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12/20(24) kV AND 18/30(36) kV COLD SHRINK TERMINATIONS FOR MV CABLES

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Revision	Data	List of modifications
00	25/11/2015	First emission.
01	23/02/2018	Material codes updated. Chapter on barcode updated, Painted or coated semiconducting layer not allowed; New tests: expiration test, UV test for outdoor accessories; Modification of requirements for resistance to fire; pin lugs eliminated, Modification of requirements of screen connecting plate; modification of requirements of tracking and erosion test. Class 24 kV for Italy and Rumania. Rated short time withstand current in the screen; Increase of the minimum section of the earthing lug for Italy, Rumania, Spain and Peru from 16 to 25 mm ² .
02	25/05/2018	Revised tables 4, 5, 6, 7, 8, 9, 10 and 11. Expiration tests description. Paragraph on robustness test eliminated.
03	09/07/2018	Note on table 11. Revised material codes for Brazil.


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1 SCOPE

This Global Standard applies to 12/20(24) kV and 18/30(36) kV indoor and outdoor cold shrink terminations for MV cables with extruded insulation, both full and reduced insulating thickness, with copper wires or aluminum tape screen.

These Global Standard applies to the Distribution Companies of Enel Group listed below:

<i>Enel Distribución Colombia</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>

2 FIELD OF APPLICATION

These requirements apply to the underground and overhead distribution network with rated maximum voltage of 24 kV and 36 kV. Other existing rated maximum voltage levels up to 24 kV are covered by the 12/20(24) kV class, whereas those with rated maximum voltage up to 36 kV are covered by the 18/30(36) kV class.

3 REFERENCE LAWS AND STANDARDS

3.1 International standards


Unless otherwise specified the following standards applies:

- Cenelec HD 629-1;
- IEC 61238-1;
- IEC 60587;
- IEC 60695-11-10
- IEC 60721-2-1
- IEC 62217
- ISO IEC 17067

3.2 Global Standards

- GSC001¹
- GSCC015

¹ The characteristics of the cables are included in the Enel Group Global Standard. Besides installation on new cables, which comply to GSC001, the termination may be installed on the existing network, which is made of cables compliant to older local standards. Nevertheless, this Global Standard also takes into account the main characteristics of existing cables for each Country (rated voltage, section and min/max diameter over insulation).

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3.3 Local standards

3.3.1 Italy

- DJ4580
- PVR 006
- GUI 101

3.3.2 Brazil

- NBR14643, Corrosão atmosférica – Classificação da corrosividade de atmosferas
- Nr-10, Segurança em Instalações e Serviços em Eletricidade

3.3.3 Chile

- NSEC 5
- NCH 4/2003

3.3.4 Colombia

- RETIE – Reglamento Técnico de Instalaciones Eléctricas

3.3.5 Iberia

- 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.
- R. D, 223/2008 de 15 de febrero, por el que aprueba el Reglamento sobre condiciones técnicas y garantías de seguridad en líneas eléctricas de alta tensión y sus instrucciones técnicas complementarias ITC-LAT 01 a 09 (R.L.A.T.).

4 TERMS AND DEFINITIONS


See Cenelec HD 629-1.

5 UNIT OF MEASURE

Number of pieces.

6 TYPES OF TERMINATIONS

The following types of terminations are defined:

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Type code	Rated voltage U_0/U (U_m) (kV)		Installation	
	12/20(24)	18/30(36)	Indoor	Outdoor
GSCC005/1	X		X	
GSCC005/2	X			X
GSCC005/3		X	X	
GSCC005/4		X		X

Table 1 – Type codes

7 ELECTRICAL CHARACTERISTICS

The following requirements apply:


Rated voltage U_0/U (U_m) (kV)	12/20(24)	18/30(36)
Rated power frequency withstand voltage (kV)	50	70
Rated impulse withstand voltage (kV)	125	170
Rated short time withstand current in the conductor (kA)	According to HD629-1 (EN 61442)	
Rated short time (0,5 s ^a) withstand current in the screen (kA)	5 ^b ; 10 ^c	
NOTE (see Table 7): a: for E-distribuzione, E-distributie, Endesa Distribución Eléctrica the rated short time is 1 s b: for 16 mm ² and 25 mm ² screen (all Distribution Companies except Enel Distribución Colombia) c: for 25 mm ² screen (only for Enel Distribución Colombia) and 50 mm ² screen (all Distribution Companies to which applies)		

Table 2 – Electrical characteristics

The rated voltage levels of the cables for which is foreseen the installation of the terminations is the following:

Rated voltage of the termination U_0/U (U_m) (kV)	12/20(24)	18/30(36)
Distribution Company (Country)	Rated voltage of the cables U_0/U (U_m) (kV)	
Enel Distribuição Ceará (Brazil) Enel Distribución Colombia (Colombia)	8.7/15(17.5)	-
Enel Distribución Chile (Chile)	8.7/15(17.5)	15/25(31)
Enel Distribución Perú (Perù)	8.7/15(17.5); 12/20(24)	-
Edesur (Argentina) Enel Distribuição Rio (Brazil) Enel Distribuição Goiás (Brazil)	8.7/15(17.5)	18/30(36)
Endesa Distribución Eléctrica (Spain)	12/20(24)	18/30(36) 12/20(24)*
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	12/20(24)	-
* Only for 200022		

