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UNDERGROUND MEDIUM VOLTAGE CABLES
ADDENDUM FOR ENEL DISTRIBUIÇÃO SÃO PAULO

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00	04/04/2019	First emission
01	13/06/2019	Common list updated for country codes updating

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1 SCOPE

This addendum of the Global Standard GSC001 rev. 5 specifies the requirements applicable to Enel Distribuição São Paulo (Brazil). They are specified in this document with reference to the same paragraph number of GSC001 rev. 5.

5 DESIGN AND MANUFACTURE

5.1 Conductor

5.1.1 Aluminum conductors

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
95	15	11,0	12,0	0,320
240	30	17,6	19,2	0,125
400	53	22,3	24,6	0,0778

Table 1 Stranded compacted aluminum conductor characteristics

5.1.1 Copper conductors

The copper conductors shall be stranded compacted circular class 2, complying all the features specified herein and in standard IEC 60228. Copper purity shall not be less than 99,9%

.Nominal cross-section [mm ²]	Minimum number of wires	Diameter of conductors [mm]		Maximum resistance of conductor at 20°C [Ω/km]
		Minimum	Maximum	
240	34	17,6	19,2	0,0754
500	53	25,3	27,6	0,0366

Table 2 Stranded compacted copper conductor characteristics

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N°	TITLE	DESCRIPTION
3.3	Local Standards	PMA 210.10.1 “Cabo multiplexado de MT, alumínio, 12/20 kV, com e sem fibra optica” NTE-M-055: Condutores Elétricos Distribuição Subterrânea NTE-030: Carreteis para fios e cabos elétricos NBR 7286 - Cabos de potência com isolamento sólida extrudada de borracha etileno propileno (EPR) para tensões de 3 kV a 35 kV – Especificação NBR 7287 - Cabos de potência com isolamento sólida extrudada de polietileno reticulado (XLPE) para tensões de 3 kV a 35 kV – Especificação NBR 6251 - Cabos de potência com isolamento extrudada para tensões de 1 a 35kV – Requisitos construtivos
5.11.1	Cable designation	Type of conductor - A: Aluminum R: Round Stranded E4: XLPE cross-linked polyethylene insulation H1: copper wires earth screen E: PE outer sheath X: Triples configuration Rated Voltage: Uo/U Conductor cross-section Example ARE4H1EX 8,7/15 kV 185 mm2
5.11.2	Marking	The distance between the end of a mark and the beginning of the next one will be less than or equal to 1 m and shall contain, in the order listed the following inscriptions: • The property stands • Cable designation • 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 (for triplex configuration); also supports sealed ink. Alternatively to the aforementioned method, it could be stamped at a distance less than 1 meter.

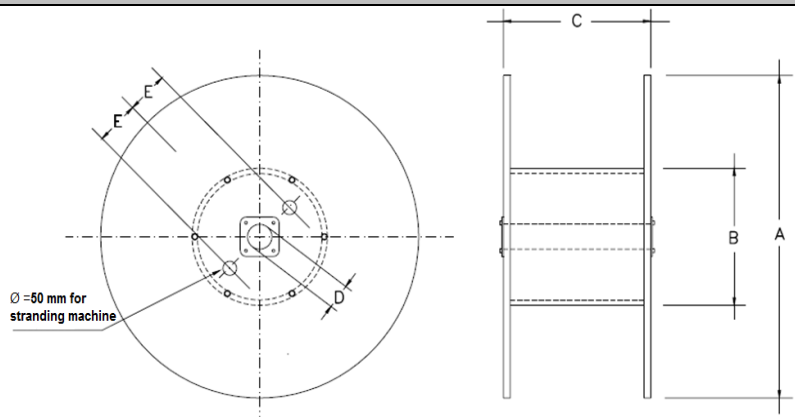
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Nº	TITLE	DESCRIPTION
5.11.2	Marking	Identification of the phase, repeated at least 100 mm in the interval between two successive of entries. Example: Triplex cable , marking in phase 1 cable: Enel Distribuição Goiás ARE4H1EX 8,7/15 kV 185 mm2 XXXXXX 2017 12 0000 FASE 1 ... FASE 1 Single core cable: Enel Distribuição Goiás ARE4H1E 8,7/15 kV 185 mm2 XXXXXX 2017 12 0000
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.

