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MV AERIAL BUNDLED CABLES

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1 SCOPE

The aim of this document is to provide technical requirements for the supply of MV aerial cables bundled around a cable messenger to be used in the distribution networks of Enel Group Distribution Companies, listed below:

<i>Codensa</i>	<i>Colombia</i>
<i>Enel distribución Perú</i>	<i>Perú</i>
<i>Edesur</i>	<i>Argentina</i>
<i>e-distributie Banat</i>	<i>Romania</i>
<i>e-distributie Dobrogea</i>	<i>Romania</i>
<i>e-distributie Muntenia</i>	<i>Romania</i>
<i>e-distribuzione</i>	<i>Italy</i>
<i>Endesa Distribución Eléctrica</i>	<i>Spain</i>
<i>Enel distribución Chile</i>	<i>Chile</i>
<i>Enel Distribuição Ceará</i>	<i>Brazil</i>
<i>Enel Distribuição Rio</i>	<i>Brazil</i>
<i>Enel Distribuição Goiás</i>	<i>Brazil</i>

This standard specifies the construction, dimensions and test requirements that must be accomplished by medium voltage aerial bundled cables with rated voltage U_0/U (U_{max}) = 8,7/15(17,5) kV, 12/20(24) kV, 15/25 (31), 18/30(36) kV and 20/34,5(37,95) to be used in distribution systems by the utilities mentioned above. This standard replaces all the local standards used up to now by all the Distribution Companies, as long as local regulation allows it.

2 LIST OF COMPONENTS

The list of components with the main requirements, which is an integral part of the present document, is reported in the common list attached.

3 REFERENCE LAWS AND STANDARDS

The list of reference laws and standards are mentioned below in this document.

3.1 Laws

See Local Sections.

3.2 European & International Standards

- EN 50189 "Conductors for overhead lines. Zinc coated steel wires".

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- EN 50399 “Common test methods for cables under fire conditions - Heat release and smoke production measurement on cables during flame spread test - Test apparatus, procedures, results”.
- EN 50575 “Power, control and communication cables - Cables for general applications in construction works subject to reaction to fire requirements”.
- EN 13501-6 “Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on electric cables”.
- HD 605 S2 “Electric cables - Additional test methods”.
- HD620 S2 “Distribution cables with extruded insulation for rated voltages from 3,6/6 (7,2) kV up to and including 20,8/36 (42) kV.
- IEC 60228 “Conductors of insulated cables”.
- IEC 60230 “Impulse tests on cables and their accessories”.
- IEC 60332-1-2 “Tests on electric and optical fibre cables under fire conditions Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame”
- IEC 60502-2 “Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV) - Part 2: Cables for rated voltages from 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)”.
- IEC 60754-1 “Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content”.
- IEC 60754-2 “Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity”.
- IEC 60811-100 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 100: General”.
- IEC 60811-201 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 201: General tests - Measurement of insulation thickness”.
- IEC 60811-202: “Electric and optical fibre cables - Test methods for non-metallic materials - Part 202: General tests - Measurement of thickness of non-metallic sheath”.
- IEC 60811-401 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 401: Miscellaneous tests - Thermal ageing methods - Ageing in an air oven”.
- IEC 60811-402 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 402: Miscellaneous tests - Water absorption tests”.

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- IEC 60811-406 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 406: Miscellaneous tests - Resistance to stress cracking of polyethylene and polypropylene compounds”.
- IEC 60811-412 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 412: Miscellaneous tests - Thermal ageing methods - Ageing in an air bomb”
- IEC 60811-501 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 501: Mechanical tests - Tests for determining the mechanical properties of insulating and sheathing compounds”.
- IEC 60811-502: “Electric and optical fibre cables - Test methods for non-metallic materials - Part 502: Mechanical tests - Shrinkage test for insulations”.
- IEC 60811-503 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 503: Mechanical tests - Shrinkage test for sheaths”.
- IEC 60811-505: “Electric and optical fibre cables - Test methods for non-metallic materials - Part 505: Mechanical tests - Elongation at low temperature for insulations and sheaths”.
- IEC 60811-507: “Electric and optical fibre cables - Test methods for non-metallic materials - Part 507: Mechanical tests - Hot set test for cross-linked materials”.
- IEC 60811-508: “Electric and optical fibre cables - Test methods for non-metallic materials - Part 508: Mechanical tests - Pressure test at high temperature for insulation and sheaths”.
- IEC 60811-509: “Electric and optical fibre cables - Test methods for non-metallic materials - Part 509: Mechanical tests - Test for resistance of insulations and sheaths to cracking (heat shock test)”.
- IEC 60811-510 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 510: Mechanical tests - Methods specific to polyethylene and polypropylene compounds - Wrapping test after thermal ageing in air”.
- IEC 60811-511 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 511: Mechanical tests - Measurement of the melt flow index of polyethylene compounds”.
- IEC 60811-605 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 605: Physical tests - Measurement of carbon black and/or mineral filler in polyethylene compounds”.
- IEC 60811-606 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 606: Physical tests - Methods for determining the density”.
- IEC 60811-607 “Electric and optical fibre cables - Test methods for non-metallic materials - Part 607: Physical tests - Test for the assessment of carbon black dispersion in polyethylene and polypropylene”.
- IEC 60885-2 “Electrical test methods for electric cables -- Part 2: Partial discharge tests”.

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- IEC 60885-3 “Electrical test methods for electric cables. Part 3: Test methods for partial discharge measurements on lengths of extruded power cables”.
- IEC 61034-2 “Measurement of smoke density of cables burning under defined conditions -- Part 2: Test procedure and requirements”.
- IEC 61232 “Aluminum-clad steel wires for electrical purposes”.
- IEC 62230 “Electric cables - Spark-test method”.
- ISO 2859-1 “Sampling procedures for inspection by attributes -- Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection”.

3.3 Local Standards

See Local Section.

3.4 Replaced Local Standards

See Local Section.

4 CABLES CLASSIFICATION

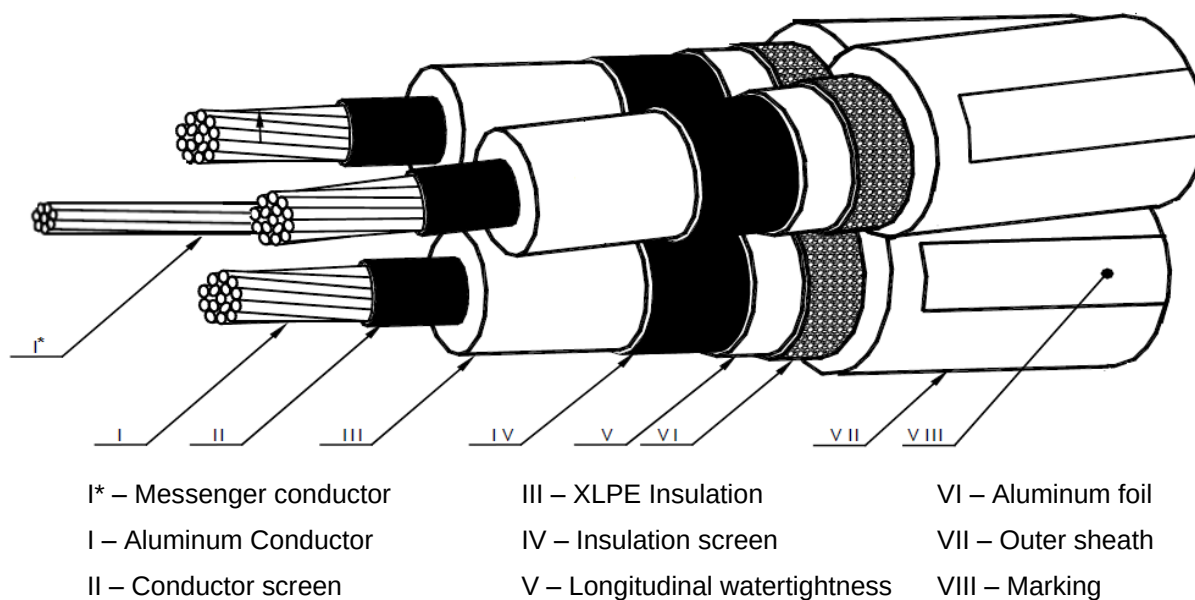
In Table 1 a general description of types of cables depicted in this standard are summarized. Detailed characteristics are described in section 5.

TYPE	DESCRIPTION
I	Three single cores cables, with aluminum conductor, cross-linked polyethylene insulation, laminated aluminum foil earth screen and polyolefin (polyethylene) outer sheath bundled around an alumoweld or galvanized steel conductor sheathed (if required) with cross-linked polyethylene.
II	Three single cores cables, with aluminum conductor, cross-linked polyethylene insulation, copper wires earth screen and polyolefin (polyethylene) outer sheath bundled around an alumoweld or galvanized steel conductor sheathed (if required) with cross-linked polyethylene.

Table 1 Type of cables

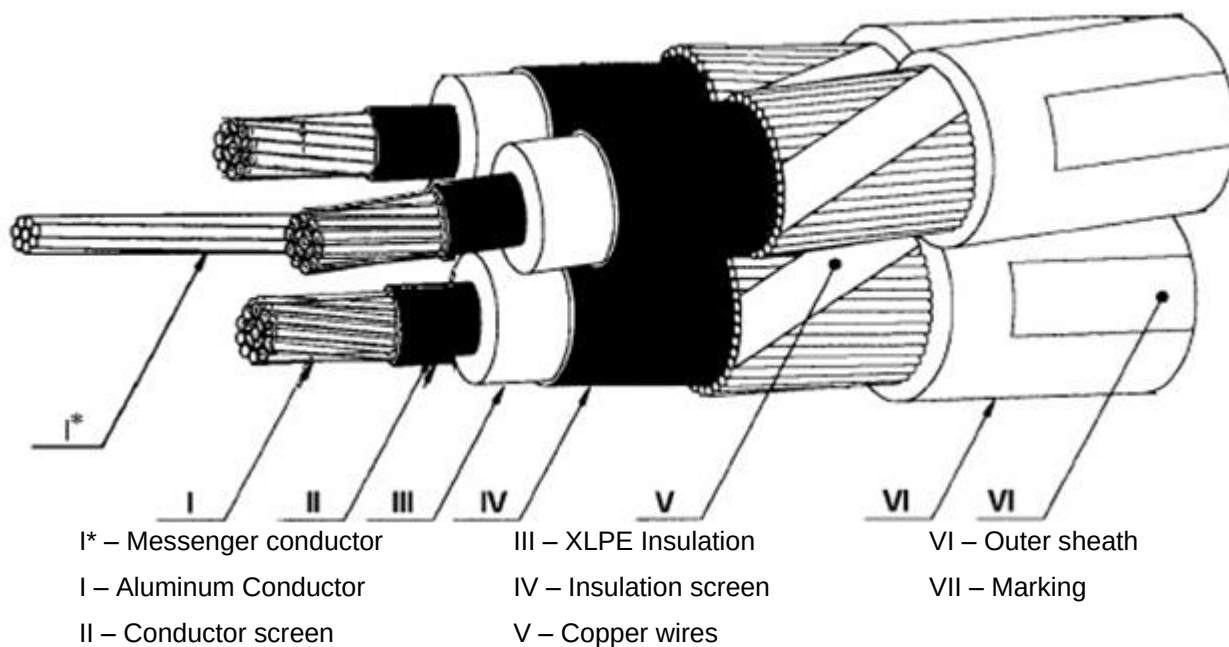
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Typical lay-out of Type I and Type II cables are shown in Figure 1 and Figure II.



Note: messenger conductor could be sheathed with XLPE

Figure 1 Type I cable lay-out



Note: messenger conductor could be sheathed with XLPE.

Figure 2 Type II cable lay-out

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5 DESIGN AND MANUFACTURE

5.1 Conductor

The aluminum conductors shall be stranded compacted circular class 2, complying all the features specified herein and in standard IEC 60228. Conductor material shall be AAC-1350 i.e. 99,5% aluminum content.

In Table 2 aluminum conductors for cables specified in this document are depicted.

Nominal cross-section [mm ²]	Minimum number of wires	Diameter of conductors [mm]		Maximum resistance of conductor at 20°C [Ω/km]
		Minimum	Maximum	
35	6	6,6	7,5	0,868
50	6	7,7	8,6	0,641
70	12	9,3	10,2	0,443
95	15	11,0	12,0	0,320
120	15	12,3	13,5	0,253
150	15	13,7	15,0	0,206
185	30	15,3	16,8	0,164

Table 2 Stranded compacted aluminum conductors characteristics

5.2 Conductor screen

It shall consist of a fully bonded layer of black semi-conductive cross-linked compound. It shall be extruded over the conductor to provide a smooth surface without causing any damage to the conductor or insulation and ensuring material compatibility.