Table 3 – Rated voltage of the cables


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8 OVERALL DIMENSIONS

With reference to Figure 1 and Figure 2, overall dimension of terminations are defined in Table 4:

Type	GSCC005/1	GSCC005/2	GSCC005/3	GSCC005/4
Minimum creepage distance (mm)	420	600 ^a 840 ^b	580	900
Maximum height L (from first hole center of the lug to the support axis) (mm)	350	450	450	750
Maximum diameter of sheds D (mm)	130	-	130	-
a apply to Enel Distribución Colombia (Colombia), Endesa Distribución Eléctrica (Spain), E-Distributie Banat (Romania), E-Distributie Dobrogea (Romania), E-Distributie Muntenia (Romania), E-Distribuzione (Italy); b apply to Enel Distribuição Rio (Brazil), Enel Distribución Chile (Chile), Enel Distribuição Ceará (Brazil), Enel Distribución Perú (Perù), Edesur (Argentina);				

Table 4 – Overall dimensions for indoor and outdoor installation

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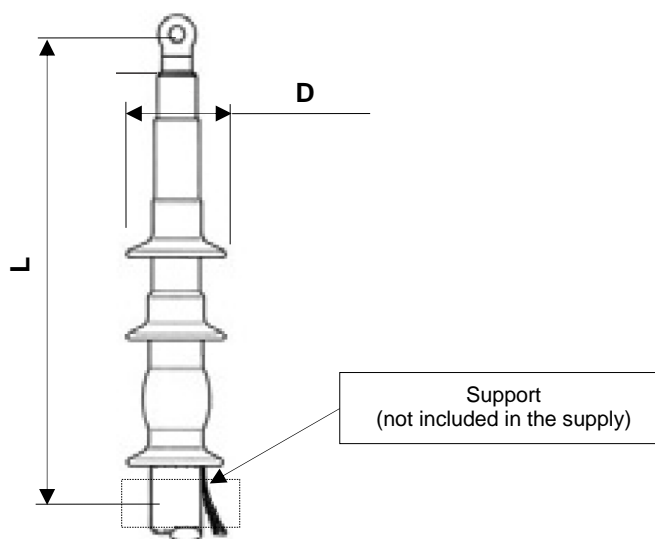


Figure 1 – Indoor termination

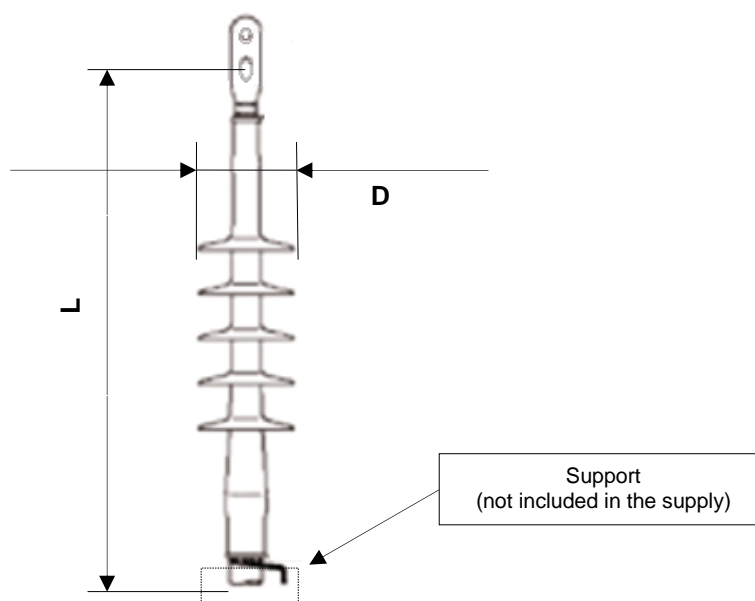



Figure 2 – Outdoor termination

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9 SERVICE CONDITIONS

9.1 General service conditions

IEC 60721-2-1.

Severe ambient conditions according to IEC 60587.

9.2 Specific service conditions

For Enel Distribución Colombia (Codensa): the reference altitude is 2.700 m.

10 CONSTRUCTION CHARACTERISTICS

10.1 GENERAL CHARACTERISTICS

10.1.1 Shrink technology

The terminations shall be cold shrink type².

10.1.2 Resistance to corrosion, infiltrations, moisture and dust

The external surfaces of terminations shall be resistant to atmospheric conditions that can occur during normal operation (moisture, dust, UV rays, etc.). The insulating body shall ensure non-infiltration of moisture and dust and there shall be no standing water at the seals under normal conditions of installation.

The supplier shall provide appropriate documentation of the material used, the characteristics of aging, the details of construction and assembly demonstrating the reliability of seals; the use of paints, enamels or similar materials is not be considered sufficient to ensure the level of protection required.

Furthermore, special precautions must be taken to avoid the risk of corrosion resulting from contact of different metals. All parts of ferrous material in contact with the air, including hardware, must be made of austenitic stainless steel.

10.1.3 Heating

All the materials that make up the termination shall withstand the heating conditions expected during operation, without having an adverse effect on their proper functioning of the termination or the cable.

10.1.4 Resistance to fire

The insulating housing (see 10.2.3) shall be resistant to fire.

