladding thickness/uniformity	x	x	6.5.2
	- resistivity	x	x	6.5.2
Grease	- mass per unit length	x	x	6.6.1
	- drop point	x	x	6.6.2

(1) By agreement between the purchaser and manufacturer.

(2) Elongation test for AL1 is not required.

6.2 Sample size

When agreed by the manufacturer and the purchaser at the time of ordering, tests shall be carried out on a minimum of 10 % of the drums offered for inspection and, in such cases, each wire shall be tested. 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 manufacturer, to a level which ensures that each production lot of conductor is given adequate monitoring.

Drums to be sampled shall be selected at random, and samples taken from the outer end of the drums.

The length of the sample of conductor taken shall be sufficient to allow all tests to be performed on the same specimens of wire.

In order to check the grease, a sample of conductor shall be taken from one drum of each inspection lot.

6.3 Rounding rules

The following rounding rules shall be used for determination of compliance with this standard.

6.3.1 When the figure immediately after the last figure to be retained is less than 5, the last figure to be retained remains unchanged.

6.3.2 When the figure immediately after the last figure to be retained is greater than 5, or equal to 5 and followed by at least one figure other than zero, the last figure to be retained is increased by one.

6.3.3 When the figure immediately after the last figure to be retained is equal to 5 and followed by zeros only, the last figure to be retained remains unchanged if even and is increased by one if odd.

6.4 Properties of conductor

6.4.1 Surface condition

The surface of the conductor shall comply with the requirements of 5.3.

6.4.2 Conductor diameter

The conductor diameter shall be measured either:

(a) midway between the closing die and the capstan on the stranding machine; or

(b) at the middle of a portion of conductor, at least 3 m long and more than 5 m from either end of the conductor, under a tension of at least 2 % of the conductor rated tensile strength.

The diameter shall be the average of two readings, rounded to two decimals of a millimetre, taken at right angles to each other at the same location.

The value obtained shall comply with the requirement of 5.4.

6.4.3 Inertness

The requirement of 5.5.7 shall be met.

6.4.4 Lay ratio and direction of lay

The lay ratio of a given layer of the conductor shall be obtained by dividing the measured lay length by the diameter of the layer.

The values obtained shall comply with the requirements of 5.5. In addition the direction of each layer shall be noted and shall also comply with the requirements of 5.5.

6.4.5 Number and type of wires

The number and type of wires shall be confirmed as being in accordance with the conductor designation stated on the order.

6.4.6 Mass per unit length

The mass per unit length of a 1m sample of conductor shall be determined by using apparatus capable of achieving an accuracy of ±0,1 %. The value obtained shall comply with the requirement of 5.7.3.

6.4.7 Stress-strain curves

6.4.7.1 If the provision of stress-strain curves is agreed between the manufacturer and purchaser at the time of placing the order, the method described in annex C shall be used.

6.4.7.2 Stress-strain curves shall be supplied as a type test when requested by the purchaser and shall represent the best knowledge of the behaviour of the conductor under load.

6.4.8 Tensile breaking strength

6.4.8.1 The sample length, between end terminations, shall be at least 400 times the conductor diameter but not less than 10 m. A shorter length may be agreed between the manufacturer and purchaser.

6.4.8.2 The breaking strength of the conductor shall be determined by pulling a conductor in a suitable tensile testing machine having an accuracy of at least ±1 %. The rate of increase of load shall be as in C.6.8 of annex C.

6.4.8.3 At the request of the purchaser, an intermediate load may be held for a period during the test in order to allow tension fittings to be tested at the same time as the conductor.

6.4.8.4 The breaking strength of the conductor shall be determined by the load attained at which one or more wires of the conductor are fractured. The test shall be considered satisfactory if 95 % of the rated tensile strength is reached without the fracture of any wires. If fracture occurs within 5 cm of the end terminations before 95 % of the rated tensile strength has been reached, the fracture shall be deemed to have been caused by the end termination and the test shall be repeated. In this case, a change in the end terminations shall be considered. If a single wire fractures more than 5 cm from the end terminations before 95 % of the rated tensile strength has been reached, two re-tests shall be carried out on samples taken adjacent to the original sample. Both re-tested samples shall withstand 95 % of the rated tensile strength without the fracture of any wire.

6.4.9 Stringing test

Where the purchaser requires evidence that the conductor is capable of being installed using the purchaser's recommended installation method, this may be satisfied by a stringing test, an example of which is given in annex E. Alternative tests or evidence of satisfactory service experience may also be agreed.

6.5 Properties of wires after stranding

6.5.1 The specimen of wire shall be taken from the conductor sample and shall be removed from its position and straightened, care being taken not to stretch it in so doing.

6.5.2 The properties of the individual wires after stranding, including tests on the coating of steel wires, shall meet the requirements of the wire as specified in the standard referenced in clause 2 with the exceptions:

(a) permitted reductions in wire properties after stranding, given in Table 6, shall apply together with the following:

the reduction in tensile strength after stranding for ST6C wire, given in Table 6, shall apply to the mean value of a lot, which shall be interpreted as being the mean value of all the wires of a given material in the conductor;

(b) for wires where the mean of a lot is specified (AL4 and ST6C), 5 % of individual wire values may be below the minimum value for an individual wire for tensile strength before stranding, and above the maximum value for an individual wire for electrical resistivity

Table 6 — Permitted reductions in wire properties after stranding

Material	Reduction after stranding	
Aluminium (AL1)	Tensile strength:	5 %
Zinc coated steel (ST1A to ST6C) and	Stress at 1 % extension [1]:	5 %
Aluminium-clad steel (20SA to 40SA)	Tensile strength:	5 %
	Torsion:	subtract 2 turns
	Elongation [2]:	subtract 0,5
	Thickness of AL. cladding (SA wire):	25 % of minimum
Aluminium alloy (AL2 to AL7)	None	

[1] Measurements of stress at 1 % extension on steel wires other than the centre wire are unreliable. If these measurements are required to be made on wires other than the centre wire, then the minimum value may be agreed between the purchaser and the manufacturer.

[2] Example: A minimum elongation value of 3,0 % for wire before stranding is reduced to 2,5 % for wire after stranding.

6.5.3 Welding of aluminium wires

The manufacturer shall, if required by the purchaser, demonstrate that the method used for jointing aluminium wires meets the strength requirement of 5.6.5 by performing the tensile test in the relevant wire standard given in clause 2.

6.6 Properties of grease

6.6.1 Mass per unit length

Using apparatus capable of achieving an accuracy of ±0,1 %, the mass of grease in a 1 m sample of conductor shall be determined from the difference between the mass of the conductor with grease and its mass after removing the grease with the aid of a suitable solvent. The mass of grease shall comply with the requirement of 5.8.3.

6.6.2 Drop point

A sample of grease removed from the conductor shall meet the drop point requirement of EN 50326, without preconditioning, after allowing for a reduction of 5 °C due to the sampling process.

6.7 Inspection

6.7.1 All tests and inspection shall be made at the manufacturer's plant prior to shipment unless otherwise agreed between the manufacturer and the purchaser at the time of placing the order and shall be so conducted as not to interfere unnecessarily with the manufacturer's operations. The manufacturer shall afford the inspector, representing the purchaser, sufficient testing facilities in order to satisfy him that the material is being furnished in accordance with this standard.

6.7.2 When inspection is to be made by the purchaser before shipment, the tests shall all be made within 14 days after receipt of a notice by the purchaser that the material is ready to test, and the material shall be accepted or rejected at the manufacturer's plant. If the purchaser does not have a representative present at the manufacturer's plant to test the material at the expiry of the said 14 days, the manufacturer shall make the tests herein provided for and furnish to the purchaser, when requested, official copies of the results of such tests, and the purchaser shall accept or reject the material in accordance with the results of such tests. Alternatively, the manufacturer may provide relevant test results if these have already been carried out during production.

6.8 Acceptance or rejection

6.8.1 Failure of a test specimen to comply with any one of the requirements of this standard shall constitute grounds for rejection of the lot represented by the specimen.

6.8.2 If any lot is so rejected, the manufacturer shall have the right to test, only once, all individual drums of conductor in the lot and submit those which meet the requirements for acceptance. Only those tests which do not meet the requirements for acceptance on the original specimen shall be carried out.

7 Packaging and marking

7.1 Packaging

The conductor shall be suitably protected against damage or deterioration which could occur in ordinary handling and shipping.

The following shall be agreed upon between the manufacturer and the purchaser at the time of placing the order or at the earliest possible time:

(a) the type and size of package and method of packing;

(b) the packaging size and drum bore requirements and also the availability of the inner end of the conductor for grounding purposes, where the conductor stringing practices require special consideration.

7.2 Marking and tare

The gross, net and tare weight, length (or length and number of conductors, if more than one length is agreed upon to be supplied on the same drum), designation, and any other necessary identification shall be suitably marked inside the package. This same information, together with the purchase order number, the manufacturer's serial number (if any) and all shipping marks and other information shall appear on the outside of each package.

7.3 Random lengths

Unless otherwise agreed between the purchaser and manufacturer, random lengths of conductors unavoidably obtained during production should not exceed 5 % of the purchased quantity providing that no piece is less than 50 % of the contractual length.

7.4 Accuracy of lengths

The manufacturer shall use equipment to measure the length to an accuracy of ±1 %.

7.5 Drum barrel dimensions

The diameter of the drum barrel shall be sufficiently large not to cause problems during subsequent use of the conductor. The experience of some countries is that this value should be at least thirty times the conductor diameter or sixty times the steel core diameter, whichever is the greater.

8 Information to be clarified by the purchaser and manufacturer

When making an enquiry or placing an order the following information shall be clarified between the purchaser and manufacturer:

a) quantity of conductor;

b) conductor designation and number of wires of each type;

c) length of conductor per drum, its tolerance, and where applicable, matching of conductor lengths;

d) direction of lay. If this information is omitted, the direction of the external lay shall be right-hand;

e) requirements for grease (designation according to EN 50326 and nominal mass according to annex B), if any;

f) type and size of package and method of packing;

g) special packaging requirements, if any;

h) lagging requirements, if any;

i) whether tests on wires after stranding are required;

j) nominal conductor diameter and method of measurement;

k) whether conductor breaking strength tests are required;

l) whether conductor stress-strain tests are required;

m) recommended or specified installation methods, or purchaser requirements for tests designed to demonstrate capability for satisfactory installation;

n) if inspection is required and place of inspection;

o) special requirements, for example any special national conditions (see annex A) which may apply.

NOTE This list is given for guidance only, and may not be complete.

Annex A
(normative)

Special national conditions

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions. If it affects harmonization, it forms part of the European Standard or Harmonization Document.

For the countries in which the relevant special national apply these provisions are normative, for other countries they are informative.

Clause	Special national condition
1	**Norway, Sweden** Conductors outside the scope of this European Standard may be used. These conductors are specified in Svensk Standards SS 4240811, SS 4240812, SS 4240813 and SS 4240814.
5.5.7	**Norway, Sweden** This requirement shall not apply.
5.6.2 and **5.6.4**	**France** Joints are not permitted in the outer layer of conductors of type AL4.
5.6.4	**France** Joints made by cold pressure welding should be annealed. The tensile strength of a joint in aluminium of type AL4 shall be not less than 130 N/mm^2 and not more than 205 N/mm^2.

Annex B
(normative)

Calculation of nominal mass of grease for stranded conductors

B.1 When it is required for bare conductors to be greased in order to reduce the risk of corrosion in some environments, the mass of grease shall be calculated using the methods given in this annex.

B.2 Four cases of grease application are as follows.

Case 1: Steel core only greased [Figure B.1(a)].

Case 2: All the conductor is greased except the outer layer [Figure B.1(b)].

Case 3: All the conductor is greased including the outer layer [Figure B.1(c)].

Case 4: All the conductor is greased except the outer surface of the wires in the outer layer [Figure B.1(d)].

Other cases may be specified by the purchaser.

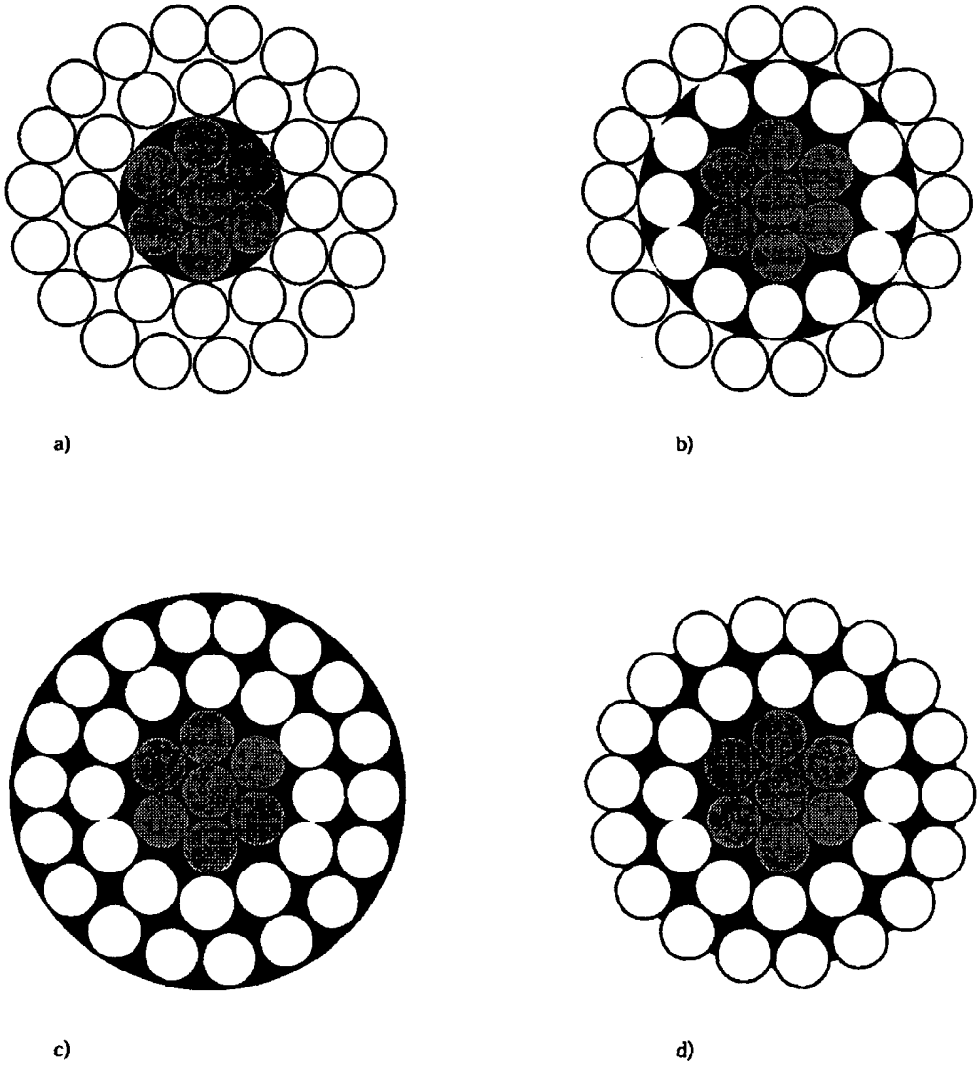


Figure B.1 — Application of grease to bare conductors

B.3 Assuming the grease completely fills the voids between the wires, the volume of grease in any given conductor shall be calculated from the following equations:

Case 1: $V_g = 0{,}25\ \pi\ (D_s^2 - n_s d_s^2)$

Case 2: $V_g = 0{,}25\ \pi\ \{\ (D_o - 2d_a)^2 - (n_a - n_o)\ d_a^2 - n_s d_s^2\ \}$

Case 3: $V_g = 0{,}25\ \pi\ (D_o^2 - n_a d_a^2 - n_s d_s^2)$

Case 4: $V_g = 0{,}125\ n_o\ (D_o - d_a)^2 \sin(360/n_o) - 0{,}125\ \pi\ (2n_a - n_o - 2) d_a^2 - 0{,}25\ \pi\ n_s d_s^2$

where:

V_g is the volume of grease, per unit length, in the conductor;

D_o is the external diameter of the conductor;

D_s is the diameter of the steel core;

d_a is the diameter of the aluminium wire in the outer layer;

d_s is the diameter of the steel wire;

n_a is the number of aluminium wires in the conductor;

n_o is the number of wires in the outer layer;

n_s is the number of steel wires in the conductor.

Since there is a geometric relationship between the parameters of these equations, it is possible to express the total mass of grease in a conductor with the following relation:

$$M_g = k\ d_a^2$$

where:

M_g is the mass of grease (kg/km);

k is a factor which depends on the conductor stranding and the grease density and the fill factor (ratio of theoretical volume).

Values of k are given in Table B.1 for the four cases of grease application, a grease density of 0,87g/cm^3, and a fill factor of 0,8.

Table B.1 — Coefficients k for mass of grease

Stranding		k_1	k_2	k_3	k_4
Aluminium	Steel	Case 1	Case 2	Case 3	Case 4
7	-	-	-	1,09	0,17
19	-	-	1,09	3,28	1,79
37	-	-	3,28	6,56	4,52
61	-	-	6,56	10,93	8,35
91	-	-	10,93	16,40	13,27
127	-	-	16,40	22,96	19,28
6	1	-	-	1,09	0,17
8	1	-	-	1,46	0,34
18	1	-	1,09	3,28	1,79
9	3	0,90	-	2,88	1,46
6	7	0,12	-	1,21	0,29
10	7	0,66	-	2,48	1,18
12	7	1,09	-	3,28	1,79
14	7	1,63	-	4,18	2,51
18	7	0,12	1,21	3,40	1,91
22	7	0,34	1,80	4,35	2,67
24	7	0,49	2,13	4,86	3,10
26	7	0,66	2,48	5,40	3,54
28	7	0,86	2,87	5,97	4,02
30	7	1,09	3,28	6,56	4,52
32	7	1,35	3,72	7,18	5,05
36	7	1,94	4,68	8,50	6,19
42	7	0,34	4,35	7,99	5,77
45	7	0,49	4,86	8,69	6,37
48	7	0,66	5,40	9,41	7,01
54	7	1,09	6,56	10,93	8,35
72	7	0,49	8,69	13,61	10,75
84	7	1,09	10,93	16,40	13,27
14	19	1,76	-	4,31	2,64
15	19	2,10	-	4,83	3,07
16	19	2,46	-	5,38	3,52
18	19	3,28	-	6,56	4,52
30	19	1,18	3,37	6,65	4,61
32	19	1,46	3,83	7,29	5,16
36	19	2,10	4,83	8,66	6,35
42	19	3,28	6,56	10,93	8,35
54	19	1,18	6,65	11,02	8,44
38 + 22	19	1,42	5,42	9,43	7,03
42 + 20	19	1,30	4,33	7,98	5,76
66	19	2,46	9,39	14,49	11,54
78	19	4,21	12,59	18,43	15,11
96	19	2,10	13,58	19,59	16,19
100	19	2,46	14,49	20,68	17,19
18	37	3,35	-	6,63	4,59
24	37	6,56	-	10,93	8,35
72	37	3,35	11,00	16,47	13,33
54 + 66	37	4,39	16,44	23,00	19,33
150	37	3,35	23,03	30,68	26,45

Annex C
(normative)

Stress-strain test method
(test to be performed if required by the purchaser)

C.1 Sample length

The sample length, between end terminations, shall be at least 400 times the conductor diameter but not less than 10 m. A shorter length may be agreed between the manufacturer and purchaser. The gauge length shall be a minimum of 100 times the conductor diameter.

