12/20(24) kV AND 18/30(36) kV SEPARABLE CONNECTORS FOR MV CABLES

Countries I&N	
Argentina	**C. Espinoza**
Brazil	**R. Sales**
Chile	**D. Sarkis**
Colombia	**J. C. Gomez**
Italy	**L. Giansante**
Peru	**R. Sanchez**
Romania	**V. Obrejan**
Spain	**J. Gonzalez**

	Elaborated by	Verified by	Approved by
Global I&N – O&M/NCS	**L. Foddai**	**N. Cammalleri**	**M. Mazzotti**

Revision	Data	List of modifications
00	25/11/2015	First emission.
01	23/02//2018	Material codes updated. Chapter on barcode updated, Painted semiconducting layer not allowed; New tests: UV test for outdoor accessories; Modification of requirements for resistance to fire; Modification of requirements of screen connecting plate; modification of requirements of tracking and erosion test, introduction of PE-bag packaging instead of obstruction cups. Class 24 kV for Italy and Rumania. Modification of max width for elbow type. 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 mm2
02	25/05/2018	Revised tables 8, 9 and 10.
03	09/07/2018	Tracking and erosion test withdrawn. Revised material codes for Brazil.

Contents

1 SCOPE

This Global Standard applies to 12/20(24) kV and 18/30(36) kV indoor and outdoor separable connectors 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:

Enel Distribución Colombia	*Colombia*
Enel Distribución Perú	*Perú*
Edesur	*Argentina*
e-distributie Banat	*Romania*
e-distributie Dobrogea	*Romania*
e-distributie Muntenia	*Romania*
e-distribuzione	*Italy*
Endesa Distribución Eléctrica	*Spain*
Enel Distribución Chile	*Chile*
Enel Distribuição Ceará	*Brazil*
Enel Distribuição Rio	*Brazil*
Enel Distribuição Goiás	*Brazil*

2 FIELD OF APPLICATION

These requirements apply to the 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:

- EN 50181
- Cenelec HD 629-1
- IEC 61238-1
- IEC 60587
- IEC 60695-11-10
- IEC 60721-2-1
- ISO IEC 17067

3.2 Global Standards

- GSC001[1]
- 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 separable connectors 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).

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, 223/2008de 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 SEPARABLE CONNECTORS

The following types of separable connector are defined:

Type code	Shape				Interface			Rated voltage U_0/U (U_m) (kV)		Rated current I_n (A)		
	Elbow	Straight	Tee (symmetric or asymmetric)	Tee (symmetric with joint element)	A	B	C	12/20(24)	18/30(36)	250	400	630
GSCC006/1	X				X			X		X		
GSCC006/2	X					X		X			X	
GSCC006/3	X					X			X		X	
GSCC006/4		X			X			X		X		
GSCC006/5		X				X		X			X	
GSCC006/6		X				X			X		X	
GSCC006/7			X				X	X				X
GSCC006/8			X				X		X			X
GSCC006/9				X			X	X				X
GSCC006/10				X			X		X			X

Table 1 – Separable connector types

7 ELECTRICAL AND DIMENSIONAL 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 8): 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