10.1.5 Resistance to surface currents

The insulating housing (see 10.2.3) shall be resistant to surface currents.

10.1.6 Materials compatibility

All the component parts of the termination shall be made out of materials that can be in contact with each other and with the parts that make up the cable, without having an adverse effect on their proper functioning. Greases and sealing compounds, if any, shall be absolutely neutral in relation to the materials with which they are in contact and shall remain stable in contact with air.

² Slip-on type may be accepted as well.

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10.2 TERMINATIONS

Terminations are composed by the following elements:

1. Shear bolt lug
2. Component to control the electric field
3. Main insulating housing
4. Metallic screen earthing connection
5. Greases and sealing compounds

Items 2 (component to control the electric field) and 3 (main insulating housing) of the above list shall be assembled on the same single body.

It may be designed in order to ensure the following functions (e.g. through embedded sealing compounds):

- to seal the termination,
- to protect the junction of the metallic screen.

10.2.1 Shear bolt lug

The shear bolt lug shall be made of tin plated aluminum alloy suitable for both aluminum and copper cables and shall be compliant with IEC 61238-1, Class A.

No additional hole (e.g. for inspection) shall be made. The shear bolts shall be made to break inside their holes, assuring that no spike of any projection of material remain on the lug surface.

The lugs shall have a lock to assure the correct positioning of the conductor, even for the smaller sections.

The internal and external surface of the lugs shall not have sharp edges, spikes or deformities.


Lugs must be designed and constructed so that, when properly installed, the electrical resistance of the connection is not greater than the equivalent resistance of the reference conductor.

It is allowed to use greases to improve the electrical contact between the lug and the cable conductor and avoid corrosion as well as a sealing compound to fill screw cavities of the lug. In any case, the design of screw cavities protection shall be so that no material is dispersed inside the termination during the cold shrinking operation and/or in the installation.

10.2.1.1 Lugs for indoor terminations

10.2.1.1.1 Palm lugs

With reference to Figure 3, Table 5 reports the main characteristics and dimensions of the palm lugs for indoor installation:

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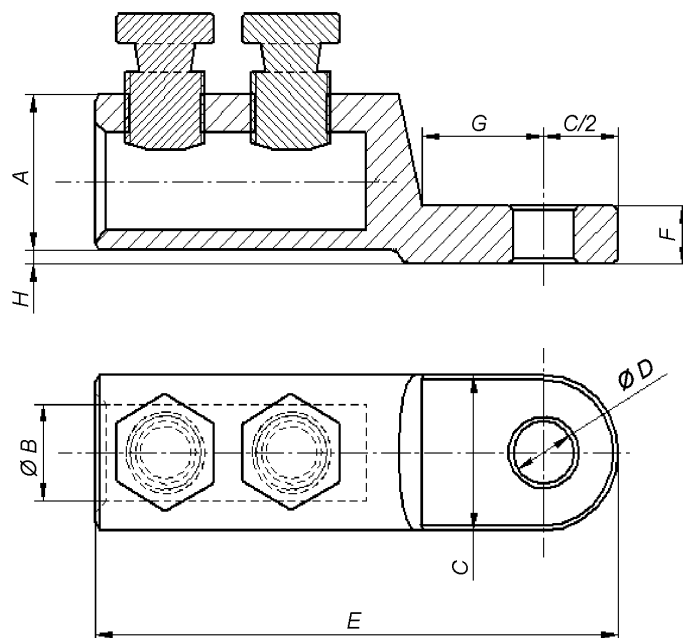


Figure 3 – Indoor lug

Cable section (mm ²)	A max	Ø B min	C max	Ø D ± 0,2	E max	F min	G min	H	nº of screws min
35 ÷ 95	28	13	27	13	105	8,5	12,5	(*)	1
95 ÷ 240	38	19,5	37	13	130	9	14,5		2
150 ÷ 240									
400	45	26	42	13 ; 17 ^a	170	12	18,5		2; 3 ^a
630	47	29,6	45	13	173	20	22		3
a. apply to Enel Distribuição Rio (Brazil), Enel Distribuição Ceará (Brazil), Enel Distribuição Goiás (Brazil), Enel Distribución Perú (Peru); (*) The palm and the barrel shall be on a different quote (to be verified by visual inspection).									

Table 5 – Indoor lugs dimensions (mm)

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10.2.1.2 Lugs for outdoor terminations

10.2.1.2.1 Palm lugs

With reference to Figure 4, Table 6 reports the main characteristics and dimensions of the palm lugs for outdoor installation:

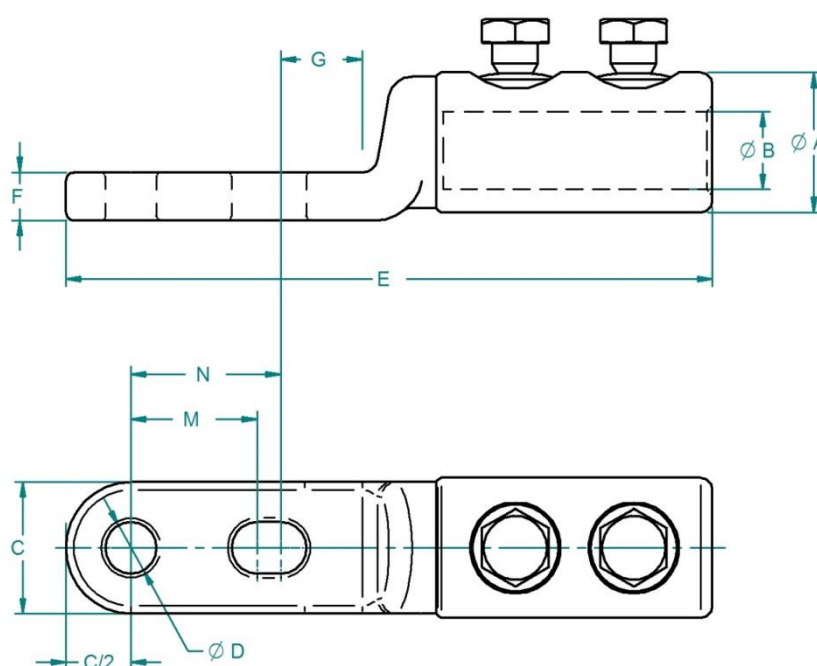


Figure 4 - Outdoor lug


Cable section (mm ²)	A max	Ø B min	C min	Ø D ± 0,2	E max	F min	G min	M -0,5/+0	N -0/+1	nº of screws min
35 ÷ 95	28	13	20	13	143	8,5	12,5	32	45	2
95 ÷ 240	38	19,5	33	13	168	13	14,5	32	45	2
150 ÷ 240										
400	45	26	40	13; 17 ^a	208	15	18,5	32	45	2; 3 ^a
630	47	29,6	45	13	200	20	20	44	-	3

a. apply to to Enel Distribuição Rio (Brazil), Enel Distribuição Ceará (Brazil), Enel Distribuição Goiás (Brazil), Enel Distribución Perú (Peru);

Table 6 - Outdoor palm lugs dimensions (mm)

10.2.2 Component to control the electric field

It shall be applied on the insulation of the cable and connected to the external cable semiconductor.

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10.2.3 Main insulating housing

The main insulating housing ensure the prescribed creepage distance (see Table 2).
Only for GSC005/4, the main insulating housing may be made of 2 (two) parts.

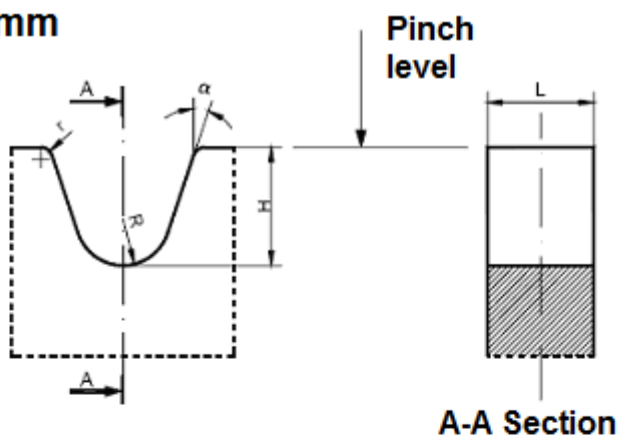
10.2.4 Metallic screen earthing connection

10.2.4.1 Earthing lug

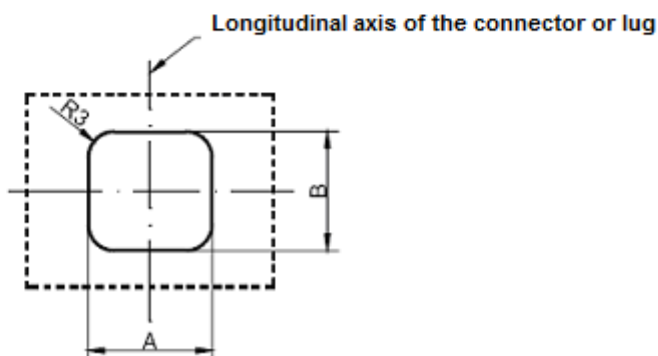
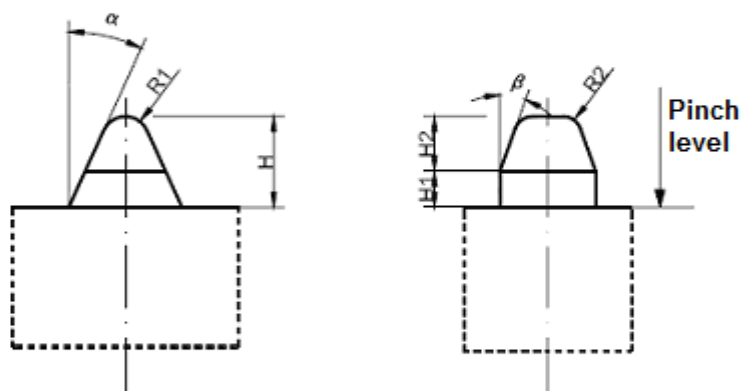
The metallic screens of the cables shall be connected to earth by means of a tin plated copper palm straight lug with a M12 screw hole, to be applied by compression with the tools indicated in Figure 5 or equivalent.