C.2 Test temperature

Temperature readings shall be taken at the beginning and end of each hold period. If the temperature varies by more than 2 °C from that at the commencement of the test then allowance for the thermal expansion of the conductor shall be made.

C.3 Sample preparation

Great care shall be taken in the preparation of test samples. Relative displacements as small as 1 mm between the steel core and the aluminium layers of the conductor cause significant changes in the measured stress-strain curves. The sample preparation shall be as follows.

C.3.1 Before removing the sample from the drum, fit a bolted clamp 5 m ± 1 m from the end of the conductor length. The clamp shall apply sufficient pressure to prevent relative wire movements in the conductor.

C.3.2 Unwind the desired length of conductor from the drum and install another bolted clamp at the required distance from the first clamp. Apply adhesive tape and cut the conductor at a distance from the clamp just far enough to allow room for applying dead-end fittings.

C.3.3 During transportation to the test laboratory, the sample shall be properly protected from damage. The diameter of the coil or drum of conductor shall be at least 50 times the conductor diameter.

C.3.4 End fittings such as compression, epoxy type or solder type approved by the purchaser shall be used for stress-strain tests. The wires shall not be unwound, cleaned or greased prior to application of the end fittings.

C.3.5 Care shall be taken not to damage any wire during the end preparation of the sample.

C.3.6 The application of the end fitting shall not induce any slack in the wires which might alter the stress-strain curves of the conductor.

C.4 Requirements for compression fittings

When compression fittings are used for ALx/STyz conductors, the method indicated in C.4.1, C.4.2 and C.4.3 shall be followed.

C.4.1 Slide the aluminium sleeve on to the conductor. Cut back the aluminium wires to allow room for the steel terminal, the extrusion of the steel terminal and the extrusion of the aluminium wires by the aluminium compression sleeve. The space required between the aluminium wires and the steel terminal, before crimping, is typically 30 mm to 40 mm. Slide the compression steel dead-end terminal on to the steel core. Crimp the steel terminal, with a 2 % to 10 % maximum overlap, starting from the outer core end.

C.4.2 Pull the aluminium sleeve on to the steel terminal. Leave 40 mm of space if the conductor diameter is less than or equal to 30 mm and 50 mm of space if the conductor diameter is greater than 30 mm, between the end of the aluminium sleeve and the shoulder of the steel terminal for extrusion. Make the first crimp on the tapered mouth of the aluminium sleeve.

This locks the sleeve in place and inhibits extrusion of aluminium towards the test span. Proceed to crimp in the direction away from the span in small bites of 20 % on uncompressed metal.

Stop crimping before the filler hole in the sleeve is reached; the steel terminal and core are too small to support the crimped aluminium sleeve in this region. Continue towards the eye, on the other side of the terminal pad to lock the sleeve on to the expanded portion of the steel terminal.

C.4.3 The aluminium sleeve shall be oriented so that there is no interference with conductor movement during the test.

C.5 Test set-up

C.5.1 The test sample shall be supported in a trough over its full length, and the trough adjusted so that the conductor will not lift by more than 10 mm when under tension. This shall be ascertained by measurement rather than by tensioning the conductor.

C.5.2 The conductor strain shall be evaluated from the measured displacements at the two ends of the gauge length of the conductor. The gauge reference targets shall be attached to the bolted clamps which lock the conductor wires together. Target plates may be used with dial gauges or displacement transducers and care shall be taken to position the plates perpendicular to the conductor.

NOTE Twisting the conductor, lifting it and moving it from side to side by the maximum amounts expected during the test should introduce no more than 0,3 mm error in the reading.

C.6 Test loads for the conductor

The loading conditions for stress-strain tests for conductors shall be as follows:

C.6.1 Load initially to 5 % of RTS (rated tensile strength) to straighten the conductor and set the strain gauges to zero.

C.6.2 For non-continuous stress-strain data recordings, take the strain readings at intervals of 2,5 % RTS, rounded to the nearest kN, during both loading and unloading.

C.6.3 Load to 30 % RTS and hold for 0,5 h. Take readings after 5 min, 10 min, 15 min, and 30 min during the hold period. Release to the initial load.

C.6.4 Re-load to 50 % RTS and hold for 1 h. Take readings after 5 min, 10 min, 15 min, 30 min, 45 min and 60 min during the hold period. Release to the initial load.

C.6.5 Re-load to 70 % RTS and hold for 1 h. Take readings after 5 min, 10 min, 15 min, 30 min, 45 min and 60 min. Release to the initial load.

C.6.6 Re-load to 85 % RTS and hold for 1 h. Take readings after 5 min, 10 min, 15 min, 30 min, 45 min and 60 min. Release to the initial load.

C.6.7 After the fourth application of load, again apply tension, increasing uniformly, until the actual breaking strength is reached. Simultaneous readings of tension and elongation shall be taken up to 85 % RTS at least at the same time intervals as for the previous loading.

C.6.8 The rate of application of loads shall be uniform during testing. The time required to reach 30 % RTS shall not be less than one minute nor more than two minutes. The same rate of loading shall thereafter be maintained throughout the tests.

C.7 Test loads for steel core only

The loading conditions for stress-strain tests of the steel core of ALx/STyz, ALx/yzSA, or yzSA conductors shall be as follows.

C.7.1 The test shall consist of successive application of load applied in a manner similar to that for the conductor at 30 %, 50 %, 70 % and 85 % RTS of the steel core.

C.7.2 The steel core shall be loaded until the elongation at the beginning of each hold period corresponds to that obtained on the conductor at 30 %, 50 %, 70 % and 85 % RTS of the steel core, respectively.

C.8 Stress / strain curve

The data shall be presented graphically.

Obtain the characteristic initial stress-strain curve by drawing a smooth line through the strain point after 0,5 h at 30 % RTS, and the strain points after 1h at 50 %, 70 % and 85 % RTS. Adjust the curve to pass through zero.

The characteristic final stress-strain curve shall be determined from the unloading (from 50 %, 70 % and/or 85 % RTS) portions of the graph as agreed between the manufacturer and purchaser.

All measurement data and the characteristic curves shall be submitted to the purchaser.

Annex D
(informative)

Lay ratios used for calculation of increments due to stranding in Table 4

Table D.1 — Lay ratios used for calculation of increments due to stranding in Table 4

Aluminium wires		Steel wires		Lay ratio							
No.	Layers	No.	Layers	1	2	3	4	5	6	7	8
7	1	-	-	13	-	-	-	-	-	-	-
19	2	-	-	15	12	-	-	-	-	-	-
37	3	-	-	15	13,5	11,5	-	-	-	-	-
61	4	-	-	15	13,5	12,5	11	-	-	-	-
91	5	-	-	15	13,5	12,5	11	10,5	-	-	-
127	6	-	-	15	14,5	13,5	12	11,5	10,5	-	-
6	1	1	-	12,5	-	-	-	-	-	-	-
8	1	1	-	12,5	-	-	-	-	-	-	-
18	2	1	-	14	12	-	-	-	-	-	-
9	1	3	1	19	12	-	-	-	-	-	-
6	1	7	1	19	12	-	-	-	-	-	-
10	1	7	1	19	12	-	-	-	-	-	-
12	1	7	1	19	12	-	-	-	-	-	-
14	1	7	1	19	12	-	-	-	-	-	-
18	2	7	1	19	14	11,5	-	-	-	-	-
22	2	7	1	19	14	11,5	-	-	-	-	-
24	2	7	1	19	14	11,5	-	-	-	-	-
26	2	7	1	19	14	11,5	-	-	-	-	-
28	2	7	1	19	14	11,5	-	-	-	-	-
30	2	7	1	19	14	11,5	-	-	-	-	-
32	2	7	1	19	14	11,5	-	-	-	-	-
36	2	7	1	19	14	11,5	-	-	-	-	-
42	3	7	1	19	15	13	11,5	-	-	-	-
45	3	7	1	19	15	13	11,5	-	-	-	-
48	3	7	1	19	15	13	11,5	-	-	-	-
54	3	7	1	19	15	13	11,5	-	-	-	-
72	4	7	1	19	15,5	13,5	12	11,5	-	-	-
84	4	7	1	19	15,5	13,5	12	11,5	-	-	-
14	1	19	2	20	17,5	11,5	-	-	-	-	-
15	1	19	2	20	17,5	11,5	-	-	-	-	-
16	1	19	2	20	17,5	11,5	-	-	-	-	-
18	1	19	2	20	17,5	11,5	-	-	-	-	-
30	2	19	2	20	17	13	11,5	-	-	-	-
32	2	19	2	20	17	13	11,5	-	-	-	-
36	2	19	2	20	17	13	11,5	-	-	-	-
42	2	19	2	20	17	13	11,5	-	-	-	-
54	3	19	2	20	18	15	13,5	11,5	-	-	-
38+22	3	19	2	20	18	15	13,5	11,5	-	-	-
42+20	3	19	2	20	18	15	13,5	11,5	-	-	-
66	3	19	2	20	18	15	13,5	11,5	-	-	-
78	3	19	2	20	18	15	13,5	11,5	-	-	-
96	4	19	2	20	18	15	13,5	12,5	11,5	-	-
100	4	19	2	20	18	15	13,5	12,5	11,5	-	-
18	1	37	3	20	18	16	11,5	-	-	-	-
24	1	37	3	20	18	16	11,5	-	-	-	-
72	3	37	3	22	19	17	15	13	11,5	-	-
54+66	4	37	3	24	20	18	16,5	15	12,5	11,5	-
150	5	37	3	24	20	18	16,5	15	14	12,5	11,5

NOTE For more accurate calculations, measured values may be used.

Annex E
(normative)

Test for ability of a conductor to be erected using tension stringing
(test to be performed if required by the purchaser)

E.1 Introduction

This test is intended to simulate the tensions existing during tension stringing and to verify, in particular, the absence of bird-caging, which is the opening up of individual wires by an unacceptable amount.

E.2 Procedure

E.2.1 Test set-up: the test arrangement is given in Figure E.1.

Drum holder: the drum shall be installed on an unwinding drum holder equipped with an adjustable disc brake which is not under automatic control from the tensioner. The conductor shall unwind from the top of the drum.

Tensioner: one of the characteristics of the tensioner bull wheels is the maximum conductor diameter, D_M, which is recommended for use. The tensioner to be used for this test shall have a D_M value as close as possible to the diameter of the conductor being tested (preferably, the tensioner to be used shall have polychloroprene coated grooves).

The tensioner shall be installed 15 m from the drum.

Figure E.2 gives the input direction of the conductor in the tensioner grooves. The horizontal input angle shall be set at 5° maximum. The drum shall be staggered with respect to the tensioner on the side where the conductor enters the top of the tensioner (right-hand side for the left-hand lay, left-hand side for the right-hand lay).

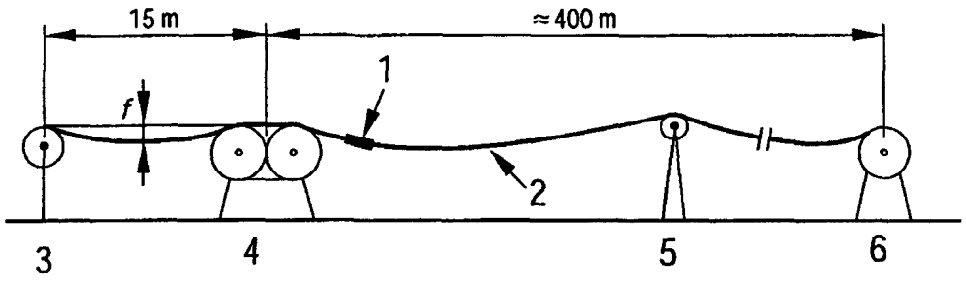
Conductor pulling winch: the winch shall be 400 m from the tensioner and the conductor pulled by means of a pilot cable (attached to the conductor with a suitable grip and a swivel).

Block: a running block, selected by the purchaser, shall be installed at mid-distance between the pulling winch and the tensioner at adequate height, so that the conductor does not touch the ground during unwinding.

E.2.2 Unwinding: during unwinding, a mid-span sag, f, of approximately 1,5 m, shall be maintained in the part of the conductor between the drum and the tensioner. Very sudden changes of the tension shall be avoided in this part. The tension at the output of the tensioner shall be maintained at 20 % of the RTS of the conductor under test, and the unwinding speed shall be approximately 1 m/s.

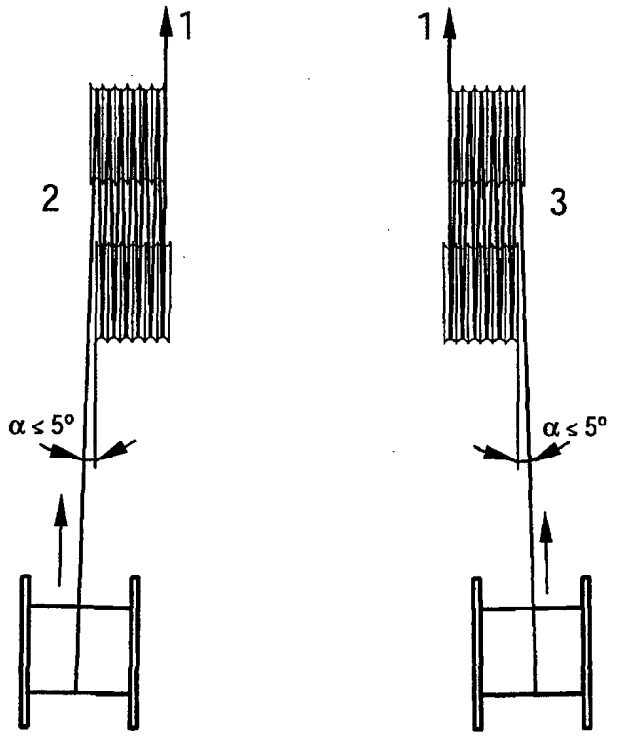
E.3 Acceptance criterion

During the unwinding of the conductor length, observation shall be made and if an individual outer layer wire is raised above the normal position of that wire by more than one wire diameter the conductor shall deemed unacceptable. Additional acceptance criteria may be specified by the purchaser.



1 Woven grip
2 Pilot cable
3 Drum holder
4 Tensioner
5 Block
6 Pulling winch

Figure E.1 — Test arrangement



1 Pulling towards the winch
2 Right-hand cable lay
3 Left-hand cable lay

Figure E.2 — Drum holder and tensioner set-up

Annex F
(informative)

Conductors in frequent use in some member countries

F.1 Tables F.1 to F.48 give details of the conductors which are in common use in the member countries mentioned, together with their properties calculated according to this standard, at the time of publication of this standard.

F.2 Although aluminium is defined in this standard to include aluminium alloy, the titles of the Tables in this annex differentiate between aluminium (AL1) and aluminium alloy (AL2 to AL7) to avoid the possibility of confusion.