The conductor screen minimum thickness measured and accepted at any point shall not be less than 0,3 mm. In addition, the average of all the measures shall not be less than the nominal thickness (0,5 mm).

5.3 Insulation

The insulation shall be applied by a suitable extrusion process, and shall form a compact and homogenous body. In addition, it shall be possible to remove it without creating any damage to the conductor.

The insulating material shall be cross-linked polyethylene; compliant with the characteristics required herein this document. Such XLPE compound can comply all the characteristics described in Standard IEC 60502-2 and standard HD 620 S2 part 1 for DIX 3 compound.

The XLPE insulation must allow maximum conductor temperatures of 90 °C in normal operation and 250 °C under short circuit condition by at least 5 seconds.

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The insulation minimum thickness measured and accepted at any point of the cable shall not be less than 90% of the nominal value minus 0,1 mm.

$$t_{min} \geq 0,9 t_n - 0,1$$

Where:

t_{min} : minimum insulation thickness in millimeters

t_n : nominal thickness in millimeters

In Table 3 rated and minimum thickness for XLPE insulated cables are shown.

Rated Voltage Uo/U (Umax) [kV]	Insulation thickness	
	Nominal (t_n) [mm]	Minimum (t_{min}) [mm]
8,7/15 (17,5)	4,5(3,5)*	4,0(3,1)*
12/20 (24)	4,9*	4,31*
15/25 (31)	6,6	5,84
18/30 (36)	7,25*	6,43*
20/34,5 (37,95)	6,6*	5,84*
*Reduced thickness insulation		

Table 3 Insulation reduced thickness values.

5.4 Insulation screen

A black layer of cross-linked semi-conductive compound shall be applied over the insulation. Such layer shall be compatible with insulation temperatures in normal operation and during short circuit.

The insulation screen shall be easily strippable. The compound mechanical properties before aging are: minimum tensile strength same as 7 N/mm² and a minimum elongation at break same as 150%.

The insulation screen minimum thickness measured and accepted at any point shall not be less than 0,3 mm. In addition, the average of all the measures shall not be less than the nominal thickness (0,5 mm).

5.5 Conductor screen, Insulation and Insulation screen application

The conductor screen, the insulation and the insulation screen shall be extruded in one operation, i.e. triple extrusion process. It is not permitted using any type of lacquer or other material between this layers.

5.6 Longitudinal water-tightness (only for Endesa)

A swelling tape made of suitable semi-conductive material shall be applied between the insulation screen and the earth screen in order to achieve longitudinal water-tightness. Such tape shall be applied without harming

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the adjacent layers and could work as additional separator layer as well. The swelling tape shall be applied with a minimum overlap same as 10%.

5.7 Earth screen.

For **Type I** cables a poly-laminated aluminum foil with minimum thickness same as 0,3 mm shall be applied over the swelling tape (if any), forming a longitudinal pipe with overlapping glued edges at least of 5 mm. Besides nullifying the electric field outside the cable and drain the current during short-circuits the aluminum tape screen is intended to ensure radial water-tightness. The aluminum tape screen shall be firmly bonded to the outer sheath.

For **Type II** cables a 25 mm² copper wire screen shall be applied between the insulation screen and the outer sheath. The copper screen shall be made with a continuous crown of annealed copper wires, with diameter between 0,5 and 1,0 mm, arranged in an open helix with step not greater than 20 times the cable diameter before the screening. It shall be used at least 30 wires distributed evenly over the circumference. The mechanical clamping of the copper wires shall be ensured without using copper tape or band copper strips.

Type I cables		
Disposition [n x mm ²]	Aluminum foil screen	
	Theoretical Cross-section [mm ²]	Maximum resistance at 20 °C [Ω/km]
3x35+50Y	18,5	1,622
3x50+50Y	19,5	1,551
3x95+50Y	22,5	1,344
3x150+50Y	25,5	1,186
3x185+50Y	27,0	1,120

Table 4 Type I cables 12/20(24) kV aluminum foil screen main characteristics

Type I cables		
Disposition [n x mm ²]	Aluminum foil screen	
	Theoretical Cross-section [mm ²]	Maximum resistance at 20 °C [Ω/km]
3x50+50Y	24,0	1,260
3x95+50Y	27,0	1,120
3x150+50Y	30,0	1,008
3x185+50Y	31,5	0,960

Table 5 Type I cables 18/30(36) kV aluminum foil screen main characteristics

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Type II cables		
Disposition [n x mm ²]	Cross-section [mm ²]	Maximum resistance at 20 °C [Ω/km]
All	25	0,727

Table 6 Type II copper wires screen main characteristics

5.8 Outer Sheath

The outer sheath shall be resistant to moisture, abrasion and UV.

Unless otherwise indicated the outer sheath color shall be grey RAL 7001.

The material shall be polyethylene compliant with the characteristics required herein.

The minimum thickness of the outer sheath measured and accepted at any point of the cable shall not be less than 80% of the nominal value minus 0,2 mm. In addition, the average of all these measures should not be less than the nominal thickness.

$$t_{min} \geq 0,8 t_n - 0,2$$

Where:

t_{min} : minimum thickness in millimeters

t_n : nominal thickness in millimeters

In Table 7 rated and minimum thickness of the polyolefin outer sheath are shown.

Cross-section [mm ²]	Sheath nominal thickness [mm]	Sheath minimum thickness [mm]
35	1,8	1,24
50	1,9	1,32
70	1,9	1,32
95	1,9	1,32
120	1,9	1,32
150	2	1,40
185	2	1,40

Table 7 PO outer sheath thickness

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For **Endesa Type I** cables DMZ2 polyolefin of standard HD 620 S2 part 1 shall be used. The nominal thickness of the outer sheath shall be same as 2,75 mm. In addition, the minimum thickness measured and accepted at any point of the cable shall not be less than 2,0 mm.

5.9 Messenger

The messenger may be made of aluminum clad steel wires type 20SA in compliance with standard IEC 61232 or galvanized steel ST1A in compliance with standard EN 50189.

The messenger wires shall be stranded in clockwise sense, with a pitch ratio same as 90 mm to 144 mm. Welding points are forbidden.

If required the messenger shall be insulated with XLPE compliant with the characteristics required herein. Such compound complies DCX 1 of standard HD 620 S2 part1.

The minimum thickness of the outer sheath measured and accepted at any point of the cable shall not be less than 85% of the nominal value minus 0,1 mm. In addition, the average of all these measures should not be less than the nominal thickness, same as 1,2 mm.

In following tables the main characteristics of the messenger are summarized.

Aluminum clad steel 20SA		
Description	Unit	Requirement
Theoretical cross-section*	[mm ²]	49,48
Wires disposition	N°x mm	7x3
Bare messenger diameter	mm	9
Maximum resistance at 20 °C	[Ω/km]	1,77
Rated mass*	[kg/km]	329,3
Minimum breaking load (after stranding)	[daN]	5.980
Young modulus*	[daN/mm ²]	16.200
Coefficient of linear thermal expansion*	[C ⁻¹]	13 x 10 ⁻⁶
* Reference values for network design purposes		

Table 8 Aluminum clad steel messenger characteristics with type 20SA wires.

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Galvanized steel ST1A		
Description	Unit	Requirement
Theoretical cross-section	[mm ²]	49,48
Wires disposition	N°x mm	7x(3±1,5%)
Bare messenger diameter	mm	9
Maximum resistance at 20 °C	[Ω/km]	4,00
Rated mass	[kg/m]	0,390
Minimum breaking load	[daN]	6.000
Minimum young modulus	[daN/mm ²]	15.000
Coefficient of linear thermal expansion	[K ⁻¹]	10,5 x 10 ⁻⁶

Table 9 Galvanized steel messenger characteristics with type ST1A wires

5.10 Ampacity and Short-circuit rating

The ampacity and short-circuit rating **estimated** values shall be given for network design purposes.

Unless otherwise indicated in local sections, such ampacity values shall be calculated in steady state condition, when installed in air using the following operational conditions:

- Maximum conductor temperature 90 °C
- Ambient air temperature 40 °C
- Wind speed 2 km/h
- Solar radiation intensity 10³ W/m²
- Both end bonding

Regarding short-circuit rating adiabatic and non-adiabatic values shall be calculated using the following conditions:

- Conductor initial temperature 90 °C
- Conductor final temperature 250 °C
- Tape foil screen initial temperature 75 °C
- Tape foil screen final temperature 150 °C
- Copper wires screen initial temperature 80 °C
- Copper wires screen final temperature 180 °C
- Messenger initial temperature 60 °C
- Messenger final temperature 150 °C
- Short-circuit duration: 0,5 s and 1 s

For reference values see local section.

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5.11 Constructive aspects

Cables shall be bundled around the messenger conductor to the left (anti-clockwise). The length of lay shall be up to 40D where D is intended as one phase external diameter.

5.12 Cable designation and Markings

5.12.1 Cable designation

See Local Section.

5.12.2 Marking

The marking must be indelible paint, easily legible and carried out by indenting or embossing above the surface of the outer sheath in a continuous way.

Durability shall be checked by the test given in sub-clause 2.5.4 of standard HD 605.

Specific characteristics are detailed in Local Section.

6 TESTS

For **Endesa** tests see Local Section F.

6.1 Test classification

6.1.1 Acceptance tests

Acceptance tests (routine tests and sample tests) shall be carried out in the Supplier's facilities.

6.1.2 Routine tests

Routine tests shall be performed at 100% of delivered spools to demonstrate product integrity.

6.1.3 Sample test

Sample tests are carried out over samples taken from a complete cable (See Table 10 in sub-clause 6.2 for sampling) in order to verify that the finished product meet the design specifications.

6.1.4 Type test

Type tests shall be performed before supplying a type of cable covered by this standard in order to demonstrate satisfactory performance characteristics to meet the intended application.

When type tests have been successfully performed on one type cable covered herein with a specific cross-section, rated voltage and construction characteristics, the type approval could be accepted valid as long as the following conditions are met:

- The conductor cross-section is not larger than that of the tested cable.
- The cable as similar constructions as that of the tested cable, i.e. utilizes same materials, (conductor, screens, insulation, earth screen, outer sheath) and the same manufacturing process.
- The rated voltage not exceeds that of the tested cable.

When design, manufacturing process or materials are changed (which might affect the performance characteristics of the cable), the relevant type tests shall be repeated.

Cables shall undergo type tests and acceptance tests for type approval.

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6.2 Sampling and acceptance criteria

In order to determine acceptability of a lot, an inspection by attributes following a simple sampling plan shall be performed, in compliance with standard ISO 2859-0 and ISO 2859-1.

Specifically, AQL=1,5%, level II, rejecting any “minor, major or critical” defect in the inspection.

The costs of rejected materials will be charged to the bidder. The approval or rejection of each one of the samples will be according to what is required in standard ISO 2859-1 for each one of the trials. In detail, if a lot doesn't comply with what is required in the electric resistance test according to the approval requirements of the reference standard, the Inspector can carry out such test to all the units that make up the lot.

If only a single spool is purchased, it must be tested according to what is indicated for a single sample.