Dimensions are in mm

$$\begin{aligned} H &= 11,0 \pm 0,1 \\ L &= 9,0 \pm 0,1 \\ R &= 4,0 \pm 0,1 \\ r &= 1,0 \\ \alpha &= 15^\circ \end{aligned}$$



$$\begin{aligned} A &= 10,0 \pm 0,1 \\ B &= 9,0 \pm 0,1 \\ H &= 7,5 \pm 0,1 \\ H1 &= 3,0 \\ H2 &= 4,5 \\ R1 &= 2,0 \\ R2 &= 1,5 \\ R3 &= 2,0 \\ \alpha &= 24^\circ \\ \beta &= 20^\circ \end{aligned}$$




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Figure 5 – Tool for compressing the earthing lug

The lug shall be suitable for connecting the metallic screen sections reported in Table 7. It shall be compatible with both aluminum tape and copper wire cable screens.

The lug shall be supplied un-mounted and compressed on field.


Distribution Company (Country)	Cable section (mm ²)	Earthing lug section (mm ²)
Enel Distribuição Rio (Brazil)	≤ 240	25
Enel Distribuição Ceará (Brazil)		
Enel Distribuição Goiás (Brazil)	400 and 630	50
Enel Distribución Chile (Chile)		
Enel Distribución Colombia (Colombia)		
Enel Distribución Perú (Perù)	all sections ^a	25
Endesa Distribución Eléctrica (Spain)		
E-distributie Banat (Romania)		
E-distributie Dobrogea (Romania)		
E-distributie Muntenia (Romania)		
E-Distribuzione (Italy)		
NOTE: for Edesur (Argentina) no earthing lug is required. a: in those companies, MV cables could have aluminum tape screen or copper wire screens.		

Table 7 – Earthing lug section

10.2.4.2 Cables with aluminum tape screen

In the case of cables with aluminum tape screen, the connection with the screen of the cable shall be made by means of :

- plate of tin-plated hard copper with a tin coating having minimum thickness of 0,5 µm. The plate shall be as shown in Figure 6 and shall be bent on a cylinder of diameter 25 ± 2 mm; the convex side of the plate shall include 65 asperities, arranged as shown in the Figure 6. These asperities shall have a particular shape (see example in Figure 6) in order to allow piercing the aluminum tape, to obtain a satisfactory contact with the screen, and to partly penetrate the outer thermoplastic sheath of the cable, to prevent movement or removal of the device. The edge and the internal side of the plate shall be free of sharp or rough parts, in particular in the lower side in contact with the semiconductive layer of the cable. The lower side going under the aluminum tape shall have no protruding edge (an example is shown in Figure 6) but a small rounded edge lower than the asperities.
- A tin coated copper braid with a minimum length of 0,6 m. One end of the braid shall be welded to the rectangular plate described above at the position shown in Figure 6; the other end shall be connected to the lug described in 10.2.4.1. The section of the tin copper braid shall be compatible with the sections prescribed in Table 7.

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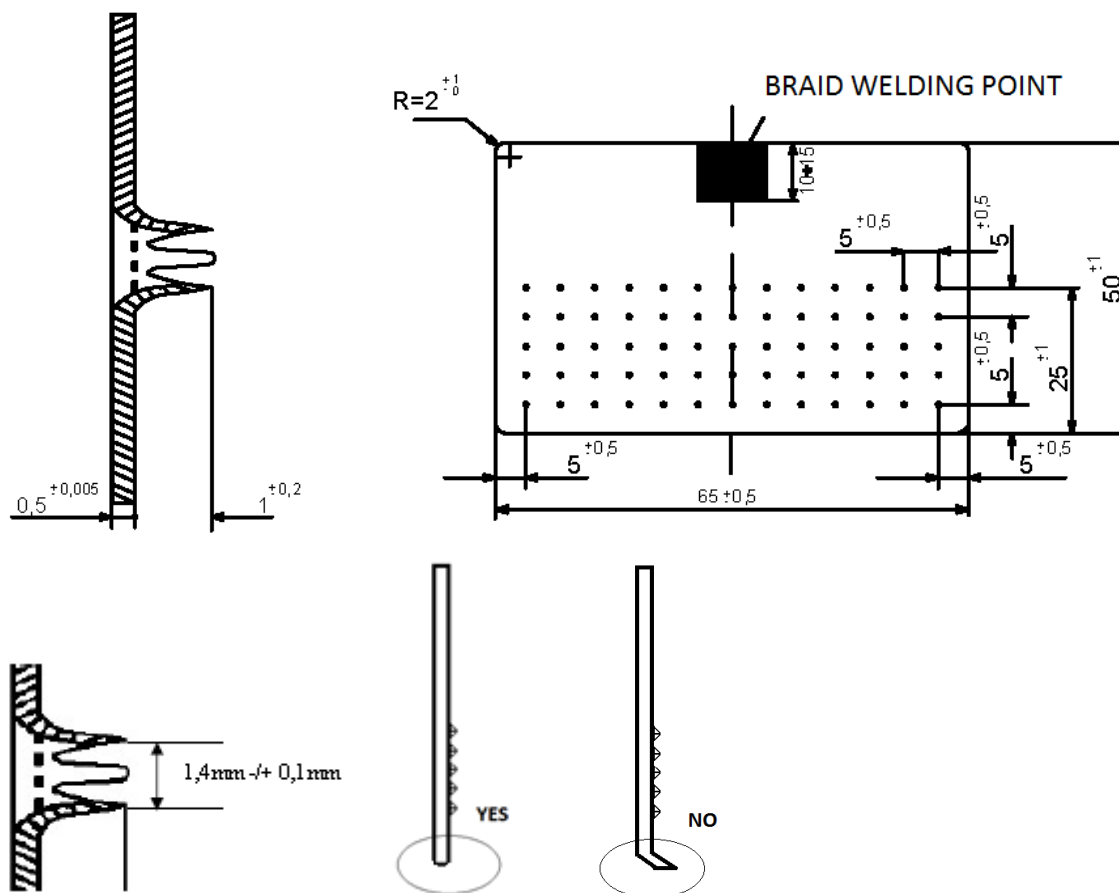