Table F.1 — Characteristics of aluminium conductors used in Austria — type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
				Wire	Cond.						
		mm^2		mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	A
24-AL1	25	24,2	7	2,10	6,30	66,3	4,36	1,178 7	60 000	2,3E-05	144
34-AL1	35	34,4	7	2,50	7,50	93,9	6,01	0,831 7	60 000	2,3E-05	180
49-AL1	50	49,5	7	3,00	9,00	135,2	8,41	0,577 6	60 000	2,3E-05	225
66-AL1	70	65,8	19	2,10	10,5	180,9	11,85	0,436 7	57 000	2,3E-05	270
93-AL1	95	93,3	19	2,50	12,5	256,3	16,32	0,308 1	57 000	2,3E-05	340
117-AL1	120	117,0	19	2,80	14,0	321,5	19,89	0,245 6	57 000	2,3E-05	390
147-AL1	150	147,1	37	2,25	15,8	405,7	26,48	0,196 0	57 000	2,3E-05	455
182-AL1	185	181,6	37	2,50	17,5	500,9	31,78	0,158 8	57 000	2,3E-05	520
243-AL1	240	242,5	61	2,25	20,3	671,1	43,66	0,119 3	55 000	2,3E-05	625
299-AL1	300	299,4	61	2,50	22,5	828,5	52,40	0,096 6	55 000	2,3E-05	710
400-AL1	400	400,1	61	2,89	26,0	1 107,1	68,02	0,072 3	55 000	2,3E-05	855
452-AL1	450	451,5	61	3,07	27,6	1 249,3	74,50	0,064 1	55 000	2,3E-05	925
500-AL1	500	499,8	61	3,23	29,1	1 382,9	82,47	0,057 9	55 000	2,3E-05	990
626-AL1	625	626,2	91	2,96	32,6	1 739,7	106,45	0,046 4	55 000	2,3E-05	1 140
802-AL1	800	802,1	91	3,35	36,9	2 228,3	132,34	0,036 2	55 000	2,3E-05	1 340
1000-AL1	1000	999,7	91	3,74	41,1	2 777,3	159,95	0,029 1	55 000	2,3E-05	1 540

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion of the conductor sizes listed in the table are used in Austria.
Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Austria, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.2 — Characteristics of aluminium alloy conductors used in Austria — type AL3

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
				Wire	Cond.						
		mm^2		mm	mm	Kg/km	kN	Ω/km	N/mm^2	1/K	A
24-AL3	25	24,2	7	2,10	6,30	66,2	7,15	1,356 6	60 000	2,3E-05	135
34-AL3	35	34,4	7	2,50	7,50	93,8	10,14	0,957 2	60 000	2,3E-05	169
49-AL3	50	49,5	7	3,00	9,00	135,1	14,60	0,664 7	60 000	2,3E-05	210
66-AL3	70	65,8	19	2,10	10,5	180,7	19,41	0,502 6	57 000	2,3E-05	255
93-AL3	95	93,3	19	2,50	12,5	256,0	27,51	0,354 6	57 000	2,3E-05	320
117-AL3	120	117,0	19	2,80	14,0	321,2	34,51	0,282 7	57 000	2,3E-05	365
147-AL3	150	147,1	37	2,25	15,8	405,3	43,40	0,225 6	57 000	2,3E-05	425
182-AL3	185	181,6	37	2,50	17,5	500,3	53,58	0,182 7	57 000	2,3E-05	490
243-AL3	240	242,5	61	2,25	20,3	670,3	71,55	0,137 3	55 000	2,3E-05	585
299-AL3	300	299,4	61	2,50	22,5	827,5	88,33	0,111 2	55 000	2,3E-05	670
400-AL3	400	400,1	61	2,89	26,0	1 105,9	118,04	0,083 2	55 000	2,3E-05	810
452-AL3	450	451,5	61	3,07	27,6	1 247,9	133,20	0,073 7	55 000	2,3E-05	870
500-AL3	500	499,8	61	3,23	29,1	1 381,4	147,45	0,066 6	55 000	2,3E-05	930
626-AL3	625	626,2	91	2,96	32,6	1 737,7	184,73	0,053 4	55 000	2,3E-05	1 075
802-AL3	800	802,1	91	3,35	36,9	2 225,8	236,62	0,041 7	55 000	2,3E-05	1 255
1000-AL3	1000	999,7	91	3,74	41,1	2 774,3	294,91	0,033 4	55 000	2,3E-05	1 450

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion of the conductor sizes listed in the table are used in Austria.
Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Austria, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.3 — Characteristics of aluminium conductors steel reinforced used in Austria — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm²	mm²	mm²	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km	N/mm²	1/K	A
34-AL1/6-ST1A	35/6	34,4	5,73	40,1	6	1	2,70	2,70	2,70	8,1	138,7	12,37	0,834 2	81 000	1,92E-05	180
48-AL1/8-ST1A	50/8	48,3	8,04	56,3	6	1	3,20	3,20	3,20	9,6	194,8	16,81	0,593 9	81 000	1,92E-05	220
70-AL1/11-ST1A	70/12	69,9	11,4	81,3	26	7	1,85	1,44	4,32	11,7	282,2	26,27	0,413 2	77 000	1,92E-05	290
94-AL1/22-ST1A	94/22	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,5	43,17	0,306 7	82 000	1,92E-05	350
94-AL1/15-ST1A	95/15	94,4	15,3	109,7	26	7	2,15	1,67	5,01	13,6	380,6	34,93	0,306 0	77 000	1,92E-05	350
97-AL1/34-ST1A	95/34	96,8	34,4	131,1	36	7	1,85	2,50	7,50	14,9	536,5	57,07	0,299 0	90 000	1,92E-05	360
122-AL1/20-ST1A	120/20	121,6	19,8	141,4	26	7	2,44	1,90	5,70	15,5	491,0	44,50	0,237 6	77 000	1,92E-05	410
119-AL1/42-ST1A	120/42	118,8	41,6	160,4	36	7	2,05	2,75	8,25	16,5	653,9	68,79	0,243 5	90 000	1,92E-05	415
128-AL1/30-ST1A	125/30	127,9	29,8	157,8	30	7	2,33	2,33	6,99	16,3	587,0	56,41	0,226 0	82 000	1,92E-05	425
149-AL1/24-ST1A	150/25	148,9	24,2	173,1	26	7	2,70	2,10	6,30	17,1	600,8	53,67	0,194 0	77 000	1,92E-05	470
150-AL1/53-ST1A	150/53	149,6	52,8	202,4	36	7	2,30	3,10	9,30	18,5	827,1	84,29	0,193 4	90 000	1,92E-05	480
172-AL1/40-ST1A	170/40	171,8	40,1	211,8	30	7	2,70	2,70	8,10	18,9	788,2	74,89	0,168 3	82 000	1,92E-05	515
184-AL1/30-ST1A	185/30	183,8	29,8	213,6	26	7	3,00	2,33	6,99	19,0	741,0	65,27	0,157 1	77 000	1,92E-05	535
209-AL1/34-ST1A	210/35	209,1	34,1	243,2	26	7	3,20	2,49	7,47	20,3	844,1	73,36	0,138 1	77 000	1,92E-05	590
212-AL1/49-ST1A	210/50	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	92,46	0,136 3	82 000	1,92E-05	610
243-AL1/39-ST1A	240/40	243,1	39,5	282,5	26	7	3,45	2,68	8,04	21,8	980,1	85,12	0,118 8	77 000	1,92E-05	640
238-AL1/82-ST1A	240/80	237,8	82,4	320,2	36	19	2,90	2,35	11,8	23,4	1 305,3	134,37	0,121 8	99 890	1,92E-05	645
257-AL1/60-ST1A	257/60	256,6	59,9	316,5	30	7	3,30	3,30	9,90	23,1	1 177,5	108,20	0,112 6	82 000	1,92E-05	665
304-AL1/49-ST1A	300/50	304,3	49,5	353,7	26	7	3,86	3,00	9,00	24,4	1 227,3	105,09	0,094 9	77 000	1,92E-05	740
341-AL1/109-ST1A	340/110	341,2	108,8	450,0	78	19	2,36	2,70	13,5	27,7	1 797,4	183,73	0,084 8	84 000	1,92E-05	800
382-AL1/49-ST1A	380/50	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 442,5	121,30	0,075 8	70 000	1,92E-05	840
449-AL1/39-ST1A	450/40	448,7	39,5	488,2	48	7	3,45	2,68	8,04	28,7	1 549,1	119,05	0,064 4	62 000	1,92E-05	920
562-AL1/49-ST1A	560/50	561,7	49,5	611,2	48	7	3,86	3,00	9,00	32,2	1 939,5	146,28	0,051 5	62 000	1,92E-05	1 040
635-AL1/117-ST1A	635/117	634,7	117,0	751,7	38+22	19	3,25/4,30	2,80	14,0	35,6	2 671,2	236,50	0,045 5	84 120	1,92E-05	1 106
679-AL1/86-ST1A	680/85	678,6	86,0	764,5	54	19	4,00	2,40	12,0	36,0	2 549,7	206,56	0,042 6	68 000	1,92E-05	1 150
1288-AL1/183-ST1A	1280/183	1288,2	182,8	1 471,1	100	19	4,05	3,50	17,5	49,9	5 001,6	407,20	0,022 5	79 260	1,92E-05	1 780

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion of the conductor sizes listed in the table are used in Austria. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Austria, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.4 — Characteristics of aluminium alloy conductors steel reinforced used in Austria — Type AL3/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	KN	Ω/km	N/mm^2	1/K	A
34-AL3/6-ST1A	35/6	34,4	5,73	40,1	6	1	2,70	2,70	2,70	8,10	138,6	16,66	0,960 1	81 000	1,92E-05	170
48-AL3/8-ST1A	50/8	48,3	8,04	56,3	6	1	3,20	3,20	3,20	9,60	194,7	23,08	0,683 5	81 000	1,92E-05	205
70-AL3/11-ST1A	70/12	69,9	11,4	81,3	26	7	1,85	1,44	4,32	11,7	282,0	33,96	0,475 6	77 000	1,89E-05	270
94-AL3/22-ST1A	94/22	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,2	53,53	0,353 0	82 000	1,78E-05	330
94-AL3/15-ST1A	95/15	94,4	15,3	109,7	26	7	2,15	1,67	5,01	13,6	380,3	45,79	0,352 1	77 000	1,89E-05	330
97-AL3/34-ST1A	95/34	96,8	34,4	131,1	36	7	1,85	2,50	7,50	14,9	536,2	67,72	0,344 1	90 000	1,67E-05	335
122-AL3/20-ST1A	120/20	121,6	19,8	141,4	26	7	2,44	1,90	5,70	15,5	490,6	59,09	0,273 4	77 000	1,89E-05	385
119-AL3/42-ST1A	120/42	118,8	41,6	160,4	36	7	2,05	2,75	8,25	16,5	653,6	82,45	0,280 3	90 000	1,67E-05	390
128-AL3/30-ST1A	125/30	127,9	29,8	157,8	30	7	2,33	2,33	6,99	16,3	586,6	71,76	0,260 1	82 000	1,78E-05	400
149-AL3/24-ST1A	150/25	148,9	24,2	173,1	26	7	2,70	2,10	6,30	17,1	600,3	72,28	0,223 3	77 000	1,89E-05	440
150-AL3/53-ST1A	150/53	149,6	52,8	202,4	36	7	2,30	3,10	9,30	18,5	826,6	102,24	0,222 6	90 000	1,67E-05	450
172-AL3/40-ST1A	170/40	171,8	40,1	211,8	30	7	2,70	2,70	8,10	18,9	787,7	96,36	0,193 7	82 000	1,78E-05	485
184-AL3/30-ST1A	185/30	183,8	29,8	213,6	26	7	3,00	2,33	6,99	19,0	740,4	88,24	0,180 9	77 000	1,89E-05	500
209-AL3/34-ST1A	210/35	209,1	34,1	243,2	26	7	3,20	2,49	7,47	20,3	843,5	100,54	0,159 0	77 000	1,89E-05	550
212-AL3/49-ST1A	210/50	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	972,5	118,96	0,156 9	82 000	1,78E-05	575
243-AL3/39-ST1A	240/40	243,1	39,5	282,5	26	7	3,45	2,68	8,04	21,8	979,4	116,72	0,136 8	77 000	1,89E-05	605
238-AL3/82-ST1A	240/80	237,8	82,4	320,2	36	19	2,90	2,35	11,8	23,4	1 304,6	164,09	0,140 2	99 890	1,64E-05	607
257-AL3/60-ST1A	257/60	256,6	59,9	316,5	30	7	3,30	3,30	9,90	23,1	1 176,7	141,55	0,129 6	82 000	1,78E-05	625
304-AL3/49-ST1A	300/50	304,3	49,5	353,7	26	7	3,86	3,00	9,00	24,4	1 226,4	146,16	0,109 2	77 000	1,89E-05	700
341-AL3/109-ST1A	340/110	341,2	108,8	450,0	78	19	2,36	2,70	13,5	27,7	1 796,4	224,67	0,097 6	84 000	1,67E-05	750
382-AL3/49-ST1A	380/50	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 441,4	169,01	0,087 2	70 000	1,93E-05	790
449-AL3/39-ST1A	450/40	448,7	39,5	488,2	48	7	3,45	2,68	8,04	28,7	1 547,7	177,39	0,074 1	62 000	2,09E-05	865
562-AL3/49-ST1A	560/50	561,7	49,5	611,2	48	7	3,86	3,00	9,00	32,2	1 937,8	222,11	0,059 2	62 000	2,09E-05	980
635-AL3/117-ST1A	635/117	634,7	117,0	751,7	38+22	19	3,25/4,30	2,80	14,0	35,6	2 669,2	320,62	0,052 4	84 120	1,82E-05	1 030
679-AL3/86-ST1A	680/85	678,6	86,0	764,5	54	19	4,00	2,40	12,0	36,0	2 547,6	298,17	0,049 0	68 000	1,94E-05	1 080
1288-AL3/183-ST1A	1280/183	1288,2	182,8	1 471,1	100	19	4,05	3,50	17,5	49,9	4 997,6	581,12	0,025 9	79 260	1,90E-05	1 675

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion of the conductor sizes listed in the table are used in Austria. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Austria, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.5 — Characteristics of aluminium conductors used in Belgium — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
49-AL1	25	49,5	7	3,00	9,00	135,2	8,41	0,577 6
66-AL1	35	65,8	19	2,10	10,5	180,9	11,85	0,436 7
93-AL1	50	93,3	19	2,50	12,5	256,3	16,32	0,308 1
117-AL1	70	117,0	19	2,80	14,0	321,5	19,89	0,245 6
147-AL1	95	147,1	37	2,25	15,8	405,7	26,48	0,196 0

NOTE Direction of lay of external layer is right-hand (Z).

Table F.6 — Characteristics of aluminium alloy conductors used in Belgium — Type AL4

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
Preferred sizes								
34-AL4	35	34,4	7	2,50	7,50	93,8	11,17	0,959 3
55-AL4	55	54,6	7	3,15	9,45	148,9	17,73	0,604 2
93-AL4	95	93,3	19	2,50	12,5	256,0	30,31	0,355 4
153-AL4	153	152,8	19	3,20	16,0	419,5	49,66	0,216 9
210-AL4	210	210,3	37	2,69	18,8	579,3	68,34	0,158 2
228-AL4	228	227,8	37	2,80	19,6	627,6	74,04	0,146 0
248-AL4	248	247,8	37	2,92	20,4	682,6	80,53	0,134 2
298-AL4	298	297,6	37	3,20	22,4	819,8	96,71	0,111 8
313-AL4	313	312,6	37	3,28	23,0	861,3	101,61	0,106 4
366-AL4	366	366,2	37	3,55	24,9	1 008,9	115,36	0,090 8
446-AL4	446	445,7	61	3,05	27,5	1 231,7	144,84	0,074 9
475-AL4	475	475,4	61	3,15	28,4	1 313,8	154,50	0,070 2
570-AL4	570	570,2	61	3,45	31,1	1 576,0	185,33	0,058 5
621-AL4	621	620,9	61	3,60	32,4	1 716,0	195,58	0,053 7
926-AL4	926	926,3	91	3,60	39,6	2 570,4	291,77	0,036 2
Non-preferred sizes								
117-AL4	117	117,0	19	2,80	14,0	321,2	38,02	0,283 3
148-AL4	148	148,1	19	3,15	15,8	406,5	48,12	0,223 9
182-AL4	182	181,6	37	2,50	17,5	500,3	59,03	0,183 1
198-AL4	198	198,0	37	2,61	18,3	545,3	64,34	0,168 0
265-AL4	265	265,0	37	3,02	21,1	730,1	86,14	0,125 5
288-AL4	288	288,3	37	3,15	22,1	794,3	93,71	0,115 4
318-AL4	318	318,4	37	3,31	23,2	877,1	103,47	0,104 5
709-AL4	709	709,2	91	3,15	34,7	1 968,0	230,48	0,047 2
851-AL4	851	850,7	91	3,45	38,0	2 360,7	276,47	0,039 4

NOTE Direction of lay of external layer is right-hand (Z).

Table F.7 — Characteristics of aluminium conductors steel reinforced used in Belgium — Types AL1/ST1A AND AL1/ST3D

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength		DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.		AL1/ST1A	AL1/ST3D	
		mm²	mm²	mm²	Al	Steel	mm	mm	mm	mm	kg/km	kN	kN	Ω/km
Preferred sizes														
94-AL1/22-ST1A or ST3D	116	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,5	43,17	44,05	0,306 7
119-AL1/28-ST1A or ST3D	147	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,4	54,03	55,15	0,242 3
97-AL1/56-ST1A or ST3D	153	96,5	56,3	152,8	12	7	3,20	3,20	9,60	16,0	706,8	77,85	77,85	0,299 2
171-AL1/28-ST1A or ST3D	198	170,6	27,8	198,4	26	7	2,89	2,25	6,75	18,3	688,7	61,56	62,67	0,169 3
170-AL1/40-ST1A or ST3D	210	170,5	39,8	210,3	30	7	2,69	2,69	8,07	18,8	782,4	74,34	77,12	0,169 5
201-AL1/47-ST1A or ST3D	248	200,9	46,9	247,8	30	7	2,92	2,92	8,76	20,4	921,9	87,59	90,87	0,143 9
242-AL1/39-ST1A or ST3D	281	241,6	39,5	281,1	26	7	3,44	2,68	8,04	21,8	976,2	84,89	87,65	0,119 5
241-AL1/56-ST1A or ST3D	298	241,3	56,3	297,6	30	7	3,20	3,20	9,60	22,4	1 107,2	101,74	101,74	0,119 8
283-AL1/46-ST1A or ST3D	329	282,6	45,9	328,5	26	7	3,72	2,89	8,67	23,6	1 139,6	97,56	100,77	0,102 2
362-AL1/82-ST1A or ST3D	445	362,1	82,4	444,5	30	19	3,92	2,35	11,8	27,4	1 648,4	151,88	157,65	0,079 9
456-AL1/59-ST1A or ST3D	515	456,3	59,1	515,4	54	7	3,28	3,28	9,84	29,5	1 724,4	140,35	140,35	0,063 4
512-AL1/105-ST1A or ST3D	617	512,3	104,8	617,1	42+20	19	2,64/4,24	2,65	13,3	32,3	2 236,7	203,73	211, 07	0,056 4
Non-preferred sizes														
51-AL1/30-ST1A or ST3D	81	51,2	29,8	81,0	12	7	2,33	2,33	6,99	11,7	374,7	42,98	45,07	0,564 4
68-AL1/40-ST1A or ST3D	108	68,2	39,8	108,0	12	7	2,69	2,69	8,07	13,5	499,5	56,95	59,73	0,423 4
111-AL1/18-ST1A or ST3D	129	110,9	18,0	128,9	26	7	2,33	1,81	5,43	14,8	447,0	40,47	41,19	0,260 5
111-AL1/26-ST1A or ST3D	136	111,0	25,9	136,8	30	7	2,17	2,17	6,51	15,2	509,1	50,26	51,30	0,260 5
152-AL1/25-ST1A or ST3D	177	152,2	24,7	176,9	26	7	2,73	2,12	6,36	17,3	613,6	54,78	55,77	0,189 8
323-AL1/75-ST1A or ST3D	398	322,6	75,3	397,8	30	7	3,70	3,70	11,1	25,9	1 480,2	134,40	134,40	0,089 6
305-AL1/99-ST1A or ST3D	405	304,6	98,6	403,2	78	19	2,23	2,57	12,9	26,2	1 616,1	167,20	174,10	0,095 0
362-AL1/59-ST1A or ST3D	421	361,9	59,1	421,1	26	7	4,21	3,28	9,84	26,7	1 462,2	122,97	122,97	0,079 8
645-AL1/82-ST1A or ST3D	726	645,1	81,7	726,8	54	19	3,90	2,34	11,7	35,1	2 423,8	196,36	202,08	0,044 8

NOTE Direction of lay of external layer is right-hand (Z).