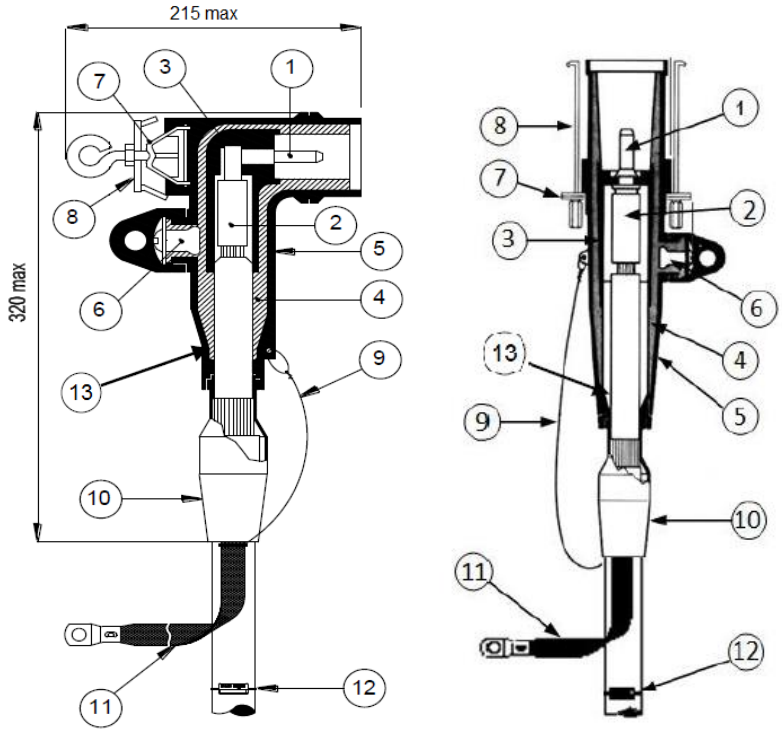
The rated voltage levels of the cables for which is foreseen the installation of the separable connectors is the following:

Rated voltage of the separable connector 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)
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	12/20(24)	-

Table 3 – Rated voltage of the cables

Dimensions [1]	**GSCC006/1 GSCC006/2 GSCC006/3**	**GSCC006/4 GSCC006/5 GSCC006/6**	**GSCC006/7 GSCC006/8**	**GSCC006/9 GSCC006/10**
Width max (mm)	215	-	300 [a] ; 220 [b]	300 [c]
Length max (mm)	320	-	410	410
1: refer to Figure 1, Figure 2 and Figure 3. a: symmetric with protection cap plugged-in b: asymmetric with protection cap plugged-in c: with junction element plugged-in				

