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	LOW VOLTAGE AERIAL BUNDLED CABLES	GSCC009 Rev. 00 15/01/2018

LOW VOLTAGE AERIAL BUNDLED CABLES

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1 SCOPE

The aim of this document is to provide technical requirements for the supply of aerial low voltage cables to be used in the distribution networks in 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 overhead low voltage distribution cables with rated voltage $U_0/U(U_{max}) = 0,6/1 (1,2)$ kV 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 – COMMON LIST

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

3 REFERENCE LAWS AND STANDARDS

3.1 Laws

Brazil

- NR-10 - Segurança em Instalações e Serviços em Eletricidade

Chile

- NSEG 5 En.71 Reglamento de Instalaciones Eléctricas de Corrientes Fuertes.

Colombia

- RETIE, Reglamento Técnico de Instalaciones Eléctricas.
- Código Eléctrico Colombiano, NTC 2050

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Peru

- Código Nacional de Electricidad – Suministro 2011.
- Norma Técnica de Calidad de los servicios electricos (NTCSE)

Spain

- 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.
- R.D. 337/2014, de 9 de mayo, por el que se aprueban el Reglamento sobre condiciones técnicas y garantías de seguridad en instalaciones eléctricas de alta tensión y sus Instrucciones Técnicas Complementarias ITC-RAT 01 a 23.

3.2 European & International Standards

- HD 605 S2 “Electric cables - Additional test methods”
- HD 626 S1 “Overhead distribution cables of rated voltage $U_o/U(U_m)$: 0,6/1 (1,2) kV”
- IEC 60228: “Conductors of insulated cables”
- IEC 60502-1: “Power cables with extruded insulation and their accessories for rated voltages from 1 kV up to 30 kV – Part 1: cables for rated voltages of 1 kV and 3 kV”
- 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 60811-203 “Electric and optical fibre cables - Test methods for non-metallic materials-Part 203: General tests - Measurement of overall dimensions”
- 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”
- IEC 60811-403 “Electric and optical fibre cables - Test methods for non-metallic materials-Part 403: Miscellaneous tests - Ozone resistance tests on cross-linked compounds”
- IEC 60811-409 “Electric and optical fibre cables - Test methods for non-metallic materials Part 409: Miscellaneous tests - Loss of mass test for thermoplastic insulations and sheaths
- 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

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- IEC 60811-504 “Electric and optical fibre cables - Test methods for non-metallic materials-Part 504: Mechanical tests - Bending tests at low temperature for insulation and 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 60811-506 “Electric and optical fibre cables - Test methods for non-metallic materials-Part 506: Mechanical tests - Impact test 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 60811-605 “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 62230 Electric cables - Spark-test method
- ISO 2859-0 “Sampling procedures for inspection by attributes -- Part 0: Introduction to the ISO 2859 attribute sampling system”
- 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 CLASIFICATION

In the following chart a brief description of the different types of cables depicted in this technical specification is given.

TYPE	DESCRIPTION	Layout
I	Aluminum conductor XLPE insulated self-supporting cables.	Figure 1
II	Cables with aluminum phase conductor insulated with XLPE supported by an aluminum alloy neutral conductor insulated with XLPE	Figure 2
III	Aluminum conductor XLPE insulated and sheathed self-supporting cables.	Figure 3
IV	Cables with aluminum phase conductor insulated and sheathed with XLPE supported by an aluminum alloy XLPE insulated neutral messenger.	Figure 4

Table 1: Types of Cables

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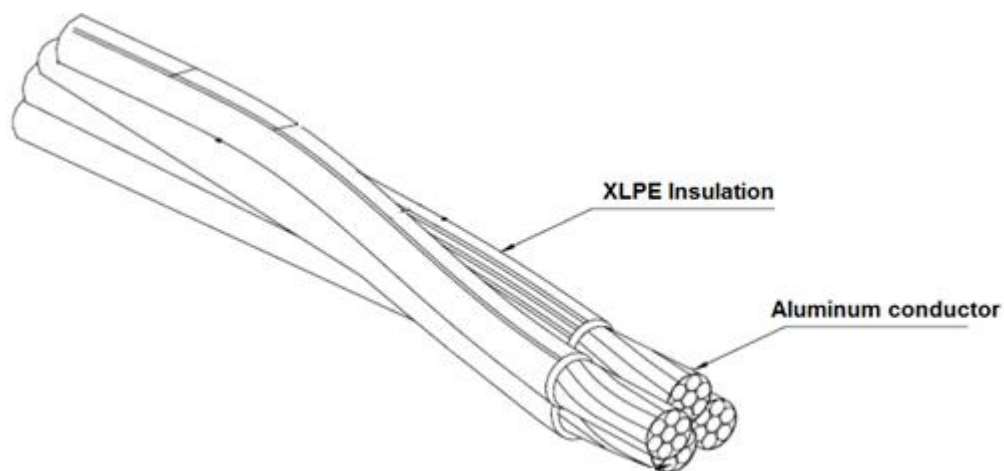


Figure 1 Type I LV self-supported cable.

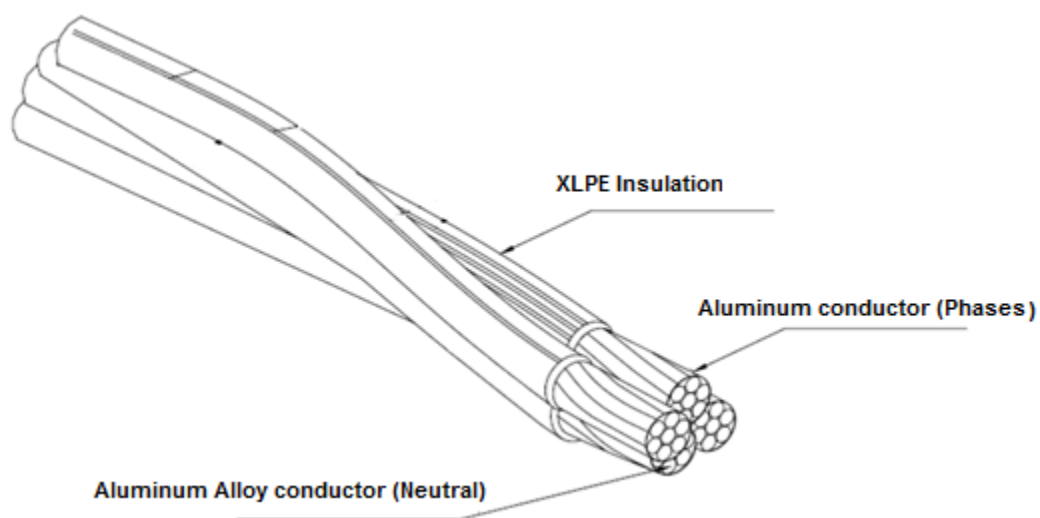


Figure 2 Type II LV neutral supported cable XLPE

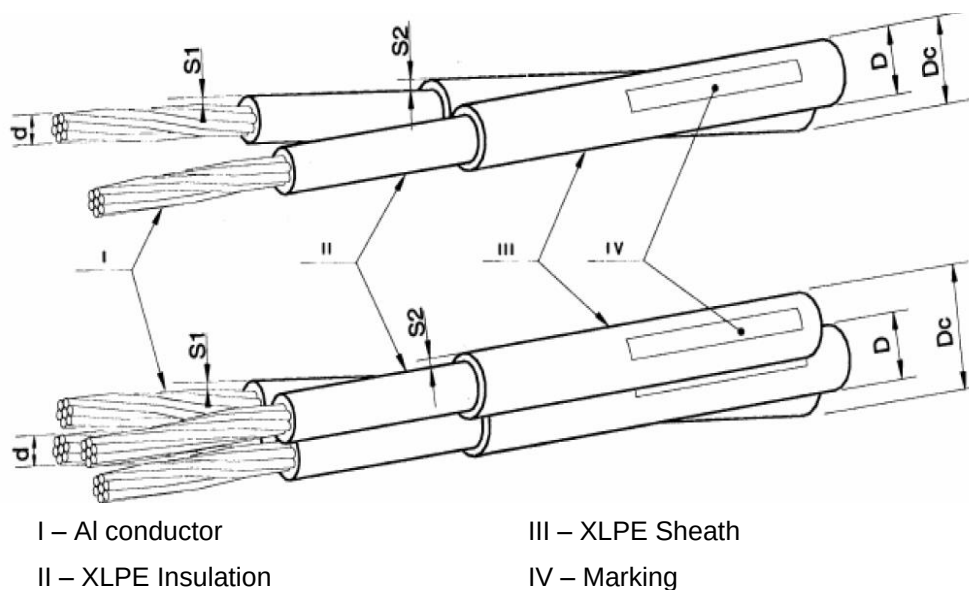


Figure 3 Type III LV self-supported cable.

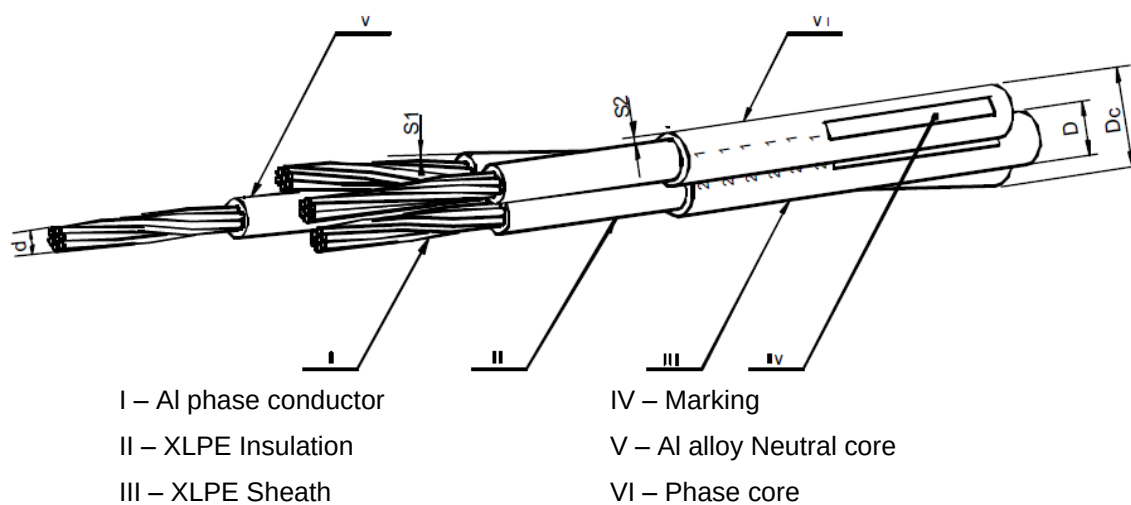


Figure 4 Type IV LV neutral supported cable.

5 DESIGN AND MANUFACTURING

5.1 Conductor

For **Type III** cables the conductors shall be stranded circular non-compacted (Class 2) made of aluminum with 99,5% purity degree.

For **Type I, Type II & Type IV** cables the phase conductors shall be stranded compacted circular (Class 2) made of aluminum with 99,5% purity degree.

Aluminum conductors shall comply all the features specified herein and in standard IEC 60228.

If required, the distance between welding points of the aluminum conductor shall not be less than:

- 15 m between two welding points of the whole conductor
- 200 m between two welding points of the external layer

On the other hand, for neutral supported cables (**Type II & Type IV**) aluminum alloy neutral conductor shall be stranded circular non-compacted, made with wires that shall comply all features specified in standard EN 50183, specifically for AL2 type.

Welding points are forbidden in the central wire. However, welding points in other layers are permitted as long as the distance between welding is not less than:

- 50 m between two welding points of the whole conductor.
- 200 m between two welding point in the external layer

In Table 2 and Table 3 aluminum and aluminum alloy conductor characteristics are shown.

Nominal cross-section [mm ²]	Minimum number of wires	Diameter of conductors [mm]		Maximum resistance of conductor at 20°C [Ω/km]
		Minimum	Maximum	
16	6(7)*	4,6	5,2	1,91
25	6(7)*	5,6	6,5	1,20
35	6	6,6	7,5	0,868
50	6	7,7	8,6	0,641
54,6**	7	9,2	9,8	0,630
70	12	9,3	10,2	0,443
80**	19	11,2	12	0,437
95	15	11,0	12,0	0,320
150	15	13,9	15,0	0,206
*(7) For non-compacted conductors				
**Aluminum alloy conductor used for neutral cores				

Table 2: Characteristics of aluminum and aluminum alloy conductors.