Table F.8 — Characteristics of aluminium alloy conductors steel reinforced used in Belgium — Types AL4/ST1A and AL4/ST3D

Code	Old Code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength		DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.		AL4/ST1A	AL4/ST3D	
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	kN	Ω/km
Preferred sizes														
119-AL4/28-ST1A or ST3D	147	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,0	71,33	72,44	0,242 3
147-AL4/34-ST1A or ST3D	182	147,3	34,4	181,6	30	7	2,50	2,50	7,50	17,5	675,3	87,03	89,44	0,196 3
185-AL4/43-ST1A or ST3D	228	184,7	43,1	227,8	30	7	2,80	2,80	8,40	19,6	847,1	109,17	112,19	0,156 5
241-AL4/56-ST1A or ST3D	298	241,3	56,3	297,6	30	7	3,20	3,20	9,60	22,4	1 106,4	140,34	140,34	0,119 8
525-AL4/68-ST1A or ST3D	594	525,5	68,1	593,6	54	7	3,52	3,52	10,6	31,7	1 984,3	240,46	240,46	0,055 0
Non-preferred sizes														
37-AL4/6-ST1A or ST3D	43	36,9	6,2	43,1	6	1	2,80	2,80	2,80	8,4	149,0	19,03	19,46	0,775 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.9 — Characteristics of aluminium conductors used in Finland — Type AL1

Code	Old Code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
107-AL1	AAC107	107,4	7	4,42	13,3	293,5	17,19	0,266 1
132-AL1	AAC132	131,6	19	2,97	14,9	361,8	22,38	0,218 3
201-AL1	AAC201	201,0	19	3,67	18,4	552,4	32,16	0,143 0
638-AL1	AAC638	638,3	61	3,65	32,9	1 766,0	102,12	0,045 3
1095-AL1	AAC1095	1 094,7	61	4,78	43,0	3 028,7	175,14	0,026 4
NOTE Direction of lay of external layer is right-hand (Z).								

Table F.10 — Characteristics of aluminium alloy conductors used in Finland — Type AL2

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
178-AL2	AAAC178	177,6	19	3,45	17,3	487,6	57,73	0,188 0
346-AL2	AAAC346	345,9	37	3,45	24,2	952,8	112,41	0,096 9
638-AL2	AAAC638	638,3	61	3,65	32,9	1 764,0	201,06	0,052 7
NOTE Direction of lay of external layer is right-hand (Z).								

Table F.11 — Characteristics of aluminium conductors steel reinforced used in Finland — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
34-AL1/6-ST1A	ACSR34/6 SPARROW	33,8	5,64	39,5	6	1	2,68	2,68	2,68	8,04	136,6	12,18	0,846 7
54-AL1/9-ST1A	ACSR54/9 RAVEN	53,5	8,92	62,4	6	1	3,37	3,37	3,37	10,11	216,1	18,64	0,535 5
85-AL1/14-ST1A	ACSR85/14 PIGEON	85,1	14,2	99,3	6	1	4,25	4,25	4,25	12,75	343,6	29,22	0,336 7
106-AL1/25-ST1A	ACSR106/25 SUURSAVO	105,9	24,7	130,6	30	7	2,12	2,12	6,36	14,84	485,9	47,97	0,272 9
152-AL1/25-ST1A	ACSR152/25 OSTRICH	152,2	24,7	176,9	26	7	2,73	2,12	6,36	17,28	613,6	54,78	0,189 8
305-AL1/39-ST1A	ACSR305/39 DUCK	304,6	39,5	344,1	54	7	2,68	2,68	8,04	24,12	1 151,2	96,80	0,094 9
565-AL1/72-ST1A	ACSR565/72 FINCH	565,0	71,6	636,6	54	19	3,65	2,19	10,95	32,85	2 123,0	174,14	0,051 2
42-AL1/25-ST1A	ACSR42/25 SAVO	42,4	24,7	67,1	12	7	2,12	2,12	6,36	10,60	310,2	36,53	0,681 7
89-AL1/52-ST1A	ACSR89/52 DOTTEREL	89,4	52,2	141,6	12	7	3,08	3,08	9,24	15,40	654,8	72,12	0,323 0
93-AL1/39-ST1A	ACSR93/39 IMATRA	92,9	39,5	132,4	10	7	3,44	2,68	8,04	14,92	565,1	60,35	0,310 2
148-AL1/67-ST1A	ACSR148/68 KUOPIO	148,3	67,1	215,3	42	19	2,12	2,12	10,60	19,08	937,3	105,16	0,195 5

NOTE Direction of lay of external layer is right-hand (Z).

Table F.12 — Characteristics of aluminium alloy conductors steel reinforced used in Finland — Type AL2/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
106-AL2/25-ST1A	AACSR106/25	105,9	24,7	130,6	30	7	2,12	2,12	6,36	14,8	485,6	63,33	0,317 1

NOTE Direction of lay of external layer is right-hand (Z).

Table F.13 — Characteristics of aluminium alloy conductors used in France — Type AL4

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Direction of lay of external layer
				Wire	Cond.						
		mm^2		mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	
	ASTER										
22-AL4	22	22,0	7	2,00	6,00	60,0	7,15	1,498 9	62 000	2,30E-05	S
34-AL4	34,4	34,4	7	2,50	7,50	93,8	11,17	0,959 3	62 000	2,30E-05	S
55-AL4	54,6	54,6	7	3,15	9,45	148,9	17,73	0,604 2	62 000	2,30E-05	S
76-AL4	75,5	75,5	19	2,25	11,3	207,4	24,55	0,438 8	60 000	2,30E-05	S
117-AL4	117	117,0	19	2,80	14,0	321,2	38,02	0,283 3	60 000	2,30E-05	S
148-AL4	148	148,1	19	3,15	15,8	406,5	48,12	0,223 9	60 000	2,30E-05	S
182-AL4	181,6	181,6	37	2,50	17,5	500,3	59,03	0,183 1	57 000	2,30E-05	S
228-AL4	228	227,8	37	2,80	19,6	627,6	74,04	0,146 0	57 000	2,30E-05	S
288-AL4	288	288,3	37	3,15	22,1	794,3	93,71	0,115 4	57 000	2,30E-05	S
366-AL4	366	366,2	37	3,55	24,9	1 008,9	115,36	0,090 8	57 000	2,30E-05	S
570-AL4	570	570,2	61	3,45	31,1	1 576,0	185,33	0,058 5	54 000	2,30E-05	S
851-AL4	851	850,7	91	3,45	38,0	2 360,7	276,47	0,039 4	52 500	2,30E-05	S
1144-AL4	1144	1 143,5	91	4,00	44,0	3 173,4	360,22	0,029 3	52 500	2,30E-05	S
1596-AL4	1600	1 595,9	127	4,00	52,0	4 427,5	502,72	0,021 0	50 500	2,30E-05	S

NOTE Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the table are used in France. Values for other conductor constructions may be calculated using the method given in IEC 61597.

Table F.14 — Characteristics of aluminium conductors steel reinforced used in France — Type AL1/ST1A

Code	Old Code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Direction of lay of external layer
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	
28-AL1/9-ST1A	CANNA 37,7	28,3	9,42	37,7	9	3	2,00	2,00	4,30	8,30	151,5	16,26	1,018 7	88 000	1,71E-05	S
38-AL1/22-ST1A	CANNA 59,7	37,7	22,0	59,7	12	7	2,00	2,00	6,00	10,0	276,1	32,70	0,766 0	103 500	1,54E-05	S
48-AL1/28-ST1A	CANNA 75,5	47,7	27,8	75,5	12	7	2,25	2,25	6,75	11,3	349,4	41,15	0,605 2	103 500	1,54E-05	S
59-AL1/34-ST1A	CANNA 93,3	58,9	34,4	93,3	12	7	2,50	2,50	7,50	12,5	431,4	49,48	0,490 2	103 500	1,54E-05	Z
94-AL1/22-ST1A	CANNA 116,2	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,5	43,17	0,306 7	75 500	1,80E-05	S
119-AL1/28-ST1A	CANNA 147,1	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,4	54,03	0,242 3	75 500	1,80E-05	S
147-AL1/34-ST1A	CANNA 181,6	147,3	34,4	181,6	30	7	2,50	2,50	7,50	17,5	675,8	64,94	0,196 3	75 500	1,80E-05	S
185-AL1/43-ST1A	CANNA 228	184,7	43,1	227,8	30	7	2,80	2,80	8,40	19,6	847,7	80,54	0,156 5	75 500	1,80E-05	S
234-AL1/55-ST1A	CANNA 288	233,8	54,6	288,3	30	7	3,15	3,15	9,45	22,1	1 072,8	98,58	0,123 6	75 500	1,80E-05	S

NOTE Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the table are used in France. Values for other conductor constructions may be calculated using the method given in IEC 61597.

Table F.15 — Characteristics of aluminium conductors steel reinforced used in France — Type AL1/ST6C

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Direction of lay of external layer
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	
94-AL1/22-ST6C	CROCUS 116,2	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,5	49,32	0,306 7	75 500	1,80E-05	S
119-AL1/28-ST6C	CROCUS 147,1	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,4	61,83	0,242 3	75 500	1,80E-05	S
147-AL1/34-ST6C	CROCUS 181,6	147,3	34,4	181,6	30	7	2,50	2,50	7,50	17,5	675,8	74,22	0,196 3	75 500	1,80E-05	S
185-AL1/43-ST6C	CROCUS 228	184,7	43,1	227,8	30	7	2,80	2,80	8,40	19,6	847,7	92,18	0,156 5	75 500	1,80E-05	S
234-AL1/55-ST6C	CROCUS 288	233,8	54,6	288,3	30	7	3,15	3,15	9,45	22,1	1 072,8	113,86	0,123 6	75 500	1,80E-05	S
222-AL1/76-ST6C	CROCUS 297	221,7	75,5	297,2	36	19	2,80	2,25	11,3	22,5	1 206,8	147,22	0,130 7	79 000	1,69E-05	Z
326-AL1/86-ST6C	CROCUS 412	325,7	86,0	411,7	32	19	3,60	2,40	12,0	26,4	1 576,1	173,31	0,088 9	72 000	1,76E-05	Z
508-AL1/105-ST6C	CROCUS 612	507,8	104,8	612,6	66	19	3,13	2,65	13,3	32,0	2 226,5	231,55	0,057 0	66 500	1,83E-05	S
717-AL1/148-ST6C	CROCUS 865	717,3	148,1	865,4	66	19	3,72	3,15	15,8	38,1	3 145,4	319,11	0,040 3	66 500	1,83E-05	S
957-AL1/228-ST6C	CROCUS 1185	956,7	227,8	1 184,5	54	37	2,80	2,80	19,6	44,7	4 433,6	480,75	0,030 2	63 000	1,83E-05	S
					66		3,47									

NOTE Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the Table are used in France. Values for other conductor constructions may be calculated using the method given in IEC 61597.

Table F.16 — Characteristics of aluminium alloy conductors steel reinforced used in France — Type AL4/ST6C

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Direction of lay of external layer
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	
28-AL4/9-ST6C	PHLOX 37,7	28,3	9,4	37,7	9	3	2,00	2,00	4,30	8,30	151,4	22,86	1,175 0	93 000	1,70E-05	Z
38-AL4/22-ST6C	PHLOX 59,7	37,7	22,0	59,7	12	7	2,00	2,00	6,00	10,0	276,0	44,14	0,883 5	108 000	1,53E-05	S
48-AL4/28-ST6C	PHLOX 75,5	47,7	27,8	75,5	12	7	2,25	2,25	6,75	11,3	349,3	55,86	0,698 1	108 000	1,53E-05	S
52-AL4/42-ST6C	PHLOX 94,1	52,0	42,1	94,1	15	19	2,10	1,68	8,40	12,6	474,2	77,96	0,643 5	112 000	1,47E-05	S
57-AL4/60-ST6C	PHLOX 116,2	56,5	59,7	116,2	18	19	2,00	2,00	10,0	14,0	625,0	104,93	0,592 1	124 000	1,42E-05	S
72-AL4/76-ST6C	PHLOX 147,1	71,6	75,5	147,1	18	19	2,25	2,25	11,3	15,8	791,0	132,80	0,467 8	124 000	1,42E-05	S
119-AL4/28-ST6C	PASTEL 147,1	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,0	79,12	0,279 5	84 000	1,81E-05	S
88-AL4/93-ST6C	PHLOX 181,6	88,4	93,3	181,6	18	19	2,50	2,50	12,5	17,5	976,6	160,22	0,378 9	124 000	1,42E-05	S
147-AL4/34-ST6C	PASTEL 181,6	147,3	34,4	181,6	30	7	2,50	2,50	7,50	17,5	675,3	96,31	0,226 4	84 000	1,81E-05	S
111-AL4/117-ST6C	PHLOX 228	110,8	117,0	227,8	18	19	2,80	2,80	14,0	19,6	1 225,0	200,98	0,302 1	124 000	1,42E-05	S
185-AL4/43-ST6C	PASTEL 228	184,7	43,1	227,8	30	7	2,80	2,80	8,40	19,6	847,1	120,81	0,180 5	84 000	1,81E-05	S
140-AL4/148-ST6C	PHLOX 288	140,3	148,1	288,3	18	19	3,15	3,15	15,8	22,1	1 550,4	249,93	0,238 7	124 000	1,42E-05	S
234-AL4/55-ST6C	PASTEL 288	233,8	54,6	288,3	30	7	3,15	3,15	9,45	22,1	1 072,1	151,26	0,142 6	84 000	1,80E-05	S
206-AL4/93-ST6C	PASTEL 299	206,2	93,3	299,4	42	19	2,50	2,50	12,5	22,5	1 302,8	198,51	0,162 2	96 500	1,63E-05	S
148-AL4/228-ST6C	PHLOX 376	147,8	227,8	375,6	24	37	2,80	2,80	19,6	25,2	2 202,4	369,27	0,227 0	130 000	1,35E-05	S
326-AL4/86-ST6C	PASTEL 412	325,7	86,0	411,7	32	19	3,60	2,40	12,0	26,4	1 575,1	223,80	0,102 5	82 000	1,78E-05	S
508-AL4/105-ST6C	PETUNIA 612	507,8	104,8	612,6	66	19	3,13	2,65	13,3	32,0	2 225,0	312,81	0,065 7	77 500	1,86E-05	S
717-AL4/148-ST6C	PASTEL 865	717,3	148,1	865,4	66	19	3,72	3,15	15,8	38,1	3 143,2	430,29	0,046 5	77 500	1,85E-05	S
957-AL4/228-ST6C	POLYGONUM 1185	956,7	227,8	1 184	54	37	2,80	2,80	19,6	42,0	4 430,7	632,15	0,034 9	75 500	1,81E-05	S
					66		3,47									

NOTE Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the table are used in France. Values for other conductor constructions may be calculated using the method given in IEC 61597.

Table F.17 — Characteristics of aluminium conductors used in Germany — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
				Wire	Cond.						
		mm^2		mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	A
16-AL1	16	15,9	7	1,70	5,10	43,4	3,02	1,798 6	60 000	2,30E-05	110
24-AL1	25	24,2	7	2,10	6,30	66,3	4,36	1,178 7	60 000	2,30E-05	145
34-AL1	35	34,4	7	2,50	7,50	93,9	6,01	0,831 7	60 000	2,30E-05	180
49-AL1	50	49,5	7	3,00	9,00	135,2	8,41	0,577 6	60 000	2,30E-05	225
48-AL1	50	48,3	19	1,80	9,00	132,9	8,94	0,594 4	57 000	2,30E-05	225
66-AL1	70	65,8	19	2,10	10,5	180,9	11,85	0,436 7	57 000	2,30E-05	270
93-AL1	95	93,3	19	2,50	12,5	256,3	16,32	0,308 1	57 000	2,30E-05	340
117-AL1	120	117,0	19	2,80	14,0	321,5	19,89	0,245 6	57 000	2,30E-05	390
147-AL1	150	147,1	37	2,25	15,8	405,7	26,48	0,196 0	57 000	2,30E-05	455
182-AL1	185	181,6	37	2,50	17,5	500,9	31,78	0,158 8	57 000	2,30E-05	520
243-AL1	240	242,5	61	2,25	20,3	671,1	43,66	0,119 3	55 000	2,30E-05	625
299-AL1	300	299,4	61	2,50	22,5	828,5	52,40	0,096 6	55 000	2,30E-05	710
400-AL1	400	400,1	61	2,89	26,0	1 107,1	68,02	0,072 3	55 000	2,30E-05	855
500-AL1	500	499,8	61	3,23	29,1	1 382,9	82,47	0,057 9	55 000	2,30E-05	990
626-AL1	625	626,2	91	2,96	32,6	1 739,7	106,45	0,046 4	55 000	2,30E-05	1 140
802-AL1	800	802,1	91	3,35	36,9	2 228,3	132,34	0,036 2	55 000	2,30E-05	1 340
1000-AL1	1000	999,7	91	3,74	41,1	2 777,3	159,95	0,029 1	55 000	2,30E-05	1 540

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the Table are used in Germany. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Germany, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.18 — Characteristics of aluminium alloy conductors used in Germany — Type AL3