Amount of reels	Numbers of samples	Acceptable Level	Rejection Level
2 - 8	2	0	1
9 - 15	3	0	1
16 - 25	5	0	1
26 - 50	8	0	1
51 - 90	13	0	1
91 - 150	20	1	2
151 - 280	32	1	2
281 - 500	50	2	3
501 - 1200	80	3	4
1201 - 3200	125	5	6
3201 - 10000	200	7	8
>10000	315	10	11

Table 10: Samples and Grade of Acceptance to Each of the Trials

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6.3 Routine tests list

N°	Test	Requirements	Test method
1	Voltage Test Test voltage Test duration Test Result	3,5 U ₀ 5 min No breakdown	IEC 60502-2 sub-clause 16.4 on each phase cable
2	Conductor electrical resistance measurement	See sub-clause 5.1	IEC 60502-2 sub-clause 16.2
3	Earth Screen electrical resistance measurement	See sub-clause 5.7	IEC 60502-2 sub-clause 16.2
4	Partial discharge test Applied voltage before test Applied voltage duration Max. discharge magnitude Sensitivity level	After Voltage test N°1 2 U ₀ ≤ 60 s 5 pC ≤ 5 pC	IEC 60885-3
5	Outer sheath voltage test (spark test) Test result Test voltage DC AC	No breakdown 25 kV 15 kV	IEC 62230

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6.4 Sample tests list

N°	Test	Requirements	Test method
1	Conformity to the approved type e.g.: marking, colors, number conductor wires, insulation and outer sheath application, etc. Lay length (Pitch) measurement	Cables shall comply characteristics described herein	Constructive characteristics, i.e. marking, number of conductor wires, colors shall be inspected by visual examination.
2	Cable mass per unit length	The value shall be recorded	HD 605 sub-clause 2.1.13.1
3	Conductor diameter measurement	See sub-clause 5.1	IEC 60811-203
4	Conductor screen thickness measurement	See sub-clause 5.2	IEC 60811-201
5	Insulation screen thickness measurement	See sub-clause 5.4	IEC 60811-201
6	Insulation screen strippability test Min. force required Max. force required	4 N 45 N	IEC 60502-2 sub-clause 19.23
7	Insulation thickness measurement	See sub-clause 5.3	IEC 60811-201
8	Insulation mechanical properties Before ageing on sample Minimum tensile strength Minimum elongation at break	12,5 MPa 200%	IEC 60811-501
9	Insulation hot set test Temperature Duration Mechanical stress Maximum elongation under load Maximum residual elongation	200 °C 15 min 0,2 MPa 175% 15%	IEC 60811-507
10	Voltage Test (Complete cable) Test voltage Test duration Sample length Test Result	4 U ₀ 4 h > 5 m per core No breakdown	IEC 60502-2 sub-clause 17.9

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6.5 Type tests list

N°	Test	Requirements	Test method
1	Sequential electrical tests Sample	15 m of cable 15 to 20 m	
1.1	Partial discharge test Test Voltage Discharge magnitude	2 U ₀ ≤ 5 pC	IEC 60885-3
1.2	Partial discharge measurement after bending test Cycles Test cylinder Discharge magnitude	3 20(d+D)±5% ≤ 5 pC	IEC 60502-2 sub-clause 18.2.4
1.3	Tan δ measurement as a function of the temperature Test voltage Tan δ at (20 ± 3) °C Tan δ at (90 ± 5) °C	U ₀ ≤ 20x10 ⁻⁴ ≤ 40x10 ⁻⁴	IEC 60502-2 sub-clause 18.2.6
1.4	Thermal cycle test followed by partial discharge test Discharge magnitude	≤ 5 pC	IEC 60502-2 sub-clause 18.2.7
1.5	Impulse test followed by a voltage test Test result	No breakdown	IEC 60502-2 sub-clause 18.2.8
1.6	High voltage test A.C test voltage Duration test Test result	4 U ₀ 4 h No breakdown	IEC 60502-2 sub-clause 18.2.9

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N°	Test	Requirements	Test method
2	Insulation resistance at 90 °C Volume resistivity [$\Omega \cdot \text{cm}$]	10^{12}	IEC 60502-2 sub-clause 18.3.3
3	Insulation mechanical properties After ageing on sample Temperature Duration T1 <i>Minimum Tensile strength</i> Maximum variation T1/T0 <i>Minimum elongation at break</i> Maximum variation T1/T0	135 °C 168 h $\pm 25\%$ $\pm 25\%$	IEC 60811-501 IEC 60811-401
4	Insulation water absorption test (Gravimetric method) Temperature Duration Maximum variation of mass	85 °C 336 h 1 mg/cm ²	IEC 60811-402
5	Insulation shrinkage test Duration Temperature Maximum shrinkage	1 h 130 °C 4%	IEC 60811-502
6	Insulation screen resistivity measurement Volume resistivity Oven temperature	$\leq 500 \Omega \cdot \text{m}$ 90 $\pm$ 2 °C	IEC 60502-2 Annex D
7	Insulation screen mechanical properties Minimum tensile strength Minimum elongation at break	7 MPa 150%	IEC 60811-501 sub clause 4.3
8	Insulation screen strippability test (at 0 °C, 20 °C, 40 °C) Min. force required Max. force required	4 N 45 N	IEC 60502-2 sub-clause 19.23

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N°	Test	Requirements	Test method
9	Earth screen adhesion test (Type I cables) Minimum strength	>12 N	HD 605 sub-clause 2.4.17.1
10	Sheath mechanical properties After ageing on sample Temperature Duration T1 Minimum elongation at break	110±2 °C 240 h 300%	IEC 60811-501 IEC 60811-401
11	Sheath pressure test at high temperature Duration Temperature Maximum depth of indentation	6 h 110±5 °C 30%	IEC 60811-508
12	Test at low temperature (Sheath) Elongation test at low temperature Temperature Minimum elongation	-15±2 °C 20%	IEC 60811-505
13	Sheath shrinkage test Cycles Duration Temperature Maximum shrinkage	5 5 h 80±2 °C 3%	IEC 60811-503
14	Sheath abrasion resistance test Temperature Mass Speed Number of scratches	20±5 °C 20 kg 0,3 ±15% m/s 8	HD 605 Sub-clause 2.4.22

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N°	Test	Requirements	Test method
15	Sheath water absorption test Temperature Duration Maximum variation of mass	(Gravimetric method) 85±2 °C 336 h 5 mg/cm ²	IEC 60811-402
16	Sheath UV ray resistance test Tensile strength max variation Elongation at break max variation Discoloration	15% 15% Poor	HD 605 Sub clause 2.4.23
17	Test under fire conditions* (Complete cable)	The cable shall be classified Minimum fire class Fca	EN 50575 sub-clause 4.1
18	Non contamination test (Complete cable) XLPE Insulation Temperature Duration T2 <i>Tensile strength</i> max variation T2/T0 <i>Elongation at break.</i> Max variation T2/T0 PO Sheath Temperature Duration T1 <i>Elongation at break</i> Maximun variation T1/T0	100 °C 168 h ±25% ±25% 100 °C 168 h ±25%	IEC 60811-501 IEC 60811-401 sub-clause 4.2.3.4
19	Radial water-tightness test and corrosion resistance test (Complete cable) (Type I cables)	No corrosion	HD 605 sub-clause 5.5

*Only for Italy, Spain and Romania

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6.6 Aluminum clad steel messenger tests

N°	Test	Requirements	Test Method	S	T
1	Compliance with general requirements	See sub-clause 5.9 The wires shall have a homogeneous aspect and a smooth surface, cylindrical and regular, without any ruling, bristle, crack, trimming, leakage of material, inclusion, etc.	Visual examination	X	X
2	Wire diameter	3 mm $\pm$ 1,5%	HD 605 subclause 2.1.4.1	X	X
3	Wire tensile strength and elongation at break Tensile strength Min. elongation break referred to the initial marks distance of 200 mm Minimum tensile load referred to 1 % elongation	$\geq 134,3$ da N/mm ² $\geq 1,2$ % $\geq 120,5$ da N/mm ²	HD 605 Sub-clause 2.3.3 (a)	X	X
4	Torsion test on the wire Minimum number of turns without breaking	30 before stranding, 28 after During the test up to the sample breaking no bristles, crack or other superficial imperfections which can mean wire defects or bad adhesion between steel and aluminum layer shall be revealed. Also in the breaking section the aluminum shall adhere to the steel core.	HD 605, sub-clause 2.3.4	X	X

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N°	Test	Requirements	Test Method	S	T
5	Mass determination of complete messenger	The value shall be recorded	Weighing of a sample at least 3 m long	X	X
6	Tensile strength at break of complete messenger	See sub-clause 5.9	HD 605, sub-clause 2.3.3(b)	X	X
7	Electrical resistance	See sub-clause 5.9		-	X
8	Vickers hardness Test load Test result	HV 0,025 0,245 N ≥35	ISO 6507-3	-	X
9	Wires pitch measurement	See sub-clause 5.9		X	X
S: Sample test T: Type test					

6.7 Galvanized steel messenger tests

N°	Test	Requirements	Test Method	S	T
1	Compliance with general requirements	See sub-clause 5.8 The wires shall have a homogeneous aspect and a smooth surface, cylindrical and regular, without any ruling, bristle, crack, trimming, leakage of material, inclusion, etc.	Visual examination	X	X
2	Wire diameter	3 mm ±1,5%	EN 50189	X	X
3	Stress at 1% extension	EN 50189 sub clause 11.3	EN 50189 sub clause 11.3	-	X
4	Tensile strength	EN 50189 sub clause 11.4	EN 50189 sub clause 11.4	X	X
5	Ductility test	EN 50189 Sub clause 11.5.2	EN 50189 Sub clause 11.5.2	-	X

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N°	Test	Requirements	Test Method	S	T
6	Mass of zinc coating	EN 50189 sub clause 11.6	EN 50189 sub clause 11.6	-	X
7	Tensile strength at break of complete messenger	See sub-clause 5.9	The breaking load shall be determined by means of a suitable testing machine	X	X
8	Wire pitch measurement	See sub-clause 5.9		X	X
S: Sample test T: Type test					

6.8 Messenger sheath tests

N°	Test	Requirements	Test Method	S	T
1	Insulation thickness measurement Nominal thickness Minimum thickness at any point	1,2 mm 0,92 mm	IEC 60811-201	X	X
2	Mechanical properties of XLPE Before ageing on sample Minimum tensile strength Minimum elongation at break	14,5 MPa 200%	IEC 60811-501	X	X
3	Hot set test of XLPE Temperature Duration Mechanical stress Maximum elongation under load Maximum residual elongation	200 °C 15 min 0,3 MPa 100% 15%	IEC 60811-507	-	X

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N°	Test	Requirements	Test Method	S	T
4	XLPE mechanical properties After ageing on sample Temperature Duration T1 <i>Minimum Tensile strength</i> Maximum variation T1/T0 <i>Minimum elongation at break</i> Maximum variation T1/T0	150 °C 240 h ±25% ±25%	IEC 60811-501 IEC 60811-401	-	X
5	XLPE Shrinkage test (Before and after ageing) Duration Temperature Maximum shrinkage	1 h 100 °C 4%	IEC 60811-401 IEC 60811-502	-	X
6	Insulation resistance at 90 °C Water immersion duration Volume resistivity [$\Omega \cdot \text{cm}$] Insulation constant K_i [$\text{M}\Omega \cdot \text{km}$]	1 h 10^{12} 1000	IEC 60502-1 sub-clause 17.2	-	X
7	Carbon black content (For black sheath)	$\geq 2,5\%$	IEC 60811-605	-	X
R: Routine test S: Sample test T: Type test					

7 GUARANTEE

Requirement of warranty will be indicated in the request for bids, indicating periods and standards.

8 CONDITIONS OF SUPPLY

See Local Section

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9 TECHNICAL CHECK-LIST

The following chart indicates the minimum technical information that suppliers shall give in the tender.

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Info	
1.2	Factory	-	Info	
2	MAIN FEATURES			
2.1	Distribution Company and Country	-		
2.2	Country Code	-		
2.3	GS Type Code			
2.4	Nominal Voltage U ₀ /U (U _{max})	[kV]		
2.5	Type I or Type II	-		
2.6	Disposition	[n x mm ²]		
3	CONDUCTOR			
3.1	Material	-		
3.2	Nominal cross-section	[mm ²]		
3.3	Minimum number of wires of conductor	-		
3.4	Minimum diameter	[mm]		
3.5	Maximum diameter	[mm]		
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]		
3.7	Stranding Type	-		
4	CONDUCTOR SCREEN			
4.1	Material			
4.2	Nominal thickness	[mm]		
4.3	Minimum thickness	[mm]		
4.4	Maximum potential gradient at U ₀	[kV/mm]		
5	INSULATION			
5.1	Material	-		
5.2	Nominal thickness	[mm]		
5.3	Minimum thickness	[mm]		
5.4	Color	-		
6	INSULATION SCREEN			
6.1	Material			
6.2	Nominal thickness	[mm]		
6.3	Minimum thickness	[mm]		
6.4	Maximum potential gradient at U ₀	[kV/mm]		

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Item	Description	Unit	Required	Offered
7	LONGITUDINAL WATER-TIGHTNESS (only for Endesa)			
7.1	Material			
7.2	Nominal thickness	[mm]		
8	EARTH SCREEN			
8.1	Minimum thickness (when aluminum foil)	[mm]		
8.2	Cross-section	[mm ²]		
8.3	Maximum resistance at 20°C	[Ω/ km]		
8.4	Wires diameter (when copper wires)			
8.5	Number of wires (when copper wires)			
9	OUTER SHEATH			
9.1	Material			
9.2	Nominal thickness			
9.3	Minimum thickness			
9.4	Color			
10	MESSENGER CHARACTERISTICS			
10.0	Material			
10.1	Number of wires	N° x mm		
10.2	Messenger diameter	[mm]		
10.3	Wire diameter	[mm]		
10.4	Cross-section (Informative value)	[mm ²]		
10.5	Weight (sheathed and bare)	[kg/km]		
10.6	Maximum electrical resistance at 20 °C	[Ω/km]		
10.7	Tensile strength (min.)	[daN]		
10.8	Young's modulus	[kN/mm ²]		
10.9	Expansion coefficient	[k ⁻¹]		
10.10	Sheath material			
10.11	Sheath nominal thickness	[mm]		
10.12	Sheath minimum thickness	[mm]		
10.13	Sheath color			