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N°	TITLE	DESCRIPTION															
8	CONDITIONS OF SUPPLY	 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 ⁽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⁾											

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N°	TITLE	DESCRIPTION																																																			
8	CONDITIONS OF SUPPLY	- A stainless steel plate for identification purposes. Such plate shall be applied in both flanges and shall have the following information (in Portuguese): - Manufacturer name - Country of origin - ENEL RIO/ENEL CEARÁ/ENEL GOIÁS/ ENEL SÃO PAULO (according to purchase) - Purchase order N° - Rated Voltage Uo/U (Umax) - Insulation material - Cable cross-section [mm²] - Spool number of the corresponding delivered batch - Net and gross weight [kg] - Configuration type (unipolar, triplex, quadruplex). - Cable length [m] The drums shall be: <table><tr><th>Type Code</th><th>Formation</th><th>Spool max dimension</th><th>Nominal length [m]</th></tr><tr><td>GSC001/038</td><td>3x95</td><td>Figure A and Table A</td><td>250</td></tr><tr><td>GSC001/058</td><td>3x95</td><td>Figure A and Table A</td><td>250</td></tr><tr><td>GSC001/059</td><td>3x95</td><td>Figure A and Table A</td><td>250</td></tr><tr><td>GSC001/060</td><td>3x35</td><td>ABNT 11137 150/80</td><td>250</td></tr><tr><td>GSC001/061</td><td>3x400</td><td>Figure A and Table A</td><td>250</td></tr><tr><td>GSC001/063</td><td>3x240</td><td>Figure A and Table A</td><td>200</td></tr><tr><td>GSC001/064</td><td>3x400</td><td>Figure A and Table A</td><td>200</td></tr><tr><td>GSC001/065</td><td>3x400</td><td>Figure A and Table A</td><td>200</td></tr><tr><td>GSC001/066</td><td>1x240</td><td>ABNT 11137 150/80</td><td>250</td></tr><tr><td>GSC001/067</td><td>3x500</td><td>Figure A and Table A</td><td>200</td></tr><tr><td>GSC001/068</td><td>1x500</td><td>ABNT 11137 150/80</td><td>250</td></tr></table>				Type Code	Formation	Spool max dimension	Nominal length [m]	GSC001/038	3x95	Figure A and Table A	250	GSC001/058	3x95	Figure A and Table A	250	GSC001/059	3x95	Figure A and Table A	250	GSC001/060	3x35	ABNT 11137 150/80	250	GSC001/061	3x400	Figure A and Table A	250	GSC001/063	3x240	Figure A and Table A	200	GSC001/064	3x400	Figure A and Table A	200	GSC001/065	3x400	Figure A and Table A	200	GSC001/066	1x240	ABNT 11137 150/80	250	GSC001/067	3x500	Figure A and Table A	200	GSC001/068	1x500	ABNT 11137 150/80	250
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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 thcikness [mm]	Minimum insulation thcikness [mm]	Insulation Screen Nominal thickness [mm]	Insulation Screen Minimum thickness [mm]	Longitudinal watertightness (Yes/Not)	Earth Screen type	Copper wires screen cross- section [mm2]	Aluminum screen minimum thickness [mm]	Outer sheath material	Sheath nominal thickness [mm]	Sheath minimun thickness [mm]	Sheath color	Constructive Characteristics	Minimum fire class reaction
GSC001/038	SP-BRASIL	323860	8.7/15(17.5)	95	III	ALUMINUM	0,5	0,3	XLPE	4,5	4	0,5	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	2,75	2	BLACK	TRIPLEX	-
GSC001/058	SP-Brazil	323861	15/25(31)	95	III	ALUMINUM	0,5	0,3	XLPE	6,6	5,8	0,5	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	2,75	2	BLACK	TRIPLEX	-
GSC001/059	SP-Brazil	323862	20/34(37.95)	95	III	ALUMINUM	0,5	0,3	XLPE	8	7,1	1	0,9	YES	COPPER WIRES	16	-	POLYETHYLENE	2,75	2	BLACK	TRIPLEX	-
GSC001/060	SP-Brazil	325010	8.7/15(17.5)	35	III	ALUMINUM	0,5	0,3	XLPE	4,5	4	0,4	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	2,5	1,8	BLACK	TRIPLEX	-
GSC001/061	SP-Brazil	325012	8.7/15(17.5)	400	III	ALUMINUM	0,5	0,3	XLPE	4,5	4	0,4	0,3	YES	COPPER WIRES	25	-	POLYETHYLENE	3	2,2	BLACK	TRIPLEX	-
GSC001/063	SP-Brazil	323846	15/25(31)	240	III	COPPER	0,5	0,3	XLPE	6,6	5,8	0,4	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	3	2,2	BLACK	TRIPLEX	-
GSC001/064	SP-Brazil	323850	15/25(31)	400	III	ALUMINUM	0,5	0,3	XLPE	6,6	5,8	0,4	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	3	2,2	BLACK	TRIPLEX	-
GSC001/065	SP-Brazil	323851	20/34(37.95)	400	III	ALUMINUM	0,5	0,3	XLPE	8	7,1	1	0,9	YES	COPPER WIRES	16	-	POLYETHYLENE	3	2,2	BLACK	TRIPLEX	-
GSC001/066	SP-Brazil	323842	12/20(24)	240	III	COPPER	0,5	0,3	XLPE	4,9	4,3	0,5	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	3	2,2	BLACK	SINGLE CORE	-
GSC001/067	SP-Brazil	323897	8.7/15(17.5)	500	III	COPPER	0,5	0,3	XLPE	4,5	4	0,4	0,3	YES	COPPER WIRES	25	-	POLYETHYLENE	3	2,2	BLACK	TRIPLEX	-
GSC001/068	SP-Brazil	323118	12/20(24)	500	III	COPPER	0,5	0,3	XLPE	4,9	4,3	0,5	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	3	2,2	BLACK	SINGLE CORE	-