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
				Wire	Cond.						
		mm^2		mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	A
16-AL3	16	15,9	7	1,70	5,10	43,4	4,69	2,070 1	60 000	2,30E-05	105
24-AL3	25	24,2	7	2,10	6,30	66,2	7,15	1,356 6	60 000	2,30E-05	135
34-AL3	35	34,4	7	2,50	7,50	93,8	10,14	0,957 2	60 000	2,30E-05	170
49-AL3	50	49,5	7	3,00	9,00	135,1	14,60	0,664 7	60 000	2,30E-05	210
48-AL3	50	48,3	19	1,80	9,00	132,7	14,26	0,684 1	57 000	2,30E-05	210
66-AL3	70	65,8	19	2,10	10,5	180,7	19,41	0,502 6	57 000	2,30E-05	255
93-AL3	95	93,3	19	2,50	12,5	256,0	27,51	0,354 6	57 000	2,30E-05	320
117-AL3	120	117,0	19	2,80	14,0	321,2	34,51	0,282 7	57 000	2,30E-05	365
147-AL3	150	147,1	37	2,25	15,8	405,3	43,40	0,225 6	57 000	2,30E-05	425
182-AL3	185	181,6	37	2,50	17,5	500,3	53,58	0,182 7	57 000	2,30E-05	490
243-AL3	240	242,5	61	2,25	20,3	670,3	71,55	0,137 3	55 000	2,30E-05	585
299-AL3	300	299,4	61	2,50	22,5	827,5	88,33	0,111 2	55 000	2,30E-05	670
400-AL3	400	400,1	61	2,89	26,0	1 105,9	118,04	0,083 2	55 000	2,30E-05	810
500-AL3	500	499,8	61	3,23	29,1	1 381,4	147,45	0,066 6	55 000	2,30E-05	930
626-AL3	625	626,2	91	2,96	32,6	1 737,7	184,73	0,053 4	55 000	2,30E-05	1 075
802-AL3	800	802,1	91	3,35	36,9	2 225,8	236,62	0,041 7	55 000	2,30E-05	1 255
1000-AL3	1000	999,7	91	3,74	41,1	2 774,3	294,91	0,033 4	55 000	2,30E-05	1 450

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the table are used in Germany. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Germany, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.19 — Characteristics of aluminium conductors steel reinforced used in Germany — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km	N/mm^2	1/K	A
15-AL1/3-ST1A	16/2,5	15,3	2,54	17,8	6	1	1,80	1,80	1,80	5,40	61,6	5,80	1,876 9	81 000	1,92E-05	105
24-AL1/4-ST1A	25/4	23,9	3,98	27,8	6	1	2,25	2,25	2,25	6,75	96,3	8,95	1,201 2	81 000	1,92E-05	140
34-AL1/6-ST1A	35/6	34,4	5,73	40,1	6	1	2,70	2,70	2,70	8,10	138,7	12,37	0,834 2	81 000	1,92E-05	170
44-AL1/32-ST1A	44/32	44,0	31,7	75,6	14	7	2,00	2,40	7,20	11,2	369,3	44,24	0,657 4	110 000	1,50E-05	-
48-AL1/8-ST1A	50/8	48,3	8,04	56,3	6	1	3,20	3,20	3,20	9,60	194,8	16,81	0,593 9	81 000	1,92E-05	210
51-AL1/30-ST1A	50/30	51,2	29,8	81,0	12	7	2,33	2,33	6,99	11,7	374,7	42,98	0,564 4	107 000	1,53E-05	-
70-AL1/11-ST1A	70/12	69,9	11,4	81,3	26	7	1,85	1,44	4,32	11,7	282,2	26,27	0,413 2	77 000	1,89E-05	290
94-AL1/15-ST1A	95/15	94,4	15,3	109,7	26	7	2,15	1,67	5,01	13,6	380,6	34,93	0,306 0	77 000	1,89E-05	350
97-AL1/56-ST1A	95/55	96,5	56,3	152,8	12	7	3,20	3,20	9,60	16,0	706,8	77,85	0,299 2	107 000	1,53E-05	-
106-AL1/76-ST1A	105/75	105,7	75,5	181,2	14	19	3,10	2,25	11,3	17,5	885,3	105,82	0,274 2	110 000	1,50E-05	-
122-AL1/20-ST1A	120/20	121,6	19,8	141,4	26	7	2,44	1,90	5,70	15,5	491,0	44,50	0,237 6	77 000	1,89E-05	410
122-AL1/71-ST1A	120/70	122,1	71,3	193,4	12	7	3,60	3,60	10,8	18,0	894,5	97,92	0,236 4	107 000	1,53E-05	-
128-AL1/30-ST1A	125/30	127,9	29,8	157,8	30	7	2,33	2,33	6,99	16,3	587,0	56,41	0,226 0	82 000	1,78E-05	425
149-AL1/24-ST1A	150/25	148,9	24,2	173,1	26	7	2,70	2,10	6,30	17,1	600,8	53,67	0,194 0	77 000	1,89E-05	470
172-AL1/40-ST1A	170/40	171,8	40,1	211,8	30	7	2,70	2,70	8,10	18,9	788,2	74,89	0,168 3	82 000	1,78E-05	520
184-AL1/30-ST1A	185/30	183,8	29,8	213,6	26	7	3,00	2,33	6,99	19,0	741,0	65,27	0,157 1	77 000	1,89E-05	535
209-AL1/34-ST1A	210/35	209,1	34,1	243,2	26	7	3,20	2,49	7,47	20,3	844,1	73,36	0,138 1	77 000	1,89E-05	590
212-AL1/49-ST1A	210/50	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	92,46	0,136 3	82 000	1,78E-05	610
231-AL1/30-ST1A	230/30	230,9	29,8	260,8	24	7	3,50	2,33	6,99	21,0	870,9	72,13	0,125 0	74 000	1,96E-05	630
243-AL1/39-ST1A	240/40	243,1	39,5	282,5	26	7	3,45	2,68	8,04	21,8	980,1	85,12	0,118 8	77 000	1,89E-05	645
264-AL1/34-ST1A	265/35	263,7	34,1	297,7	24	7	3,74	2,49	7,47	22,4	994,4	81,04	0,109 5	74 000	1,96E-05	680
304-AL1/49-ST1A	300/50	304,3	49,5	353,7	26	7	3,86	3,00	9,00	24,4	1227,3	105,09	0,094 9	77 000	1,89E-05	740
305-AL1/39-ST1A	305/40	304,6	39,5	344,1	54	7	2,68	2,68	8,04	24,1	1151,2	96,80	0,094 9	70 000	1,93E-05	740
339-AL1/30-ST1A	340/30	339,3	29,8	369,1	48	7	3,00	2,33	6,99	25,0	1171,2	91,71	0,085 2	62 000	2,05E-05	790
382-AL1/49-ST1A	380/50	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1442,5	121,30	0,075 8	70 000	1,93E-05	840
386-AL1/34-ST1A	385/35	386,0	34,1	420,1	48	7	3,20	2,49	7,47	26,7	1333,6	102,56	0,074 9	62 000	2,05E-05	850
434-AL1/56-ST1A	435/55	434,3	56,3	490,6	54	7	3,20	3,20	9,60	28,8	1641,3	133,59	0,066 6	70 000	1,93E-05	900
449-AL1/39-ST1A	450/40	448,7	39,5	488,2	48	7	3,45	2,68	8,04	28,7	1549,1	119,05	0,064 4	62 000	2,05E-05	920
490-AL1/64-ST1A	490/65	490,3	63,6	553,8	54	7	3,40	3,40	10,2	30,6	1852,9	150,81	0,059 0	70 000	1,93E-05	960
494-AL1/34-ST1A	495/35	494,4	34,1	528,4	45	7	3,74	2,49	7,47	29,9	1632,6	117,96	0,058 4	61 000	2,09E-05	985

Table F.19 — Characteristics of aluminium conductors steel reinforced used in Germany — Type AL1/ST1A *(continued)*

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
		Al	Steel	Total			Al	Steel	Core	Cond.						
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	/km	N/mm^2	1/K	A
511-AL1/45-ST1A	510/45	510,5	45,3	555,8	48	7	3,68	2,87	8,61	30,7	1765,3	133,31	0,056 6	62 000	2,05E-05	995
550-AL1/71-ST1A	550/70	549,7	71,3	620,9	54	7	3,60	3,60	10,8	32,4	2077,2	166,32	0,052 6	70 000	1,93E-05	1 020
562-AL1/49-ST1A	560/50	561,7	49,5	611,2	48	7	3,86	3,00	9,00	32,2	1939,5	146,28	0,051 5	62 000	2,05E-05	1 040
571-AL1/39-ST1A	570/40	571,2	39,5	610,6	45	7	4,02	2,68	8,04	32,2	1 887,1	136,40	0,050 6	61 000	2,09E-05	1 050
653-AL1/45-ST1A	650/45	653,5	45,3	698,8	45	7	4,30	2,87	8,61	34,4	2 159,9	156,18	0,044 2	61 000	2,09E-05	1 120
679-AL1/86-ST1A	680/85	678,6	86,0	764,5	54	19	4,00	2,40	12,0	36,0	2 549,7	206,56	0,042 6	68 000	1,94E-05	1 150
1046-AL1/45-ST1A	1045/45	1 045,6	45,3	1 090,9	72	7	4,30	2,87	8,61	43,0	3 248,2	218,92	0,027 7	60 000	2,17E-05	1 580

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the Table are used in Germany. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Germany, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.20 — Characteristics of aluminium alloy conductors steel reinforced used in Germany — Type AL3/ST1A

Code	Old CODE	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance	Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
		Al	Steel	Total			Al	Steel	Core	Cond						
		mm²	mm²	mm²	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km	N/mm²	1/K	A
15-AL3/3-ST1A	16/2,5	15,3	2,54	17,8	6	1	1,80	1,80	1,80	5,40	61,6	7,48	2,160 2	81 000	1,92E-05	100
24-AL3/4-ST1A	25/4	23,9	3,98	27,8	6	1	2,25	2,25	2,25	6,75	96,2	11,69	1,382 5	81 000	1,92E-05	135
34-AL3/6-ST1A	35/6	34,4	5,73	40,1	6	1	2,70	2,70	2,70	8,10	138,6	16,66	0,960 1	81 000	1,92E-05	165
44-AL3/32-ST1A	44/32	44,0	31,7	75,6	14	7	2,00	2,40	7,20	11,2	369,1	49,08	0,756 6	110 000	1,50E-05	-
48-AL3/8-ST1A	50/8	48,3	8,04	56,3	6	1	3,20	3,20	3,20	9,60	194,7	23,08	0,683 5	81 000	1,92E-05	200
51-AL3/30-ST1A	50/30	51,2	29,8	81,0	12	7	2,33	2,33	6,99	11,7	374,6	49,12	0,649 6	107 000	1,53E-05	-
70-AL3/11-ST1A	70/12	69,9	11,4	81,3	26	7	1,85	1,44	4,32	11,7	282,0	33,96	0,475 6	77 000	1,89E-05	270
94-AL3/15-ST1A	95/15	94,4	15,3	109,7	26	7	2,15	1,67	5,01	13,6	380,3	45,79	0,352 1	77 000	1,89E-05	330
97-AL3/56-ST1A	95/55	96,5	56,3	152,8	12	7	3,20	3,20	9,60	16,0	706,5	90,40	0,344 4	107 000	1,53E-05	-
106-AL3/76-ST1A	105/75	105,7	75,5	181,2	14	19	3,10	2,25	11,3	17,5	885,0	119,56	0,315 5	110 000	1,50E-05	-
122-AL3/20-ST1A	120/20	121,6	19,8	141,4	26	7	2,44	1,90	5,70	15,5	490,6	59,09	0,273 4	77 000	1,89E-05	385
122-AL3/71-ST1A	120/70	122,1	71,3	193,4	12	7	3,60	3,60	10,8	18,0	894,2	114,41	0,272 1	107 000	1,53E-05	-
128-AL3/30-ST1A	125/30	127,9	29,8	157,8	30	7	2,33	2,33	6,99	16,3	586,6	71,76	0,260 1	82 000	1,78E-05	400
149-AL3/24-ST1A	150/25	148,9	24,2	173,1	26	7	2,70	2,10	6,30	17,1	600,3	72,28	0,223 3	77 000	1,89E-05	445
172-AL3/40-ST1A	170/40	171,8	40,1	211,8	30	7	2,70	2,70	8,10	18,9	787,7	96,36	0,193 7	82 000	1,78E-05	490
184-AL3/30-ST1A	185/30	183,8	29,8	213,6	26	7	3,00	2,33	6,99	19,0	740,4	88,24	0,180 9	77 000	1,89E-05	505
209-AL3/34-ST1A	210/35	209,1	34,1	243,2	26	7	3,20	2,49	7,47	20,3	843,5	100,54	0,159 0	77 000	1,89E-05	555
212-AL3/49-ST1A	210/50	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	972,5	118,96	0,156 9	82 000	1,78E-05	575
231-AL3/30-ST1A	230/30	230,9	29,8	260,8	24	7	3,50	2,33	6,99	21,0	870,1	102,14	0,143 9	74 000	1,96E-05	595
243-AL3/39-ST1A	240/40	243,1	39,5	282,5	26	7	3,45	2,68	8,04	21,8	979,4	116,72	0,136 8	77 000	1,89E-05	605
264-AL3/34-ST1A	265/35	263,7	34,1	297,7	24	7	3,74	2,49	7,47	22,4	993,6	116,64	0,126 0	74 000	1,96E-05	640
304-AL3/49-ST1A	300/50	304,3	49,5	353,7	26	7	3,86	3,00	9,00	24,4	1 226,4	146,16	0,109 2	77 000	1,89E-05	700
305-AL3/39-ST1A	305/40	304,6	39,5	344,1	54	7	2,68	2,68	8,04	24,1	1 150,3	134,88	0,109 3	70 000	1,93E-05	700
339-AL3/30-ST1A	340/30	339,3	29,8	369,1	48	7	3,00	2,33	6,99	25,0	1 170,2	134,12	0,098 0	62 000	2,05E-05	740
382-AL3/49-ST1A	380/50	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 441,4	169,01	0,087 2	70 000	1,93E-05	790
386-AL3/34-ST1A	385/35	386,0	34,1	420,1	48	7	3,20	2,49	7,47	26,7	1 332,4	152,74	0,086 2	62 000	2,05E-05	800
434-AL3/56-ST1A	435/55	434,3	56,3	490,6	54	7	3,20	3,20	9,60	28,8	1 640,0	190,04	0,076 6	70 000	1,93E-05	845
449-AL3/39-ST1A	450/40	448,7	39,5	488,2	48	7	3,45	2,68	8,04	28,7	1 547,7	177,39	0,074 1	62 000	2,05E-05	865
490-AL3/64-ST1A	490/65	490,3	63,6	553,8	54	7	3,40	3,40	10,2	30,6	1 851,4	214,54	0,067 9	70 000	1,93E-05	905
550-AL3/71-ST1A	550/70	549,7	71,3	620,9	54	7	3,60	3,60	10,8	32,4	2 075,6	240,52	0,060 5	70 000	1,93E-05	960
562-AL3/49-ST1A	560/50	561,7	49,5	611,2	48	7	3,86	3,00	9,00	32,2	1 937,8	222,11	0,059 2	62 000	2,05E-05	980
679-AL3/86-ST1A	680/85	678,6	86,0	764,5	54	19	4,00	2,40	12,0	36,0	2 547,6	298,17	0,049 0	68 000	1,94E-05	1 080

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the table are used in Germany. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Germany, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.21 — Characteristics of aluminium clad steel conductors used in Germany — Type A20SA

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance		Final modulus of elasticity	Coefficient of linear expansion	Current carrying capacity
				Wire	Cond.			Calculated using aluminium and steel	Calculated using aluminium only			
		mm²		mm	mm	kg/km	kN	Ω/km	Ω/km	N/mm²	1/K	A
24-A20SA	25	24,2	7	2,10	6,30	161,5	32,49	3,536 4	4,699 5	159 000	1,30E-05	65
34-A20SA	35	34,4	7	2,50	7,50	229,0	46,04	2,495 3	3,316 0	159 000	1,30E-05	80
49-A20SA	50	49,5	7	3,00	9,00	329,7	66,30	1,732 8	2,302 8	159 000	1,30E-05	115
66-A20SA	70	65,8	19	2,10	10,5	441,0	88,18	1,310 2	1,741 2	159 000	1,30E-05	135
93-A20SA	95	93,3	19	2,50	12,5	624,9	124,98	0,924 5	1,228 6	159 000	1,30E-05	170
117-A20SA	120	117,0	19	2,80	14,0	783,9	156,77	0,737 0	0,979 4	159 000	1,30E-05	195
147-A20SA	150	147,1	37	2,25	15,8	989,2	197,13	0,588 1	0,781 5	159 000	1,30E-05	225
182-A20SA	185	181,6	37	2,50	17,5	1 221,2	243,38	0,476 4	0,633 1	159 000	1,30E-05	255
243-A20SA	240	242,5	61	2,25	20,3	1 636,1	325,00	0,357 9	0,475 6	157 000	1,30E-05	310
299-A20SA	300	299,4	61	2,50	22,5	2 019,8	401,24	0,289 9	0,385 2	157 000	1,30E-05	355

NOTE 1 Direction of lay of external layer is right-hand (Z).

NOTE 2 Values of final modulus of elasticity and coefficient of linear expansion for the conductor sizes listed in the table are used in Germany. Values for other conductor constructions may be calculated using the method given in IEC 61597.

NOTE 3 Guideline values of current carrying capacity are valid up to a frequency of 60 Hz, assuming a wind velocity of 0,6 m/s, the effect of solar radiation for Germany, an initial ambient temperature of 35 °C and a conductor temperature of 80 °C. For special applications, when there is no air turbulence, the values should be reduced by 30 %.

Table F.22 — Characteristics of aluminium conductors used in Norway — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm²		mm	mm	kg/km	kN	Ω/km
25-AL1	AL 16	25,4	7	2,15	6,45	69,5	4,57	1,124 5
40-AL1	AL 25	39,8	7	2,69	8,07	108,7	6,76	0,718 3
5-AL1	AL 35	55,6	7	3,18	9,54	151,9	9,17	0,514 0
79-AL1	AL 50	79,4	7	3,80	11,4	217,0	12,70	0,360 0
111-AL1	AL 70	111,3	7	4,50	13,5	304,3	17,81	0,256 7
151-AL1	AL 95	150,9	19	3,18	15,9	414,7	24,90	0,190 4
191-AL1	AL 120	191,3	19	3,58	17,9	525,6	30,60	0,150 3
239-AL1	AL 150	238,8	19	4,00	20,0	656,2	38,20	0,120 4
294-AL1	AL 185	293,9	37	3,18	22,3	810,4	48,49	0,098 1
381-AL1	AL 240	380,8	37	3,62	25,3	1 050,2	60,93	0,075 7
454-AL1	AL 286	454,5	61	3,08	27,7	1 257,5	74,99	0,063 7
477-AL1	AL 300	476,7	37	4,05	28,4	1 314,5	76,26	0,060 5
525-AL1	AL 329 BLUEBELL	524,9	37	4,25	29,8	1 447,6	83,98	0,054 9
564-AL1	AL 354 MARIGOLD	563,6	61	3,43	30,9	1 559,5	93,00	0,051 3
604-AL1	AL 380 HAWTHORN	603,8	61	3,55	32,0	1 670,5	96,60	0,047 9
645-AL1	AL 405 NARCISSUS	645,3	61	3,67	33,0	1 785,4	103,25	0,044 8
685-AL1	AL 430 COLUMBINE	684,5	61	3,78	34,0	1 894,0	109,53	0,042 3
725-AL1	AL 456 CARNATION	725,0	61	3,89	35,0	2 005,8	115,99	0,039 9
767-AL1	AL 481 GLADIOLUS	766,5	61	4,00	36,0	2 120,9	122,65	0,037 7
805-AL1	AL 506 COREOPSIS	805,4	61	4,10	36,9	2 228,2	128,86	0,035 9
911-AL1	AL 573 SOLROS	910,7	61	4,36	39,2	2 519,8	145,72	0,031 8

NOTE Direction of lay of external layer is right-hand (Z).