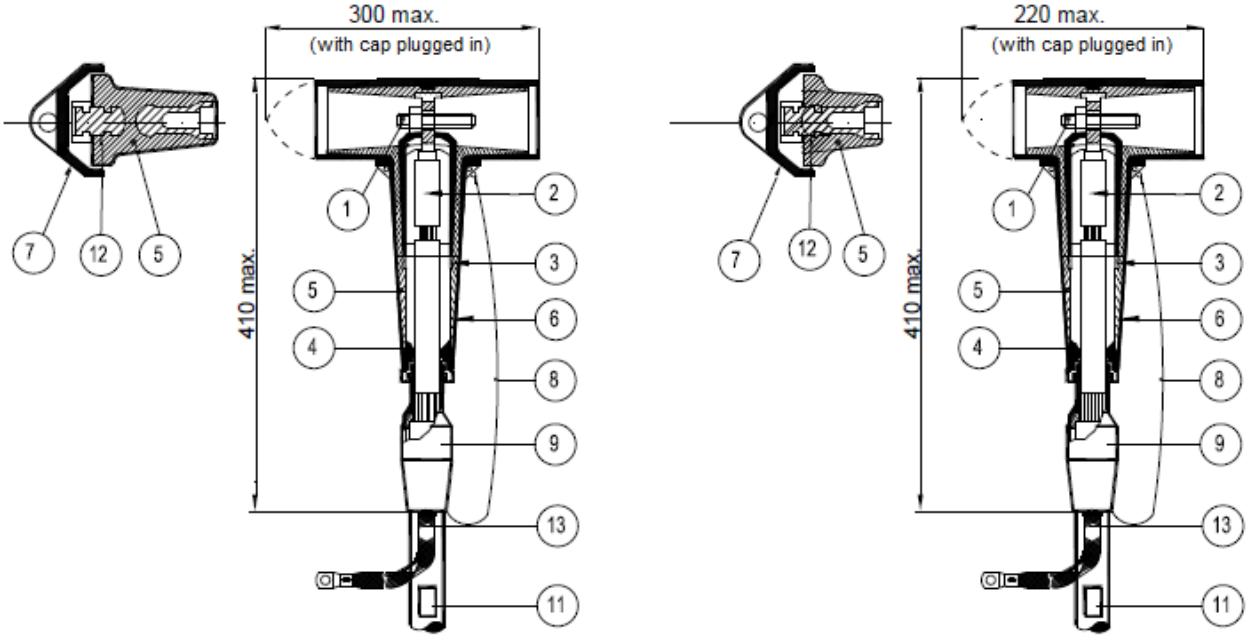
Table 4 - Dimensional characteristics



Note: maximum width (215 mm) allowed for elbow connectors, may be referred according to the design to the edge of the fastening device (as in the figure) or to the edge of the protection cap of the capacitive socket.

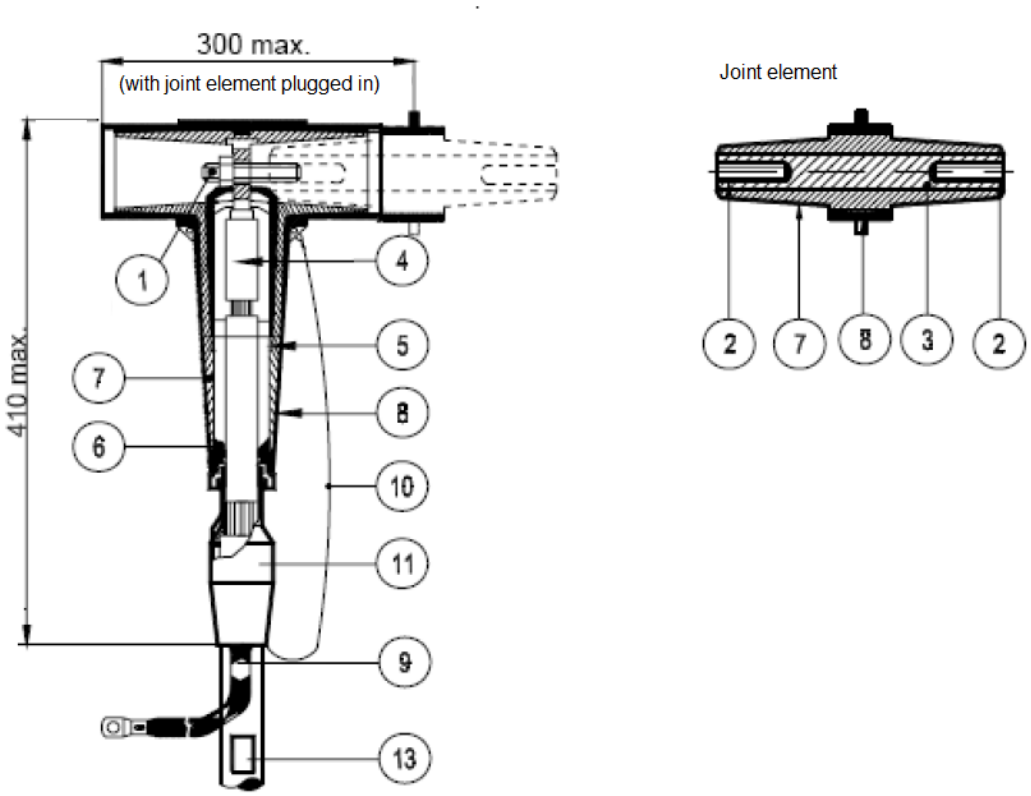
1	Contact pin	8	Fastening device
2	Lug	9	Equipotential connection
3	Internal semiconductor layer	10	Cable adapter
4	Insulating layer	11	Earthing connection
5	External semiconductor layer	12	Phase marking plate
6	Capacitive socket with protection cap	13	Electric field control
7	Coupling device for fastening		

Figure 1 – Elbow and straight separable connector



1	Contact screw	8	Equipotential connection
2	Lug	9	Cable adapter
3	Internal semiconductor layer		
4	Electric field control	11	Phase marking plate
5	Insulating layer	12	Capacitive socket
6	External semiconductor layer	13	Earthing connection
7	Protection cap		

Figure 2 – Tee (symmetric and asymmetric) separable connector



1	Contact screw	8	External semiconductor layer
2	Screw hole	9	Earthing connection
3	Copper connection	10	Equipotential connection
4	Lug	11	Cable adapter
5	Internal semiconductor layer		
6	Electric field control	13	Phase marking plate
7	Insulating layer		

Figure 3 – Tee (symmetric with joint element) separable connector

8 SERVICE CONDITIONS

8.1 General service conditions

IEC 60721-2-1. Severe ambient conditions according to IEC 60587.

