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Road vehicles — Automotive cables —

Part 6: Dimensions and requirements for 600 V a.c. or 900 V d.c. and 1 000 V a.c. or 1 500 V d.c. single core aluminium conductor cables

Véhicules routiers — Cables automobiles —

Partie 6: Dimensions et exigences des câbles en aluminium mono conducteurs de 600 V a.c. ou 900 V c.c. et 1 000 V a.c. ou 1 500 V c.c.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

A list of all parts in the ISO 19642 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document was prepared following a joint resolution to improve the general structure of the ISO Automotive Electric Cable standards. This new structure adds more clarity and, by defining a new standard family, opens up the standard for future amendments.

Many other standards currently refer to ISO 6722-1, ISO 6722-2 and ISO 14572. So these standards will stay valid at least until the next scheduled systematic review and will be replaced later on by the ISO 19642 series.

For new Automotive Cable Projects customers and suppliers are advised on using the ISO 19642 series.

Road vehicles — Automotive cables —

Part 6: Dimensions and requirements for 600 V a.c. or 900 V d.c. and 1 000 V a.c. or 1 500 V d.c. single core aluminium conductor cables

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate safety practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This document specifies the dimensions and requirements for single core cables intended for use in general purpose road vehicle applications where the nominal system voltage is 600 V a.c. or 900 V d.c. and 1 000 V a.c. or 1 500 V d.c. It also applies to the individual conductor cores used in multi core cables.

This document specifies requirements for aluminium conductor cables.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 19642-1, *Road vehicles — Automotive cables — Vocabulary and design guidelines*

ISO 19642-2, *Road vehicles — Automotive cables — Test methods*

EN 573-1, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 1: Numerical designation system*

EN 573-3:2013 *Aluminium and aluminium alloys — Chemical composition and form of wrought product — Part 3: Chemical composition and form of products*

EN 1715-2, *Aluminium and aluminium alloy — Drawing stock — Specific requirements for electrical applications*

ASTM B 231, *Standard Specification for Concentric-Lay-Standard Aluminium 1350 Conductors*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19642-1 apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Specifications

4.1 General test conditions

The test conditions of ISO 19642-2 shall apply.

The cables shall be submitted to the tests as specified in Table 3.

If suppliers and customers agree upon modifications or changes to the methods and requirements, all the changes and modifications shall be clearly documented.

4.2 Safety concerns

The precautions as described in the WARNING at the beginning of this document shall be followed.

4.3 Voltage ratings

The cables described in this document are limited to the voltage ratings shown below.

1. 600 V a.c. or 900 V d.c. maximum
2. 1 000 V a.c. or 1 500 V d.c. maximum

NOTE Annex B contains information regarding colouring for cables identified for the voltage ratings in this document.

4.4 Temperature classes

Temperature classes suitable for aluminium conductor cables are defined in Table 1.

Table 1 — Temperature class rating

Class	Equivalent class	Temperature °C
A	T1	−40 to 85
B	T2	−40 to 100
C	T3	−40 to 125
D	T4	−40 to 150
E	T5	−40 to 175
F	T6	−40 to 200

4.5 Conductor material

The conductors shall consist of annealed or annealed compressed aluminium or aluminium alloy strands. The specifications for the single strand wires of the conductors shall be according to Table 2 and completed by material specifications. Elongation requirements shall be established by agreement between the customer and the supplier. The finished cable shall meet the resistance requirements of Table 11 for all conductors.

The individual strands of the aluminium conductor shall be manufactured per 1 000 series aluminium or other alloys pursuant to EN 573-1. The chemical composition shall follow EN 573-3:2013, Table 1.

NOTE Examples for strands are shown in Annex A.

Table 2 — Characteristics of individual single strand wire after annealing

Tensile strength R_m[a,b] MPa	Reference conductor material	Elongation at break A[a,b] %	Conductivity k_{20}	
			%IACS	Sm/mm²
70 - 120	1000 series	≥16	≥61,2	≥35,5
Minimum 90	Other alloys	(Recommended) ≥8[c,d]	≥57,8[d]	≥33,5[d]

[a] The tensil strength and elongation at break shall be determined according to ISO 6892-1 and ASTM B 231.