Table F.23 — Characteristics of aluminium alloy conductors used in Norway — Type AL6

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
46-AL6	AL56 - 46	46,2	7	2,90	8,70	126,2	14,52	0,677 9
65-AL6	AL56 - 65	65,1	7	3,44	10,3	177,6	20,43	0,481 8
93-AL6	AL56 - 93	92,9	7	4,11	12,3	253,5	28,23	0,337 5
130-AL6	AL56 - 130	129,9	7	4,86	14,6	354,5	39,48	0,241 4
167-AL6	AL56 - 167	167,5	19	3,35	16,8	459,8	52,59	0,188 2
178-AL6	AL56 - 178	177,6	19	3,45	17,3	487,6	55,77	0,177 5
210-AL6	AL56 - 210	209,8	19	3,75	18,8	576,1	63,79	0,150 2
225-AL6	AL56 - 225	224,7	19	3,88	19,4	616,7	68,29	0,140 3
263-AL6	AL56 - 263	263,2	19	4,20	21,0	722,7	80,02	0,119 7
280-AL6	AL56 - 280	279,8	19	4,33	21,7	768,1	85,05	0,112 7
322-AL6	AL56 - 322	322,2	37	3,33	23,3	887,7	101,18	0,098 2
342-AL6	AL56 - 342	341,9	37	3,43	24,0	941,8	107,35	0,092 5
444-AL6	AL56 - 444	444,3	37	3,91	27,4	1 223,9	135,06	0,071 2
454-AL6	AL56 - 454	454,5	61	3,08	27,7	1 256,1	142,71	0,069 8
594-AL6	AL56 - 594	593,6	61	3,52	31,7	1 640,6	180,46	0,053 5
685-AL6	AL56 - 685	684,5	61	3,78	34,0	1 891,9	208,10	0,046 4
865-AL6	AL56 - 865	865,4	61	4,25	38,3	2 391,6	263,07	0,036 7
NOTE Direction of lay of external layer is right-hand (Z).								

Table F.24 — Characteristics of aluminium alloy conductors used in Norway — Type AL7

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
46-AL7	AL58 - 46	46,2	7	2,90	8,70	126,2	13,41	0,656 0
65-AL7	AL58 - 65	65,1	7	3,44	10,3	177,6	17,89	0,466 2
93-AL7	AL58 - 93	92,9	7	4,11	12,3	253,5	23,68	0,326 6
130-AL7	AL58 - 130	129,9	7	4,86	14,6	354,5	33,11	0,233 6
167-AL7	AL58 - 167	167,5	19	3,35	16,8	459,8	46,05	0,182 1
178-AL7	AL58 - 178	177,6	19	3,45	17,3	487,6	48,84	0,171 7
210-AL7	AL58 - 210	209,8	19	3,75	18,8	576,1	55,61	0,145 4
225-AL7	AL58 - 225	224,7	19	3,88	19,4	616,7	59,53	0,135 8
263-AL7	AL58 - 263	263,2	19	4,20	21,0	722,7	67,12	0,115 9
280-AL7	AL58 - 280	279,8	19	4,33	21,7	768,1	71,34	0,109 0
322-AL7	AL58 - 322	322,2	37	3,33	23,3	887,7	88,62	0,095 0
342-AL7	AL58 - 342	341,9	37	3,43	24,0	941,8	94,02	0,089 5
444-AL7	AL58 - 444	444,3	37	3,91	27,4	1 223,9	117,73	0,068 9
484-AL7	AL58 - 454	454,5	61	3,08	27,7	1 256,1	124,98	0,067 6
594-AL7	AL58 - 594	593,6	61	3,52	31,7	1 640,6	157,31	0,051 7
685-AL7	AL58 - 685	684,5	61	3,78	34,0	1 891,9	181,40	0,044 9
865-AL7	AL58 - 865	865,4	61	4,25	38,3	2 391,6	220,67	0,035 5

NOTE Direction of lay of external layer is right-hand (Z).

Table F.25 — Characteristics of aluminium conductors steel reinforced used in Norway — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	Kg/km	kN	Ω/km
27-AL1/9-ST1A	FA 16 8/1	26,7	9,29	36,0	8	1	2,06	3,44	3,44	7,56	145,6	15,02	1,077 6
38-AL1/13-ST1A	FA 25 8/1	38,0	13,3	51,3	8	1	2,46	4,11	4,11	9,03	207,7	21,25	0,755 7
40-AL1/7-ST1A	FA 25 6/1	39,6	6,61	46,2	6	1	2,90	2,90	2,90	8,70	160,0	14,27	0,723 1
52-AL1/30-ST1A	FA 35 12/7	52,5	29,6	82,1	12	7	2,36	2,32	6,96	11,7	376,4	42,92	0,550 1
53-AL1/19-ST1A	FA 35 8/1	53,2	18,6	71,8	8	1	2,91	4,86	4,86	10,7	290,5	29,45	0,540 0
56-AL1/9-ST1A	FA 35 6/1	55,8	9,29	65,1	6	1	3,44	3,44	3,44	10,3	225,1	19,42	0,513 9
79-AL1/46-ST1A	FA 50 12/7	79,3	46,2	125,5	12	7	2,90	2,90	8,70	14,5	580,5	66,18	0,364 3
80-AL1/13-ST1A	FA 50 6/1	79,6	13,3	92,9	6	1	4,11	4,11	4,11	12,3	321,4	27,33	0,360 0
111-AL1/19-ST1A	FA 70 6/1	111,3	18,6	129,9	6	1	4,86	4,86	4,86	14,6	449,4	38,21	0,257 5
112-AL1/65-ST1A	FA 70 12/7	111,5	65,1	176,6	12	7	3,44	3,44	10,3	17,2	816,8	89,97	0,258 9
112-AL1/18-ST1A	FA 70 26/7	111,8	18,2	130,0	26	7	2,34	1,82	5,46	14,8	451,2	40,87	0,258 3
151-AL1/25-ST1A	FA 95 26/7	151,1	24,7	175,8	26	7	2,72	2,12	6,36	17,2	610,5	54,59	0,191 2
151-AL1/35-ST1A	FA 95 30/7	150,8	35,2	186,0	30	7	2,53	2,53	7,59	17,7	692,1	65,76	0,191 6
191-AL1/31-ST1A	FA 120 26/7	191,2	31,1	222,3	26	7	3,06	2,38	7,14	19,4	771,6	67,05	0,151 0
191-AL1/45-ST1A	FA 120 30/7	191,4	44,7	236,0	30	7	2,85	2,85	8,55	20,0	878,2	83,44	0,151 0
239-AL1/39-ST1A	FA 150 26/7	238,8	38,9	277,7	26	7	3,42	2,66	7,98	21,7	963,9	83,76	0,120 9
238-AL1/56-ST1A	FA 150 30/7	238,3	55,6	293,9	30	7	3,18	3,18	9,54	22,3	1 093,4	100,47	0,121 3
293-AL1/48-ST1A	FA 185 26/7	293,3	47,8	341,2	26	7	3,79	2,95	8,85	24,0	1 184,3	101,47	0,098 5
294-AL1/69-ST1A	FA 185 30/7	293,6	68,5	362,1	30	7	3,53	3,53	10,6	24,7	1 347,3	122,33	0,098 4
381-AL1/62-ST1A	FA 240 26/7	381,1	62,1	443,2	26	7	4,32	3,36	10,1	27,4	1 537,9	129,25	0,075 8
381-AL1/87-ST1A	FA 240 30/19	380,8	86,7	467,4	30	19	4,02	2,41	12,1	28,1	1 733,6	159,73	0,076 0
382-AL1/49-ST1A	FA 240 54/7	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 442,5	121,30	0,075 8
402-AL1/52-ST1A	FA 253 GONDOR	402,3	52,2	454,5	54	7	3,08	3,08	9,24	27,7	1 520,5	123,75	0,071 9
476-AL1/78-ST1A	FA 300 26/7	476,4	77,7	554,1	26	7	4,83	3,76	11,3	30,6	1 923,6	161,72	0,060 6
477-AL1/109-ST1A	FA 300 30/19	477,1	108,8	585,9	30	19	4,50	2,70	13,5	31,5	2 173,7	200,36	0,060 6
476-AL1/62-ST1A	FA 300 54/7	476,0	61,7	537,7	54	7	3,35	3,35	10,1	30,2	1 798,8	146,40	0,060 8
525-AL1/68-ST1A	FA 329 CURLEW	525,5	68,1	593,6	54	7	3,52	3,52	10,6	31,7	1 986,0	159,01	0,055 0
565-AL1/72-ST1A	FA 354 FINCH	565,0	71,6	636,6	54	19	3,65	2,19	11,0	32,9	2 123,0	174,14	0,051 2
606-AL1/77-ST1A	FA 380 GRACKLE	606,0	76,9	682,9	54	19	3,78	2,27	11,4	34,0	2 278,0	184,62	0,047 7
645-AL1/82-ST1A	FA 405 PHEASANT	645,1	81,7	726,8	54	19	3,90	2,34	11,7	35,1	2 423,8	196,36	0,044 8
766-AL1/97-ST1A	FA 481 PARROT	766,1	97,0	863,1	54	19	4,25	2,55	12,8	38,3	2 878,3	233,19	0,037 7
806-AL1/102-ST1A	FA 506 FALCON	806,2	102,4	908,7	54	19	4,36	2,62	13,1	39,3	3 031,7	245,77	0,035 8
1223-AL1/307-ST1A	FA 770	1 222,7	306,9	1 529,7	72	37	4,65	3,25	22,8	50,7	5 796,3	533,27	0,023 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.26 — Characteristics of aluminium conductors steel reinforced used in Norway — Type AL1/ST5E

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm²	mm²	mm²	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
606-AL1/77-ST5E	GRACKLE SP	606,0	76,9	682,9	54	19	3,78	2,27	11,4	34,0	2 278,0	206,15	0,047 7
766-AL1/97-ST5E	PARROT SP	766,1	97,0	863,1	54	19	4,25	2,55	12,8	38,3	2 878,3	255,51	0,037 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.27 — Characteristics of aluminium alloy conductors steel reinforced used in Norway — Type AL3/ST5E

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm²	mm²	mm²	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
96-AL3/86-ST5E	GOLL	96,4	86,0	182,4	16	19	2,77	2,40	12,0	17,5	941,3	146,20	0,346 2
96-AL3/102-ST5E	GONDUL	96,3	101,7	198,0	18	19	2,61	2,61	13,1	18,3	1 064,4	167,68	0,346 9
114-AL3/102-ST5E	TRUD	113,9	101,7	215,5	16	19	3,01	2,61	13,1	19,1	1 112,8	172,85	0,293 2
127-AL3/134-ST5E	SVEID	127,2	134,3	261,5	18	19	3,00	3,00	15,0	21,0	1 406,3	221,53	0,262 6
202-AL3/211-ST5E	TRIMA	202,0	210,6	412,6	18	37	3,78	2,69 *	18,9	26,5	2 216,3	348,08	0,165 4
703-AL3/89-ST5E	LUNDE	702,5	88,8	791,4	54	19	4,07	2,44	12,2	36,6	2 636,4	328,96	0,047 3
886-AL3/112-ST5E	LOMVI	885,8	112,0	997,8	54	19	4,57	2,74	13,7	41,1	3 324,1	414,78	0,037 6
1683-AL3/211-ST5E	TEIST	1 683,3	210,6	1 893,9	150	37	3,78	2,69 *	18,9	56,7	6 305,5	785,07	0,019 8

NOTE Direction of lay of external layer is right-hand (Z).
* 2,76 mm king wire.

Table F.28 — Characteristics of aluminium conductors used in Spain — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit lengt	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
28-AL1	L 28	27,8	7	2,25	6,75	76,1	5,01	1,026 8
43-AL1	L 40	43,1	7	2,80	8,40	117,8	7,33	0,663 0
55-AL1	L 56	54,6	7	3,15	9,45	149,1	9,00	0,523 9
76-AL1	L 80	75,5	19	2,25	11,3	207,6	13,60	0,380 4
117-AL1	L 110	117,0	19	2,80	14,0	321,5	19,89	0,245 6
148-AL1	L 145	148,1	19	3,15	15,8	407,0	24,43	0,194 1
188-AL1	L 180	188,1	19	3,55	17,8	516,9	30,09	0,152 8
279-AL1	L 280	279,3	37	3,10	21,7	770,2	46,08	0,103 3
381-AL1	L 400	381,0	61	2,82	25,4	1 054,1	64,77	0,075 9
454-AL1	L 450	454,5	61	3,08	27,7	1 257,5	74,99	0,063 7
547-AL1	L 550	547,3	61	3,38	30,4	1 514,4	90,31	0,052 9
638-AL1	L 630	638,3	61	3,65	32,9	1 766,0	102,12	0,045 3

NOTE Direction of lay of external layer is right-hand (Z).

Table F.29 — Characteristics of aluminium alloy conductors used in Spain — Type AL2

Code	Old code	Area	No. of wires	Diameter		Mass per unit lengt	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
28-AL2	D 28	27,8	7	2,25	6,75	76,0	9,05	1,193 0
43-AL2	D 40	43,1	7	2,80	8,40	117,7	14,01	0,770 4
55-AL2	D 56	54,6	7	3,15	9,45	148,9	17,73	0,608 7
76-AL2	D 80	75,5	19	2,25	11,3	207,4	24,55	0,442 0
117-AL2	D 110	117,0	19	2,80	14,0	321,2	38,02	0,285 4
148-AL2	D 145	148,1	19	3,15	15,8	406,5	48,12	0,225 5
188-AL2	D 180	188,1	19	3,55	17,8	516,3	59,24	0,177 6
279-AL2	D 280	279,3	37	3,10	21,7	769,3	90,76	0,120 0
381-AL2	D 400	381,0	61	2,82	25,4	1 053,0	123,82	0,088 2
454-AL2	D 450	454,5	61	3,08	27,7	1 256,1	147,71	0,074 0
547-AL2	D 550	547,3	61	3,38	30,4	1 512,7	177,88	0,061 4
638-AL2	D 630	638,3	61	3,65	32,9	1 764,0	201,06	0,052 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.30 — Characteristics of aluminium conductors steel reinforced used in Spain — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
27-AL1/4-ST1A	LA 30	26,7	4,45	31,1	6	1	2,38	2,38	2,38	7,14	107,8	9,74	1,073 6
47-AL1/8-ST1A	LA 56	46,8	7,79	54,6	6	1	3,15	3,15	3,15	9,45	188,8	16,29	0,612 9
67-AL1/11-ST1A	LA 78	67,3	11,2	78,6	6	1	3,78	3,78	3,78	11,3	271,8	23,12	0,425 6
94-AL1/22-ST1A	LA 110	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,5	43,17	0,306 7
119-AL1/28-ST1A	LA 145	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,4	54,03	0,242 3
147-AL1/34-ST1A	LA 180	147,3	34,4	181,6	30	7	2,50	2,50	7,50	17,5	675,8	64,94	0,196 3
242-AL1/39-ST1A	LA 280 HAWK	241,6	39,5	281,1	26	7	3,44	2,68	8,04	21,8	976,2	84,89	0,119 5
337-AL1/44-ST1A	LA 380 GULL	337,3	43,7	381,0	54	7	2,82	2,82	8,46	25,4	1 274,6	107,18	0,085 7
402-AL1/52-ST1A	LA 455 CONDOR	402,3	52,2	454,5	54	7	3,08	3,08	9,24	27,7	1 520,5	123,75	0,071 9
485-AL1/63-ST1A	LA 545 CARDINAL	484,5	62,8	547,3	54	7	3,38	3,38	10,1	30,4	1 831,1	149,04	0,059 7
565-AL1/72-ST1A	LA 635 FINCH	565,0	71,6	636,6	54	19	3,65	2,19	11,0	32,9	2 123,0	174,14	0,051 2

NOTE Direction of lay of external layer is right-hand (Z).

Table F.31 — Characteristics of aluminium alloy conductors steel reinforced used in Spain — Type AL2/ST1A

Code	Old code	Areas			No. of wires		Wire Diameter		Diameter		Mass per unit length	Rated strength	DC Resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
27-AL2/4-ST1A	DA 30	26,7	4,45	31,1	6	1	2,38	2,38	2,38	7,14	107,7	13,75	1,247 4
47-AL2/8-ST1A	DA 56	46,8	7,79	54,6	6	1	3,15	3,15	3,15	9,45	188,6	23,77	0,712 1
67-AL2/11-ST1A	DA 78	67,3	11,2	78,6	6	1	3,78	3,78	3,78	11,3	271,6	33,55	0,494 5
94-AL2/22-ST1A	DA 110	94,2	22,0	116,2	30	7	2,00	2,00	6,00	14,0	432,2	56,36	0,356 3
119-AL2/28-ST1A	DA 145	119,3	27,8	147,1	30	7	2,25	2,25	6,75	15,8	547,0	71,33	0,281 5
147-AL2/34-ST1A	DA 180	147,3	34,4	181,6	30	7	2,50	2,50	7,50	17,5	675,3	87,03	0,228 0
226-AL2/53-ST1A	DA 280	226,4	52,8	279,3	30	7	3,10	3,10	9,30	21,7	1 038,4	131,71	0,148 3

NOTE Direction of lay of external layer is right-hand (Z).