The lay direction of conductors external layer shall be right hand “Z” direction.

Messenger conductor (Type II & Type IV)			
Material	AL2 EN 50183		
Stranding Type	Non-compacted		
Tensile strength of the individual wires (See EN 50183)	$\geq(325) \text{ N/mm}^2$		
Cross-section	[mm ²]	54,6	80
Wire nominal diameter	[mm]	3,15 ±0,03 mm	2,32 ±0,03 mm
Coefficient of linear thermal expansion	[°C ⁻¹]	23·10 ⁻⁶	
Young modulus	[MPa]	62.000	

Table 3 Neutral supporting conductor additional features.

5.2 Insulation

The insulation shall be applied by a suitable extrusion process, and shall form a compact and homogenous body, it shall not penetrate beyond the external layer of the conductor. In addition, it shall be possible to remove without creating any damage to the conductor.

The insulating material shall be cross-linked polyethylene (XLPE), compliant with the characteristics required herein this document.

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

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

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

Where:

t_{min} : minimum insulation thickness in millimeters

t_n : nominal thickness in millimeters

If there is any separator between the conductor and insulation it shall not be considered when the insulation thickness measurement is performed.

Cross-section [mm ²]	Type I and Type II		Type III and Type IV	
	Insulation nominal thickness [mm]	Insulation minimum thickness [mm]	Insulation nominal thickness [mm]	Insulation minimum thickness [mm]
16	1,2	0,98	1,2	0,98
25	1,4	1,16	1,2	0,98
35	1,6	1,34	1,6	1,34
50	1,6	1,34	1,6	1,34
70	1,8	1,52	1,6	1,34
95	1,8	1,52	1,8	1,52
150	1,8	1,52	1,8	1,52
54,6*	1,6	1,34	1,6	1,34
80*	1,8	1,52	1,8	1,52
*Aluminum alloy conductor used for neutral cores				

Table 4 XLPE insulation thickness

Unless otherwise indicated in the local section the insulation color shall be **black**

5.3 Sheath.

The following indications are only applied to **Type III** and **Type IV** cables on phase cores.

The outer sheath material shall be appropriate for normal operation at 90°C. In addition, it shall be resistant to moisture, abrasion, and solar radiation.

The outer sheath compound shall be made of cross-linked polyethylene (XLPE) compliant with the characteristic required herein in this document. In addition it shall be adhered to the insulation.

The minimum thickness of the outer sheath measured and accepted at any point of the cable shall not be less than 0,1 mm, and the average of all these measures should not be less than the nominal thickness.

Using a separator between insulation material and the outer sheath is not admitted.

Cross-section [mm ²]	Sheath nominal thickness [mm]	Sheath minimum thickness [mm]	Color
All	0,2	0,1	Grey RAL 7001

Table 5 XLPE sheath thickness and color

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5.4 Constructive aspects.

Unless otherwise indicated in Local sections the following indications shall be followed:

For Type I & Type III cables the cores shall be bundled to the right (clockwise). The lay ratio shall be 15 up to 20 per the overall diameter of the bundled cores.

For Type II & Type IV cables the phase cores shall be bundled around the neutral core to the right (clockwise). The lay ratio shall be 25 up to 30 per the overall diameter of the configuration.

5.5 Ampacity and Short-circuit rating

See local section

5.6 Cable designation and Markings

5.6.1 Cable designation

See Local Section.

5.6.2 Markings

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

Specific characteristics are detailed in Local Section.

6 TEST CLASSIFICATION

For **Endesa** cables test shall be performed according to standard **UNE 21030**

6.1 Acceptance tests

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

6.1.1 Routine tests:

Routine tests shall be performed at 100% of delivered spools

6.1.2 Sample test

Sample tests are carried out over samples taken from a complete cable (See Table 6 in sub-clause 6.1.3 for sampling).

6.1.3 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

Table 6: Samples and Grade of Acceptance to Each of the Trials

6.2 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 and construction characteristics, the type approval shall be accepted as valid for 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, insulation, outer sheath) and the same manufacturing process.

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

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

6.3 Tests list for Type I and Type II cables

N°	Test	Requirements	Test Method	R	S	T
1	Voltage Test Duration of immersion Test voltage Voltage applied duration Test Result	1 h 4 kV AC 15 min No breakdown	IEC 60502-1 sub-clause 15.3 as applicable	X	X	-
2	Conductor electrical resistance	See clause 5.1	IEC 60502-1 sub-clause 15.2	X	-	-
3	Mechanical breaking load verification of: Phase conductors 16 mm ² 25 mm ² 35 mm ² 50 mm ² 70 mm ² 95 mm ² 150 mm ² Neutral conductors 54,6 mm ² 80 mm ²	≥190 daN ≥300 daN ≥420 daN ≥600 daN ≥840 daN ≥1140 daN ≥1800 daN ≥1660 daN ≥2100 daN	HD 626 Part 2 sub-clause 2.1.2	-	-	X
4	Conformity to the approved type	See clause 5	Constructional characteristics, markings colors, and phase identification shall be inspected by visual examination. Dimensions, thickness, pitches and diameters shall be measured according to IEC 60811 parts 201, 202 and 203.	-	X	-
5	Conductor mass per unit length Test carried out on a phase conductor	The value shall be recorded	HD 605 sub-clause 2.1.13.1 or equivalent standard	-	-	X
6	Durability of markings	HD 626-1 Part 1 Sub-clause 3.3	HD 605 sub-clause 2.5.4	-	X	-
7	Mechanical properties of XLPE Before ageing Minimum tensile strength Minimum elongation at break	14,5 Mpa 200%	IEC 60811-501	-	X	-

N°	Test	Requirements	Test Method	R	S	T
8	XLPE mechanical properties After ageing					
	Temperature	150 °C				
	Duration T1	240 h	IEC 60811-501	-	-	X
	Minimum tensile strength		IEC 60811-401			
	Maximum variation T1/T0	±25%				
9	Minimum elongation at break					
	Maximum variation T1/T0	±25%				
	Hot set test of XLPE					
	Temperature	200 °C				
	Duration	15 min	IEC 60811-507	-	X	-
10	Mechanical stress	0,2 Mpa				
	Maximum elongation under load	175%				
	Maximum residual elongation	15%				
	Shrinkage test (Complete cable)					
	L	200 mm	IEC 60811-502	-	-	X
11	Duration	1 h				
	Temperature	130 °C				
	Maximum shrinkage	4%				
	Capillarity water absorption test (Only Type I cables)					
	The end of the test piece outside the container shall show no trace of water		HD 626 Part 2 sub-clause 2.7.1	-	-	X
12	Insulation resistance at 20 °C					
	Water immersion duration	1 h	IEC 60502-1 sub-clause 17.1	-	X	-
	Insulation constant K_i [MΩ·km]	≥10 ⁴				
13	Insulation resistance at 90 °C					
	Water immersion duration	2 h	IEC 60502-1 sub-clause 17.2	-	-	X
	Volume resistivity [Ω·cm]	≥10 ¹²				
14	Carbon black content	2,5%±0,5%	IEC 60811-605	-	-	X

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N°	Test	Requirements	Test Method	R	S	T
15	Abrasion test	The samples shall withstand ≥ 2000 turns of the test rotor	HD 605 2.5.13	-	X	-
16	Test at low temperature When cable $D > 12,5$ mm Elongation test at low temperature Temperature Minimum elongation When cable $D < 12,5$ mm Bending test at low temperature Temperature	-25 °C 50% -25 °C	IEC 60811-505 IEC 60811-504	-	-	X
17	High voltage test (Complete cable) Sample length approx. Duration of immersion Test voltage Voltage applied duration Test result	≥ 20 m 24 h 10 kV AC 30 min No breakdown	IEC 60502-1, Sub-clause 17.3 by water immersion as applicable. The test voltage shall be applied between all conductors in parallel and water.	-	-	X
18	Resistance of insulation to weather conditions	HD 626 Part 2 , Sub-clause 2.5.2	HD 626 Part 2, Sub-clause 2.5.2	-	-	X
19	Water absorption test (Gravimetric method) Temperature Duration Maximum variation of mass	85 °C 336 h 1 mg/cm ²	IEC 60811-402	-	-	X

R: Routine test

S: Sample test

T: Type test

6.4 Tests for Type III and Type IV cables

N°	Test	Requirements	Test Method	R	S	T
1	Voltage Test Duration of immersion Test voltage Voltage applied duration Test Result	1 h 4 kV AC 15 min No breakdown	IEC 60502-1 sub-clause 15.3 as applicable	X	-	-
2	Conductor electrical resistance	See clause 5.1	IEC 60502-1 sub-clause 15.2	X	-	-
3	Mechanical breaking load verification of conductors (Only for Type III cables)	BL≥280 daN	HD 626 Part 2 sub-clause 2.1.5	-	X	-
4	Conformity to the approved type	See clause 5	Constructional characteristics, markings colors, and phase identification shall be inspected by visual examination. Dimensions, thickness, pitches and diameters shall be measured according to IEC 60811 parts 201, 202 and 203.	-	X	-
5	Conductor mass per unit length Test carried out on a phase conductor	The value shall be recorded	HD 605 sub-clause 2.1.13.1	-	-	X
6	Durability of markings	HD 626 Part 1 Sub-clause 3.3	HD 605 sub-clause 2.5.4	-	X	-
7	Mechanical properties of XLPE (Insulation and sheath) Before ageing Minimum tensile strength Minimum elongation at break	14,5 Mpa 200%	IEC 60811-501	-	X	-
8	XLPE mechanical properties (Insulation and sheath) After ageing Temperature Duration T1 Minimum tensile strength Maximum variation T1/T0 Minimum elongation at break Maximum variation T1/T0	150 °C 240 h ±25% ±25%	IEC 60811-501 IEC 60811-401	-	-	X

N°	Test	Requirements	Test Method	R	S	T
9	Hot set test of XLPE (Insulation and sheath) Temperature Duration Mechanical stress Maximum elongation under load Maximum residual elongation	150 °C 15 min 0,4 Mpa 70% 10%	IEC 60811-507	-	X	-
10	Capillarity water absorption test (Only for Type III cables)	The end of the test piece outside the container shall show no trace of water	HD 626 Part 2, sub-clause 2.7.2	-	X	-
11	Insulation resistance at 20 °C (Insulation and sheath together) Water immersion duration Insulation constant K_i [$M\Omega \cdot km$]	1 h $\geq 10^4$	IEC 60502-1 sub-clause 17.1	-	X	-
12	Insulation resistance at 90 °C (Insulation and sheath together) Water immersion duration Insulation constant K_i [$M\Omega \cdot km$]	2 h $\geq 10^3$	IEC 60502-1 sub-clause 17.2	-	-	X
13	Test at low temperature for XLPE (Insulation and sheath together) When cable $D > 12,5$ mm Elongation test at low temperature Temperature Minimum elongation When cable $D \leq 12,5$ mm Bending test at low temperature Temperature	-25 °C 50% -25 °C	IEC 60811-505 IEC 60811-504	-	-	X
14	High voltage test (On complete cable) Sample length approx. Duration of immersion Test voltage Voltage applied duration Test result	≥ 5 m 24 h 10 kV AC 30 min No breakdown	IEC 60502-1, Sub-clause 17.3 by water immersion as applicable. The test voltage shall be applied between all conductors in parallel and water.	-	-	X

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N°	Test	Requirements	Test Method	R	S	T
15	Impulse test Sample length approximately Number of impulses Wave form of impulse Peak value Test result	≈ 5 m 5(+) and 5 (-) (1 to 5/(50±10))μ s 20 kV No breakdown	The sample shall be water immersed and the voltage shall be applied between phase conductors in parallel and water connected to neutral conductor (if any). Publications HD 588-1	-	-	X
16	Cold impact test (Insulation and sheath together) XLPE insulation and sheath	-20 °C	IEC 60811-506, extended also to XLPE insulation and sheath with hammer mass of 1000g	-	-	X
17	Water absorption test (Gravimetric method) Temperature Duration Maximum variation of mass	85 °C 336 h 5 mg/cm ²	IEC 60811-402	-	-	X
18	Abrasion test	The samples shall withstand ≥ 2000 turns of the test rotor	HD 626 part 2 sub-clause 2.6.1	-	-	X
19	Mechanical breaking load verification of messenger (Only for Type IV cables)	≥1660 daN	HD 626 Part 2 Sub-clause 2.1.5		X	-
20	Thermo mechanical behavior	HD 626 Part 2 Sub-clause 2.3.4	HD 626 Part 2 Sub-clause 2.3.4 ⁽³⁾ with clamps DM 6020 or DM 6010 for Italy and Romania	-	-	X
21	Mechanical behavior of messenger with anchoring device (Only for Type IV cables)	HD 626 Part 2 Sub-clause 2.3.5	HD 626 S1 Sub-clause 2.3.5 with clamps DM 6010 for Italy and Romania	-	-	X

³NOTE: The measurement of Sgc15 and Scm15 shall be performed after the fifteenth cycle. The slippage of every sheath shall be measured after the final cycle. The thermal probe shall be installed in the middle of the sample, i.e. notes (1) and (2) of HD 626 §2.3.4 must not be considered.