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GS Type Code	Distribution Company and Country	Country Code	Rated Voltage U _o /U(U _{max}) [kV]	Crosssection [mm ²]	Type of cable	Conductor material	Conductor maximum diameter [mm]	Conductor screen nominal thickness [mm]	Conductor screen minimum thickness [mm]	Insulation material	Nominal insulation thcikness [mm]	Minimum insulation thcikness [mm]	Insulation Screen Nominal thickness [mm]	Insulation Screen Minimum thickness [mm]	Longitudinal watertightness (Yes/Not)	Earth Screen type	Copper wires screen cross-section [mm ²]	Aluminum screen minimum thickness [mm]	Outer sheath material	Sheath nominal thickness [mm]	Sheath minimum thickness [mm]	Sheath color	Constructive Characteristics	Minimum fire class reaction
GSC001/081	SP-BRASIL	330703	8.7/15(17.5)	35	III	ALUMINUM	7,5	0,5	0,3	XLPE	4,5	4	0,4	0,3	YES	COPPER WIRES	16	-	POLYETHYLENE	2,5	2,2	BLACK	SINGLE CORE	-

GS Type Code	Distribution Company and Country	Country Code	TAM Description
GSC001/081	SP-BRASIL	330703	MV UNDERGROUND SINGLE CORE CABLES (8.7/15(17.5) kV) 35 mm ² ALUMINUM CONDUCTORXLPE INSULATION COPPER WIRES SCREEN POLYETHYLENE SHEATH