[b] The tensil strength and elongation at break shall be measured at clamping length of 200 mm.

[c] This is not applicable for compressed conductors. The tensile strength, elongation, and chemical composition characteristics shall be established by agreement between customer and supplier.

[d] Additional aluminium alloys may be used. The conductivity, tensile strength, elongation characteristics and chemical composition shall be established by agreement between customer and supplier.

NOTE 1 See also EN-1715-2.

NOTE 2 %IACS is the Percentage of International Annealed Copper Standard.

4.6 Conductors

The conductors in the finished cable shall meet the cross-sectional area (CSA) and resistance requirements of Table 11.

The maximum diameter of the conductors is standardized and presented in Table 12.

The configuration of the stranded conductor is not standardized.

NOTE 1 Existing stranding configurations for aluminium conductors are presented in Table A.1.

NOTE 2 Preferred stranding configurations for aluminium conductors are presented in Table A.2.

Other stranding configurations may be used for aluminium conductors provided they meet the above requirements and are agreed between the customer and the supplier.

4.7 Insulation thickness

Two different insulation thicknesses are allowed in this document:

1. thick wall insulation;
2. thin wall insulation.

The minimum wall thickness requirements for the different ISO conductor sizes are standardized and specified in Table 12.

The nominal wall thickness is derived from the minimum wall thickness in Table 12 document by the following formulae:

$$w_{nom} = 1,25 \times w_{min} \text{ or } w_{nom} = w_{min} / 0,8$$

where

w_{min} is the minimum wall thickness;

w_{nom} is the nominal wall thickness.

4.8 Cable outside diameter

The cable outside diameter for each ISO conductor size and insulation thickness is standardized and specified in Table 12.

4.9 Representative conductor sizes for testing

When a test is required, all combinations of conductor size, insulation thickness and insulation formulation shall meet the specified requirements. However, if testing of representative conductor sizes is permitted by agreement between the customer and the supplier, compliance for a cable family may be demonstrated by testing examples of large and small conductor sizes only.

4.10 Reference and requirements for the tests according to ISO 19642-2

Table 3 provides a list of all relevant tests in ISO 19642-2:2019 for single core aluminium conductor cables.

Table 3 — Tests

Test description	Mandatory			If required[c]	
	In process[a]	Initial certification	Periodic[b]	Initial certification	Periodic[b]
5.1 **Dimensional tests**					
5.1.2 Cable outside diameter	—	X	X	—	—
5.1.3 Insulation thickness	—	X	X	—	—
5.1.4 Conductor diameter	—	—	—	X	X
5.1.5 Cross sectional area	—	—	—	X	X
5.1.6 In-process cable outside diameter	X	—	—	—	—
5.2 **Electrical tests**					
5.2.1 Conductor resistance	—	X	X	—	—
5.2.2 Determination of temperature coefficients	—	X	—	—	—
5.2.3 Withstand voltage	—	X	X	—	—
5.2.4 Withstand voltage after environmental testing[d]	—	—	—	—	—
5.2.5 Insulation faults	X	—	—	—	—
5.2.6 Insulation volume resistivity	—	—	—	X	X
5.3 **Mechanical tests**					
5.3.1 Strip force	—	—	—	X	X
5.3.2 Abrasion[e]					
5.3.2.4 Sandpaper abrasion test	—	X	X	—	—
5.3.2.5 Scrape abrasion test	—	X	X	—	—

Key

X: Test shall be performed according to ISO 19642-2

—: Test is not required

a A test made on the entire cable lot during or after manufacture.

b The frequency of periodic testing shall be established by agreement between the customer and the supplier.

c The usage of "If required" tests shall be established by agreement between the customer and the supplier.

d These tests are only used in preparation and after environmental endurance tests.

e Only one of the abrasion tests has to be performed by agreement between the customer and the supplier.

f Compliance for a cable family may be demonstrated by testing examples of large and small conductor sizes only.

g Some fluids are for "Initial certification" and others are "If required".