N°	Test	Requirements	Test Method	R	S	T
22	Thermo-gravimetric test for insulating materials	It is assumed that the loss of mass and the characteristic peak temperature for each step are taken as the average of the results obtained on the two test specimens. During qualification tests, the values shall be recorded. During acceptance tests, for each step the loss of mass shall not differ by more than $\pm 10\%$ and the characteristic peak temperatures by more than $\pm 10\text{ }^{\circ}\text{C}$ from the corresponding values of the qualification tests	HD 605, Sub-clause 2.5.7	-	X	-
23	Resistance of insulation to weather conditions	No cracks on the exposed surface shall occur. Breaking load and elongation shall not vary more than 20% from the initial value	HD 626 Part 2 Sub-clause 2.5.3	-	-	X
24	Test at low temperature for XLPE (Insulation and sheath together) After ageing Temperature Duration When cable D>12,5 mm Elongation test at low temperature Temperature Minimum elongation When cable D<12,5 mm Bending test at low temperature Temperature	150 $^{\circ}\text{C}$ 240 h -25 $^{\circ}\text{C}$ 50% -25 $^{\circ}\text{C}$	IEC 60811-401 IEC 60811-505 IEC 60811-504	-	-	X
25	Test under fire conditions (Complete cable)	The cable shall be classified Minimum fire class Fca	EN 50575 sub-clause 4.1	-	-	X
R: Routine test S: Sample test T: Type test						

7 GUARANTEE

Requirement of warranty will be indicated in the bid request, including periods and standards.

8 CONDITIONS OF SUPPLY

See in Local Section

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9 TECHNICAL CHECK-LIST

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

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Manufacturer information	Manufacturer information
1.2	Factory	-	Manufacturer information	Manufacturer information
2	MAIN FEATURES			
2.1	Distribution Company and Country	-		
2.2	Country Code	-		
2.3	GS Type Code			
2.4	Rated Voltage U ₀ /U (U _{max})	[kV]		
2.4	Disposition	[n x mm ²]		
2.5	Type I, Type II, Type III or Type IV	-		
3	PHASE 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	INSULATION			
4.1	Material	-		
4.2	Nominal thickness	[mm]		
4.3	Minimum thickness	[mm]		
4.4	Color	-		
5	OUTER SHEATH (if apply)			
5.1	Material	-		
5.2	Nominal thickness	[mm]		
5.3	Minimum thickness	[mm]		
5.4	Color	-		
6	ADDITIONAL INFORMATION			
6.1	Maximum total diameter	[mm]		
6.2	Drum Type	-		
6.3	Total length	[m]		
6.4	Ampacity (See clause 5.5 for conditions)	[A]		
6.5	Weight per unit of length	[kg/km]		

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Item	Description	Unit	Required	Offered
7	NEUTRAL CONDUCTOR (if apply)			
7.1	Material	-		
7.2	Nominal cross-section	[mm ²]		
7.3	Wire diameter			
7.4	Minimum Number of Wires of Conductor	-		
7.5	Minimum diameter	[mm]		
7.6	Maximum diameter	[mm]		
7.7	Maximum resistance at 20°C	[Ω/ km]		
7.8	Stranding Type	-		
8	NEUTRAL OUTER SHEATH			
8.1	Material	-		
8.2	Nominal thickness	[mm]		
8.3	Minimum thickness	[mm]		
8.4	Color	-		

9.1 Technical check-list examples

9.1.1 Type I 4x25 mm² cable

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Manufacturer information	Manufacturer information
1.2	Factory	-	Manufacturer information	Manufacturer information
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	EE-SPAIN	
2.2	Country Code	-	330043	
2.3	GS Type Code		GSCC009/004	
2.4	Rated Voltage U ₀ /U (U _{max})	[kV]	0,6/1	
2.5	Disposition	[n xmm ²]	4X25	
2.6	Type I, Type II, Type III or Type IV	-	Type I	
3	PHASE CONDUCTOR			
3.1	Material	-	Aluminum	
3.2	Nominal cross-section	[mm ²]	25	
3.3	Minimum Number of Wires of Conductor	-	6	
3.4	Minimum diameter	[mm]	5,6	
3.5	Maximum diameter	[mm]	6,5	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	1,20	
3.7	Stranding Type	-	Compacted circular class 2	
4	INSULATION			
4.1	Material	-	XLPE	
4.2	Nominal thickness	[mm]	1,4	
4.3	Minimum thickness	[mm]	1,16	
4.4	Color	-	Black	
5	OUTER SHEATH (if apply)		NO	
5.1	Material	-	NO	
5.2	Nominal thickness	[mm]	NO	
5.3	Minimum thickness	[mm]	NO	
5.4	Color	-	NO	
6	ADDITIONAL INFORMATION		NO	
6.1	Maximum total diameter	[mm]	Informative	
6.2	Drum Type	-	Informative	
6.3	Total length	[m]	Informative	
6.4	Ampacity (See clause 5.5 for conditions)	[A]	Calculated	
6.5	Weight per unit of length	[kg/km]	Informative	

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9.1.2 Type II 3x150+80 mm² cable

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Manufacturer information	Manufacturer information
1.2	Factory	-	Manufacturer information	Manufacturer information
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	EE-Spain	
2.2	Country Code	-	330046	
2.3	GS Type Code		GSCC009/013	
2.4	Rated Voltage U ₀ /U (U _{max})	[kV]	0,6/1	
2.5	Disposition	[n xmm ²]	3x150+80	
2.6	Type I, Type II, Type III or Type IV	-	Type II	
3	PHASE CONDUCTOR			
3.1	Material	-	Aluminum	
3.2	Nominal cross-section	[mm ²]	150	
3.3	Minimum Number of Wires of Conductor	-	15	
3.4	Minimum diameter	[mm]	13,9	
3.5	Maximum diameter	[mm]	15	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	0,206	
3.7	Stranding Type	-	Compacted circular class 2	
4	INSULATION			
4.1	Material	-	XLPE	
4.2	Nominal thickness	[mm]	2	
4.3	Minimum thickness	[mm]	1,7	
4.4	Color	-	Black	
5	OUTER SHEATH (if apply)		NO	
5.1	Material	-	NO	
5.2	Nominal thickness	[mm]	NO	
5.3	Minimum thickness	[mm]	NO	
5.4	Color	-	NO	
6	ADDITIONAL INFORMATION			
6.1	Maximum total diameter	[mm]	Informative	
6.2	Drum Type	-	Informative	
6.3	Total length	[m]	Informative	
6.4	Ampacity (See clause 5.5 for conditions)	[A]	Calculated	
6.5	Weight per unit of length	[kg/km]	Informative	

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Item	Description	Unit	Required	Offered
7	NEUTRAL CONDUCTOR (if apply)			
7.1	Material	-	AL2	
7.2	Nominal cross-section	[mm ²]	80	
7.3	Wire diameter	[mm]	2,32	
7.4	Minimum Number of Wires of Conductor	-	19	
7.5	Minimum diameter	[mm]	11,2	
7.6	Maximum diameter	[mm]	12	
7.7	Maximum resistance at 20°C	[Ω/ km]	0,437	
7.8	Stranding Type	-	Non-compacted circular	
8	NEUTRAL OUTER SHEATH			
8.1	Material	-	XLPE	
8.2	Nominal thickness	[mm]	1,6	
8.3	Minimum thickness	[mm]	1,34	
8.4	Color	-	Black	

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9.1.3 Type III 4x16 mm² cable

Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Manufacturer information	Manufacturer information
1.2	Factory	-	Manufacturer information	Manufacturer information
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	ED-Italy	
2.2	Country Code	-	339063	
2.3	GS Type Code		GSCC009/015	
2.4	Rated Voltage U ₀ /U (U _{max})	[kV]	0,6/1	
2.4	Disposition	[n xmm ²]	4x16	
2.5	Type I, Type II, Type III or Type IV	-	Type III	
3	PHASE CONDUCTOR			
3.1	Material	-	Aluminum	
3.2	Nominal cross-section	[mm ²]	16	
3.3	Minimum Number of Wires of Conductor	-	7	
3.4	Minimum diameter	[mm]	4,6	
3.5	Maximum diameter	[mm]	5,2	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	1,91	
3.7	Stranding Type	-	Non-compacted circular class 2	
4	INSULATION			
4.1	Material	-	XLPE	
4.2	Nominal thickness	[mm]	1,3	
4.3	Minimum thickness	[mm]	1,07	
4.4	Color	-	Black	
5	OUTER SHEATH (if apply)			
5.1	Material	-	XLPE	
5.2	Nominal thickness	[mm]	0,2	
5.3	Minimum thickness	[mm]	0,1	
5.4	Color	-	Grey	
6	ADDITIONAL INFORMATION			
6.1	Maximum total diameter	[mm]	≈20	
6.2	Drum Type	-	10 (GUI 102)	
6.3	Total length	[m]	750	
6.4	Ampacity (See clause 5.5 for conditions)	[A]	Calculated	
6.5	Weight per unit of length	[kg/km]	≈350	

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9.1.4 Type IV 3x70+54,6 mm² cable

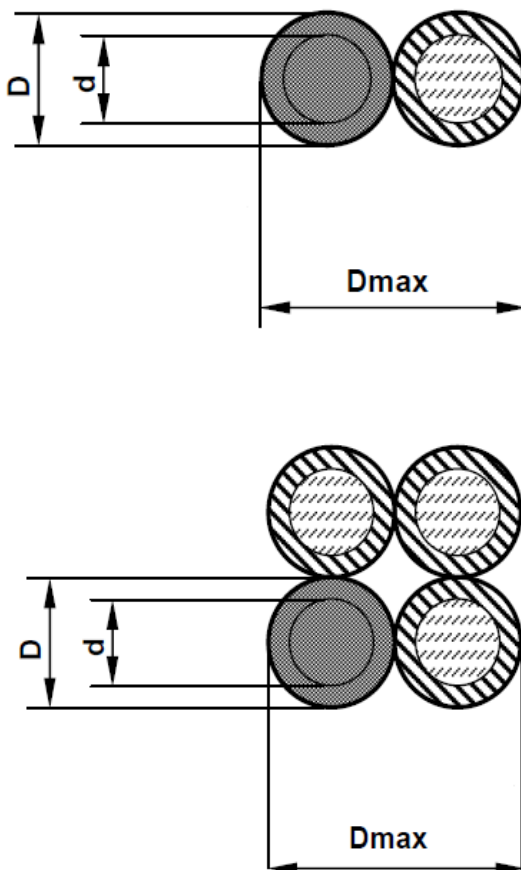
Item	Description	Unit	Required	Offered
1	GENERAL INFORMATION			
1.1	Supplier	-	Manufacturer information	Manufacturer information
1.2	Factory	-	Manufacturer information	Manufacturer information
2	MAIN FEATURES			
2.1	Distribution Company and Country	-	ED-Romania	
2.2	Country Code	-	339013	
2.3	GS Type Code		GSCC009/017	
2.4	Rated Voltage U ₀ /U (U _{max})	[kV]	0,6/1	
2.5	Disposition	[n xmm ²]	3x70+54,6	
2.6	Type I, Type II, Type III or Type IV	-	Type IV	
3	PHASE CONDUCTOR			
3.1	Material	-	Aluminum	
3.2	Nominal cross-section	[mm ²]	70	
3.3	Minimum Number of Wires of Conductor	-	12	
3.4	Minimum diameter	[mm]	9,3	
3.5	Maximum diameter	[mm]	10,2	
3.6	Maximum resistance of conductor at 20°C	[Ω/ km]	0,443	
3.7	Stranding Type	-	Compacted circular class 2	
4	INSULATION			
4.1	Material	-	XLPE	
4.2	Nominal thickness	[mm]	1,6	
4.3	Minimum thickness	[mm]	1,34	
4.4	Color	-	Black	
5	OUTER SHEATH (if apply)			
5.1	Material	-	XLPE	
5.2	Nominal thickness	[mm]	0,2	
5.3	Minimum thickness	[mm]	0,1	
5.4	Color	-	Grey	
6	ADDITIONAL INFORMATION			
6.1	Maximum total diameter	[mm]	≈40	
6.2	Drum Type	-	16 (GUI 102/RO)	
6.3	Total length	[m]	750	
6.4	Ampacity (See clause 5.5 for conditions)	[A]	Calculated	
6.5	Weight per unit of length	[kg/km]	≈1000	