8.2 Specific service conditions

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

9 CONTRUCTION CHARACTERISTICS

9.1 GENERAL CHARACTERISTICS

9.1.1 Resistance to corrosion, infiltrations, moisture and dust

The external surfaces of separable connectors (including caps used in shipping and storage) 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.

9.1.2 Heating

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

9.1.3 Resistance to fire

The main insulating housing shall be resistant to fire.

9.1.4 Resistance to surface currents

The main insulating housing (see 9.2.3) shall be resistant to surface currents.

9.1.5 Materials compatibility

All the component parts of the separable connector 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.

9.2 SEPARABLE CONNECTORS

Separable connectors are composed by the following elements:

1. Shear bolt lug
2. Cable adapter
3. Main insulating housing
4. Capacitive socket
5. Protection cap
6. Interface and contact device
7. Metallic screen earthing connection
8. Equipotential connection
9. Fastening device
10. Phase marking plates
11. Greases and sealing compounds

Separable connectors shall be supplied as a single, pre-assembled part, including the main insulating housing and protection cap.

9.2.1 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.

Lug shall be designed to assure the connection and interface with the contact device specified in Table 7. Depending on the type of separable connector, interface and contact device, the following requirements apply:

	Elbow		**Straight**		**Symmetric or Asymmetric Tee**
Interface	**A**	**B**	**A**	**B**	**C**
Contact device	Pin		Pin		Screw
Lug	Palm lug with a threaded through hole, able to receive the threaded end of the contact pin		Pin		Palm lug with a smooth through hole[1] (diameter min 18 mm).
Lug/contact device assembling	The contact pin shall be screwed to the lug using a torque wrench		The pin is pre-assembled with the lug		The contact screw is inserted into the lug and screwed to the type C interface using a torque wrench
1: the internal surface of the hole shall not be tin plated.					

Table 5 – Lug

9.2.2 Cable adapter

It shall be made of a semiconductor prefabricated rubber to cover the area between the outer sheath of the cable and the main insulating housing.

9.2.3 Main insulating housing

The main insulating housing consists of:

1) an internal semiconductor layer which functions as a shield for the electrical connections. Painted semiconducting layers are not allowed.
2) an insulating layer;
3) an external semiconductor layer for the electrical field control which also functions as an electrostatic shield. Painted semiconducting layers are not allowed;
4) a capacitive socket as described in par. 9.2.4;
5) a protection cap for the capacitive socket as described in par. 9.2.5;
6) a coupling device for inserting and detaching the terminal which is also capable of bearing the stress of the fastening device described in par. 9.2.10 (only for elbow and straight separable connectors).

9.2.4 Capacitive socket

Separable connectors shall be provided with a capacitive socket made of a metal electrode which faces the outside of the main insulating housing, and a circular surface with a diameter in the range 15 ÷ 24 mm, easily accessible with an insulated rod.
The Ctc capacity (measured between the electrode and the cable conductor) must be greater than 1 pF.
The ratio between Cte capacity (measured between the electrode and earth) and Ctc capacity shall be less than 12 (Cte/Ctc ≤ 12).

9.2.5 Protection cap

Separable connectors shall be supplied with a protection cap firmly fastened to its position. When properly installed, it shall provide IP 66 degree of protection.

The protection cap is used in order to protect the separable connector capacitive socket from water and dust during transport and storage, as well as during the operation. It shall be made of semi-conductive rubber with an eyelet of 15 ± 0,5 mm in diameter. The protection cap shall be linked to the main insulating housing so that it is not lost when it is removed. The protection cap shall withstand at least the secondary voltage of the capacitive divider.