Table 3 *(continued)*

Test description	Mandatory			If required[c]	
	In process[a]	Initial certification	Periodic[b]	Initial certification	Periodic[b]
5.3.3 Breaking force of the finished cable	—	—	—	X	—
5.3.4 Cyclic bending	—	—	—	X	—
5.3.5 Flexibility	—	—	—	X	—
5.4 **Environmental tests**					
5.4.1 Specimen preparation and winding tests[d]	—	—	—	—	—
5.4.2 Long term heat ageing, 3 000 h at temperature class rating	—	X	—	—	—
5.4.3 Short term heat ageing, 240 h at temperature class rating +25 °C	—	X	X	—	—
5.4.4 Thermal overload, 6 h at temperature class rating +50 °C	—	—	—	X	X
5.4.5 Pressure test at high temperature	—	X	X	—	—
5.4.6 Shrinkage by heat	—	X	X	—	—
5.4.7 Low temperature winding	—	X	X	—	—
5.4.8 Cold impact	—	—	—	X	X
5.4.9 Temperature and humidity cycling[f]	—	—	—	X	—
5.4.10 Resistance to hot water[f]	—	X	—	—	—
5.4.11 Resistance to liquid chemicals[f, g]	—	X	—	X	—
5.4.12 Durability of cable marking[f]	—	—	—	X	X
5.4.13 Stress cracking resistance[f]	—	—	—	X	—
5.4.14 Resistance to ozone[f]	—	—	—	X	—
5.4.15 Resistance to flame propagation	—	X	X	—	—

Key

X: Test shall be performed according to ISO 19642-2

—: Test is not required

a A test made on the entire cable lot during or after manufacture.

b The frequency of periodic testing shall be established by agreement between the customer and the supplier.

c The usage of "If required" tests shall be established by agreement between the customer and the supplier.

d These tests are only used in preparation and after environmental endurance tests.

e Only one of the abrasion tests has to be performed by agreement between the customer and the supplier.

f Compliance for a cable family may be demonstrated by testing examples of large and small conductor sizes only.

g Some fluids are for "Initial certification" and others are "If required".

5 Requirements

5.1 General

The cables shall be tested per ISO 19642-2 according to their temperature class rating.

The cables shall be tested as specified in Table 3.

5.2 Dimensional tests

5.2.1 Cable outside diameter

No single value shall be greater or less than the standardized values in Table 12.

5.2.2 Insulation thickness

No single value shall be less than the standardized minimum value in Table 12.

5.2.3 Conductor diameter

No single value shall be greater than the maximum value in Table 12.

5.2.4 Cross sectional area

No single value shall be greater or less than the standardized values in Table 11.

5.2.5 In-process cable outside diameter

In-process cable outside diameter monitoring is mandatory.

The cable outside diameter measurement shall be within the standardized values of Table 12.

5.3 Electrical tests

5.3.1 Conductor resistance

No single value shall be greater than the maximum value in Table 11.

5.3.2 Determination of temperature coefficients

For aluminium, $\alpha_\rho = 4{,}03 \times 10^{-3}\ 1/K$.

For aluminium alloys, determine α_ρ per ISO 19642-2:2019, 5.2.2.

5.3.3 Withstand voltage

Breakdown shall not occur when the specified voltage in Table 4 is applied for the specified time.

Table 4 — Withstand voltage

Voltage rating			
600 V a.c. or 900 V d.c.		1 000 V a.c. or 1 500 V d.c.	
Withstand voltage	Hold time	Withstand voltage	Hold time
kV a.c.	min	kV a.c.	min
5	5	10	5

5.3.4 Withstand voltage after environmental testing

Breakdown shall not occur when the specified voltage in Table 5 is applied for the specified time.

Table 5 — Withstand voltage after environmental testing

Voltage rating			
600 V a.c. or 900 V d.c.		1 000 V a.c. or 1 500 V d.c.	
Withstand voltage	Hold time	Withstand voltage	Hold time
kV a.c.	min	kV a.c.	min
1	1	3	1

5.3.5 Insulation faults

The specified voltage in Table 6 shall be continuously applied.

Breakdown shall not occur.