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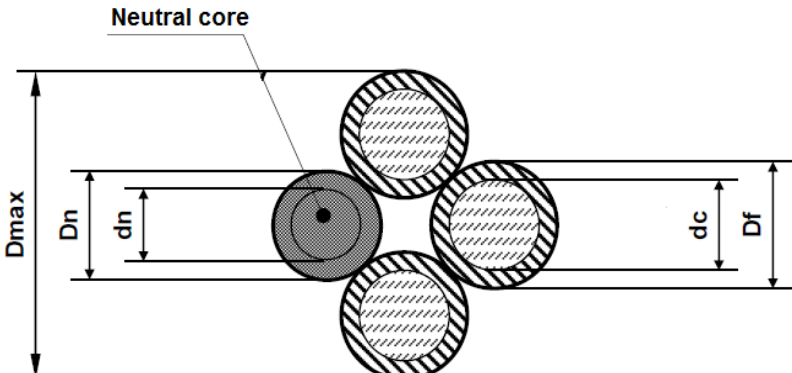
Item	Description	Unit	Required	Offered
7	NEUTRAL CONDUCTOR (if apply)			
7.1	Material	-	AL2	
7.2	Nominal cross-section	[mm ²]	54,6	
7.3	Wire diameter	[mm]	3,15	
7.4	Minimum Number of Wires of Conductor	-	7	
7.5	Minimum diameter	[mm]	9,2	
7.6	Maximum diameter	[mm]	9,8	
7.7	Maximum resistance at 20°C	[Ω/ km]	0,630	
7.8	Stranding Type	-	Non-compacted circular	
8	NEUTRAL OUTER SHEATH			
8.1	Material	-	XLPE	
8.2	Nominal thickness	[mm]	1,6	
8.3	Minimum thickness	[mm]	1,34	
8.4	Color	-	Black	

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LOCAL SECTION A – e-distribuzione (Italy), e- e-distributie (Romania)

ITEM	TITLE	DESCRIPTION
3.3	Local Standards	<u>e-distribuzione (Italy), e-distributie (Romania)</u> - Standard PVR 006 Operational Note Vendor Rating Control: BARCODES Warranty and Traceability of Enel Distribution Materials. - GUI 102 “Bobine per il trasporto di cavi elettrici, cavi ottici e conduttori per le linee elettriche di media e bassa tensione”
3.4	Replaced Local Standards	<u>e-distribuzione (Italy), e-distributie (Romania)</u> - DC4182/DC4182 RO - DC4183/DC4183 RO
5.4	Constructive aspects.	<u>e-distribuzione (Italy), e-distributie (Romania)</u> <u>Values are given for network design purposes</u> <u>Type III cables</u> 

LOCAL SECTION A – e-distribuzione (Italy), e- e-distributie (Romania)

ITEM	TITLE	DESCRIPTION																										
5.4	Constructive aspects.	<u>e-distribuzione (Italy), e-distributie (Romania)</u>																										
		<table><tr><th rowspan="2">Formation</th><th colspan="2">D [mm]</th><th rowspan="2">D_{max} [mm]</th><th rowspan="2">Total Mass [kg/km]</th><th rowspan="2">Breaking load [daN]</th></tr><tr><th>Min</th><th>Max</th></tr><tr><td>2x16 mm²</td><td>7,4</td><td>8,6</td><td>16,8</td><td>175</td><td>550</td></tr><tr><td>4x16 mm²</td><td>7,4</td><td>8,6</td><td>20</td><td>350</td><td>1100</td></tr></table>	Formation	D [mm]		D _{max} [mm]	Total Mass [kg/km]	Breaking load [daN]	Min	Max	2x16 mm ²	7,4	8,6	16,8	175	550	4x16 mm ²	7,4	8,6	20	350	1100						
		Formation		D [mm]					D _{max} [mm]	Total Mass [kg/km]	Breaking load [daN]																	
			Min	Max																								
		2x16 mm ²	7,4	8,6	16,8	175	550																					
		4x16 mm ²	7,4	8,6	20	350	1100																					
		Where:																										
		D= Core external diameter (insulation+sheath)																										
		D _{max} = Formation external diameter (<u>indicative</u>)																										
		<u>Type IV cables</u>																										
																												
<table><tr><th rowspan="2">Formation [n° x mm²]</th><th colspan="2">D_f [mm]</th><th colspan="2">D_n [mm]</th><th rowspan="2">D_{max} [mm]</th><th rowspan="2">Total Mass [kg/km]</th><th rowspan="2">Neutral core Breaking load [daN]</th></tr><tr><th>Min</th><th>Max</th><th>Min</th><th>Max</th></tr><tr><td>3x35+54,6</td><td>10,2</td><td>11,8</td><td>12,4</td><td>13,3</td><td>33</td><td>700</td><td>1600</td></tr><tr><td>3x70+54,6</td><td>12,9</td><td>14,5</td><td>12,4</td><td>13,3</td><td>40</td><td>1000</td><td>1600</td></tr></table>	Formation [n° x mm ²]	D _f [mm]		D _n [mm]		D _{max} [mm]	Total Mass [kg/km]	Neutral core Breaking load [daN]	Min	Max	Min	Max	3x35+54,6	10,2	11,8	12,4	13,3	33	700	1600	3x70+54,6	12,9	14,5	12,4	13,3	40	1000	1600
Formation [n° x mm ²]		D _f [mm]		D _n [mm]					D _{max} [mm]	Total Mass [kg/km]	Neutral core Breaking load [daN]																	
	Min	Max	Min	Max																								
3x35+54,6	10,2	11,8	12,4	13,3	33	700	1600																					
3x70+54,6	12,9	14,5	12,4	13,3	40	1000	1600																					
Where:																												
D _f = Phase core external diameter (insulation+sheath)																												
D _n = Neutral core external diameter																												
D _{max} = Formation external diameter (<u>indicative</u>)																												

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LOCAL SECTION A – e-distribuzione (Italy), e- e-distributie (Romania)

ITEM	TITLE	DESCRIPTION										
5.5	Ampacity and Short-circuit rating	<u>e-distribuzione (Italy), e-distributie (Romania)</u> The ampacity and short-circuit rating estimated values shall be given for network design purposes. Such currents 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 For short-circuit capacity the following reference values could be used: <table><tr><th>Cross-section [mm²]</th><th>Short circuit rating [kA]</th></tr><tr><td>16</td><td>1,6</td></tr><tr><td>35</td><td>3,2</td></tr><tr><td>54,6</td><td>4,5⁽¹⁾</td></tr><tr><td>70</td><td>6,9</td></tr></table> The short circuit capacities are determined using the following parameters: Conductor initial temperature: 90 °C Conductor final temperature: 250 °C Short circuit duration: 1 s ⁽¹⁾ For the Aluminum alloy neutral conductor the following parameter are used: Conductor initial temperature: 65 °C Conductor final temperature: 180 °C	Cross-section [mm ²]	Short circuit rating [kA]	16	1,6	35	3,2	54,6	4,5 ⁽¹⁾	70	6,9
Cross-section [mm ²]	Short circuit rating [kA]											
16	1,6											
35	3,2											
54,6	4,5 ⁽¹⁾											
70	6,9											
5.6.1	Cable designation	<u>e-distribuzione (Italy), e-distributie (Romania)</u> The cable designation shall be the following: - Aluminum conductor: A - Stranded compacted circular conductors: R - Cross-linked polyethylene insulation: E4 - Cross-linked polyethylene sheath: E4 - Bundled assemble cores: X - Assigned voltage of the cable expressed in kV: U₀/U - Nominal cross-section of the conductor Example: ARE4*E4*X-0.6/1 kV 16										

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LOCAL SECTION A – e-distribuzione (Italy), e- e-distributie (Romania)

ITEM	TITLE	DESCRIPTION
5.6.2	Markings	<u>e-distribuzione (Italy), e-distributie (Romania)</u> The distance between the end of the mark and the beginning of the next identical mark does not exceed 550 mm. Cables shall be provided with a marking consisting of: - Property name: e-distribuzione or e-distributie Banat, e-distributie Dobrogea, e-distributie Muntenia - Cable designation: see 5.6.2 - Reaction to fire class (CPR) - Manufacturer name or trademark: XXXXXX - Identification of the production plant with a different letter of the alphabet: B - Project index: to choose exponentially (00, 01, 02, 03). This index must be modified with every construction variation of the single core (phase or neutral). - Year and month of manufacturing (2017 12): It could be marked over a different generatrix (position) in relation to the other parameters as long as the maximum step of 1 meter is respected. In such case ink stamping could be used. - Fire class reaction ("CPR") - Metric marking (0000): For Type III cables shall be made only over the core sheath of "PHASE 1". In case of Type IV cables is on the neutral conductor. The marking could be executed with ink if placed in another generatrix. - Core identification (FASE X): To be repeated at least every 100 mm in the intervals between two consequent series of inscriptions. The core identification (FASE X) could be marked over a different generatrix (position) as long as the maximum step of 100 mm is respected. In such case ink stamping could be used For Type III 2x16 configuration the core identification (FASE/FASE 1) could be marked over a different generatrix (position) as long as the maximum step of 100 mm is respected. In such case ink stamping could be used. For Type III the neutral core shall be identified using a longitudinal rib with 0,4-0,8 mm height and 0,9-1 mm width. <u>Marking examples</u> a) Type III cables 2x16 configuration Phase core: e-distribuzione ARE4*E4*X-0,6/1 kV 16 CPR XXXXX B 01 2017 12 0000 FASE FASE Neutral core e-distribuzione ARE4*E4*X-0,6/1 kV 16 CPR XXXXX B 01 2017 12

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LOCAL SECTION A – e-distribuzione (Italy), e- e-distributie (Romania)

ITEM	TITLE	DESCRIPTION															
5.6.2	Markings	<u>e-distribuzione (Italy), e-distributie (Romania)</u> b) Type III cables 4x16 configuration Phase core 1: e-distribuzione ARE4*E4*X-0,6/1 kV 16 CPR XXXXX B 01 2017 12 0000 FASE 1 FASE 1 Phase core 2 or 3: e-distribuzione ARE4*E4*X-0,6/1 kV 16 CPR XXXXX B 01 2017 12 FASE X FASE X Neutral core e-distribuzione ARE4*E4*X-0,6/1 kV 16 CPR XXXXX B 01 2017 12 c) Type IV cables Phase core 1, 2 or 3: e-distribuzione ARE4*E4*X*-0,6/1 kV 35 CPR XXXXX B 01 2017 12 FASE X FASE X Neutral core: e-distribuzione ARE4*-0,6/1 kV 54,6 CPR XXXXX B 01 2003 12 0000															
8	CONDITIONS OF SUPPLY	<u>e-distribuzione (Italy), e-distributie (Romania)</u> The maximum length and reel type for each configuration of cable are depicted in the following table: <table border="1"> <thead> <tr> <th>Formation [n° x mm²]</th><th>Maximum Length [m]</th><th>Coil Type (GUI 102)</th></tr> </thead> <tbody> <tr> <td>2x16</td><td>750</td><td>10</td></tr> <tr> <td>4x16</td><td>750</td><td>10</td></tr> <tr> <td>3x35+54,6</td><td>750</td><td>14</td></tr> <tr> <td>3x70+54,6</td><td>750</td><td>16</td></tr> </tbody> </table> The admitted tolerance is equal to $\pm 3\%$ of the length indicated in the order. Coils with total length less than indicated in the table above are permitted, as long as such reels constitute up a maximum to 10% of the cables forming the deliver batch (same transport document). However, each coil shall contain at least 100m, excluding the sample sizes whose length was reduced during the acceptance test. 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 drum. Such bar code shall be in compliance with technical specification PVR006. Reels shall be made in compliance with the standard GUI102/GUI 102 RO.	Formation [n° x mm²]	Maximum Length [m]	Coil Type (GUI 102)	2x16	750	10	4x16	750	10	3x35+54,6	750	14	3x70+54,6	750	16
Formation [n° x mm²]	Maximum Length [m]	Coil Type (GUI 102)															
2x16	750	10															
4x16	750	10															
3x35+54,6	750	14															
3x70+54,6	750	16															

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LOCAL SECTION A – e-distribuzione (Italy), e- e-distributie (Romania)

ITEM	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	<u>e-distribuzione (Italy), e-distributie (Romania)</u> 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).