9.2.6 Interface and contact device

The dimensions of the interfaces of separable outer cone connector are stated in EN 50181; these dimensions are reported in Figure 4 and Figure 5 and in Table 6 and Table 7, relative to the dimensions of the outer cone interface and the contact device (pin or screw), respectively.

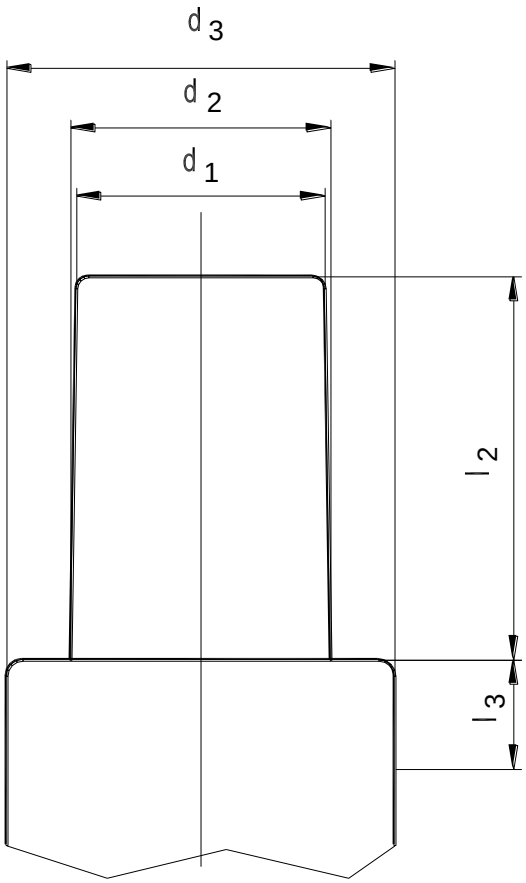


Figure 4 – Interface

Interface type	U_m (kV)	I_n (A)	d_1 (mm)	d_2 (mm)	d_3 (mm)	l_2 (mm)	l_3 (mm)	Contact type
A	24	250	$31^{+0.1}_{-0.3}$	$32.5^{\pm 0.2}$	$48.5^{\pm 0.2}$	$48^{+0}_{-0.2}$	9	Pin
B	24; 36	400	$46^{\pm 0.2}$	$56^{\pm 0.2}$	$70^{\pm 0.2}$	$90^{\pm 0.2}$	11	Pin
C	24; 36	630	$46^{\pm 0.2}$	$56^{\pm 0.2}$	$76.2^{\pm 0.2}$	$90^{\pm 0.2}$	11	Screw