Table F.32 — Characteristics of aluminium conductors used in Switzerland — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
25-AL1	25	25,2	7	2,14	6,42	68,8	4,53	1,135 0
35-AL1	35	34,9	7	2,52	7,56	95,4	5,94	0,818 5
50-AL1	50	50,1	7	3,02	9,06	137,0	8,27	0,569 9
70-AL1	70	70,3	19	2,17	10,9	193,1	12,65	0,409 0
95-AL1	95	94,8	19	2,52	12,6	260,5	16,11	0,303 3
120-AL1	120	120,4	19	2,84	14,2	330,8	20,46	0,238 8
150-AL1	150	150,0	19	3,17	15,9	412,1	24,74	0,191 6
150-AL1	150	149,7	37	2,27	15,9	413,0	26,20	0,192 6
185-AL1	185	184,5	37	2,52	17,6	508,9	31,37	0,156 3
239-AL1	240	239,4	37	2,87	20,1	660,1	40,69	0,120 5
301-AL1	300	301,3	37	3,22	22,5	831,0	49,71	0,095 7
403-AL1	400	402,9	61	2,90	26,1	1 114,8	68,50	0,071 8
497-AL1	500	496,7	61	3,22	29,0	1 374,4	81,96	0,058 2
551-AL1	550	550,6	61	3,39	30,5	1 523,3	90,85	0,052 5
548-AL1	550	548,4	91	2,77	30,5	1 523,5	93,23	0,053 0
600-AL1	600	600,4	61	3,54	31,9	1 661,1	96,06	0,048 2
601-AL1	600	601,1	91	2,90	31,9	1 669,9	102,18	0,048 3
802-AL1	800	802,1	91	3,35	36,9	2 228,3	132,34	0,036 2

NOTE Direction of lay of external layer is right-hand (Z).

Table F.33 — Characteristics of aluminium alloy conductors used in Switzerland — Type AL3

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
16-AL3	16	15,9	7	1,70	5,10	43,4	4,69	2,070 1
25-AL3	25	25,2	7	2,14	6,42	68,7	7,43	1,306 4
35-AL3	35	34,9	7	2,52	7,56	95,3	10,30	0,942 1
50-AL3	50	50,1	7	3,02	9,06	136,9	14,79	0,656 0
50-AL3	50	50,0	19	1,83	9,15	137,2	14,74	0,661 9
70-AL3	70	70,3	19	2,17	10,9	192,9	20,73	0,470 7
95-AL3	95	94,8	19	2,52	12,6	260,2	27,96	0,349 0
120-AL3	120	120,4	19	2,84	14,2	330,4	35,51	0,274 8
150-AL3	150	149,7	37	2,27	15,9	412,5	44,17	0,221 7
185-AL3	185	184,5	37	2,52	17,6	508,4	54,44	0,179 9
239-AL3	240	239,4	37	2,87	20,1	659,4	70,61	0,138 7
301-AL3	300	301,3	37	3,22	22,5	830,0	88,88	0,110 2
299-AL3	300	299,4	61	2,50	22,5	827,5	88,33	0,111 2
403-AL3	400	402,9	61	2,90	26,1	1 113,6	118,86	0,082 6
497-AL3	500	496,7	61	3,22	29,0	1 372,9	146,54	0,067 0
551-AL3	550	550,6	61	3,39	30,5	1 521,6	162,42	0,060 5
548-AL3	550	548,4	91	2,77	30,5	1 521,8	161,78	0,061 0
600-AL3	600	600,4	61	3,54	31,9	1 659,3	177,11	0,055 5
601-AL3	600	601,1	91	2,90	31,9	1 668,0	177,32	0,055 6
802-AL3	800	802,1	91	3,35	36,9	2 225,8	236,62	0,041 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.34 — Characteristics of aluminium conductors steel reinforced used in Switzerland — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
22-AL1/4-ST1A	-	21,6	3,60	25,2	6	1	2,14	2,14	2,14	6,42	87,1	8,09	1,327 9
30-AL1/5-ST1A	-	29,9	5,0	34,9	6	1	2,52	2,52	2,52	7,56	120,8	10,77	0,957 6
43-AL1/7-ST1A	-	43,0	7,2	50,1	6	1	3,02	3,02	3,02	9,06	173,5	14,97	0,666 8
60-AL1/10-ST1A	-	59,7	10,0	69,7	6	1	3,56	3,56	3,56	10,7	241,1	20,50	0,479 8
79-AL1/18-ST1A	-	78,9	18,4	97,3	30	7	1,83	1,83	5,49	12,8	362,1	36,14	0,366 3
97-AL1/23-ST1A	-	97,1	22,7	119,8	30	7	2,03	2,03	6,09	14,2	445,6	43,98	0,297 7
121-AL1/28-ST1A	-	121,4	28,3	149,7	30	7	2,27	2,27	6,81	15,9	557,1	53,54	0,238 1
150-AL1/35-ST1A	-	149,6	34,9	184,5	30	7	2,52	2,52	7,56	17,6	686,6	65,24	0,193 2
194-AL1/45-ST1A	-	194,1	45,3	239,4	30	7	2,87	2,87	8,61	20,1	890,6	84,62	0,148 9
212-AL1/49-ST1A	-	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	92,46	0,136 3
244-AL1/57-ST1A	-	244,3	57,0	301,3	30	7	3,22	3,22	9.66	22,5	1 121,1	103,01	0,118 3
282-AL1/66-ST1A	-	282,1	65,8	347,9	30	7	3,46	3,46	10,4	24,2	1 294,4	118,94	0,102 5
357-AL1/46-ST1A	-	356,7	46,2	402,9	54	7	2,90	2,90	8,70	26,1	1 348,0	113,35	0,081 1
440-AL1/57-ST1A	-	439,7	57,0	496,7	54	7	3,22	3,22	9,66	29,0	1 661,9	135,26	0,065 8
487-AL1/63-ST1A	-	487,4	63,2	550,6	54	7	3,39	3,39	10,2	30,5	1 842,0	149,92	0,059 3
531-AL1/69-ST1A	-	531,5	68,9	600,4	54	7	3,54	3,54	10,6	31,9	2 008,6	160,82	0,054 4
748-AL1/97-ST1A	-	748,1	97,0	845,2	96	19	3,15	2,55	12,8	38,0	2 832,9	234,06	0,038 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.35 — Characteristics of aluminium alloy conductors steel reinforced used in Switzerland — Type AL3/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
14-AL3/4-ST1A	-	13,6	2,27	15,9	6	1	1,70	1,70	1,70	5,10	54,9	6,67	2,421 8
22-AL3/4-ST1A	-	21,6	3,60	25,2	6	1	2,14	2,14	2,14	6,42	87,1	10,57	1,528 3
30-AL3/5-ST1A	-	29,9	4,99	34,9	6	1	2,52	2,52	2,52	7,56	120,7	14,51	1,102 1
43-AL3/7-ST1A	-	43,0	7,16	50,1	6	1	3,02	3,02	3,02	9,06	173,4	20,56	0,767 4
60-AL3/10-ST1A	-	59,7	10,0	69,7	6	1	3,56	3,56	3,56	10,7	240,9	28,57	0,552 3
79-AL3/18-ST1A	-	78,9	18,4	97,3	30	7	1,83	1,83	5,49	12,8	361,8	44,82	0,421 6
97-AL3/23-ST1A	-	97,1	22,7	119,8	30	7	2,03	2,03	6,09	14,2	445,3	55,15	0,342 6
121-AL3/28-ST1A	-	121,4	28,3	149,7	30	7	2,27	2,27	6,81	15,9	556,8	68,11	0,274 0
150-AL3/35-ST1A	-	149,6	34,9	184,5	30	7	2,52	2,52	7,56	17,6	686,2	83,94	0,222 3
194-AL3/45-ST1A	-	194,1	45,3	239,4	30	7	2,87	2,87	8,61	20,1	890,0	108,88	0,171 4
212-AL3/49-ST1A	-	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	972,5	118,96	0,156 9
244-AL3/57-ST1A	-	244,3	57,0	301,3	30	7	3,22	3,22	9,66	22,5	1 120,3	134,77	0,136 2
282-AL3/66-ST1A	-	282,1	65,8	347,9	30	7	3,46	3,46	10,38	24,2	1 293,5	155,61	0,117 9
357-AL3/46-ST1A	-	356,7	46,2	402,9	54	7	2,90	2,90	8,70	26,1	1 346,9	157,93	0,093 3
440-AL3/57-ST1A	-	439,7	57,0	496,7	54	7	3,22	3,22	9,66	29,0	1 660,5	192,43	0,075 7
487-AL3/63-ST1A	-	487,4	63,2	550,6	54	7	3,39	3,39	10,17	30,5	1 840,5	213,28	0,068 3
531-AL3/69-ST1A	-	531,5	68,9	600,4	54	7	3,54	3,54	10,62	31,9	2 007,0	232,57	0,062 6
748-AL3/97-ST1A	-	748,1	97,0	845,2	96	19	3,15	2,55	12,75	38,0	2 830,6	331,32	0,044 6

NOTE Direction of lay of external layer is right-hand (Z).

Table F.36 — Characteristics of aluminium conductors used in Sweden — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
62-AL1	VITSIPPA	62,4	7	3,37	10,1	170,6	10,30	0,457 7
99-AL1	KATTFOT	99,3	7	4,25	12,8	271,4	15,89	0,287 8
159-AL1	GULLVIVA	158,6	19	3,26	16,3	435,9	26,17	0,181 2
241-AL1	VALLMO	241,2	19	4,02	20,1	662,8	38,58	0,119 2
330-AL1	RENFANA	330,0	37	3,37	23,6	910,2	54,45	0,087 4
454-AL1	AKLEJA	454,5	61	3,08	27,7	1 257,5	74,99	0,063 7
594-AL1	HAMPDAN	593,6	61	3,52	31,7	1 642,4	94,98	0,048 7
774-AL1	STORMHATT	774,2	61	4,02	36,2	2 142,1	123,88	0,037 4
911-AL1	SOLROS	910,7	61	4,36	39,2	2 519,8	145,72	0,031 8

NOTE Direction of lay of external layer is right-hand (Z).

Table F.37 — Characteristics of aluminium alloy conductors used in Sweden — Type AL7

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
62-AL7	AlMgSi - 62	62,4	7	3,37	10,1	170,5	17,17	0,485 8
99-AL7	AlMgSi - 99	99,3	7	4,25	12,8	271,1	25,32	0,305 5
159-AL7	AlMgSi - 157	158,6	19	3,26	16,3	435,4	43,61	0,192 3
241-AL7	AlMgSi - 241	241,2	19	4,02	20,1	662,1	61,49	0,126 5
330-AL7	AlMgSi - 329	330,0	37	3,37	23,6	909,2	90,76	0,092 7
454-AL7	AlMgSi - 454	454,5	61	3,08	27,7	1 256,1	124,98	0,067 6
594-AL7	AlMgSi - 593	593,6	61	3,52	31,7	1 640,6	157,31	0,051 7
774-AL7	AlMgSi - 774	774,2	61	4,02	36,2	2 139,8	197,43	0,039 7
911-AL7	AlMgSi - 910	910,7	61	4,36	39,2	2 517,0	232,24	0,033 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.38 — Characteristics of aluminium conductors steel reinforced used in Sweden — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
54-AL1/9-ST1A	RAVEN	53,5	8,92	62,4	6	1	3,37	3,37	3,37	10,1	216,1	18,64	0,535 5
85-AL1/14-ST1A	PIGEON	85,1	14,2	99,3	6	1	4,25	4,25	4,25	12,8	343,6	29,22	0,336 7
135-AL1/22-ST1A	PARTRIDGE	134,9	22,0	156,9	26	7	2,57	2,00	6,00	16,3	544,5	48,66	0,214 1
201-AL1/33-ST1A	IBIS	201,3	32,7	234,1	26	7	3,14	2,44	7,32	19,9	812,1	70,53	0,143 4
283-AL1/46-ST1A	DOVE	282,6	45,9	328,5	26	7	3,72	2,89	8,67	23,6	1 139,6	97,56	0,102 2
402-AL1/52-ST1A	CONDOR	402,3	52,2	454,5	54	7	3,08	3,08	9,24	27,7	1 520,5	123,75	0,071 9
525-AL1/68-ST1A	CURLEW	525,5	68,1	593,6	54	7	3,52	3,52	10,6	31,7	1 986,0	159,01	0,055 0
685-AL1/89-ST1A	SKATA	685,4	88,8	774,2	54	7	4,02	4,02	12,1	36,2	2 590,2	207,39	0,042 2
806-AL1/102-ST1A	FALCON	806,2	102,4	908,7	54	19	4,36	2,62	13,1	39,3	3 031,7	245,77	0,035 8
563-AL1/29-ST1A	MORKULLA	562,7	29,3	592,0	42	7	4,13	2,31	6,93	31,7	1 783,7	123,47	0,051 3
735-AL1/38-ST1A	RIPA	734,9	38,0	772,9	42	7	4,72	2,63	7,89	36,2	2 327,5	160,93	0,039 3
865-AL1/44-ST1A	ORRE	864,7	44,0	908,8	42	7	5,12	2,83	8,49	39,2	2 733,1	188,55	0,033 4
89-AL1/52-ST1A	DOTTEREL	89,4	52,2	141,6	12	7	3,08	3,08	9,24	15,4	654,8	72,12	0,323 0
117-AL1/68-ST1A	ODEN	116,8	68,1	184,9	12	7	3,52	3,52	10,6	17,6	855,2	93,62	0,247 3
152-AL1/89-ST1A	ATLE	152,3	88,8	241,2	12	7	4,02	4,02	12,1	20,1	1 115,4	122,10	0,189 6
251-AL1/65-ST1A	YMER	251,0	64,7	315,6	32	7	3,16	3,43	10,3	22,9	1 199,8	112,56	0,115 2

NOTE Direction of lay of external layer is right-hand (Z).

Table F.39 — Characteristics of aluminium conductors used in the United Kingdom — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
23-AL1	MIDGE	23,3	7	2,06	6,18	63,8	4,20	1,224 9
27-AL1	GNAT	26,9	7	2,21	6,63	73,4	4,83	1,064 3
37-AL1	MOSQUITO	36,9	7	2,59	7,77	100,8	6,27	0,774 9
43-AL1	LADYBIRD	42,8	7	2,79	8,37	117,0	7,28	0,667 8
53-AL1	ANT	52,8	7	3,10	9,30	144,4	8,72	0,540 9
64-AL1	FLY	63,6	7	3,40	10,2	173,7	10,49	0,449 7
74-AL1	BLUEBOTTLE	73,6	7	3,66	11,0	201,3	11,78	0,388 0
79-AL1	EARWIG	78,6	7	3,78	11,3	214,7	12,57	0,363 8
84-AL1	GRASSHOPPER	84,1	7	3,91	11,7	229,7	13,45	0,340 0
96-AL1	CLEGG	95,6	7	4,17	12,5	261,3	15,30	0,298 9
106-AL1	WASP	106,0	7	4,39	13,2	289,6	16,95	0,269 7
106-AL1	BEETLE	106,4	19	2,67	13,4	292,4	18,08	0,270 1
132-AL1	BEE	132,0	7	4,90	14,7	360,8	21,12	0,216 5
158-AL1	HORNET	157,6	19	3,25	16,3	433,2	26,01	0,182 3
186-AL1	CATERPILLAR	185,9	19	3,53	17,7	511,1	29,75	0,154 6
213-AL1	CHAFER	213,2	19	3,78	18,9	586,0	34,12	0,134 8
238-AL1	SPIDER	237,6	19	3,99	20,0	652,9	38,01	0,121 0
266-AL1	COCKROACH	265,7	19	4,22	21,1	730,4	42,52	0,108 1
323-AL1	BUTTERFLY	322,7	19	4,65	23,3	886,8	51,63	0,089 1
373-AL1	MOTH	373,1	19	5,00	25,0	1 025,3	59,69	0,077 0
372-AL1	DRONE	372,4	37	3,58	25,1	1 027,1	59,59	0,077 4
415-AL1	CENTIPEDE	415,2	37	3,78	26,5	1 145,1	66,43	0,069 5
486-AL1	MAYBUG	486,1	37	4,09	28,6	1 340,6	77,78	0,059 3
530-AL1	SCORPION	529,8	37	4,27	29,9	1 461,2	84,77	0,054 4
628-AL1	CICADA	628,3	37	4,65	32,6	1 732,9	100,54	0,045 9

NOTE Direction of lay of external layer is right-hand (Z).

Table F.40 — Characteristics of aluminium alloy conductors used in the United Kingdom — Type AL3

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
19-AL3	BOX	18,8	7	1,85	5,55	51,4	5,55	1,748 0
24-AL3	ACACIA	23,8	7	2,08	6,24	64,9	7,02	1,382 8
30-AL3	ALMOND	30,1	7	2,34	7,02	82,2	8,88	1,092 6
35-AL3	CEDAR	35,5	7	2,54	7,62	96,8	10,46	0,927 3
42-AL3	DEODAR	42,2	7	2,77	8,31	115,2	12,44	0,779 7
48-AL3	FIR	47,8	7	2,95	8,85	130,6	14,11	0,687 5
60-AL3	HAZEL	59,9	7	3,30	9,90	163,4	17,66	0,549 4
72-AL3	PINE	71,6	7	3,61	10,8	195,6	21,14	0,459 1
84-AL3	HOLLY	84,1	7	3,91	11,7	229,5	24,79	0,391 3
90-AL3	WILLOW	89,7	7	4,04	12,1	245,0	26,47	0,366 5
119-AL3	OAK	118,9	7	4,65	14,0	324,5	35,07	0,276 7
151-AL3	MULBERRY	150,9	19	3,18	15,9	414,3	44,52	0,219 2
181-AL3	ASH	180,7	19	3,48	17,4	496,1	53,31	0,183 0
211-AL3	ELM	211,0	19	3,76	18,8	579,2	62,24	0,156 8
239-AL3	POPLAR	239,4	37	2,87	20,1	659,4	70,61	0,138 7
303-AL3	SYCAMORE	303,2	37	3,23	22,6	835,2	89,40	0,109 5
362-AL3	UPAS	362,1	37	3,53	24,7	997,5	106,82	0,091 7
479-AL3	YEW	479,0	37	4,06	28,4	1 319,6	141,31	0,069 3
498-AL3	TOTARA	498,1	37	4,14	29,0	1 372,1	146,93	0,066 6
587-AL3	RUBUS	586,9	61	3,50	31,5	1 622,0	173,13	0,056 7
659-AL3	SORBUS	659,4	61	3,71	33,4	1 822,5	194,53	0,050 5
821-AL3	ARAUCARIA	821,1	61	4,14	37,3	2 269,4	242,24	0,040 6
996-AL3	REDWOOD	996,2	61	4,56	41,0	2 753,2	293,88	0,033 4

NOTE Direction of lay of external layer is right-hand (Z).