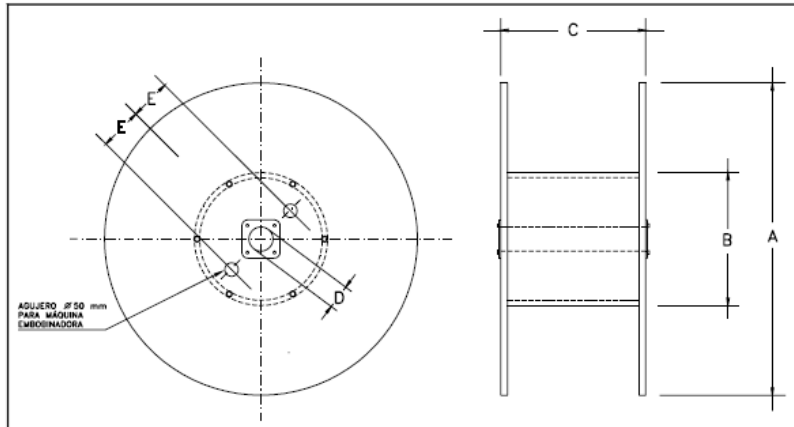
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LOCAL SECTION B – CODENSA

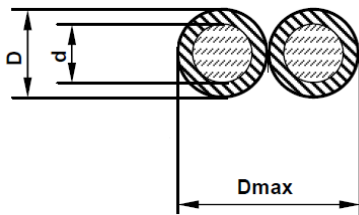
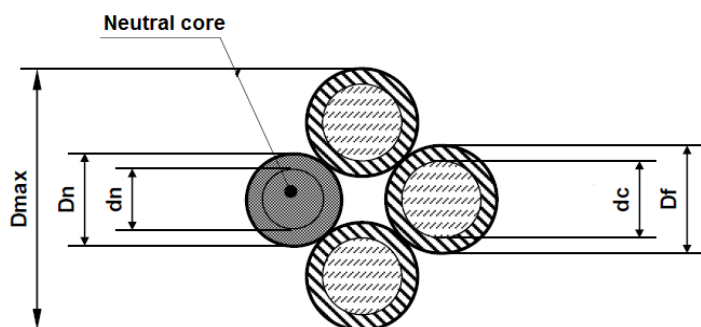
ITEM	TITLE	DESCRIPTION
3.4	Replaced Local Standards	<u>Enel Distribución Colombia</u> E-BT-002 “Cables preensamblados para líneas aéreas en baja tensión” ET115 CABLE MULTIPLEX (Duplex, Triplex, Cuadriplex) DE ALUMINIO AISLADO TIPO XLPE 600 V”
5.6.2	Markings	In order to avoid accidents, the phase and neutral cores shall be identified by printed stripes or adhesive labels or in the outer surface with the following colors: Yellow, Blue and Red. On each meter of length, the following information shall be marked: • Manufacturer's name or trademark • BOG-CUN • Nominal cross sectional area (in mm²) and material of phase and neutral conductors • Material and voltage class (Uo/U) KV • Year of manufacture XXXX • Sequential meters markings m Example: MANUFACTURER – BOG-CUN – 1x54,6mm² AAAC + 3x95mm² AAC - XLPE 0.6/1KV – 2017 – XXX m
8	CONDITIONS OF SUPPLY	Packaging and Labelling The cable shall be delivered by the manufacturer on a wooden or metal spool, which will not be returned, as per maximum and minimum dimensions indicated in Table 8 and in accordance with Figure 10.1. The total length of the cable supplied may not be less than that requested in the purchase order and shall not be longer by any more than 5%. In addition, there will be some special packaging requirements as indicated further ahead. 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.

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LOCAL SECTION B – CODENSA

ITEM	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	When the distance between the origin of manufacture and the purchaser's storage area involves only one means of transport and a distance of less than 200 km, the use of the internal helix will be required only on spools of conductors with a diameter greater than or equal to 120 mm²; this does not make them exempt from the moisture protection on both visible ends of the conductor, mechanical protection, and careful handling of the spools. Temporarily, some of the batches of cables can be requested restricting them to 2,000 m of maximum length per spool and/or pre-joined, as per the Purchase Order. The wooden spools 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 nor should they affect the physical characteristics of wood.  <table><tr><th>A⁽¹⁾</th><th>B</th><th>C⁽¹⁾</th><th>D⁽²⁾</th><th>E</th></tr><tr><th>mm</th><th>mm</th><th>mm</th><th>mm</th><th>mm</th></tr><tr><td>1730</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table> Notes: (1) Maximum value (2) Minimum value (3) Two times the minimum cable curvature radius for transport 300 or 180mm according to type of drum (large or small respectively)	A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E	mm	mm	mm	mm	mm	1730	(3)	1120	80	(4)
A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E													
mm	mm	mm	mm	mm													
1730	(3)	1120	80	(4)													

LOCAL SECTION C – Enel Distribución Chile

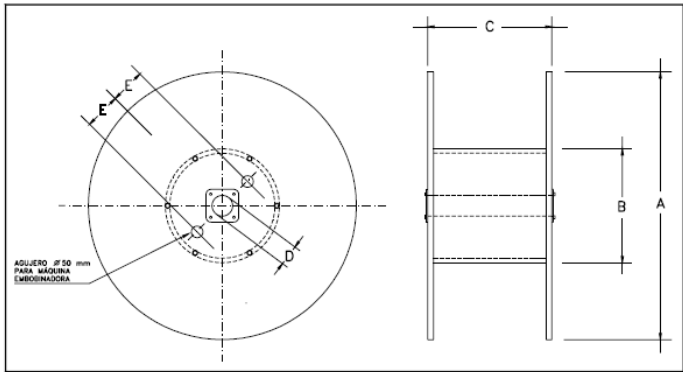
ITEM	TITLE	DESCRIPTION												
3.4	Replaced Local Standards	<u>Enel Distribución Chile</u> E-BT-002 “Cables preensamblados líneas aéreas en baja tensión”												
5.4	Constructive aspects.	<u>Enel Distribución Chile</u> Values are given for network design purposes Type I Cables Aluminum conductor XLPE insulated cables self-supported												
		 <table><thead><tr><th rowspan="2">Formation [n° x mm²]</th><th colspan="2">D_f [mm]</th><th rowspan="2">D_{max} [mm]</th><th rowspan="2">Total Mass kg/km</th><th rowspan="2">Breaking load [daN]</th></tr><tr><th>Min</th><th>Max</th></tr></thead><tbody><tr><td>2x16</td><td>7</td><td>7,6</td><td>15,2</td><td>170</td><td>384</td></tr></tbody></table> Where: D= Core external diameter (insulation) D_{max}= Formation external diameter Type II Cables. Aluminum conductor XLPE insulated cables supported by an aluminum alloy XLPE insulated messenger. 	Formation [n° x mm²]	D _f [mm]		D _{max} [mm]	Total Mass kg/km	Breaking load [daN]	Min	Max	2x16	7	7,6	15,2
Formation [n° x mm²]	D _f [mm]			D _{max} [mm]	Total Mass kg/km				Breaking load [daN]					
	Min	Max												
2x16	7	7,6	15,2	170	384									

LOCAL SECTION C – Enel Distribución Chile

ITEM	TITLE	DESCRIPTION																																																				
5.4	Constructive aspects.	<u>Enel Distribución Chile</u>																																																				
		<table><tr><th rowspan="2">Formation [n° x mm²]</th><th colspan="2">D_f [mm]</th><th colspan="2">D_n [mm]</th><th rowspan="2">D_{max} [mm]</th><th rowspan="2">Total Mass kg/km</th><th rowspan="2">Neutral core Breaking load [daN]</th></tr><tr><th>Min</th><th>Max</th><th>Min</th><th>Max</th></tr><tr><td>3x25+54,6</td><td>8,4</td><td>9,3</td><td>12,5</td><td>13</td><td>32</td><td>530</td><td>1690</td></tr><tr><td>3x35+54,6</td><td>9,4</td><td>10,3</td><td>12,5</td><td>13</td><td>34</td><td>650</td><td>1690</td></tr><tr><td>3x50+54,6</td><td>10,5</td><td>11,4</td><td>12,5</td><td>13</td><td>35</td><td>765</td><td>1690</td></tr><tr><td>3x70+54,6</td><td>12,1</td><td>13,0</td><td>12,5</td><td>13</td><td>39</td><td>1020</td><td>1690</td></tr><tr><td>3x95+54,6</td><td>13,8</td><td>14,8</td><td>12,5</td><td>13</td><td>43</td><td>1270</td><td>1690</td></tr></table>	Formation [n° x mm²]	D _f [mm]		D _n [mm]		D _{max} [mm]	Total Mass kg/km	Neutral core Breaking load [daN]	Min	Max	Min	Max	3x25+54,6	8,4	9,3	12,5	13	32	530	1690	3x35+54,6	9,4	10,3	12,5	13	34	650	1690	3x50+54,6	10,5	11,4	12,5	13	35	765	1690	3x70+54,6	12,1	13,0	12,5	13	39	1020	1690	3x95+54,6	13,8	14,8	12,5	13	43	1270	1690
		Formation [n° x mm²]		D _f [mm]		D _n [mm]					D _{max} [mm]	Total Mass kg/km	Neutral core Breaking load [daN]																																									
			Min	Max	Min	Max																																																
		3x25+54,6	8,4	9,3	12,5	13	32	530	1690																																													
		3x35+54,6	9,4	10,3	12,5	13	34	650	1690																																													
		3x50+54,6	10,5	11,4	12,5	13	35	765	1690																																													
		3x70+54,6	12,1	13,0	12,5	13	39	1020	1690																																													
3x95+54,6	13,8	14,8	12,5	13	43	1270	1690																																															
Where:																																																						
D _f = Phase core external diameter (insulation)																																																						
D _n = Neutral core external diameter																																																						
D _{max} = Formation external diameter																																																						
5.6.2	Markings	<u>Enel Distribución Chile</u>																																																				
		Phases:																																																				
		Phase conductors shall be identified by ribs, by numbers or by letters.																																																				
		In case of ribs, each phase conductor will have 1, 2 or 3 ribs respectively, with a maximum height of 0.5 mm and a ribs separation of 4 mm approximately.																																																				
		In case of numbers or letters they can be made by printing or embossing on the outer surface of the cable. The maximum separation between markings is 50 cm.																																																				
		When printed markings are used, they shall be printed in a color which contrasts with the cable color. The numbers or letters shall be clearly identifiable and durable.																																																				
		Durability shall be checked by the test specified in sub-clause 2.5.4 of HD 605.																																																				
		Neutral:																																																				
The outer surface of the cable must be identified either by embossing or printing with a 1m maximum separation between markings. The marking must be durable and must contain the following information:																																																						
• Manufacturer's name or trademark • Enel • Nominal cross sectional area (in mm²) and material of phase and neutral conductors • Material and voltage class (U₀/U) KV • Year of manufacture XXXX • Sequential meters markings m																																																						
Example:																																																						
MANUFACTURER – ENEL – 1x54,6mm² AAAC + 3x95mm² AAC - XLPE 0.6/1KV – 2017 – XXX m																																																						