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11	ADDITIONAL FEATURES			
11.1	Maximum total diameter	[mm]		
11.2	Drum Type			
11.3	Total length in one drum	[m]		
11.4	One phase weight	[kg/km]		
11.5	Total weight	[kg/km]		
11.6	Ampacity (see clause 5.10 for conditions)	[A]		
11.7	Conductor SC current (see clause 5.10)	[kA]		
11.8	Earth screen SC current (see clause 5.10)	[kA]		
11.9	Messenger SC current (see clause 5.10)	[kA]		
11.10	Fire reaction Class (EN 50575 if apply)			
11.11	Positive sequence reactance	[Ω/ km]		
11.12	Positive sequence capacitance	[μF/km]		
11.13	Zero sequence resistance at 20 °C	[Ω/ km]		
11.14	Zero sequence reactance	[Ω/ km]		
11.15	Zero sequence capacitance	[μF/km]		

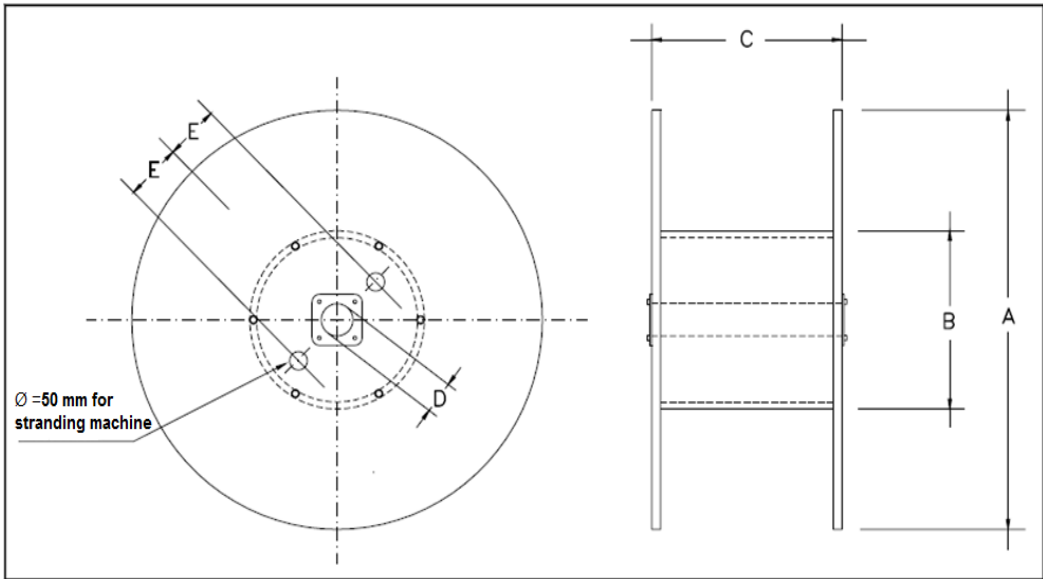
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LOCAL SECTION A – Codensa

N°	TITLE	DESCRIPTION
3.3	Local Standards	RETIE- Reglamento técnico de instalaciones eléctricas.
3.4	Replaced Local Standards	This Global standard replace local standard ET-130
5.3	Insulation	The XLPE compound shall have tree retardant characteristics, complying standard ASTM D6097
5.8	Outer Sheath	The outer sheath shall be grey, with a colored strip in order to identify the phases complying the following indications: Phase A: Grey outer sheath with a violet strip Phase B: Grey outer sheath with a brown strip Phase C: Grey outer sheath with a red strip
5.12.2	Marking	Markings shall be indelible spaced from each other 1 meter maximum. The following information shall be marked in relief: Manufacturer name or trademark BOG-CUN Year of manufacture Rated Voltage $U_0/U(U_{max})$ Insulation material Cable cross-section [mm ²] Metric marking Phase identification using violet, brown and red strips.
8	CONDITIONS OF SUPPLY	Packaging and Labelling Cables shall be delivered on spools made of wood or metal, such spool will not be returned. Characteristics are indicated in Figure A, dimensions are depicted in Table A. The total length of the supplied cable shall not be less than that requested in the purchase order and shall not be longer by any more than 5%. The maximum gross weight of the packaged spool must not exceed 3500 kg.

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LOCAL SECTION A – Codensa

N°	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	The ends of the cables on each spool must be protected with caps or hoods that prevent the entry of moisture. These ends internally secured to the spools, must be mechanically protected against possible damages resulting from handling and transportation of each spool, leaving both ends accessible through the use of an internal helix or reel on each spool. When distance between manufacturing facilities and Enel Distribución Colombia storage center is less than 200 km and is necessary only one mean of transportation, It is mandatory to use internal helix for cables cross-section greater of equal to 120 mm². However, moisture protection on both visible ends of the cables, mechanical protection, and careful handling shall be applied. Some Purchase orders could request 2,000 m of maximum length per spool and/or pre-joined cables. The supplier shall process RETIE certification in order to deliver the order. Spools made of wood shall be treated according to the international requirements for the control of plant disease, avoiding the compounds "Pentachlorophenol" and "Creosote". The treatment must include, at least: highly toxic to xylophagous organisms, high penetration and holding power, chemical stability, non-corrosive substances to metals that could affect the physical characteristics of wood.  Figure A

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LOCAL SECTION A – Codensa

N°	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	<u>Dimensions:</u> <table><tr><td>A⁽¹⁾</td><td>B</td><td>C⁽¹⁾</td><td>D⁽²⁾</td><td>E</td></tr><tr><td>mm</td><td>mm</td><td>mm</td><td>mm</td><td>mm</td></tr><tr><td>2000</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table>	A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E	mm	mm	mm	mm	mm	2000	(3)	1120	80	(4)
		A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E											
		mm	mm	mm	mm	mm											
		2000	(3)	1120	80	(4)											
		Table A															
		Notes:															
		(1) Maximum value.															
		(2) Minimum value.															
		(3) Two times the minimum bending radius indicated by the supplier.															
		(4) 300 or 180 mm according to spool type (large or small, respectively)															
The spools must contain:																	
• An external protection built with wooden flanges fixed on the wooden spools or some equivalent for metal spools, being secured with tapes or straps. • Indication with an arrow of the rolling direction. • A stainless steel plate for identification purposes. Such plate shall be applied in both flanges and shall have the following information (in Spanish): 1) Manufacturer name 2) Country of origin 3) BOG-CUN 4) Purchase order N° 5) Rated Voltage Uo/U (Umax) 6) Insulation material 7) Cable cross-section [mm²] 8) Spool number of the corresponding delivered batch 9) Net and gross weight [kg] 10) Configuration type (unipolar, triplex, quadruplex). 11) Cable length [m]																	
9	TECHNICAL CHECK-LIST	Besides all technical information provided according the common part, ISO certifications, Certification of conformity with this Global Standard and RETIE certification shall be indicated.															

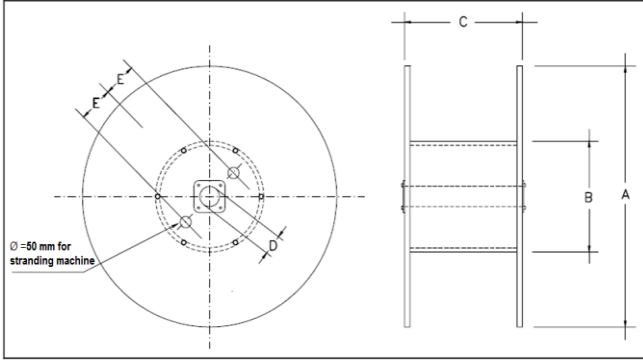
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LOCAL SECTION B – Enel distribución Perú

N°	TITLE	DESCRIPTION
3.3	Local Standards	- CÓDIGO NACIONAL DE ELECTRICIDAD – SIMINISTRO – 2011 - NORMA TÉCNICA DE CALIDAD DE LOS SERVICIOS ELECTRICOS
3.4	Replaced Local Standards	This Global Standard GSCC008 replaced the following standards of Edelnor: - Standard DNN-ET-275 Rev. “0” - DNN-ET-061-b
5.12.1	Cable designation	Type of conductor A: Aluminum R: Round Stranded E4: XLPE cross-linked polyethylene insulation H5: aluminum tape screen PE: polyethylene outer sheath XY: Three cores bundled around an alumoweld bare messenger Uo/U = Rated voltage in kV Messenger: 50 mm ² Aluminum clad steel insulated with black XLPE Example of designation code: ARE4H5PEXY 12/20 kV 3x(1x95) mm ² AL+1x50 Three 95 mm ² round compact conductors, insulated with XLPE, with an aluminum tape screen, with polyethylene sheath bundled around a 50mm ² aluminum clad steel sheathed messenger conductor insulated with black XLPE
5.12.2	Marking	The distance between the end of a mark and the beginning of the next one will be less than or equal to 550 mm The following inscriptions shall be marked in the order listed: - Name of Distribution Company - Name of the Manufacturer - Cable designation - The year and month of manufacture - The metric indicated only in phase 1; also supports sealed ink. Alternatively to the aforementioned method, it could be stamped at a distance less than 1 meter. - Identification of the phase, repeated at least 100 mm in the interval between two successive of entries. Printing example core phase 1: ENEL DISTRIBUCIÓN PERU XXXXXXXX ARE4H5PEXY 12/20kV 3x(1x95) mm ² AL+1X50- 2017 12 0000 FASE 1

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LOCAL SECTION B – Enel distribución Perú

N°	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	Packaging and Labelling Cables shall be delivered on spools made of wood or metal, such spool will not be returned. Characteristics are indicated in Figure A, dimensions are depicted in Table A. The total length of the supplied cable shall not be less than that requested in the purchase order and shall not be longer by any more than 5%. The maximum gross weight of the packaged spool must not exceed 3500 kg. The ends of the cables on each spool must be protected with caps or hoods that prevent the entry of moisture. These ends internally secured to the spools, must be mechanically protected against possible damages resulting from handling and transportation of each spool, leaving both ends accessible through the use of an internal helix or reel on each spool. When distance between manufacturing facilities and Enel Distribución Perú storage center is less than 200 km and is necessary only one mean of transportation, It is mandatory to use internal helix for cables cross-section greater of equal to 120 mm². However, moisture protection on both visible ends of the cables, mechanical protection, and careful handling shall be applied. Some Purchase orders could request 2,000 m of maximum length per spool and/or pre-joined cables. Spools made of wood shall be treated according to the international requirements for the control of plant disease, avoiding the compounds “Pentachlorophenol” and “Creosote”. The treatment must include, at least: highly toxic to xylophagous organisms, high penetration and holding power, chemical stability, non-corrosive substances to metals that could affect the physical characteristics of wood.  Figure A

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LOCAL SECTION B – Enel distribución Perú

N°	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	<u>Dimensions:</u>															
		<table><tr><td>A⁽¹⁾</td><td>B</td><td>C⁽¹⁾</td><td>D⁽²⁾</td><td>E</td></tr><tr><td>mm</td><td>mm</td><td>mm</td><td>mm</td><td>mm</td></tr><tr><td>2000</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table>	A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E	mm	mm	mm	mm	mm	2000	(3)	1120	80	(4)
		A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E											
		mm	mm	mm	mm	mm											
		2000	(3)	1120	80	(4)											
		Table A															
		Notes:															
		(1) Maximum value.															
		(2) Minimum value.															
		(3) Two times the minimum bending radius indicated by the supplier.															
		(4) 300 or 180 mm according to spool type (large or small, respectively)															
		The spools must contain:															
		• An external protection built with wooden flanges fixed on the wooden spools or some equivalent for metal spools, being secured with tapes or straps. • Indication with an arrow of the rolling direction. • A stainless steel plate for identification purposes. Such plate shall be applied in both flanges and shall have the following information (in Spanish):															
		1) Enel Distribución Peru															
		2) Name of the manufacturer															
		3) Country of origin of the item															
		4) Country code															
		5) Description of item															
		6) Year and month of manufacture															
		7) Number of the spool within the delivered batch.															
		8) Cable length, in meters.															
9) the metric initial (m)																	
10) the metric final (m)																	
11) Manufacture standard																	
12) Purchase Order N°																	
13) Rated Voltage (12/20(24) kV)																	
14) Insulation material and type																	
15) Conductor caliber (mm²)																	
16) Net weight and gross weight in kg.																	
17) Weight of the coil in kg																	
18) Weight of one meter of cable in kg																	
19) Cable type																	
20) Cable length, in meters.																	
21) Coil dimension in mm.																	