Figure 6 – Detail of rectangular plate for aluminum tape screen connection

10.2.4.3 Cables with copper wire screen

For cables with copper wires metallic screen, the earthing connection shall be made by collecting the copper wires of the metallic screen and connecting them to the tin coated copper braid described in 10.2.4.2 b). In order to do so, the braid shall be cut at the point of welding to the rectangular plate. The connection of copper wires and the tin coated copper braid shall be made by means of the connector described in par. 10.2.4.3.1.

If the distance is sufficient, connection to earth could be made directly connecting the copper wires of the screen to earth with the earthing lug described in 10.2.4.1.

10.2.4.3.1 Connector for copper wire screen

The copper wires of the metallic screen of the cable shall be connected to the tin coated copper braid described in 10.2.4.2 b), by means of a compression straight connector with the tools indicated in or equivalent. The section of the connector shall be compatible with the screen sections prescribed in Table 7.

The connector shall be supplied un-mounted and compressed on field.

10.2.5 Greases and sealing compounds

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Sealing compounds are not allowed, except those:

- to seal the whole termination,
- to protect the junction of the metallic screen
- inside the lug screws cavities

Greases are not allowed, except those:

- over the main insulation of the cable and over the lug

Greases and sealing compounds shall have no electrical functions for the assembling of the termination but only provide mechanical and/or sealing features.

11 CONTENT OF THE KIT

All the necessary elements and accessory to install the termination on-field shall be included, namely:

- 1 (one) shear bolt lug (see 10.2.1)
- 1 (one) component to control the electric field (see 10.2.2)
- 1 (one) main insulating housing (see 10.2.3)
- 1 (one) earthing lug (see 10.2.4.1)
- 1 (one) plate for aluminum tape screen cables (see 10.2.4.2) (only in the Countries which use them, see Table 7);
- 1 (one) connector for copper wire screen (see 10.2.4.3.1)
- Greases and sealing compounds (see 10.2.5)
- Accessories for cleaning;
- Plastic bag for collecting residual materials of installation;
- List of materials;
- Installing instructions and templates (see 14.3);
- Identification label (see 14.2.2);
- Other materials, tools and accessories (according to supplier's design).

12 LIST OF COMPONENTS

The list of components included in this Global Standard is reported in the following tables for 12/20(24) kV and 18/30(36) kV rated voltages:



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Distribution Company (Country)	Type: GSCC005/1			
Enel Distribuição Rio (Brazil) Enel Distribuição Ceará (Brazil) Enel Distribuição Goiás (Brazil)	6772090	6811850	6811851	6811852
Enel Distribución Chile (Chile)	6811573	6812045	6812046	-
Enel Distribución Colombia (Colombia)	6811863	6811864	-	-
Enel Distribución Perú (Perù)	6812293	6811502	6811483	-
Edesur (Argentine)	-	-	-	-
Endesa Distribución Eléctrica (Spain)	200026	270098	270099	-
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	273055	273041	-	-
Characteristics of the cable				
Cable section (mm ²)	35 ÷ 95	95 ÷ 240	400	630
Rated voltage U_0/U (U_m) (kV)	See Table 3			
Min/max diameter over insulation (mm)	14.9/ 25.0	20.6/32.2	31/37.5	37.9/43.5

Table 8 – Material codes for cold shrink 12/20(24) kV indoor termination



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Distribution Company (Country)	Type: GSCC005/2			
Enel Distribuição Rio (Brazil) Enel Distribuição Ceará (Brazil) Enel Distribuição Goiás (Brazil)	6772085	6776450	6789739	6792743
Enel Distribución Chile (Chile)	6811552	6812041	6812043	-
Enel Distribución Colombia (Colombia)	6811865	6811868	-	-
Enel Distribución Perú (Perù)	6812294	6811484	6811485	-
Edesur (Argentine)	-	-	-	-
Endesa Distribución Eléctrica (Spain)	200024	270094	270095	-
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	273056	273069	-	-
Characteristics of the cable				
Cable section (mm ²)	35 ÷ 95	95 ÷ 240	400	630
Rated voltage U_0/U (U_m) (kV)	See Table 3			
Min/max diameter over insulation (mm)	14.9/ 25.0	20.6/32.2	31/37.5	37.9/43.5