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LOCAL SECTION C – Enel Distribución Chile

ITEM	TITLE	DESCRIPTION										
8	CONDITIONS OF SUPPLY	<u>Enel Distribución Chile</u> PACKAGING AND LABELLING The conductor will be delivered by the manufacturer in wooden or steel reels, which will not be returned, according to maximum and minimum dimensions shown in Table below and according to Figure.  <table><tr><th>A⁽¹⁾ mm</th><th>B mm</th><th>C⁽¹⁾ mm</th><th>D⁽²⁾ mm</th><th>E mm</th></tr><tr><td>1730</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table> Notes: (4) Maximum value (5) Minimum value (6) Two times the minimum cable curvature radius for transport (7) 300 or 180mm according to type of drum (large or small respectively) The total length of the conductor given on each drum must not be less than the requested in the purchase order and shall not exceed by more than 1 %. The maximum gross weight of the packed drum is 3,500 kg. It should protect the ends of each cable with caps to prevent moisture ingress and must be internally secured to the spool ends, and must be mechanically protected against possible damages from the handling and transport of each drum. The hole for handling the drums must be round, center, with a diameter of 80mm and with a metallic flange on each side of the drum (centered at the hole). The wooden reels will be treated according to international requirements for pest control , avoiding the compound " Pentachlorophenol " and " Creosote " . Treatment should include, at least : high toxicity to decay organisms , high penetration and holding power , chemical stability, non-corrosive to metals and substances affecting physical characteristics of the wood and weather protection . The cable must be coiled in uniform layers and the last layer must be protected with a coating of impermeable material.	A ⁽¹⁾ mm	B mm	C ⁽¹⁾ mm	D ⁽²⁾ mm	E mm	1730	(3)	1120	80	(4)
		A ⁽¹⁾ mm	B mm	C ⁽¹⁾ mm	D ⁽²⁾ mm	E mm						
1730	(3)	1120	80	(4)								

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LOCAL SECTION C – Enel Distribución Chile

ITEM	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	<u>Enel Distribución Chile</u> The reels must: 1. Be protected by wooden staves on the exterior, which are to be secured to the wooden spools. An equivalent system is to be used on the steel spools. The staves are to be fastened by steel or plastic bands. 2. Show the correct direction for unwinding the spools, by means of an arrow located on the sides. 3. Have a stainless steel nameplate on each side of the spool. Each nameplate will show the following information (as a minimum), in Spanish. The following data will be required: • Name of the Manufacturer • Country of origin of the batch • The words: “ENEL GROUP” • Purchase Order number • Type, class and nominal insulation voltage • Conductor Material and nominal cross-sectional area (in mm²) of cable • Number of the spool within the delivered batch • Net weight and gross weight, in kg. • Length of the conductor, in meters. • Arrow indicating the direction of rotation

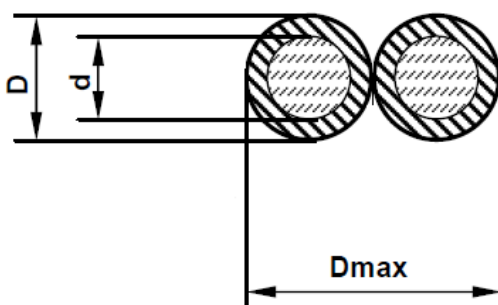
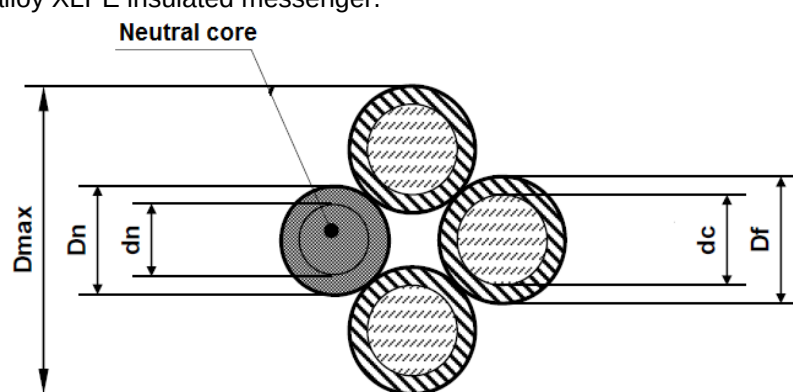
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LOCAL SECTION D – EDESUR

ITEM	TITLE	DESCRIPTION
3.3	Local Standards	<u>EDESUR</u> IRAM 2263 “Cables preensamblados con conductors de aluminio aislados con politileno reticulado para lineas aereas de hasta 1,1 kV”
8	CONDITIONS OF SUPPLY	<u>EDESUR</u> The reels must meet the requirements of the IRAM 9590-1 standard

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LOCAL SECTION E – Enel Distribución Peru

ITEM	TITLE	DESCRIPTION														
3.4	Replaced Local Standards	E-BT-002: CABLES PREENSAMBLADOS PARA LÍNEAS AÉREAS EN BAJA TENSIÓN														
5.4	Constructive aspects.	<u>Type I cables</u> Aluminum conductor XLPE insulated cables self-supported  <table><thead><tr><th rowspan="2">Formation [n° x mm²]</th><th colspan="2">D [mm]</th><th rowspan="2">D_{max} [mm]</th><th rowspan="2">Total Mass kg/km</th><th rowspan="2">Breaking load [daN]</th></tr><tr><th>Min</th><th>Max</th></tr></thead><tbody><tr><td>2x16</td><td>7</td><td>7,6</td><td>15.2</td><td>170</td><td>384</td></tr></tbody></table> Where: D= Core external diameter (insulation) D_{max}= Formation external diameter (reference value) <u>Type II Cables.</u> Aluminum conductor XLPE insulated cables supported by an aluminum alloy XLPE insulated messenger. 	Formation [n° x mm²]	D [mm]		D _{max} [mm]	Total Mass kg/km	Breaking load [daN]	Min	Max	2x16	7	7,6	15.2	170	384
		Formation [n° x mm²]		D [mm]					D _{max} [mm]	Total Mass kg/km	Breaking load [daN]					
Min	Max															
2x16	7	7,6	15.2	170	384											

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LOCAL SECTION E – Enel Distribución Peru

ITEM	TITLE	DESCRIPTION							
5.4	Constructive aspects.	Formation [n° x mm ²]	D _f [mm]		D _n [mm]		D _{max} [mm]	Total Mass kg/km	Neutral core Breaking load [daN]
			Min	Max	Min	Max			
		3x35+54,6	9,4	10,7	12,5	13	34	650	1690
		3x95+54,6	14,4	16,0	12,5	13	43	1270	1690
Where: D _f = Phase core external diameter (insulation) D _n = Neutral core external diameter D _{max} = Formation external diameter									
5.5	Ampacity and Short-circuit rating	The ampacity and short-circuit rating estimated values shall be given for network design purposes. Such currents 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							
		The following estimated values could be used as reference for aluminum cables							
		Cross-section [mm ²]		Short circuit rating [kA]					
		16		1,52					
		35		3,33					
		95		9,03					
		54.6		4,5					
		The short circuit capacities are determined using the following parameters: Conductor initial temperature: 90 °C Conductor final temperature: 250 °C Short-circuit duration: 1 s							
		(1) For the Aluminum alloy neutral conductor the following parameter are used: Conductor initial temperature: 65 °C Conductor final temperature: 180 °C							

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LOCAL SECTION E – Enel Distribución Peru

ITEM	TITLE	DESCRIPTION
5.6.1	Cable designation	<u>The cable designation shall be the following:</u> - Aluminum conductor: AL - Cross-linked polyethylene insulation: XLPE - Rated voltage: 0,6/1(1,2) kV - Nominal cross-sectional area in mm² - Nominal cross-sectional area in mm² of neutral cable and type material. <u>Example:</u> AL-XLPE- 0,6/1 (1,2) kV 3x95mm² + 1x54.6mm² AAAC Stranded compacted aluminum conductor, cross-linked polyethylene insulation, for nominal voltage 0.6/1 kV, section and neutral supported of aluminum alloy non-compacted.
5.6.2	Markings	Phases: All the phase conductors shall be permanently differentiated with independent identification. Their identification shall be by means of: Embossed numbersm letters or longitudinal ribs extracted longitudinally from the sheath, allowing to clearly identify each one of the phases. In case of numbers or letters they can be made by engraving or in relief above the surface on the outer surface of the cable. The maximum separation between markings is 50 cm. In the case of ribs, each one of the phase cables will have 1, 2 or 3 ribs, respectively, with a minimum height of 0.5 mm and a proximate spacing between ribs of 4 mm. The street lighting conductors (with a cross-section equal to 16 mm² shall not have any identification. Neutral support cable: The marking of the neutral support can be made by engraving or in relief above the surface on the outer surface of the cable at intervals of 1 (one) meter in length, with the following information: - Name of Distribution Company (XXXX) - Manufacturer's name (NNN) - Cable designation (see 5.6.1) - Year and month of manufacture - Sequential marking by meter. Marking example: XXXX - NNN — AL-XLPE- 0,6/1 (1,2) kV 3x95mm² + AAAC 1x54.6mm² -- 2017-02 – YYYY m

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LOCAL SECTION E – Enel Distribución Peru

ITEM	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	<u>Enel Distribución Perú</u> The cable will be delivered by the manufacturer in wood or metal drum, which will not be returned , according to maximum and minimum dimensions shown in Table xxx and according to Figure N° xxx. The wooden spools will be treated according to international requirements for pest control , avoiding the compound " Pentachlorophenol " and " Creosote " . Treatment should include, at least : high toxicity to decay organisms , high penetration and holding power , chemical stability, non-corrosive to metals and substances affecting physical characteristics of the wood and weather protection The total length of the driver given on each reel may not be less than requested in the purchase order and shall not exceed by more than $\pm 5\%$. The maximum gross weight of the reel is packed 2,500 kg o 3500 kg The two ends of the insulated cable must be tightened up firmly to the internal part of the reel, they must be accessible and must be fully sealed with a hood or insulating material in order to prevent humidity from wetting the cables. The ends of the conductors shall be mechanically protected against potential damage produced by the handling and transportation of each reel. The spindle hole to handle the reels must be circular, centered in its axle, and with a minimum diameter of 80 millimeters, with a metal flange on each side of the reel (centered in the hole). The cable must be coiled in uniform layers and the last layer must be protected with a coating of impermeable material. The reels must: • Be protected by wooden staves on the exterior, which are to be secured to the wooden spools. An equivalent system is to be used on the steel spools. The staves are to be fastened by steel or plastic bands. • Show the correct direction for unwinding the spools, by means of an arrow located on the sides. • Have a stainless steel nameplate on each side of the spool. Each nameplate will show the following information (as a minimum), in spanish. The following data will be required: • ENEL DISTRIBUCIÓN PERÚ • Manufacturer's name • Country of origin • Country code • Equipment description • Year and mounth of manufacture

LOCAL SECTION E – Enel Distribución Peru

ITEM	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	- Number of the spool within the delivered batch - Cable length (m) - Initial metric labeled in cable - Final, metric labeled in cable - Conductor cross-section (mm²) - Cable type - Insulation material and type - Manufacturing Standard - Rated insulation voltage: U_o / U (U_{max}) kV - Purchase order number - Net weight / kg - Weight of one meter of cable (kg) - Coil Weight (Kg) - Coil dimension in mm. - Gross Weight (kg) - Coil Dimensions (mm) Figure N° 1 Trial type <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>1730</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table> able N° 1 Trial Dimension <u>Notes:</u> (1) Maximum value. (2) Minimum value (3) El Double the minimum cable curvature radius for transportation, in accordance with Manufacturer specifications. (4) 300 or 180 mm, in accordance with the type of spool (large or small, respectively).	A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E	mm	mm	mm	mm	mm	1730	(3)	1120	80	(4)
A ⁽¹⁾	B	C ⁽¹⁾	D ⁽²⁾	E													
mm	mm	mm	mm	mm													
1730	(3)	1120	80	(4)													