Table 6 — Insulation faults

Voltage rating	
600 V a.c. or 900 V d.c.	1 000 V a.c. or 1 500 V d.c.
kV a.c.	kV a.c.
6	8

5.3.6 Insulation volume resistivity

The insulation volume resistivity shall not be less than the value in Table 7.

Table 7 — Insulation volume resistivity

Voltage rating	
600 V a.c. or 900 V d.c.	1 000 V a.c. or 1 500 V d.c.
Ω·mm	Ω·mm
10^{11}	10^{12}

5.4 Mechanical tests

5.4.1 Strip force

The measured force shall be within the values as agreed between the customer and the supplier.

5.4.2 Abrasion

5.4.2.1 General

This test is only applicable to cables with an ISO conductor size less than or equal to 6 mm^2, for which either sandpaper abrasion or scrape abrasion shall be used.

The customer and the supplier shall define which test shall be used.

No abrasion test is required for ISO conductor sizes greater than 6 mm^2.

5.4.2.2 Sandpaper abrasion test

Perform the test with an additional mass according to Table 8.

The mean value of the 4 readings shall be equal to or greater than the specified value in Table 8.

Table 8 — Sandpaper abrasion

ISO conductor size	Thick wall		Thin wall	
	Additional mass[a]	Minimum length of sandpaper	Additional mass[a]	Minimum length of sandpaper
mm^2	kg	mm	kg	mm
0,5	0,5	400	0,2	300
0,75		410		350
1		420		400
1,25		425		425
1,5		430		450
2		450		500
2,5	1,5	280	0,5	250
3		330		300
4		400		350
5		450		430
6		500		500

[a] The total vertical force exerted on the test specimen shall be the combination of the force exerted by the bracket, pivoting arm, support rod and additional mass.

5.4.2.3 Scrape abrasion test

Apply a total vertical force as specified in Table 9.

The minimum cycles shall be greater than or equal to the specified value in Table 9.

Table 9 — Scrape abrasion

ISO conductor size	mm^2	0,5	0,75	1	1,25	1,5	2	2,5	3	4	5	6
Vertical force	N	7,00										
Tolerance	N	±0,05										
Cycles	Minimum	300	350	400	400	450	500	550	600	700	700	700

5.4.3 Breaking force of the finished cable

The cable sizes to be tested and the requirement shall be as agreed between the customer and the supplier.

5.4.4 Cyclic bending

This test is only applicable to cables with an ISO conductor size less than or equal to 25 mm^2.

The requirement for this test shall be established by agreement between customer and supplier.

5.4.5 Flexibility

This test is applicable to cables with an ISO conductor size greater than or equal to 8 mm^2.

The requirement for this test shall be established by agreement between customer and supplier.

5.5 Environmental tests

5.5.1 Test specimen preparation and winding tests

ISO 19642-2:2019, 5.4.1 describes the mandrel sizes used for preparation of specimens in subsequent environmental tests.

It also describes the winding tests used to detect defects caused by environmental stresses.

5.5.2 Long term heat ageing, 3 000 h at temperature class rating

The specimen shall be aged for 3 000 h at the upper value of the temperature class rating.

After winding, no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.3 Short term heat ageing, 240 h at temperature class rating +25 °C

The specimen shall be aged for 240 h at the upper value of the temperature class rating plus 25 °C.

After winding, no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.4 Thermal overload, 6 h at temperature class rating +50 °C

The specimen shall be aged for 6 h at the upper value of the temperature class rating plus 50 °C.

After winding, no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.5 Pressure test at high temperature

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.6 Shrinkage by heat

The maximum shrinkage shall not exceed 2 mm from either end.

5.5.7 Low temperature winding

The specimen shall be conditioned for 4 h at the lower value of the temperature class rating.

After winding no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.8 Cold impact

Perform the test with a mass of the hammer according to Table 10.

After impact no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

Table 10 — Cold impact

ISO conductor size (a) mm2	Mass of the hammer (g)	
	Thick wall cable	Thin wall cable
$a \leq 4$	100	100
$4 < a \leq 10$	200	200
$10 < a \leq 50$	300	300
$50 < a \leq 95$	400	400
$95 < a$		X

Key

X: Cable type does not exist

5.5.9 Temperature and humidity cycling

After unwinding no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.10 Resistance to hot water

Perform the test with "+" on the conductor and "–" on the copper electrode.