Table 9 – Material codes for cold shrink 12/20(24) kV outdoor termination



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GSCC005

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Distribution Company (Country)	Type: GSCC005/3					
Enel Distribuição Rio (Brazil)	-	-	-	-	-	-
Enel Distribuição Goiás (Brazil)	-	-	-	-	-	-
Enel Distribución Chile (Chile)			6811574	6811575	6811576	6811534
Enel Distribución Colombia (Colombia)	-	-	-	-	-	-
Enel Distribuição Ceará (Brazil)	-	-	-	-	-	-
Enel Distribución Perú (Perù)	-	-	-	-	-	-
Edesur (Argentina)	-	-	-	-	-	-
Endesa Distribución Eléctrica (Spain)	200027	-	-	270110	270111	-
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	-	-	-	-	-	-
Characteristics of the cable						
Cable section (mm ²)	35 ÷ 95	95 ÷ 240	70 ÷ 150	150 ÷ 240	400	630
Rated voltage U_0/U (U_m) (kV)	See Table 3					
Min/max diameter over insulation (mm)	20.4/30.0	24.8/37.2	19.0/32.2	27.3/37.2	34.9/42.5	41.3/46.7

Table 10 – Material codes for cold shrink 18/30(36) kV indoor termination



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GSCC005

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Distribution Company (Country)	Type: GSCC005/4					
Enel Distribuição Rio (Brazil)	-	-	-	-	-	-
Enel Distribuição Goiás (Brazil)	-	-	-	-	-	-
Enel Distribución Chile (Chile)	-	-	6811554	6811557	6811558	6811571
Enel Distribución Colombia (Colombia)	-	-	-	-	-	-
Enel Distribuição Ceará (Brazil)	-	-	-	-	-	-
Enel Distribución Peru (Perù)	-	-	-	-	-	-
Edesur (Argentina)	-	-	-	-	-	-
Endesa Distribución Eléctrica (Spain)	200025	200022		270096	270097	
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	-	-	-	-	-	-
Characteristics of the cable						
Cable section (mm ²)	35 ÷ 95	95 ÷ 240	70 ÷ 150	150 ÷ 240	400	630
Rated voltage U_o/U (U_m) (kV)	See Table 3					
Min/max diameter over insulation (mm)	20.4/30.0	24.8/37.2 20.6/32.2*	19.0/32.2	27.3/37.2	34.9/42.5	41.3/46.7
*Only for 200022						

Table 11 – Material codes for cold shrink 18/30(36) kV outdoor termination

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13 TESTS

13.1 GENERAL

Tests are classified into:

- Type tests
- Acceptance tests

They shall be carried out according to HD 629-1. Lugs shall be tested according to IEC 61238-1 class A.

13.2 TYPE TESTS

For each material code, type tests shall be carried out on a sample installed on cables with the maximum section indicated in Table 8, Table 9, Table 10 and Table 11, respectively for $U_o/U (U_m)$ 12/20(24) kV indoor and outdoor and 18/30(36) kV indoor and outdoor (e.g. 270096 shall be tested on a 240 mm² – 18/30(36) kV cable and 270094 on a 240 mm² 12/20(24) kV cable).

For E-Distribuzione, E-Distributie Banat, E-Distributie Dobrogea and E-Distributie Muntenia, type tests shall be carried out on both HPTE and XLPE insulated cables.

For Endesa Distribución code 200022 type tests shall be carried out using a 185 mm² – 18/30(36) kV cable.

Type tests shall be carried out at the maximum rated voltage level prescribed for the termination (i.e. 12/20(24) kV or 18/30(36) kV).

The lugs shall be tested both for their maximum and minimum section, according to IEC 61238-1, class A.

Insulating materials shall be tested for resistance to tracking and erosion according to IEC 60587, with 3.5 kV test voltage.

The Supplier shall declare the resistance to fire of the main insulating housing according to IEC 60695-11-10 or another equivalent standard.


13.2.1 EXPIRATION TEST

An expiration test shall be performed in order to verify the capability of the termination to maintain its properties during its life according to the expiry date declared by the manufacturer.

The test shall be performed on a new termination and on a termination of the same lot aged 7 days at 65°C in oven in expanded stage (to simulate 2 years of storage at 35°C of mean temperature).

After ageing, the new termination and the aged termination are put in expanded stage at +5°C during 24h. After that cooling phase, the terminations are installed on the minimum cross-section cable of their reference range.

Then, the following test sequence is applied:

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Test	Indoor termination (table 3 of HD 629-1)	Outdoor termination (table 4 of HD 629-1)
Partial discharge at ambient temperature	X (test n°3)	X (test n°4)
Immersion	-	X (test n°7)
Lightning impulse voltage test at ambient temperature	X (test n°10)	X (test n°12)
Power-frequency voltage tests	X (test n°2)	X (test n°2)
Partial discharge at ambient temperature	X (test n°3)	X (test n°4)
Visual inspection of water penetration	-	X

13.2.2 UV RESISTANCE TEST FOR OUTDOOR TERMINATION

Outdoor terminations shall be tested according to the IEC 62217 2012 par 9.3.2 (1000 h).

13.2.3 ADDITIONAL TYPE TESTS

For each material code, the extension of compliance from maximum section to minimum section in the reference range shall be verified on a cable having the minimum diameter over insulation (or lower) specified in Table 8, Table 9, Table 10 and Table 11, by carrying out all the additional tests prescribed by HD 629-1, table 10, taking into account that test No. 5 must be performed, additionally to prescribed conditions, also by subjecting the samples to 63 cycles in water (to be performed according to HD 629-1, table 5, test No. 7). Additional type tests shall be carried out at the maximum rated voltage level prescribed for the termination (i.e. 12/20(24) kV or 18/30(36) kV).