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LOCAL SECTION F – ENDESA DISTRIBUCIÓN ELÉCTRICA

ITEM	TITLE	DESCRIPTION																								
3.3	Local standards	a) UNE 21030-0: Conductores aislados, cableados en haz, de tensión asignada 0,6/1 kV, para líneas de distribución, acometidas y usos análogos. Parte 0: Índice b) UNE 21030-1: Conductores aislados, cableados en haz, de tensión asignada 0,6/1 kV, para líneas de distribución, acometidas y usos análogos. Parte 1: Conductores de aluminio. c) UNE 211435 “Guía para la elección de cables eléctricos de tensión asignada superior o igual a 0,6/1 kV para circuitos de distribución” d) UNE 21167 “Bobinas de madera para cables aislados de transporte y distribución. Características generales”																								
5.1	Conductor	The following maximum diameters shall be satisfied: <table> <tr> <th>Cross-section [mm²]</th><th>Min External Diameter [mm]</th><th>Max External Diameter [mm]</th></tr> <tr> <td>16</td><td>7,0</td><td>7,9</td></tr> <tr> <td>25</td><td>8,4</td><td>9,6</td></tr> <tr> <td>50</td><td>10,9</td><td>12,3</td></tr> <tr> <td>95</td><td>15</td><td>16,5</td></tr> <tr> <td>150</td><td>17,9</td><td>19,5</td></tr> <tr> <td>54.6</td><td>12,4</td><td>13,0</td></tr> <tr> <td>80</td><td>14,8</td><td>15,8</td></tr> </table>	Cross-section [mm ²]	Min External Diameter [mm]	Max External Diameter [mm]	16	7,0	7,9	25	8,4	9,6	50	10,9	12,3	95	15	16,5	150	17,9	19,5	54.6	12,4	13,0	80	14,8	15,8
Cross-section [mm ²]	Min External Diameter [mm]	Max External Diameter [mm]																								
16	7,0	7,9																								
25	8,4	9,6																								
50	10,9	12,3																								
95	15	16,5																								
150	17,9	19,5																								
54.6	12,4	13,0																								
80	14,8	15,8																								
5.4	Constructive aspects.	For Type I & Type II cables the phase cores shall be bundled to the left “S” (anti-clockwise) without suffering any torsion. The lay length shall be the following: <table> <tr> <th rowspan="2">Cross-section [mm²]</th><th>Type I</th><th>Type II</th></tr> <tr> <th>Maximum lay length [mm]</th><th>Maximum lay length [mm]</th></tr> <tr> <td>16</td><td>400</td><td>-</td></tr> <tr> <td>25</td><td>450</td><td>550</td></tr> <tr> <td>50</td><td>530</td><td>725</td></tr> <tr> <td>95</td><td>700</td><td>850</td></tr> <tr> <td>150</td><td>900</td><td>1000</td></tr> </table>	Cross-section [mm ²]	Type I	Type II	Maximum lay length [mm]	Maximum lay length [mm]	16	400	-	25	450	550	50	530	725	95	700	850	150	900	1000				
Cross-section [mm ²]	Type I	Type II																								
	Maximum lay length [mm]	Maximum lay length [mm]																								
16	400	-																								
25	450	550																								
50	530	725																								
95	700	850																								
150	900	1000																								

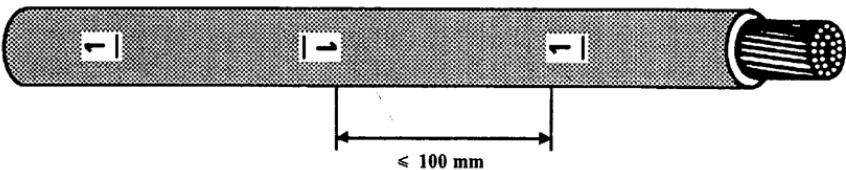
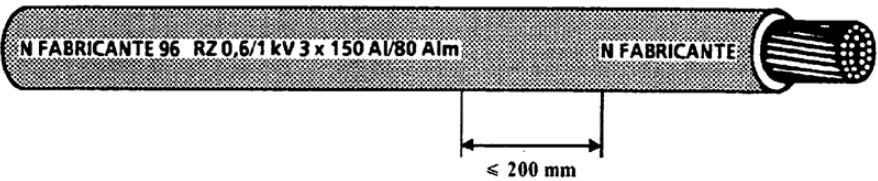
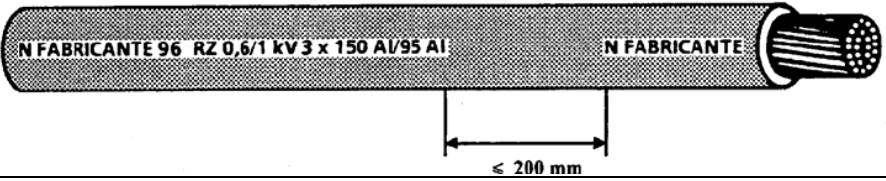
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LOCAL SECTION F – ENDESA DISTRIBUCIÓN ELÉCTRICA

ITEM	TITLE	DESCRIPTION
Errore L'origine riferimento non è stata trovata.	Errore. L'origine riferimento non è stata trovata.	For all uses of cables, the maximum current-carrying permitted for conductors must be in accordance with Low-Voltage Electrotechnical Regulation (REBT), approved by R.D. 842/2002, of 2 August and Standard UNE211425. The ampacity estimated values shall be given for network design purposes. Such currents shall be calculated in the following steady state conditions: • A single circuit (3F+N) installed outdoors. • Far from any heat source. • Protected from the sun. • Maximum conductor temperature 90 °C. • Ambient air temperature 40 °C. For short-circuit rating the following condition shall be used: • Initial conductor temperature 90 °C • Final conductor temperature 250 °C
5.6.1	Cable designation	The designation of the cables will be carried out by means of an acronym that, in the order mentioned below, will indicate the following: • Constructive type: R that will designate the XLPE insulation Z that will designate visible bundle assembled cores • Assigned voltage of the cable which, expressed in kV, will designate the values U_0 and U in the form 0.6/1 kV. • Number of conductors and their nominal cross section. Between the number of conductors and the section, the sign x will be interspersed. In case of a conductor of reduced section, the section of this one will follow the one of the main conductors separated by a slash. • Nature of the conductors and eventually of the messenger if it acts as a neutral conductor. After the cross section of the conductors the designation Al is placed. If the neutral conductor is made of aluminum, silicon and magnesium alloy, the designation Alm will follow the cross section thereof. Designation example of a 0,6/1kV neutral supported cable with three phase conductors of Aluminum with 95 mm² cross section and a neutral conductor of aluminum, silicon and magnesium alloy with 54.6 mm² cross section. RZ 0,6/1 kV 3 x 95 Al/54,6 Alm

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LOCAL SECTION F – ENDESA DISTRIBUCIÓN ELÉCTRICA

ITEM	TITLE	DESCRIPTION
5.6.2	Markings	The conductors shall have on the outer surface of the insulating cover, the following marks: - Phase conductors. Figures 1, 2 or 3 with a underscore bellow, inverted 180° alternately, and with a mark spacing of not more than 100mm, as indicated in the following image:  - Neutral conductor (messenger or not). The letter N followed by the identification of the manufacturer, the last two digits of the manufacture year and the designation of the cable according to section 5.6.1. The distance between marks must not exceed 200 mm, as indicated in the following images:. Neutral supported cable  self-supported cable 

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LOCAL SECTION F – ENDESA DISTRIBUCIÓN ELÉCTRICA

ITEM	TITLE	DESCRIPTION
6	TEST CLASSIFICATION	All test shall be performed in compliance with standard UNE 21030
8	CONDITIONS OF SUPPLY	The permitted tolerance range for a cable is $\pm 3\%$ of the length indicated in the order; lower lengths could be accepted for a maximum of 10% of the cables that make up the delivery lot (same transport document), provided that each is at least 100m long; in the calculation of this 10%, the sample cables whose length has been reduced due to the acceptance tests are excluded. Reels shall be in compliance with the Standard UNE 21167 “Bobinas de Madera para cables asilados de transporte y distribución” a) 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 ENEL. If the Supplier uses 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 ENEL during certification 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 drums at the Supplier's plant 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 drums 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

ITEM	TITLE	DESCRIPTION
8	CONDITIONS OF SUPPLY	b) Marking and tara. On the outer surface of at least one of the covers of the drum transport, the following information must be indicated in clearly legible and indelible characters, plus ordering information, where applicable: ○ Name and registered address of the manufacturer. ○ Cable Type. ○ The effective length of the cable. ○ Order Number. ○ Number of drum. ○ Year of manufacture (last two digits). ○ Number of production order. ○ Direction of rotation of the drum (arrow). ○ Direction of unwinding (if the drum wrapped). ○ Gross weight, net and tare of the drum. c) 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. d) Photographic documentation A side view photo and a front view photo showing the empty drum, the drum with wound cable without external cover, the drum complete with external cover (for a total of at least 6 photos) and the detailed view of the identification plate where the drum and supply data are provided (at an enlargement level such as to allow the information photographed to be read).

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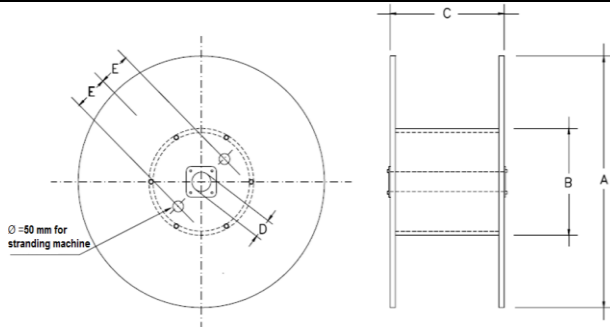
LOCAL SECTION G – ENEL DISTRIBUIÇÃO (BRASIL)

ITEM	TITLE	DESCRIPTION
3.3	Replaced local standards	• E-BT-002 • PM-R 1796 R-05 • PM-R 208.01.2 • PM-R 208.10.0 • NTC-27 – Review 2
5.6.2	Errore. L'origine riferimento non è stata trovata.	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 U₀ 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 ARE4E4X 0,6/1kV 150 XXXXXX 2007 12 0000 FASE 1 ... FASE 1 ..)

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	LOW VOLTAGE AERIAL BUNDLED CABLES	GSCC009 Rev. 00 15/01/2018

ITEM	TITLE	DESCRIPTION
Errore . L'origine riferimento non è stata trovata.	Errore. L'origine riferimento non è stata trovata.	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.

LOCAL SECTION G – ENEL DISTRIBUIÇÃO (BRASIL)

ITEM	TITLE	DESCRIPTION															
Errore . L'origi ne riferim ento non è stata trovat a.	Errore. L'origine riferimento non è stata trovata.	 Figure A <u>Dimensions:</u> <table><tr><th>A⁽¹⁾</th><th>B</th><th>C⁽¹⁾</th><th>D⁽²⁾</th><th>E</th></tr><tr><th>mm</th><th>mm</th><th>mm</th><th>mm</th><th>mm</th></tr><tr><td>2000</td><td>(3)</td><td>1120</td><td>80</td><td>(4)</td></tr></table> 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): 1) Manufacturer name 2) Country of origin 3) ENEL RIO/ENEL CEARÁ/ENEL GOIÁS (according to purchase) 4) Purchase order N° 5) Rated Voltage U₀/U (U_{max}) 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]	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)													