With a new specimen, perform the test with reverse polarity.

For both specimens, the insulation volume resistivity shall not be less than the specified value in Table 7.

A visual examination of the insulation shall show no cracks.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.11 Resistance to liquid chemicals

After winding, no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.12 Durability of cable marking

All cable markings shall remain legible.

5.5.13 Stress cracking resistance

This test shall be performed for cables with insulation materials that are prone to environmental stress cracking problems (e.g. FEP and ETFE, with an ISO conductor size smaller than 6 mm2) by agreement between the customer and the supplier.

After the test, no conductor shall be visible.

During withstand voltage after environmental testing (5.3.4), breakdown shall not occur.

5.5.14 Resistance to ozone

The visual examination of the insulation shall show no cracks.

5.5.15 Resistance to flame propagation

Any combustion flame of insulating material shall extinguish within 30 s from the end of ignition and a minimum of 50 mm of insulation at the top of the test specimen shall remain unburned.

All 5 specimens shall pass the test.

Table 11 — Cross-sectional area (CSA) and conductor resistance

ISO conductor size	CSA mm²		Maximum conductor resistance mΩ/m at 20 °C	
mm²	maximum[b]	minimum	**Aluminium**[c]	**Aluminium alloy**[a,d]
0,5	0,502	0,465	X	77,0
0,75	0,754	0,698	41,2	43,6
1	1,01	0,932	30,8	32,7
1,25	1,25	1,16	24,8	26,3
1,5	1,47	1,36	21,2	22,4
2	1,98	1,83	15,7	16,6
2,5	2,45	2,27	12,7	13,4
3	3,03	2,80	10,2	10,9
4	3,95	3,66	7,85	8,32
5	4,73	4,38	6,57	6,96
6	5,93	5,49	5,23	5,55
8	7,82	7,24	3,97	4,20
10	10,2	9,47	3,03	3,21
12	12,3	11,3	2,53	2,68
16	16,1	14,9	1,93	2,05
20	19,5	18,1	1,59	1,69
25	25,1	23,2	1,24	1,31
30	28,8	26,6	1,08	1,14
35	35,3	32,7	0,878	0,931
40	39,4	36,5	0,788	0,835
50	50,6	46,9	0,613	0,650
60	59,1	54,7	0,525	0,556
70	71,9	66,6	0,432	0,457
85	85,0	78,7	0,365	0,387
95	95,0	88,0	0,327	0,346
120	122	113	0,255	0,270
160	159	147	0,195	0,207

Key

X: Conductor type does not exist

[a] For other alloys other values for the maximum resistance may be used. Maximum resistance requirements shall be established by agreement between customer and supplier.

[b] Additional maximum cross-sectional areas may be used. Maximum cross-sectional area requirements shall be established by agreement between customer and supplier.

[c] Calculated from minimum CSA with a conductivity of 35,5 Sm/mm² taking into account a 2 % increase due to stranding loss.

[d] Calculated from minimum CSA with a conductivity of 33,5 Sm/mm² taking into account a 2 % increase due to stranding loss.