Table F.41 — Characteristics of aluminium alloy conductors used in the United Kingdom — Type AL5

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
239-AL5	POPLAR	239,4	37	2,87	20,1	659,4	70,61	0,133 0
303-AL5	SYCAMORE	303,2	37	3,23	22,6	835,2	89,44	0,105 0
362-AL5	UPAS	362,1	37	3,53	24,7	997,5	106,82	0,087 9
479-AL5	YEW	479,0	37	4,06	28,4	1 319,6	141,31	0,066 5
498-AL5	TOTARA	498,1	37	4,14	29,0	1 372,1	146,93	0,063 9
587-AL5	RUBUS	586,9	61	3,50	31,5	1 622,0	173,13	0,054 4
659-AL5	SORBUS	659,4	61	3,71	33,4	1 822,5	194,53	0,048 4
821-AL5	ARAUCARIA	821,1	61	4,14	37,3	2 269,4	242,24	0,038 9
996-AL5	REDWOOD	996,2	61	4,56	41,0	2 753,2	293,88	0,032 1

NOTE Direction of lay of external layer is right-hand (Z).

Table F.42 — Characteristics of aluminium conductors steel reinforced used in the United Kingdom — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diamter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
11-AL1/2-ST1A	MOLE	10,6	1,77	12,4	6	1	1,50	1,50	1,50	4,50	42,8	4,14	2,702 7
21-AL1/3-ST1A	SQUIRREL	21,0	3,50	24,5	6	1	2,11	2,11	2,11	6,33	84,7	7,87	1,365 9
26-AL1/4-ST1A	GOPHER	26,2	4,37	30,6	6	1	2,36	2,36	2,36	7,08	106,0	9,58	1,091 9
32-AL1/5-ST1A	WEASEL	31,6	5,27	36,9	6	1	2,59	2,59	2,59	7,77	127,6	11,38	0,906 5
37-AL1/6-ST1A	FOX	36,7	6,11	42,8	6	1	2,79	2,79	2,79	8,37	148,1	13,21	0,781 2
42-AL1/7-ST1A	FERRET	42,4	7,07	49,5	6	1	3,00	3,00	3,00	9,00	171,2	15,27	0,675 7
53-AL1/9-ST1A	RABBIT	52,9	8,81	61,7	6	1	3,35	3,35	3,35	10,1	213,5	18,42	0,541 9
63-AL1/11-ST1A	MINK	63,1	10,5	73,6	6	1	3,66	3,66	3,66	11,0	254,9	21,67	0,454 0
63-AL1/37-ST1A	SKUNK	63,2	36,9	100,1	12	7	2,59	2,59	7,77	13,0	463,0	52,79	0,456 8
75-AL1/13-ST1A	BEAVER	75,0	12,5	87,5	6	1	3,99	3,99	3,99	12,0	302,9	25,76	0,382 0
73-AL1/43-ST1A	HORSE	73,4	42,8	116,2	12	7	2,79	2,79	8,37	14,0	537,3	61,26	0,393 6
79-AL1/13-ST1A	RACOON	78,8	13,1	92,0	6	1	4,09	4,09	4,09	12,3	318,3	27,06	0,363 5
84-AL1/14-ST1A	OTTER	83,9	14,0	97,9	6	1	4,22	4,22	4,22	12,7	338,8	28,81	0,341 5
95-AL1/16-ST1A	CAT	95,4	15,9	111,3	6	1	4,50	4,50	4,50	13,5	385,3	32,76	0,300 3
105-AL1/17-ST1A	HARE	105,0	17,5	122,5	6	1	4,72	4,72	4,72	14,2	423,8	36,04	0,273 0
105-AL1/14-ST1A	DOG	105,0	13,6	118,5	6	7	4,72	1,57	4,71	14,2	394,0	32,65	0,273 3
132-AL1/20-ST1A	COYOTE	131,7	20,1	151,8	26	7	2,54	1,91	5,73	15,9	520,7	45,86	0,219 2
132-AL1/7-ST1A	COUGAR	131,5	7,31	138,8	18	1	3,05	3,05	3,05	15,3	418,8	29,74	0,218 8
131-AL1/31-ST1A	TIGER	131,2	30,6	161,9	30	7	2,36	2,36	7,08	16,5	602,2	57,87	0,220 2
158-AL1/37-ST1A	WOLF	158,1	36,9	194,9	30	7	2,59	2,59	7,77	18,1	725,3	68,91	0,182 9
159-AL1/9-ST1A	DINGO	158,7	8,81	167,5	18	1	3,35	3,35	3,35	16,8	505,2	35,87	0,181 4
183-AL1/43-ST1A	LYNX	183,4	42,8	226,2	30	7	2,79	2,79	8,37	19,5	841,6	79,97	0,157 6
184-AL1/10-ST1A	CARACAL	184,2	10,2	194,5	18	1	3,61	3,61	3,61	18,1	586,7	40,74	0,156 2
212-AL1/49-ST1A	PANTHER	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	92,46	0,136 3
211-AL1/12-ST1A	JAGUAR	210,6	11,7	222,3	18	1	3,86	3,86	3,86	19,3	670,8	46,57	0,136 6
238-AL1/56-ST1A	LION	238,3	55,6	293,9	30	7	3,18	3,18	9,54	22,3	1 093,4	100,47	0,121 3
264-AL1/62-ST1A	BEAR	264,4	61,7	326,1	30	7	3,35	3,35	10,1	23,5	1 213,4	111,50	0,109 3
324-AL1/76-ST1A	GOAT	324,3	75,7	400,0	30	7	3,71	3,71	11,1	26,0	1 488,2	135,13	0,089 1
375-AL1/88-ST1A	SHEEP	375,1	87,5	462,6	30	7	3,99	3,99	12,0	27,9	1 721,3	156,30	0,077 1
374-AL1/48-ST1A	ANTELOPE	374,1	48,5	422,6	54	7	2,97	2,97	8,91	26,7	1 413,8	118,88	0,077 3
382-AL1/49-ST1A	BISON	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 442,5	121,30	0,075 8
430-AL1/100-ST1A	DEER	429,6	100,2	529,8	30	7	4,27	4,27	12,8	29,9	1 971,4	179,00	0,067 3
429-AL1/56-ST1A	ZEBRA	428,9	55,6	484,5	54	7	3,18	3,18	9,54	28,6	1 620,8	131,92	0,067 4
477-AL1/111-ST1A	ELK	477,1	111,3	588,5	30	7	4,50	4,50	13,5	31,5	2 189,5	198,80	0,060 6
476-AL1/62-ST1A	CAMEL	476,0	61,7	537,7	54	7	3,35	3,35	10,1	30,2	1 798,8	146,40	0,060 8
528-AL1/69-ST1A	MOOSE	528,5	68,5	597,0	54	7	3,53	3,53	10,6	31,8	1 997,3	159,92	0,054 7

NOTE Direction of lay of external layer is right-hand (Z).

Table F.43 — Characteristics of aluminium alloy conductor steel reinforced used in the United Kingdom — Type AL5/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
183-AL5/43-ST1A	KEZIAH	183,4	42,8	226,2	30	7	2,79	2,79	8,37	19,5	841,6	102,89	0,174 0
NOTE Direction of lay of external layer is right-hand (Z).													

Table F.44 — Characteristics of aluminium conductors used in Italy — Type AL1

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
25-AL1	25/7	25,2	7	2,14	6,42	68,8	4,53	1,135 0
34-AL1	35/7	34,4	7	2,50	7,50	93,9	6,01	0,831 7
49-AL1	50/7	49,5	7	3,00	9,00	135,2	8,41	0,577 6
68-AL1	70/19	68,3	19	2,14	10,7	187,8	12,30	0,420 5
93-AL1	95/19	93,3	19	2,50	12,5	256,3	16,32	0,308 1
125-AL1	120/19	125,5	19	2,90	14,5	344,9	21,33	0,229 0
244-AL1	240/37	244,4	37	2,90	20,3	674,0	41,55	0,118 0
491-AL1	500/61	490,6	61	3,20	28,8	1 357,4	80,95	0,059 0
767-AL1	800/61	766,5	61	4,00	36,0	2 120,9	122,65	0,037 7
NOTE Direction of lay of external layer is right-hand (Z).								

Table F.45 — Characteristics of aluminium alloy conductors used in Italy — Type AL3

Code	Old code	Area	No. of wires	Diameter		Mass per unit length	Rated strength	DC resistance
				Wire	Cond.			
		mm^2		mm	mm	kg/km	kN	Ω/km
35-AL3	35/7	34,9	7	2,52	7,56	95,3	10,30	0,942 1
49-AL3	50/7	49,5	7	3,00	9,00	135,1	14,60	0,664 7
68-AL3	70/19	68,3	19	2,14	10,7	187,6	20,16	0,484 0
95-AL3	95/19	94,8	19	2,52	12,6	260,2	27,96	0,349 0
125-AL3	120/19	125,5	19	2,90	14,5	344,5	37,02	0,263 6
147-AL3	150/37	147,1	37	2,25	15,8	405,3	43,40	0,225 6
185-AL3	185/37	184,5	37	2,52	17,6	508,4	54,44	0,179 9
196-AL3	200/37	196,4	37	2,60	18,2	541,2	57,95	0,169 0
244-AL3	240/37	244,4	37	2,90	20,3	673,3	72,10	0,135 8
304-AL3	300/61	304,2	61	2,52	22,7	840,8	89,75	0,109 4
403-AL3	400/61	402,9	61	2,90	26,1	1 113,6	118,86	0,082 6

NOTE Direction of lay of external layer is right-hand (Z).

Table F.46 — Characteristics of aluminium conductors steel reinforced used in Italy — Type AL1/ST1A

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
42-AL1/7-ST1A	42/ 6+1	42,4	7,07	49,5	6	1	3,00	3,00	3,00	9,00	171,2	15,27	0,675 7
68-AL1/39-ST1A	68/ 12+7	67,7	39,5	107,2	12	7	2,68	2,68	8,04	13,4	495,8	56,52	0,426 6
128-AL1/21-ST1A	128/ 26+7	127,6	20,9	148,5	26	7	2,50	1,95	5,85	15,9	516,0	46,79	0,226 3
191-AL1/31-ST1A	191/ 26+7	191,2	31,1	222,3	26	7	3,06	2,38	7,14	19,4	771,6	67,05	0,151 0
212-AL1/49-ST1A	212/ 30+7	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	92,46	0,136 3
265-AL1/43-ST1A	265/ 26+7	264,6	43,1	307,8	26	7	3,60	2,80	8,40	22,8	1 068,0	91,48	0,109 1
349-AL1/79-ST1A	349/ 30+19	349,2	78,9	428,2	30	19	3,85	2,30	11,5	26,9	1 585,7	145,87	0,082 8
382-AL1/49-ST1A	382/ 54+7	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 442,5	121,30	0,075 8
416-AL1/93-ST1A	416/ 30+19	415,6	93,3	508,9	30	19	4,20	2,50	12,5	29,3	1 881,8	172,82	0,069 6
434-AL1/56-ST1A	434/ 54+7	434,3	56,3	490,6	54	7	3,20	3,20	9,60	28,8	1 641,3	133,59	0,066 6
520-AL1/66-ST1A	520/ 54+19	519,5	65,8	585,3	54	19	3,50	2,10	10,5	31,5	1 952,1	162,72	0,055 6
629-AL1/79-ST1A	629/ 54+19	628,6	78,9	707,6	54	19	3,85	2,30	11,5	34,6	2 356,6	190,58	0,046 0
748-AL1/93-ST1A	748/ 54+19	748,1	93,3	841,4	54	19	4,20	2,50	12,5	37,7	2 799,3	226,03	0,038 6
859-AL1/109-ST1A	858/ 54+19	858,8	108,8	967,6	54	19	4,50	2,70	13,5	40,5	3 226,9	261,43	0,033 7
1657-AL1/209-ST1A	1657/ 150+37	1 656,7	208,7	1 865,4	150	37	3,75	2,68	18,8	56,3	6 222,4	503,01	0,017 5

NOTE Direction of lay of external layer is right-hand (Z).

Table F.47 — Characteristics of aluminium conductors steel reinforced used in Italy — Type AL1/ST3D

Code	Old code	Areas			No. of wires		Wire diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
42-AL1/7-ST3D	42/ 6+1	42,4	7,07	49,5	6	1	3,00	3,00	3,00	9,00	171,2	14,99	0,675 7
68-AL1/39-ST3D	68/ 12+7	67,7	39,5	107,2	12	7	2,68	2,68	8,04	13,4	495,8	59,29	0,426 6
128-AL1/21-ST3D	128/ 26+7	127,6	20,9	148,5	26	7	2,50	1,95	5,85	15,9	516,0	47,63	0,226 3
191-AL1/31-ST3D	191/ 26+7	191,2	31,1	222,3	26	7	3,06	2,38	7,14	19,4	771,6	69,23	0,151 0
212-AL1/49-ST3D	212/ 30+7	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	90,48	0,136 3
265-AL1/43-ST3D	265/ 26+7	264,6	43,1	307,8	26	7	3,60	2,80	8,40	22,8	1 068,0	89,76	0,109 1
349-AL1/79-ST3D	349/ 30+19	349,2	78,9	428,2	30	19	3,85	2,30	11,5	26,9	1 585,7	151,40	0,082 8
382-AL1/49-ST3D	382/ 54+7	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 442,5	119,32	0,075 8
416-AL1/93-ST3D	416/ 30+19	415,6	93,3	508,9	30	19	4,20	2,50	12,5	29,3	1 881,8	179,35	0,069 6
434-AL1/56-ST3D	434/ 54+7	434,3	56,3	490,6	54	7	3,20	3,20	9,60	28,8	1 641,3	133,59	0,066 6
520-AL1/66-ST3D	520/ 54+19	519,5	65,8	585,3	54	19	3,50	2,10	10,5	31,5	1 952,1	165,35	0,055 6
629-AL1/79-ST3D	629/ 54+19	628,6	78,9	707,6	54	19	3,85	2,30	11,5	34,6	2 356,6	196,10	0,046 0
748-AL1/93-ST3D	748/ 54+19	748,1	93,3	841,4	54	19	4,20	2,50	12,5	37,7	2 799,3	232,55	0,038 6
859-AL1/109-ST3D	858/ 54+19	858,8	108,8	967,6	54	19	4,50	2,70	13,5	40,5	3 226,9	269,04	0,033 7
1657-AL1/209-ST3D	1657/ 150+37	1 656,7	208,7	1 865,4	150	37	3,75	2,68	18,8	56,3	6 222,4	517,62	0,017 5
NOTE Direction of lay of external layer is right-hand (Z).													

Table F.48 — Characteristics of aluminium conductors steel reinforced used in Italy — Type AL1/ST4A

Code	Old code	Areas			No. of wires		Wire Diameter		Diameter		Mass per unit length	Rated strength	DC resistance
		Al	Steel	Total			Al	Steel	Core	Cond.			
		mm^2	mm^2	mm^2	Al	Steel	mm	mm	mm	mm	kg/km	kN	Ω/km
42-AL1/7-ST4A	42/ 6+1	42,4	7,07	49,5	6	1	3,00	3,00	3,00	9,00	171,2	16,22	0,675 7
68-AL1/39-ST4A	68/ 12+7	67,7	39,5	107,2	12	7	2,68	2,68	8,04	13,4	495,8	61,85	0,426 6
128-AL1/21-ST4A	128/ 26+7	127,6	20,9	148,5	26	7	2,50	1,95	5,85	15,9	516,0	48,99	0,226 3
191-AL1/31-ST4A	191/ 26+7	191,2	31,1	222,3	26	7	3,06	2,38	7,14	19,4	771,6	71,25	0,151 0
212-AL1/49-ST4A	212/ 30+7	212,1	49,5	261,5	30	7	3,00	3,00	9,00	21,0	973,1	99,14	0,136 3
265-AL1/43-ST4A	265/ 26+7	264,6	43,1	307,8	26	7	3,60	2,80	8,40	22,8	1 068,0	97,30	0,109 1
349-AL1/79-ST4A	349/ 30+19	349,2	78,9	428,2	30	19	3,85	2,30	11,5	26,9	1 585,7	156,53	0,082 8
382-AL1/49-ST4A	382/ 54+7	381,7	49,5	431,2	54	7	3,00	3,00	9,00	27,0	1 442,5	127,98	0,075 8
416-AL1/93-ST4A	416/ 30+19	415,6	93,3	508,9	30	19	4,20	2,50	12,5	29,3	1 881,8	185,42	0,069 6
434-AL1/56-ST4A	434/ 54+7	434,3	56,3	490,6	54	7	3,20	3,20	9,60	28,8	1 641,3	140,62	0,066 6
520-AL1/66-ST4A	520/ 54+19	519,5	65,8	585,3	54	19	3,50	2,10	10,5	31,5	1 952,1	169,63	0,055 6
629-AL1/79-ST4A	629/ 54+19	628,6	78,9	707,6	54	19	3,85	2,30	11,5	34,6	2 356,6	201,23	0,046 0
748-AL1/93-ST4A	748/ 54+19	748,1	93,3	841,4	54	19	4,20	2,50	12,5	37,7	2 799,3	238,62	0,038 6
859-AL1/109-ST4A	858/ 54+19	858,8	108,8	967,6	54	19	4,50	2,70	13,5	40,5	3 226,9	276,11	0,033 7
1657-AL1/209-ST4A	1657/ 150+37	1656,7	208,7	1 865,4	150	37	3,75	2,68	18,8	56,3	6 222,4	531,19	0,017 5

NOTE Direction of lay of external layer is right-hand (Z).

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