COMMON LIST

GS Type Code	Country	Country Code	Formation [mm ²]	Cable Type	Conductor material	Minimum number of wires in the conductor	Minimum Conductor diameter [mm]	Maximum Conductor diameter [mm]	Insulation material	Insulation nominal thickness [mm]	Insulation minimum thickness [mm]	Insulation color	Sheath Material	Sheath nominal thickness [mm]	Sheath minimum thickness [mm]	Sheath color	Messenger material	Minimum number of wires in the messenger	Minimum messenger diameter [mm]	Maximum messenger diameter [mm]	Messenger nominal insulation thickness [mm]	Messenger minimum insulation thickness [mm]	Manufacturing features
GSCC009/001	ED-Argentina	0101-0472	2x16	I	Aluminum	6	4,6	5,2	XLPE	1,2	0,98	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/001	ED-Chile	6750132	2x16	I	Aluminum	6	4,6	5,2	XLPE	1,2	0,98	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/001	ED-Peru	6755993	2x16	I	Aluminum	6	4,6	5,2	XLPE	1,2	0,98	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/001	EE-Spain	330042	2x16	I	Aluminum	6	4,6	5,2	XLPE	1,2	0,98	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/002	ED-Argentina	0101-0471	4x16	I	Aluminum	6	4,6	5,2	XLPE	1,2	0,98	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/004	EE-Spain	330043	4x25	I	Aluminum	6	5,6	6,5	XLPE	1,4	1,16	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/004	GO-Brazil	41948	4x25	I	Aluminum	6	5,6	6,5	XLPE	1,4	1,16	Black	-	-	-	-	-	-	-	-	-	-	Self-supporting
GSCC009/005	CO-Colombia	6762330	1x35+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/006	CO-Colombia	ALV2	2x25+54,6	II	Aluminum	6	5,6	6,5	XLPE	1,4	1,16	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/007	CO-Colombia	ALV3	2x50+54,6	II	Aluminum	6	7,7	8,6	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/008	ED-Argentina	0101-0248	3x25+54,6	II	Aluminum	6	5,6	6,5	XLPE	1,4	1,16	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/008	ED-Chile	6750133	3x25+54,6	II	Aluminum	6	5,6	6,5	XLPE	1,4	1,16	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/008	CO-Colombia	ALV4	3x25+54,6	II	Aluminum	6	5,6	6,5	XLPE	1,4	1,16	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/009	CE-Brazil	6771587	3x35+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/009	ED-Chile	6750134	3x35+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/009	CO-Colombia	ALV5	3x35+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/009	ED-Peru	6755990	3x35+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/009	GO-Brazil	41949	3x35+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/010	CE-Brazil	6771564	3x50+54,6	II	Aluminum	6	7,7	8,6	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/010	ED-Argentina	0101-0249	3x50+54,6	II	Aluminum	6	7,7	8,6	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/010	ED-Chile	6750135	3x50+54,6	II	Aluminum	6	7,7	8,6	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/010	EE-Spain	330044	3x50+54,6	II	Aluminum	6	7,7	8,6	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/010	RJ-Brazil	6771994	3x50+54,6	II	Aluminum	6	7,7	8,6	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/011	ED-Chile	6750136	3x70+54,6	II	Aluminum	12	9,3	10,2	XLPE	1,8	1,52	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/011	CO-Colombia	ALV6	3x70+54,6	II	Aluminum	12	9,3	10,2	XLPE	1,8	1,52	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/012	CE-Brazil	6775424	3x95+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/012	ED-Argentina	0101-0247	3x95+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported

GS Type Code	Country	Country Code	Formation [mm2]	Cable Type	Conductor material	Minimum number of wires in the conductor	Minimum Conductor diameter [mm]	Maximum Conductor diameter [mm]	Insulation material	Insulation nominal thickness [mm]	Insulation minimum thickness [mm]	Insulation color	Sheath Material	Sheath nominal thickness [mm]	Sheath minimum thickness [mm]	Sheath color	Messenger material	Minimum number of wires in the messenger	Minimum messenger diameter [mm]	Maximum messenger diameter [mm]	Messenger nominal insulation thickness [mm]	Messenger minimum insulation thickness [mm]	Manufacturing features
GSCC009/012	ED-Chile	6779916	3x95+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/012	CO-Colombia	6762329	3x95+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/012	RJ-Brazil	6771995	3x95+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/012	EE-Spain	330045	3x95+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/013	CE-Brazil	6771566	3x150+80	II	Aluminum	15	13,9	15	XLPE	2	1,7	Black	-	-	-	-	AL2	19	11,2	12	1,8	1,52	Neutral supported
GSCC009/013	ED-Argentina	0101-0251	3x150+80	II	Aluminum	15	13,9	15	XLPE	2	1,7	Black	-	-	-	-	AL2	19	11,2	12	1,8	1,52	Neutral supported
GSCC009/013	RJ-Brazil	6771996	3x150+80	II	Aluminum	15	13,9	15	XLPE	2	1,7	Black	-	-	-	-	AL2	19	11,2	12	1,8	1,52	Neutral supported
GSCC009/013	CO-Colombia	ALV7	3x150+80	II	Aluminum	15	13,9	15	XLPE	2	1,7	Black	-	-	-	-	AL2	19	11,2	12	1,8	1,52	Neutral supported
GSCC009/013	EE-Spain	330046	3x150+80	II	Aluminum	15	13,9	15	XLPE	2	1,7	Black	-	-	-	-	AL2	19	11,2	12	1,8	1,52	Neutral supported
GSCC009/014	ED-Italy	339061	2x16	III	Aluminum	7	4,6	5,2	XLPE	1,3	1,07	Black	XLPE	0,2	0,10	GREY	-	-	-	-	-	-	Self-supporting
GSCC009/014	Romania	339061	2x16	III	Aluminum	7	4,6	5,2	XLPE	1,3	1,07	Black	XLPE	0,2	0,10	GREY	-	-	-	-	-	-	Self-supporting
GSCC009/015	ED-Italy	339063	4x16	III	Aluminum	7	4,6	5,2	XLPE	1,3	1,07	Black	XLPE	0,2	0,10	GREY	-	-	-	-	-	-	Self-supporting
GSCC009/015	Romania	339063	4x16	III	Aluminum	7	4,6	5,2	XLPE	1,3	1,07	Black	XLPE	0,2	0,10	GREY	-	-	-	-	-	-	Self-supporting
GSCC009/016	ED-Italy	339012	3x35+54,6	IV	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	XLPE	0,2	0,10	GREY	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/016	Romania	339012	3x35+54,6	IV	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	XLPE	0,2	0,10	GREY	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/017	ED-Italy	339013	3x70+54,6	IV	Aluminum	12	9,3	10,2	XLPE	1,6	1,34	Black	XLPE	0,2	0,10	GREY	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/017	Romania	339013	3x70+54,6	IV	Aluminum	12	9,3	10,2	XLPE	1,6	1,34	Black	XLPE	0,2	0,10	GREY	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/018	ED-Peru	6755995	3x35+2x16+54,6	II	Aluminum	6	6,6	7,5	XLPE	1,6	1,34	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported
GSCC009/019	ED-Peru	6790628	3x95+2x16+54,6	II	Aluminum	15	11	12	XLPE	2	1,7	Black	-	-	-	-	AL2	7	9,2	9,8	1,6	1,34	Neutral supported

GS Type Code	Country	Country Code	Use	TAM DESCRIPTION
GSCC009/001	ED-Argentina	0101-0472	Distribution	LV AERIAL CABLES Self-supporting Al 2x16 Type I
GSCC009/001	ED-Chile	6750132	Distribution	LV AERIAL CABLES Self-supporting Al 2x16 Type I
GSCC009/001	ED-Peru	6755993	Distribution	LV AERIAL CABLES Self-supporting Al 2x16 Type I
GSCC009/001	EE-Spain	330042	Distribution	LV AERIAL CABLES Self-supporting Al 2x16 Type I
GSCC009/002	ED-Argentina	0101-0471	Distribution	LV AERIAL CABLES Self-supporting Al 4x16 Type I
GSCC009/004	EE-Spain	330043	Distribution	LV AERIAL CABLES Self-supporting Al 4x25 Type I
GSCC009/004	GO-Brazil	41948	Distribution	LV AERIAL CABLES Self-supporting Al 4x25 Type I
GSCC009/005	CO-Colombia	6762330	Distribution	LV AERIAL CABLES Neutral supported Al 1x35+54,6 Type II
GSCC009/006	CO-Colombia	ALV2	Distribution	LV AERIAL CABLES Neutral supported Al 2x25+54,6 Type II
GSCC009/007	CO-Colombia	ALV3	Distribution	LV AERIAL CABLES Neutral supported Al 2x50+54,6 Type II
GSCC009/008	ED-Argentina	0101-0248	Distribution	LV AERIAL CABLES Neutral supported Al 3x25+54,6 Type II
GSCC009/008	ED-Chile	6750133	Distribution	LV AERIAL CABLES Neutral supported Al 3x25+54,6 Type II
GSCC009/008	CO-Colombia	ALV4	Distribution	LV AERIAL CABLES Neutral supported Al 3x25+54,6 Type II
GSCC009/009	CE-Brazil	6771587	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type II
GSCC009/009	ED-Chile	6750134	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type II
GSCC009/009	CO-Colombia	ALV5	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type II
GSCC009/009	ED-Peru	6755990	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type II
GSCC009/009	GO-Brazil	41949	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type II
GSCC009/010	CE-Brazil	6771564	Distribution	LV AERIAL CABLES Neutral supported Al 3x50+54,6 Type II
GSCC009/010	ED-Argentina	0101-0249	Distribution	LV AERIAL CABLES Neutral supported Al 3x50+54,6 Type II
GSCC009/010	ED-Chile	6750135	Distribution	LV AERIAL CABLES Neutral supported Al 3x50+54,6 Type II
GSCC009/010	EE-Spain	330044	Distribution	LV AERIAL CABLES Neutral supported Al 3x50+54,6 Type II
GSCC009/010	RJ-Brazil	6771994	Distribution	LV AERIAL CABLES Neutral supported Al 3x50+54,6 Type II
GSCC009/011	ED-Chile	6750136	Distribution	LV AERIAL CABLES Neutral supported Al 3x70+54,6 Type II
GSCC009/011	CO-Colombia	ALV6	Distribution	LV AERIAL CABLES Neutral supported Al 3x70+54,6 Type II
GSCC009/012	CE-Brazil	6775424	Distribution	LV AERIAL CABLES Neutral supported Al 3x95+54,6 Type II
GSCC009/012	ED-Argentina	0101-0247	Distribution	LV AERIAL CABLES Neutral supported Al 3x95+54,6 Type II
GSCC009/012	ED-Chile	6779916	Distribution	LV AERIAL CABLES Neutral supported Al 3x95+54,6 Type II
GSCC009/012	CO-Colombia	6762329	Distribution	LV AERIAL CABLES Neutral supported Al 3x95+54,6 Type II
GSCC009/012	RJ-Brazil	6771995	Distribution	LV AERIAL CABLES Neutral supported Al 3x95+54,6 Type II
GSCC009/012	EE-Spain	330045	Distribution	LV AERIAL CABLES Neutral supported Al 3x95+54,6 Type II

GSCC009/013	CE-Brazil	6771566	Distribution	LV AERIAL CABLES Neutral supported Al 3x150+80 Type II
GSCC009/013	ED-Argentina	0101-0251	Distribution	LV AERIAL CABLES Neutral supported Al 3x150+80 Type II
GSCC009/013	RJ-Brazil	6771996	Distribution	LV AERIAL CABLES Neutral supported Al 3x150+80 Type II
GSCC009/013	CO-Colombia	ALV7	Distribution	LV AERIAL CABLES Neutral supported Al 3x150+80 Type II
GSCC009/013	EE-Spain	330046	Distribution	LV AERIAL CABLES Neutral supported Al 3x150+80 Type II
GSCC009/014	ED-Italy	339061	Distribution	LV AERIAL CABLES Self-supporting Al 2x16 Type III
GSCC009/014	Romania	339061	Distribution	LV AERIAL CABLES Self-supporting Al 2x16 Type III
GSCC009/015	ED-Italy	339063	Distribution	LV AERIAL CABLES Self-supporting Al 4x16 Type III
GSCC009/015	Romania	339063	Distribution	LV AERIAL CABLES Self-supporting Al 4x16 Type III
GSCC009/016	ED-Italy	339012	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type IV
GSCC009/016	Romania	339012	Distribution	LV AERIAL CABLES Neutral supported Al 3x35+54,6 Type IV
GSCC009/017	ED-Italy	339013	Distribution	LV AERIAL CABLES Neutral supported Al 3x70+54,6 Type IV
GSCC009/017	Romania	339013	Distribution	LV AERIAL CABLES Neutral supported Al 3x70+54,6 Type IV
GSCC009/018	ED-Peru	6755995	Distribution & Public Illumination n=0,1,2	LV AERIAL CABLES Neutral supported Al 3x35+2x16+54,6 Type II
GSCC009/019	ED-Peru	6790628	Distribution & Public Illumination n=0,1,2	LV AERIAL CABLES Neutral supported Al 3x95+2x16+54,6 Type II