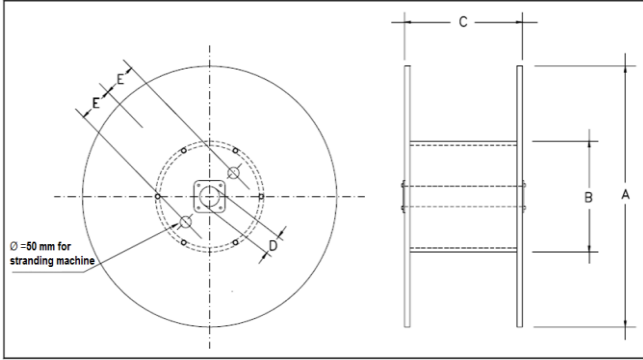
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LOCAL SECTION C – Enel distribución Chile

N°	TITLE	DESCRIPTION
3.3	Local Standards	Reglamentos NSEC N°5 y NSEC4 /2003
5.12.1	Cable designation	CA2: Stranded compacted aluminum conductor (Class 2) XR: Cross-linked polyethylene insulation HCO: Copper wires earth screen PE: Polyethylene Outer sheath
5.12.2	Marking	The distance between the end of a mark and the beginning of the next one will be less than or equal to 550 mm The following information shall be marked: Property Name Manufacturer name or trademark N° of phases Year of manufacture Cable designation Rated Voltage $U_0/U(U_{max})$ Insulation material Cable cross-section [mm²] Metric marking Phase identification with numbers, veins or stripes of color. Marking Example: Enel distribución Chile NNN CA2-XR-HCO-PE 185mm² 8,7/15 kV 2017-07 Manufactured by NNN with stranded compact Class 2 aluminum conductor, three phase, XLPE insulation, copper wire screen and polyethylene outer sheath 185mm², U_0 / U 8,7/15 kV, manufactured in 2017, month 07

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LOCAL SECTION C – Enel distribución Chile

N°	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	Packaging and Labelling Cables shall be delivered on spools made of wood or metal, such spool will not be returned. Characteristics are indicated in Figure A, dimensions are depicted in Table A. The total length of the supplied cable shall not be less than that requested in the purchase order and shall not be longer by any more than 5%. The maximum gross weight of the packaged spool must not exceed 3500 kg. The ends of the cables on each spool must be protected with caps or hoods that prevent the entry of moisture. These ends internally secured to the spools, must be mechanically protected against possible damages resulting from handling and transportation of each spool, leaving both ends accessible through the use of an internal helix or reel on each spool. When distance between manufacturing facilities and Enel Distribución Chile storage center is less than 200 km and is necessary only one mean of transportation, It is mandatory to use internal helix for cables cross-section greater of equal to 120 mm². However, moisture protection on both visible ends of the cables, mechanical protection, and careful handling shall be applied. Some Purchase orders could request 2,000 m of maximum length per spool and/or pre-joined cables. Spools made of wood shall be treated according to the international requirements for the control of plant disease, avoiding the compounds “Pentachlorophenol” and “Creosote”. The treatment must include, at least: highly toxic to xylophagous organisms, high penetration and holding power, chemical stability, non-corrosive substances to metals that could affect the physical characteristics of wood.  Figure A

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LOCAL SECTION C – Enel distribución Chile

N°	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	<u>Dimensions:</u>															
		<table><tr><td>A⁽¹⁾</td><td>B</td><td>C⁽¹⁾</td><td>D⁽²⁾</td><td>E</td></tr><tr><td>mm</td><td>mm</td><td>mm</td><td>mm</td><td>mm</td></tr><tr><td>2000</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table>	A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E	mm	mm	mm	mm	mm	2000	(3)	1120	80	(4)
		A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E											
		mm	mm	mm	mm	mm											
		2000	(3)	1120	80	(4)											
		Table A															
		Notes:															
		(1) Maximum value.															
		(2) Minimum value.															
		(3) Two times the minimum bending radius indicated by the supplier.															
		(4) 300 or 180 mm according to spool type (large or small, respectively)															
		The spools must contain:															
		• An external protection built with wooden flanges fixed on the wooden spools or some equivalent for metal spools, being secured with tapes or straps. • Indication with an arrow of the rolling direction. • A stainless steel plate for identification purposes. Such plate shall be applied in both flanges and shall have the following information (in Spanish):															
		1) Manufacturer name															
		2) Country of origin															
		3) ENEL GROUP															
		4) Purchase order N°															
5) Rated Voltage Uo/U (Umax)																	
6) Insulation material																	
7) Cable cross-section [mm²]																	
8) Spool number of the corresponding delivered batch																	
9) Net and gross weight [kg]																	
10) Configuration type (unipolar, triplex, quadruplex).																	
11) Cable length [m]																	
12) Year and month of manufacture																	
13) Weight of the coil [kg]																	
14) Cable type																	
15) Coil dimensions [mm]																	

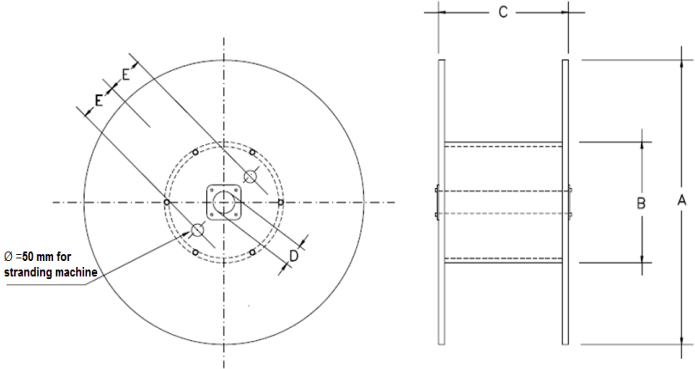
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LOCAL SECTION D – Enel Distribuição Ceará, Rio and Goiás

Nº	TITLE	DESCRIPTION
3.3	Local Standards	PMA 210.10.1 “Cabo multiplexado de MT, alumínio, 12/20 kV, com e sem fibra optica”
5.12.1	Cable designation	Type of conductor - A: Aluminum R: Round Stranded E4: XLPE cross-linked polyethylene insulation H5: aluminum tape screen E: PO outer sheath XY: Three cores bundled around an alumoweld bare messenger
5.12.2	Marking	The outer sheath should be printed by printer with an inscription high aligned characters or contiguous. The distance between the end of a mark and the beginning of the next one will be less than or equal to 550 mm and shall contain, in the order listed. the following inscriptions: • The property stands • The acronym of ENEL • Voltage between U_0 and U (kV) • Cross-section. • The name or trademark of the manufacturer • The identification letter of the manufacturing • The year and month of manufacture • The metric indicated only in phase 1; also supports sealed ink. Alternatively to the aforementioned method, it could be stamped at a distance less than 1 meter. • Identification of the phase, repeated at least 100 mm in the interval between two successive of entries. Printing example core phase 1: ENEL DISTRIBUIÇÃO CEARÁ ARE4H5EXY 12/20kV 185 XXXXXX 2007 12 0000 FASE 1 ... FASE 1 ..)

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LOCAL SECTION D – Enel Distribuição Ceará, Rio and Goiás

Nº	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	Packaging and Labelling Cables shall be delivered on spools made of wood or metal, such spool will not be returned. Characteristics are indicated in Figure A, dimensions are depicted in Table A. The total length of the supplied cable shall not be less than that requested in the purchase order and shall not be longer by any more than 5%. The maximum gross weight of the packaged spool must not exceed 3500 kg. The ends of the cables on each spool must be protected with caps or hoods that prevent the entry of moisture. These ends internally secured to the spools, must be mechanically protected against possible damages resulting from handling and transportation of each spool, leaving both ends accessible through the use of an internal helix or reel on each spool. When distance between manufacturing facilities and distribution company storage center is less than 200 km and is necessary only one mean of transportation, It is mandatory to use internal helix for cables cross-section greater of equal to 120 mm². However, moisture protection on both visible ends of the cables, mechanical protection, and careful handling shall be applied. Some Purchase orders could request 2,000 m of maximum length per spool and/or pre-joined cables. Spools made of wood shall be treated according to the international requirements for the control of plant disease, avoiding the compounds “Pentachlorophenol” and “Creosote”. The treatment must include, at least: highly toxic to xylophagous organisms, high penetration and holding power, chemical stability, non-corrosive substances to metals that could affect the physical characteristics of wood.  Figure A

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LOCAL SECTION D – Enel Distribuição Ceará, Rio and Goiás

N°	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	<u>Dimensions:</u>															
		<table><tr><td>A⁽¹⁾</td><td>B</td><td>C⁽¹⁾</td><td>D⁽²⁾</td><td>E</td></tr><tr><td>mm</td><td>mm</td><td>mm</td><td>mm</td><td>mm</td></tr><tr><td>2000</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table>	A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E	mm	mm	mm	mm	mm	2000	(3)	1120	80	(4)
		A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E											
		mm	mm	mm	mm	mm											
		2000	(3)	1120	80	(4)											
		Table A															
		Notes:															
		(1) Maximum value.															
		(2) Minimum value.															
		(3) Two times the minimum bending radius indicated by the supplier.															
(4) 300 or 180 mm according to spool type (large or small, respectively)																	
The spools must contain:																	
• An external protection built with wooden flanges fixed on the wooden spools or some equivalent for metal spools, being secured with tapes or straps. • Indication with an arrow of the rolling direction. • A stainless steel plate for identification purposes. Such plate shall be applied in both flanges and shall have the following information (in Portuguese): 16) Manufacturer name 17) Country of origin 18) ENEL RIO/ENEL CEARÁ/ENEL GOIÁS (according to purchase) 19) Purchase order N° 20) Rated Voltage Uo/U (Umax) 21) Insulation material 22) Cable cross-section [mm²] 23) Spool number of the corresponding delivered batch 24) Net and gross weight [kg] 25) Configuration type (unipolar, triplex, quadruplex). 26) Cable length [m]																	

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LOCAL SECTION E – e-distribuzione, e-distributie Banat, Dobrogea and Muntenia.

N°	TITLE	DESCRIPTION
3.3	Local Standards	- GUI 102/GUI 120 RO “Bobine per il trasporto di cavi elettrici, cavi ottici e conduttori per linee elettriche di media e bassa tensione” - PVR 006 “Operational Note Vendor Rating Control: BARCODES Warranty and Traceability of Enel Distribution Materials”.
3.4	Replaced Local Standards	This Global Standard replaces standard DC4390 and DC4390RO
5.12.1	Cable designation	Type of conductor A: Aluminum R: Round Stranded E4: XLPE cross-linked polyethylene insulation H5: aluminum foil screen E: Polyethylene outer sheath XY: Three cores bundled around an alumoweld bare messenger
5.12.2	Marking	The distance between the end of a mark and the beginning of the next one will be less than or equal to 550 mm and shall contain, in the order listed the following inscriptions: - The property stands: e-distribuzione, e-distributie Banat, e-distributie Dobrogea e-distributie Muntenia - Cable designation (see 5.11.2) (ARE4H5EXY) - Rated voltage Uo/U [kV] (12/20 Kv) - Cross-section. (150) - Fire class reaction (CPR) - The name or trademark of the manufacturer (XXXXXX) - The identification letter of the manufacturing (B) - The index of the project (01) - The year and month of manufacture (2017 12) - Identification of the phase, repeated at least 100 mm in the interval between two successive of entries (FASE 1) - The metric indicated only in phase 1; also supports sealed ink. Alternatively to the aforementioned method, it could be stamped at a distance less than 1 meter (0000).

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LOCAL SECTION E – e-distribuzione, e-distributie Banat, Dobrogea and Muntenia.