Table 12 — Dimensions

ISO conductor size	Conductor diameter	Thick wall			Thin wall		
		Insulation thickness	Cable outside diameter		Insulation thickness	Cable outside diameter	
mm²	mm	mm	mm		mm	mm	
	maximum[a]	minimum[b]	maximum[a]	minimum[c]	minimum[b]	maximum[a]	minimum[c]
0,50	1,10	0,48	2,30	2,00	0,22	1,60	1,40
0,75	1,30	0,48	2,50	2,20	0,24	1,90	1,70
1	1,50	0,48	2,70	2,40	0,24	2,10	1,90
1,25	1,70	0,48	2,95	2,40	0,24	2,30	2,10
1,5	1,80	0,48	3,00	2,70	0,24	2,40	2,20
2	2,00	0,48	3,30	3,00	0,28	2,80	2,50
2,5	2,20	0,56	3,60	3,30	0,28	3,00	2,70
3	2,40	0,56	4,10	3,80	0,32	3,40	3,10
4	2,80	0,64	4,40	4,00	0,32	3,70	3,40
5	3,10	0,64	4,90	4,50	0,32	4,20	3,90
6	3,40	0,64	5,00	4,60	0,32	4,30	4,00
8	4,30	0,64	5,90	5,00	0,32	5,00	4,60
10	4,50	0,80	6,50	5,90	0,48	6,00	5,30
12	5,40	0,80	7,40	6,60	0,48	6,50	5,80
16	6,30	0,80	8,30	7,70	0,52	7,20	6,40
20	6,90	0,88	9,10	8,10	0,52	7,80	7,00
25	7,80	1,04	10,40	9,40	0,52	8,70	7,90
30	8,30	1,04	10,90	9,70	0,64	9,60	8,70
35	9,00	1,04	11,60	9,60	0,64	10,40	9,40
40	9,60	1,12	12,40	11,20	0,71	11,10	10,00
50	10,50	1,20	13,50	11,50	0,71	12,20	11,00
60	11,60	1,20	14,60	13,40	0,80	13,30	12,00
70	12,50	1,20	15,50	13,50	0,80	14,40	13,00
85	13,60	1,28	16,80	14,80	0,90	15,80	14,40
95	14,80	1,28	18,00	16,00	0,90	16,70	15,30
120	16,50	1,28	19,70	17,70	X		
160	19,00	1,28	22,50	19,80			

Key

X: Cable type does not exist

[a] The maximum cable diameter listed in the table is standardized for bunched conductors. Different maximum conductor diameters for rope and other stranding may be allowed as agreed between customer and supplier. This change can affect the cable outside diameter dimension in the table.

[b] Nominal insulation thickness w_{nom} is calculated by

$w_{nom} = 1{,}25 \times w_{min}$ or $w_{nom} = w_{min} / 0{,}8$

where

w_{min} is the minimum wall thickness;

w_{nom} is the nominal wall thickness.

[c] Minimum cable diameter is not valid for compressed conductors.

Annex A
(informative)

ISO conductor sizes, number of strands and strand diameter

A.1 Conductors — Existing stranding configurations

Table A.1 — ISO conductor sizes, number of strands and strand diameter

ISO conductor size	Structure A[a]		Structure B[a]		Structure C[a]	
	Number of strands	Maximum strand diameter	Number of strands	Maximum strand diameter	Number of strands	Maximum strand diameter
mm²		mm		mm		mm
0,75	7	0,38	11[b]	0,30[b]	19	0,23
1	7	0,43	16[b]	0,29[b]	19	0,27
1,25	19	0,30	16[b]	0,32[b]	12	0,37
1,5	19	0,32	16[b]	0,35[b]	37	0,23
2	19	0,37	15	0,42	37	0,27
2,5	19	0,43	X		37	0,30
3	19	0,46	23	0,42	37	0,33
4	37	0,38	30	0,42	47	0,33
5	37	0,41	36	0,42	58	0,33
6	37	0,46	45	0,42	70	0,33
8	X		59	0,42	98	0,33
10			50	0,52	126	0,33
12			60	0,52	154	0,33
16			78	0,52	209	0,33
20			95	0,52	247	0,33
25			122	0,52	323	0,33
30			141	0,52	361	0,33
35	121	0,62	172	0,52	456	0,33
40	134	0,62	193	0,52	494	0,33
50	172	0,62	247	0,52	646	0,33
60	201	0,62	289	0,52	741	0,33
70	180	0,72	351	0,52	855	0,33
85	213	0,72	420	0,52	1 064	0,33

Key

X: Cable type does not exist

[a] The strandings above highlight examples of conceptual configurations and are not intended to reflect any preferred constructions. Other stranding configurations may be used providing they meet the resistance and CSA requirements and are agreed between the customer and the supplier.

[b] Possible structure for smooth body, compressed conductor. The strand diameter specified is for non-compressed conductors. No strand diameter is specified for compressed conductors.