For E-Distribuzione, E-Distributie Banat, E-Distributie Dobrogea and E-Distributie Muntenia additional type tests shall be carried out on both HPTE and XLPE insulated cables.

13.3 ACCEPTANCE TESTS


For each material code, acceptance tests shall be carried out using the smallest cable section (see Table 8, Table 9, Table 10 and Table 11 for reference) for each rated voltage of the cable according to Table 3 (e.g. 270098 shall be tested on a 95 mm² - 12/20(24) kV cable).

For Enel Distribución Peru acceptance tests shall be carried out using the smallest cable section with 12/20(24) kV rated voltage³ (e.g. 6811484 shall be tested on a 95 mm² – 12/20(24) kV).

Acceptance tests shall be carried out at the maximum rated voltage level prescribed for the cable (see Table 3).

The samples for the acceptance tests shall be selected from among the entire batch that was prepared for testing even if made up of different material codes.

³ Tests performed on a 12/20(24) kV are considered sufficient to demonstrate compliance also for the installation on a 8.7/15(17.5) kV cable with normal thickness insulation.

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Acceptance test	Batch (units)		
	≤ 50 units	> 50 and ≤ 1200	> 1200
Visual inspection	2 samples for each material code prepared for testing	5 samples for each material code prepared for testing.	10 samples for each material code prepared for testing.
Accessory manufacturing specifications check*			
Accessory assembly check	1 sample for each material code prepared for testing.	2 samples for each material code prepared for testing	3 samples for each material code prepared for testing
Power frequency withstand test			
Partial discharge test at ambient temperature			
* the nominal tightening torque of shear bolts specified by the manufacturer shall be always verified.			

Table 12 – Samples for acceptance tests

In all cases, the acceptance number will be 0 and the rejection number will be 1.

On the scheduled acceptance testing date the supplier shall prepare the cables, stripped as required by the assembly instructions of terminations being tested. This will facilitate the assembly of the termination and reduce the testing time, which benefits both parties.

13.4 RETIE Certification (only apply to Enel Distribución Colombia)

For Enel Distribución Colombia (Colombia), RETIE certification shall be also provided according to local regulation (see 3.3.4). It is requested that this certification be made under the scheme 5 (ISO IEC 17067).

14 SUPPLY REQUIREMENTS

14.1 LABELLING

The termination must bear the following information:


- name of the manufacturer;
- maximum voltage U_m in kV
- year and month of manufacture (e.g.: 15/2);

In particular, this information shall be placed on the external sheath of the terminations by means of indelible and permanent screen printing or an equivalent method accepted by the Distribution Companies of Enel Group.

14.2 PACKAGING

Terminations shall be supplied in individual packages which shall bear the following information:

- Material code assigned by the Distribution Companies of Enel Group;
- name of the manufacturer;
- type of termination (e.g. cold shrink outdoor termination);
- type of cables for which the accessory is intended, section and conductive material allowed;
- year and month of packaging;
- progressive identification number assigned by the manufacturer (or serial number);
- barcode (only for E-Distribuzione and Endesa Distribucion, see 14.2.1);
- production batch number;
- identification abbreviation;
- maximum voltage U_m in kV;
- expiry date (year/month) of the materials.

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Furthermore, the packages shall contain a self-adhesive label with the following information (only for E-Distribuzione and Endesa Distribucion):

- manufacturer identification code (CUI);
- material code assigned by the Distribution Companies of Enel Group;
- year and month of manufacture (e.g.: 15/2);
- progressive identification number (assigned by the manufacturer);
- barcode (only for E-Distribuzione and Endesa Distribucion, see 14.2.1)

For E-Distribuzione, shipping (of several individual packages) shall meet the requirements of the packaging in compliance with GUI 101 specifications.

14.2.1 Barcode (only for E-Distribuzione and Endesa Distribucion)

The characteristics of the barcode are listed in E-Distribuzione specification PVR 006.

14.2.2 Identification label

It shall include blank fields to be filled after installation:

Name:

Date:

Company:

14.3 INSTALLATION INSTRUCTIONS AND TEMPLATES

The instruction for the preparation of the cable shall be written in compliance with Enel Global Standard GSCC015. For E-distribuzione the technical specification DJ4580 also applies.

Accessory assembly instructions shall be written on A4 paper, and the various stages of construction of the termination shall be illustrated by photographs or diagrams in color.

Templates shall be included for the following types of cables:

- Extruded cables with aluminum tape screen (only for the Country listed in table Table 6)
- Extruded cables with copper wires screen

Furthermore, for processing steps that require the use of a special tool, the description of these operations shall be accompanied by the Distribution Companies of Enel Group material code/type code⁴ for the tool and a color photograph.

Additionally a QR code shall be included in the instructions to provide a web-link to demonstration videos and tutorials on the related termination. They shall be in the local language of the Country of delivery.

Installing instruction and templates shall be in the local language of the Country of delivery and shall be approved by Distribution Companies of Enel Group.

⁴ This information, if any, will be provided by Distribution Companies of Enel Group during the examination of the installation instructions (before the certification process)