N°	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	Marking example (Phase 1): e-distribuzione ARE4H5EXY 12/20 kV 150 CPR XXXXXX B 01 2017 12 0000 FASE 1 ... FASE 1 Cable length and type of coil. -3x35+50Y: 750 m in type 25 coil -3x50+50Y: 750 m in type 25 coil -3x95+50Y: 600 m in type 25 coil -3x150+50Y: 500 m in type 25 coil The far end of the cables shall be protected against the moisture. Due to traceability in the network a bar code shall be applied on the flanges of the drum. Such bar code shall be in compliance with technical specification PVR006. Drum characteristics shall be in compliance with the standard GUI102. Following standard EN 50575, the CE marking and labelling shall be in accordance with the general principles set out in Article 30 of regulation (EC) No. 765/2008 and shall be affixed visibly, legibly and indelibly to the product labels affixed to the reels, coils or drums. In compliance with standard EN 50575 in particular annex V of the EU Construction Products Regulation n° 305/2011 (CPR) the supplier shall elaborate a Declaration of performance (DoP) and shall dispose a CE marking in function of the assessment and verification of constancy of performance (AVCP).

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LOCAL SECTION F – Endesa Distribución Eléctrica

Nº	TITLE	DESCRIPTION
3.1	Laws	- R.D. 614/2001, de 8 de junio, sobre disposiciones mínimas para la protección de la salud y seguridad de los trabajadores frente al riesgo eléctrico. - Real Decreto 223/2008 de 15 de febrero, por el que aprueba el Reglamento sobre condiciones técnicas y garantías de seguridad en líneas eléctricas de alta tensión y sus instrucciones técnicas complementarias ITC-LAT 01 a 09 (R.L.A.T.) - Reglamento (UE) nº 305/2011 del Parlamento Europeo y del Consejo, de 9 de marzo de 2011, por el que se establecen condiciones armonizadas para la comercialización de productos de construcción y se deroga la Directiva 89/106/CEE del Consejo.
3.3	Local Standards	- UNE 21167: Bobinas de madera para cables aislados de transporte y distribución. - UNE 211435 “Guía para la elección de cables eléctricos de tensión asignada superior o igual a 0,6/1 kV para circuitos de distribución.” - UNE 211006 “Ensayos previos a la puesta en servicio de sistemas de cables eléctricos de alta tensión en corriente alterna.” - UNE 211605. Climatic ageing test of outer covering cables. - UNE 211620 “Distribution cables with extruded insulation and aluminum tape” screen for rated voltages from 3,6/6 (7,2) kV to 20,8/36 (42) kV”.
5.3	Insulation	The material shall be XLPE DIX3 of standard HD 620. S2 part 1
5.8	Outer Sheath	The material shall be polyolefin DMZ2 of standard HD 620. S2 part 1 The nominal thickness shall be same as 2,75 mm. In addition, the minimum thickness of the outer sheath measured and accepted at any point of the cable shall not be less than 2,0 mm. The minimum fire reaction shall be E _{ca} The outer sheath material shall be free of heavy metals, halogens or volatile hydrocarbons
5.9	Messenger	The messenger sheath compound complies DCX1 of standard HD 620 S2 part 1. It shall be black, with a minimum content of carbon black same as 5%. In addition the sheath shall guarantee a 4 kV voltage test for 1 minute at 50 Hz shall be fulfilled.
5.10	Ampacity and Short-circuit rating	Ampacity and short-circuit ratings for conductor and screen shall comply the conditions stated in ITC08 from “Reglamento sobre condiciones técnicas y garantías de seguridad en líneas eléctricas de AT (Real decreto 223/2008 15-02)

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LOCAL SECTION F – Endesa Distribución Eléctrica

N°	TITLE	DESCRIPTION
5.12.1	Cable designation	The designation code is defined as follows: R = cross-linked polyethylene H5 = Aluminum foil screen Z1 = polyolefin Composite (S) = 10E-9 Type according to UNE 211620 Uo/U = Rated voltage in kV 3 (Three phase cables) x 1 (unipolar cables) x (rated cross-section of the phase conductor, measured in mm²) K (round and compact conductor) Al (Aluminum conductor) + 1 (unipolar cable) x 50 (rated cross-section of the messenger conductor) ST (galvanized steel sheathed messenger) Quality markings: In the case of certified cable i.e. AENOR. Example of designation code RH5Z1 (S) 12/20 kV 3 x (1 x 95 k Al) + 1 x 50 ST Three 95 mm²round compact conductors, insulated with XLPE, covered with an aluminum tape screen, sheathed with polyolefin with minimum fire reaction Eca bundled around a 50mm² galvanized steel sheathed messenger conductor, for 12/20 kV voltage operation.
5.12.2	Marking	Cables shall be have easily legible and indelible marking containing the following information: • Manufacturer name and / or trademark, • The complete description of the cable (Cable designation 5.11.2) • Fire class, according to EN 50575 subclause 4.1 • The last two digits of the year of manufacture. • Additional markings: • Traceability: the manufacturer shall include in the outer sheath some element in order to trace the cable, for instance a lot number. • Certification: when the cable is certificate with a quality marking.

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LOCAL SECTION F – Endesa Distribución Eléctrica

Nº	TITLE	DESCRIPTION																		
5.12.2	Marking	The marking shall be indelible, easily legible and be performed by incision or embossed on the outer sheath. The distance between the end of a mark and the beginning of the next one will be less than or equal to 300 mm. The corresponding phase number shall be identified on each cable (1, 2 or 3). Such marking shall be distributed at least every 100 mm in the interval between two successive series of inscriptions. Marking example: (manufacturer) RH5Z1 (S) 12/20 kV 3x(1x150 K Al) + 1x50 ST Eca 17 (additional markings) Following standard EN 50575, the CE marking and labelling shall be in accordance with the general principles set out in Article 30 of regulation (EC) No. 765/2008 and shall be affixed visibly, legibly and indelibly to the product labels affixed to the reels, coils or drums.																		
6	TESTS	All test shall be performed in accordance with standard UNE 211620 For Non-electrical Type tests (Clause 3.4 of UNE 211620 N° 4 “Semiconducting screens tests”) the minimum value from subclause 5.2 and sub clause 5.4 from GSCC008 shall be satisfied, as shown in the following table: <table> <tr> <td>Conductor screen thickness measurement</td><td></td><td></td></tr> <tr> <td>Nominal thickness</td><td>0,5 mm</td><td>IEC 60811-201</td></tr> <tr> <td>Minimum at any point</td><td>0,3 mm</td><td></td></tr> <tr> <td>Insulation screen thickness measurement</td><td></td><td></td></tr> <tr> <td>Nominal thickness</td><td>0,5 mm</td><td>IEC 60811-201</td></tr> <tr> <td>Minimum at any point</td><td>0,3 mm</td><td></td></tr> </table>	Conductor screen thickness measurement			Nominal thickness	0,5 mm	IEC 60811-201	Minimum at any point	0,3 mm		Insulation screen thickness measurement			Nominal thickness	0,5 mm	IEC 60811-201	Minimum at any point	0,3 mm	
Conductor screen thickness measurement																				
Nominal thickness	0,5 mm	IEC 60811-201																		
Minimum at any point	0,3 mm																			
Insulation screen thickness measurement																				
Nominal thickness	0,5 mm	IEC 60811-201																		
Minimum at any point	0,3 mm																			

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8	CONDITIONS OF SUPPLY	Reels shall be in compliance with the Standard UNE 21167 “Bobinas de Madera para cables asilados de transporte y distribucion”						
		1) Technical report (TR)						
		The technical report (TR) must consist of the documents described below.						
		It is specified that some requirements in the following paragraphs are preceded by the word “Prescription”, and others by the word “Indication”.						
		In the first case the requirements are normative, therefore satisfying them is a necessary (but not sufficient) condition for acceptance during the trial period. In the second case, however, the content of the required information is not binding for acceptance during the trial period.						
		2) Technical document.						
		Technical working drawing of the coil, including representation of the two sections (longitudinal and transversal) completed with all the dimensional measurements and with the points where the drum is anchored to the flanges highlighted (enlarged diagram of the part).						
		The following dimensional characteristics must be provided:						
		Parts in wood:						
		<table><tr><td>For the flange</td><td>Board width Diameter Thickness Diameter of axial hole Counter-flange thickness</td></tr><tr><td>Coil width</td><td></td></tr><tr><td>For the Drum</td><td>Board width diameter width Staves thickness</td></tr><tr><td>For the tie rods</td><td>Number diameter Length</td></tr></table>	For the flange	Board width Diameter Thickness Diameter of axial hole Counter-flange thickness	Coil width		For the Drum	Board width diameter width Staves thickness
For the flange	Board width Diameter Thickness Diameter of axial hole Counter-flange thickness							
Coil width								
For the Drum	Board width diameter width Staves thickness							
For the tie rods	Number diameter Length							

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LOCAL SECTION F – Endesa Distribución Eléctrica

Nº	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	3) Photographic documentation. The following documentation shall be delivered: - A side view and a front view photo (for a total of at least 6 photos) showing: -The empty coil; -The coil with wound cable without external cover; -The coil complete with external cover - The detailed view of the identification plate where the coil and supply data are provided (at an enlargement level such as to allow the information photographed to be read). 4) Technical data sheet of the wood. Prescriptions: Wood species coming from conifers or other wood of documented equivalent performance characteristics must be used. The wood used must be free of fungi and insects; the boards must be without non-adherent (dead) chamfers and knobs Instructions: The percentage of maximum humidity of the wood at the end of the coil fabrication process shall be stated. The description of any treatments that the wood undergoes shall be provided. 5) Technical data sheet of the metals. Instructions: The type of material used shall be stated. 6) Construction methods. Prescriptions: The coil must not, in any case, have metallic projections of any kind (they could in fact cause cuts or injuries during handling). Any wooden parts must not be painted. The outer surface of the drum and that inside the flange must be planed and the boards forming the flanges must be put close to each other; the nailing of the boards for the flanges must be riveted on the outside and the nail head must penetrate inside the boards by riveting.

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LOCAL SECTION F – Endesa Distribución Eléctrica

Nº	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	The boards of the drum must have chamfered edges and be put close to each other; uneven boards or steps between two boards or between boards and metal tie rods are not allowed. Instructions: Specify the welding type/technique (if present) and the anti-oxidation treatments. 7) Protections The cables must be protected in such a way as to prevent damage or tampering during transport and handling, also within the sphere of ENDESA. If the bidder plans to use a type of protection as an alternative to staves, it must not be made with materials that during disposal are classifiable as hazardous waste; in any case, all protections that are alternatives to staves must be explicitly approved by ENDESA during homologation or during the tender process. The free ends of the cable must be properly protected against the penetration of water and moisture during transport, storage (which may also be outdoors) and lying. The finished and inspected cable coils at the Constructor's facilities cannot be parked without staves or equivalent protections in zones exposed to bad weather (sun, rain, etc.) and to accidental impacts unless for the time necessary for their staving or similar protection. Unless otherwise provided in the purchase order letter, the protection (staving or other) of the coils must be executed 100%. The spacing between the external layer of the cable and the staving must be sufficient for preventing damage to the cable and in any case never less than 50 mm; to comply with said prescription, sizes of length reduced up to the minimum allowed can be preferred, if necessary.

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LOCAL SECTION F – Endesa Distribución Eléctrica

Nº	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	8) Labeling. At least the following data shall be shown in addition to what is required in the order on the external surface of at least one of the flanges of the transport coil, or on the packaging of every single skein, with clearly legible and indelible characters, if applicable: • The ENDESA code of the cable; • The name or trademark of the company that owns the coil; • The name of the Constructor of the cable; • The code and formation of the cable; • The type and code of the coil; • The total gross weight (only for the sizes on coil) • The net weight; • The weight of one meter of cable; • The actual length of the size; • The details of the ENDESA order; • The number and date of notice of shipment or, for the skeins, the number of the production lot (job no.). Note: The two external faces of the flanges for coils made of wood and the two opposing faces of the pallets, which can be used for shipping several types of cable, must bear the mark demonstrating that the wood used for their construction has been treated as required in directive 2000/29/EC, referred to in SECTION 8.2 7.2. Following standard EN 50575, the CE marking and labelling shall be in accordance with the general principles set out in Article 30 of regulation (EC) No. 765/2008 and shall be affixed visibly, legibly and indelibly to the product labels affixed to the reels, coils or drums. The CE markings shall be followed by: • The last two digits of the year in which it was first affixed • The name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without ambiguity.

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LOCAL SECTION F – Endesa Distribución Eléctrica

N°	TITLE	DESCRIPTION						
8	CONDITIONS OF SUPPLY	• The unique identification code of the product-type • The reference number of the declaration of performance • The class of the performance declared • The date reference to the harmonized technical specification applied • The identification number of the notified body • The intended use as laid down in the appli9ed harmonized technical specification. CE marking example for products subject to AVCP system 3. <table><tr><td> CE XXXX </td><td> <i>Marcado CE, consistente en el símbolo "CE"</i> <i>Número de identificación del laboratorio notificado de ensayos</i> </td></tr><tr><td> AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium 14 (A indicar por el fabricante) </td><td> <i>Nombre y dirección registrada del fabricante, o marca identificativa</i> <i>Los dos últimos dígitos del año en que se fijó el marcado por primera vez</i> <i>Número de referencia de la Declaración de Prestaciones (DoP)</i> </td></tr><tr><td> EN 50575:2014 (A indicar por el fabricante) Suministro de electricidad en edificios y en otras obras de ingeniería civil con el objetivo de limitar la generación y propagación de fuego y humo Reacción al fuego: E_{ca} Sustancias peligrosas: Ninguna </td><td> <i>Código de la norma europea de aplicación, como se cite en el DOUE</i> <i>Código de identificación único del producto tipo</i> <i>Uso previsto del producto como se indica en la norma europea aplicada</i> <i>Clase de prestaciones</i> </td></tr></table> 9) Transport In order to facilitate unloading, drums should be arranged in the vehicle with a distance between the covers for inputting the charging and discharging means, so that either can be discharged with handling means with forks.	CE XXXX	<i>Marcado CE, consistente en el símbolo "CE"</i> <i>Número de identificación del laboratorio notificado de ensayos</i>	AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium 14 (A indicar por el fabricante)	<i>Nombre y dirección registrada del fabricante, o marca identificativa</i> <i>Los dos últimos dígitos del año en que se fijó el marcado por primera vez</i> <i>Número de referencia de la Declaración de Prestaciones (DoP)</i>	EN 50575:2014 (A indicar por el fabricante) Suministro de electricidad en edificios y en otras obras de ingeniería civil con el objetivo de limitar la generación y propagación de fuego y humo Reacción al fuego: E_{ca} Sustancias peligrosas: Ninguna	<i>Código de la norma europea de aplicación, como se cite en el DOUE</i> <i>Código de identificación único del producto tipo</i> <i>Uso previsto del producto como se indica en la norma europea aplicada</i> <i>Clase de prestaciones</i>
		CE XXXX	<i>Marcado CE, consistente en el símbolo "CE"</i> <i>Número de identificación del laboratorio notificado de ensayos</i>					
		AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium 14 (A indicar por el fabricante)	<i>Nombre y dirección registrada del fabricante, o marca identificativa</i> <i>Los dos últimos dígitos del año en que se fijó el marcado por primera vez</i> <i>Número de referencia de la Declaración de Prestaciones (DoP)</i>					
EN 50575:2014 (A indicar por el fabricante) Suministro de electricidad en edificios y en otras obras de ingeniería civil con el objetivo de limitar la generación y propagación de fuego y humo Reacción al fuego: E_{ca} Sustancias peligrosas: Ninguna	<i>Código de la norma europea de aplicación, como se cite en el DOUE</i> <i>Código de identificación único del producto tipo</i> <i>Uso previsto del producto como se indica en la norma europea aplicada</i> <i>Clase de prestaciones</i>							

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LOCAL SECTION F – Endesa Distribución Eléctrica

Nº	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	In compliance with standard EN 50575 in particular annex V of the EU Construction Products Regulation n° 305/2011 (CPR) the supplier shall elaborate a Declaration of performance (DoP) and shall dispose a CE marking in function of the assessment and verification of constancy of performance (AVCP).

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ANNEX - TECHNICAL CHECK-LIST EXAMPLE

Type I 12/20 (24) kV 3x150+50Y XLPE insulation, Al foil earth screen, PE outer sheath

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Informative	
1.2	Factory	-	Informative	
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	ED-Italy	
2.2	Country Code	-	332265	
2.3	GS Type Code		GSCC008/004	
2.4	Nominal Voltage Uo/U (Umax)	[kV]	12/20(24)	
2.5	Type I or Type II	-	Type I	
2.6	Disposition	[n x mm ²]	3x150+50	
3	CONDUCTOR			
3.1	Material	-	AAC 1350	
3.2	Nominal cross-section	[mm ²]	150	
3.3	Minimum number of wires of conductor	-	15	
3.4	Minimum diameter	[mm]	13,7	
3.5	Maximum diameter	[mm]	15,0	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	0,206	
3.7	Stranding Type	-	Compacted Class 2	
4	CONDUCTOR SCREEN			
4.1	Material		Informative	
4.2	Nominal thickness	[mm]	0,5	
4.3	Minimum thickness	[mm]	0,3	
4.4	Maximum potential gradient at Uo	[kV/mm]	Informative	
5	INSULATION			
5.1	Material	-	XLPE	
5.2	Nominal thickness	[mm]	4,9	
5.3	Minimum thickness	[mm]	4,31	
5.4	Color	-	Informative	
6	INSULATION SCREEN			
6.1	Material		informative	
6.2	Nominal thickness	[mm]	0,5	
6.3	Minimum thickness	[mm]	0,3	
6.4	Maximum potential gradient at Uo (info)	[kV/mm]	Informative	
8	EARTH SCREEN			
8.1	Minimum thickness (when aluminum foil)	[mm]	0,3	
8.2	Cross-section	[mm ²]	25,5	

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8.3	Maximum resistance at 20°C	[Ω/ km]	1,186	
8.4	Wires diameter (when copper wires)		-	
8.5	Number of wires (when copper wires)		-	
9	OUTER SHEATH			
9.1	Material		PE	
9.2	Nominal thickness		2,0	
9.3	Minimum thickness		1,4	
9.4	Color		Grey	
10	MESSENGER CHARACTERISTICS			
10.0	Material		ACS 20SA	
10.1	Number of wires	N° x mm	7x3	
10.2	Messenger diameter	[mm]	9	
10.3	Wire diameter	[mm]	3±1,5%	
10.4	Cross-section (Informative value)	[mm²]	Informative	
10.5	Weight (sheathed and bare)	[kg/km]	Informative	
10.6	Maximum electrical resistance at 20 °C	[Ω/km]	1,77	
10.7	Tensile strength (min.)	[daN]	5.980	
10.8	Young's modulus	[kN/mm²]	Informative	
10.9	Expansion coefficient	[k-1]	Informative	
10.10	Sheath material			
10.11	Sheath nominal thickness	[mm]		
10.12	Sheath minimum thickness	[mm]		
10.13	Sheath color			
11	ADDITIONAL FEATURES			
11.1	Maximum total diameter	[mm]	Informative	
11.2	Drum Type		25	
11.3	Total length in one drum	[m]	500	
11.4	One phase weight	[kg/km]	Informative	
11.5	Total weight	[kg/km]	Informative	
11.6	Ampacity (see clause 5.10 for conditions)	[A]	Informative	
11.7	Conductor SC current (see clause 5.10)	[kA]	Informative	
11.8	Earth screen SC current (see clause 5.10)	[kA]	Informative	
11.9	Messenger SC current (see clause 5.10)	[kA]	Informative	
11.10	Fire reaction Class (EN 50575 if apply)		Informative	
11.11	Positive sequence reactance	[Ω/ km]	Informative	
11.12	Positive sequence capacitance	[μF/km]	Informative	
11.13	Zero sequence resistance at 20 °C	[Ω/ km]	Informative	
11.14	Zero sequence reactance	[Ω/ km]	Informative	
11.15	Zero sequene capacitance	[μF/km]	Informative	

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Type I 18/30 (36) kV 3x150+50 XLPE insulation, Al foil earth screen, PO outer sheath

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Informative	
1.2	Factory	-	Informative	
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	EE-Spain	
2.2	Country Code	-	350035	
2.3	GS Type Code		GSCC008/011	
2.4	Nominal Voltage U ₀ /U (U _{max})	[kV]	18/30(36)	
2.5	Type I or Type II	-	Type I	
2.6	Disposition	[n x mm ²]	3x150+50	
3	CONDUCTOR			
3.1	Material	-	AAC 1350	
3.2	Nominal cross-section	[mm ²]	150	
3.3	Minimum number of wires of conductor	-	15	
3.4	Minimum diameter	[mm]	13,7	
3.5	Maximum diameter	[mm]	15,0	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	0,206	
3.7	Stranding Type	-	Compacted Class 2	
4	CONDUCTOR SCREEN			
4.1	Material		Informative	
4.2	Nominal thickness	[mm]	0,5	
4.3	Minimum thickness	[mm]	0,3	
4.4	Maximum potential gradient at U ₀	[kV/mm]	Informative	
4.5	Application		Bonded	
5	INSULATION			
5.1	Material	-	XLPE DIX 3	
5.2	Nominal thickness	[mm]	Informative	
5.3	Minimum thickness	[mm]	6,43	
5.4	Color	-	Informative	
6	INSULATION SCREEN			
6.1	Material		informative	
6.2	Nominal thickness	[mm]	0,5	
6.3	Minimum thickness	[mm]	0,3	
6.4	Application	[kV/mm]	Easy stripping	
7	LONGITUDINAL WATER TIGHTNESS			
7.1	Material		Hygroexpansive semiconductor layer	
7.2	Minimum overlap	%	10	
8	EARTH SCREEN			

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8.1	Minimum thickness (when aluminum foil)	[mm]	0,3	
8.2	Cross-section	[mm ²]	30	
8.3	Maximum resistance at 20°C	[Ω/ km]	1,008	
8.4	Overlap 5 mm			
9	OUTER SHEATH			
9.1	Material		DMZ2	
9.2	Nominal thickness		2,75	
9.3	Minimum thickness		2,0	
9.4	Color		Grey	
10	MESSENGER CHARACTERISTICS			
10.0	Material		ST1A	
10.1	Number of wires	N° x mm	7x(3±1,5)	
10.2	Messenger diameter	[mm]	9	
10.3	Wire diameter	[mm]	3±1,5%	
10.4	Cross-section (Informative value)	[mm ²]	49,48	
10.5	Weight (sheathed and bare)	[kg/km]	390	
10.6	Maximum electrical resistance at 20 °C	[Ω/km]	4	
10.7	Tensile strength (min.)	[daN]	6.000	
10.8	Young's modulus	[kN/mm ²]	15.000	
10.9	Expansion coefficient	[k-1]	0,0000105	
10.10	Sheath material		XLPE DCX1	
10.11	Sheath nominal thickness	[mm]	1,2	
10.12	Sheath minimum thickness	[mm]	0,92	
10.13	Sheath color		Black	
10.14	Lay Pitch	[mm]	Right. Step 90-144	
11	ADDITIONAL FEATURES			
11.1	Maximum total diameter	[mm]	Informative	
11.2	Total weight	[kg/km]	Informative	
11.3	Ampacity (see clause 5.10 for conditions)	[A]	288	
11.4	Wiring step (D:one phane total diameter)	[mm]	40xD	
11.10	Fire reaction Class (EN 50575 if apply)		Eca	

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Type II 20/34(37,95) kV 3x185+50 XLPE insulation, Cu wires earth screen, PE outer sheath

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Informative	
1.2	Factory	-	Informative	
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	CD-Colombia	
2.2	Country Code	-	AMV10	
2.3	GS Type Code		GSCC008/014	
2.4	Nominal Voltage Uo/U (Umax)	[kV]	20/34(37,95)	
2.5	Type I or Type II	-	Type II	
2.6	Disposition	[n x mm ²]	3x185+50	
3	CONDUCTOR			
3.1	Material	-	AAC 1350	
3.2	Nominal cross-section	[mm ²]	185	
3.3	Minimum number of wires of conductor	-	30	
3.4	Minimum diameter	[mm]	15,3	
3.5	Maximum diameter	[mm]	16,8	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	0,164	
3.7	Stranding Type	-	Compacted Class 2	
4	CONDUCTOR SCREEN			
4.1	Material		Informative	
4.2	Nominal thickness	[mm]	0,5	
4.3	Minimum thickness	[mm]	0,3	
4.4	Maximum potential gradient at Uo	[kV/mm]	Informative	
5	INSULATION			
5.1	Material	-	XLPE	
5.2	Nominal thickness	[mm]	6,6	
5.3	Minimum thickness	[mm]	5,84	
5.4	Color	-	Informative	
6	INSULATION SCREEN			
6.1	Material		informative	
6.2	Nominal thickness	[mm]	0,5	
6.3	Minimum thickness	[mm]	0,3	
6.4	Maximum potential gradient at Uo (info)	[kV/mm]	Informative	
8	EARTH SCREEN			
8.1	Minimum thickness (when aluminum foil)	[mm]	-	
8.2	Cross-section	[mm ²]	25	
8.3	Maximum resistance at 20°C	[Ω/ km]	0,727	

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8.4	Wires diameter (when copper wires)	[mm]	0,5-1	
8.5	Min.Number of wires (when copper wires)		30	
9	OUTER SHEATH			
9.1	Material		PE	
9.2	Nominal thickness		2,0	
9.3	Minimum thickness		1,8	
9.4	Color		Grey	
10	MESSENGER CHARACTERISTICS			
10.0	Material		ACS 20SA	
10.1	Number of wires	N° x mm	7x3	
10.2	Messenger diameter	[mm]	9	
10.3	Wire diameter	[mm]	3±1,5%	
10.4	Cross-section (Informative value)	[mm²]	Informative	
10.5	Weight (sheathed and bare)	[kg/km]	Informative	
10.6	Maximum electrical resistance at 20 °C	[Ω/km]	1,77	
10.7	Tensile strength (min.)	[daN]	5.980	
10.8	Young's modulus	[kN/mm²]	Informative	
10.9	Expansion coefficient	[k-1]	Informative	
10.10	Sheath material		XLPE	
10.11	Sheath nominal thickness	[mm]	1,2	
10.12	Sheath minimum thickness	[mm]	0,92	
10.13	Sheath color		Black	
11	ADDITIONAL FEATURES			
11.1	Maximum total diameter	[mm]	Informative	
11.4	One phase weight	[kg/km]	Informative	
11.5	Total weight	[kg/km]	Informative	
11.6	Ampacity (see clause 5.10 for conditions)	[A]	Informative	
11.7	Conductor SC current (see clause 5.10)	[kA]	Informative	
11.8	Earth screen SC current (see clause 5.10)	[kA]	Informative	
11.9	Messenger SC current (see clause 5.10)	[kA]	Informative	
11.10	Fire reaction Class (EN 50575 if apply)		-	
11.11	Positive sequence reactance	[Ω/ km]	Informative	
11.12	Positive sequence capacitance	[μF/km]	Informative	
11.13	Zero sequence resistance at 20 °C	[Ω/ km]	Informative	
11.14	Zero sequence reactance	[Ω/ km]	Informative	
11.15	Zero sequene capacitance	[μF/km]	Informative	

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GS Type Code	Distribution Company and Country	Country Code	Rated Voltage Uo/U(Umax) [kV]	Cross-section [mm²]	Type of cable	Conductor material	Conductor screen nominal thickness [mm]	Conductor screen minimum thickness [mm]	Insulation material	Nominal insulation thickness [mm]	Minimum insulation thickness [mm]	Insulation Screen Nominal thickness [mm]	Insulation Screen Minimum thickness [mm]	Longitudinal watertightness (Yes/Not)	Earth Screen type	Metallic screen minimum thickness [mm]	Outer sheath material	Sheath Nominal thickness [mm]	Sheath minimum thickness [mm]	Sheath color	Messenger cross-section [mm²]	Messenger conductor material	Messenger sheath material	Messenger sheath Nominal thickness [mm]	Messenger sheath minimum thickness [mm]	Messenger sheath color
GSCC008/001	ED-Italy	332262	12/20(24)	35	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,8	1,24	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/001	ED-Romania	332262	12/20(24)	35	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,8	1,24	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/002	ED-Italy	332263	12/20(24)	50	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/002	ED-Romania	332263	12/20(24)	50	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/002	EE-Spain	350030	12/20(24)	50	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	SI	ALUMINUM FOIL	0,3	DMZ2	2,75	2	GREY	50	Galvanized steel	XLPE	1,2	0,92	BLACK
GSCC008/003	ED-Italy	332264	12/20(24)	95	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/003	ED-Romania	332264	12/20(24)	95	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/009	EE-Spain	350031	18/30(36)	50	I	ALUMINUM	0,5	0,3	XLPE	7,25	6,43	0,5	0,3	SI	ALUMINUM FOIL	0,3	DMZ2	2,75	2	GREY	50	Galvanized steel	XLPE	1,2	0,92	BLACK
GSCC008/003	EN-Peru	6811977	12/20(24)	95	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/004	ED-Italy	332265	12/20(24)	150	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	2	1,4	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable

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GSCC008/004	ED-Romania	332265	12/20(24)	150	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	2	1,4	GREY	50	Alumoweld	BARE	Not applicable	Not applicable	Not applicable
GSCC008/003	EE-Spain	350032	12/20(24)	95	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	SI	ALUMINUM FOIL	0,3	DMZ2	2,75	2	GREY	50	Galvanized steel	XLPE	1,2	0,92	BLACK
GSCC008/004	EN-Peru	6811978	12/20(24)	150	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	2	1,4	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/015	ED-CHILE	AMV1	8,7/15(17,5)	50	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/018	ED-CHILE	AMV2	8,7/15(17,5)	95	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/021	ED-CHILE	AMV3	8,7/15(17,5)	150	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/024	ED-CHILE	AMV4	8,7/15(17,5)	185	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/009	RJ/CE/GO-Brasil	6815770	18/30(36)	50	I	ALUMINUM	0,5	0,3	XLPE	7,25	6,43	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY
GSCC008/010	EE-Spain	350033	18/30(36)	95	I	ALUMINUM	0,5	0,3	XLPE	7,25	6,43	0,5	0,3	SI	ALUMINUM FOIL	0,3	DMZ2	2,75	2	GREY	50	Galvanized steel	XLPE	1,2	0,92	BLACK
GSCC008/010	RJ/CE/GO-Brasil	6815771	18/30(36)	95	I	ALUMINUM	0,5	0,3	XLPE	7,25	6,43	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY
GSCC008/004	EE-Spain	350034	12/20(24)	150	I	ALUMINUM	0,5	0,3	XLPE	4,9	4,31	0,5	0,3	SI	ALUMINUM FOIL	0,3	DMZ2	2,75	2	GREY	50	Galvanized steel	XLPE	1,2	0,92	BLACK
GSCC008/011	EE-Spain	350035	18/30(36)	150	I	ALUMINUM	0,5	0,3	XLPE	7,25	6,43	0,5	0,3	SI	ALUMINUM FOIL	0,3	DMZ2	2,75	2	GREY	50	Galvanized steel	XLPE	1,2	0,92	BLACK
GSCC008/011	RJ/CE/GO-Brasil	6815772	18/30(36)	150	I	ALUMINUM	0,5	0,3	XLPE	7,25	6,43	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	2	1,4	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY

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GSCC008/012	CD-Colombia	AMV9	20/34(37,95)	95	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/013	CD-Colombia	6807656	20/34(37,95)	120	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/014	CD-Colombia	AMV10	20/34(37,95)	185	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/005	ED-CHILE	AMV5	15/25(31)	50	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/016	RJ/CE/GO-Brasil	6811876	8,7/15(17,5)	50	I	ALUMINUM	0,5	0,3	XLPE	4,5	4,00	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY
GSCC008/017	CD-Colombia	6807653	8,7/15(17,5)	70	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/006	ED-CHILE	AMV6	15/25(31)	95	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/018	CD-Colombia	AMV11	8,7/15(17,5)	95	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/019	RJ/CE/GO-Brasil	6811877	8,7/15(17,5)	95	I	ALUMINUM	0,5	0,3	XLPE	4,5	4,00	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	1,9	1,32	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY
GSCC008/020	CD-Colombia	6807651	8,7/15(17,5)	120	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	1,9	1,32	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY
GSCC008/007	ED-CHILE	AMV7	15/25(31)	150	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/022	RJ/CE/GO-Brasil	6811878	8,7/15(17,5)	150	I	ALUMINUM	0,5	0,3	XLPE	4,5	4,00	0,5	0,3	NO	ALUMINUM FOIL	0,3	PE	2	1,4	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY
GSCC008/023	RJ/CE/GO-Brasil	6815339	8,7/15(17,5)	150	II	ALUMINUM	0,5	0,3	XLPE	4,5	4,00	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Alumoweld or galvanized steel	XLPE	1,2	0,92	GREY

GSCC008/008	ED-CHILE	AMV8	15/25(31)	185	II	ALUMINUM	0,5	0,3	XLPE	6,6	5,84	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Galvanized steel	BARE	Not applicable	Not applicable	Not applicable
GSCC008/024	CD-Colombia	AMV12	8,7/15(17,5)	185	II	ALUMINUM	0,5	0,3	XLPE	3,5	3,1	0,5	0,3	NO	COPPER WIRES	-	PE	2	1,4	GREY	50	Alumoweld	XLPE	1,2	0,92	GREY

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GS Type Code	Distribution Company and Country	Country Code	TAM Description
GSCC008/001	ED-Italy	332262	MV AERIAL CABLES 12/20(24) 3x35 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/001	ED- Romania	332262	MV AERIAL CABLES 12/20(24) 3x35 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/002	ED-Italy	332263	MV AERIAL CABLES 12/20(24) 3x50 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/002	ED- Romania	332263	MV AERIAL CABLES 12/20(24) 3x50 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/002	EE-Spain	350030	MV AERIAL CABLES 12/20(24) 3x50 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/003	ED-Italy	332264	MV AERIAL CABLES 12/20(24) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/003	ED- Romania	332264	MV AERIAL CABLES 12/20(24) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/009	EE-Spain	350031	MV AERIAL CABLES 18/30(36) 3x50 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/003	EN-Peru	6811977	MV AERIAL CABLES 12/20(24) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/004	ED-Italy	332265	MV AERIAL CABLES 12/20(24) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER
GSCC008/004	ED- Romania	332265	MV AERIAL CABLES 12/20(24) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN BARE MESSENGER

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GSCC008/003	EE-Spain	350032	MV AERIAL CABLES 12/20(24) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/004	EN-Peru	6811978	MV AERIAL CABLES 12/20(24) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/015	ED-CHILE	AMV1	MV AERIAL CABLES 8,7/15(17,5) 3x50 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/018	ED-CHILE	AMV2	MV AERIAL CABLES 8,7/15(17,5) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/021	ED-CHILE	AMV3	MV AERIAL CABLES 8,7/15(17,5) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/024	ED-CHILE	AMV4	MV AERIAL CABLES 8,7/15(17,5) 3x185 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/009	RJ/CE/GO-Brasil	6815770	MV AERIAL CABLES 18/30(36) 3x50 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/010	EE-Spain	350033	MV AERIAL CABLES 18/30(36) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/010	RJ/CE/GO-Brasil	6815771	MV AERIAL CABLES 18/30(36) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/004	EE-Spain	350034	MV AERIAL CABLES 12/20(24) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/011	EE-Spain	350035	MV AERIAL CABLES 18/30(36) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/011	RJ/CE/GO-Brasil	6815772	MV AERIAL CABLES 18/30(36) 3x150 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/012	CD-Colombia	AMV9	MV AERIAL CABLES 20/34(37,95) 3x95 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER

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GSCC008/013	CD-Colombia	6807656	MV AERIAL CABLES 20/34(37,95) 3x120 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
GSCC008/014	CD-Colombia	AMV10	MV AERIAL CABLES 20/34(37,95) 3x185 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
GSCC008/005	ED-CHILE	AMV5	MV AERIAL CABLES 15/25(31) 3x50 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/016	RJ/CE/GO-Brasil	6811876	MV AERIAL CABLES 8,7/15(17,5) 3x50 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/017	CD-Colombia	6807653	MV AERIAL CABLES 8,7/15(17,5) 3x70 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
GSCC008/006	ED-CHILE	AMV6	MV AERIAL CABLES 15/25(31) 3x95 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/018	CD-Colombia	AMV11	MV AERIAL CABLES 8,7/15(17,5) 3x95 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
GSCC008/019	RJ/CE/GO-Brasil	6811877	MV AERIAL CABLES 8,7/15(17,5) 3x95 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/020	CD-Colombia	6807651	MV AERIAL CABLES 8,7/15(17,5) 3x120 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
GSCC008/007	ED-CHILE	AMV7	MV AERIAL CABLES 15/25(31) 3x150 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER
GSCC008/022	RJ/CE/GO-Brasil	6811878	MV AERIAL CABLES 8,7/15(17,5) 3x150 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH ALUMINUM FOIL SCREEN XLPE MESSENGER
GSCC008/023	RJ/CE/GO-Brasil	6815339	MV AERIAL CABLES 8,7/15(17,5) 3x150 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
GSCC008/008	ED-CHILE	AMV8	MV AERIAL CABLES 15/25(31) 3x185 50Y+mm2 AI CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN BARE MESSENGER

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GSCC008/024	CD-Colombia	AMV12	MV AERIAL CABLES 8,7/15(17,5) 3x185 50Y+mm2 Al CONDUCTOR XLPE INSULATION PO SHEATH COPPER WIRES SCREEN XLPE MESSENGER
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