Table 6 – Interface dimensions

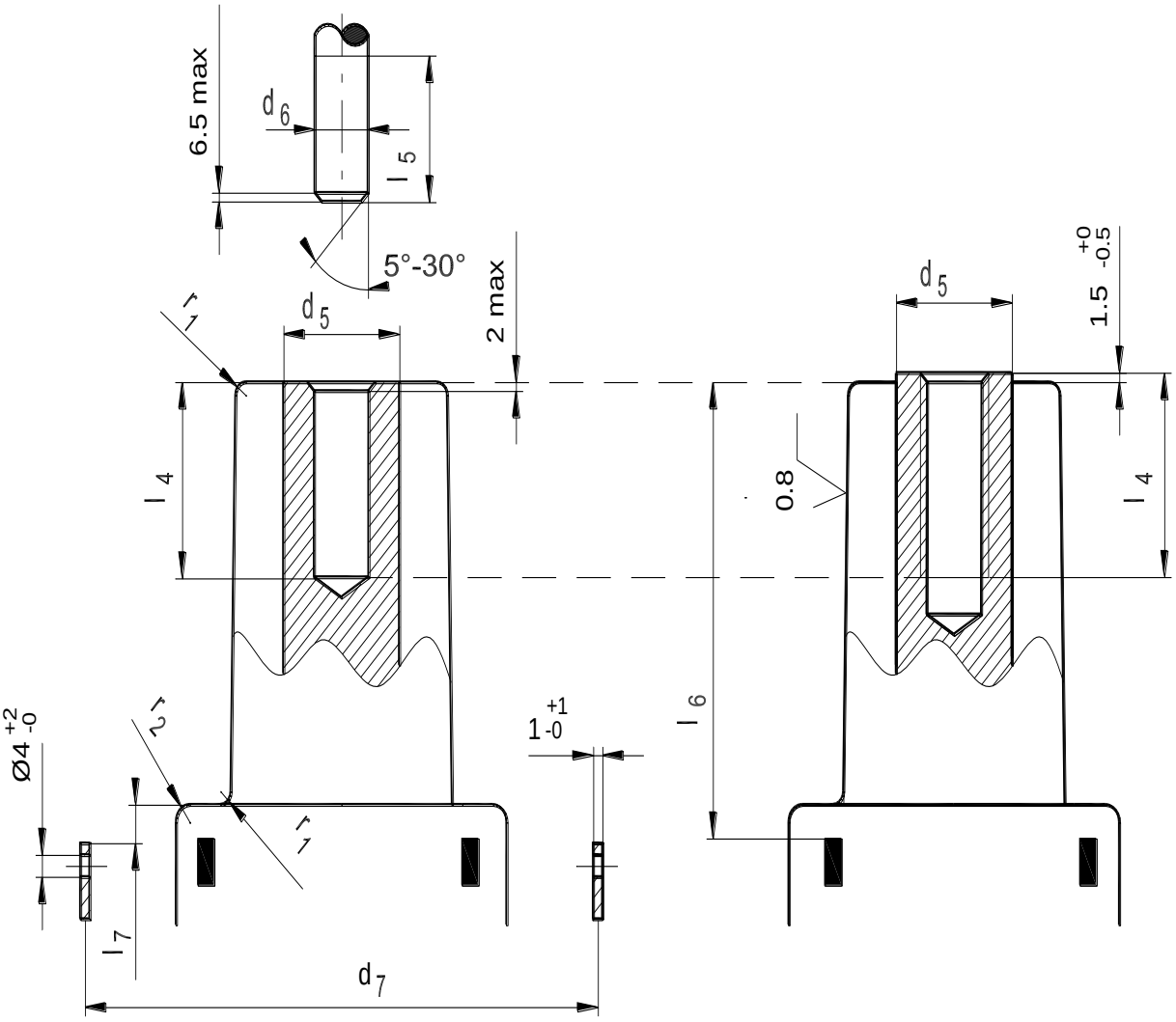


Figure 5 – Contact and fastening device dimensions (mm)

Interface type	U_m (kV)	I_n (A)	Contact zone						l_5 (mm)	l_6 max. (mm)	l_7 max. (mm)	r_1 max. (mm)	r_2 max. (mm)	Fastening device zone	
			Contact type	Material	d_5 (mm)	d_6 (mm)	Thread	l_4 min. (mm)						d_7 (mm)	n°
A	24	250	Pin	Cu	-	$7.9^{+0.02}_{-0.05}$	-	32	30	54	3.5	1	2	$90^{\pm 0.5}$	2
B	24; 36	400	Pin	Cu	-	$14^{+0}_{-0.04}$	-	40	38	97	5.5	3	3	$102^{\pm 0.5}$	2
C	24; 36	630	Screw	Cu[1]	22 min.	-	M16	29	-	97	-	3	3	$102^{\pm 0.5}$	2
[1]: aluminum alloy is also accepted															

Table 7 - Contact device and interface dimensions (mm)

9.2.7 Joint element

The joint element shall have the dimension of type C interface as defined in 9.2.6, an insulating layer and an external semiconducting layer. Painted semiconducting layers are not allowed.

9.2.8 Metallic screen earthing connection

9.2.8.1 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 6 or equivalent.

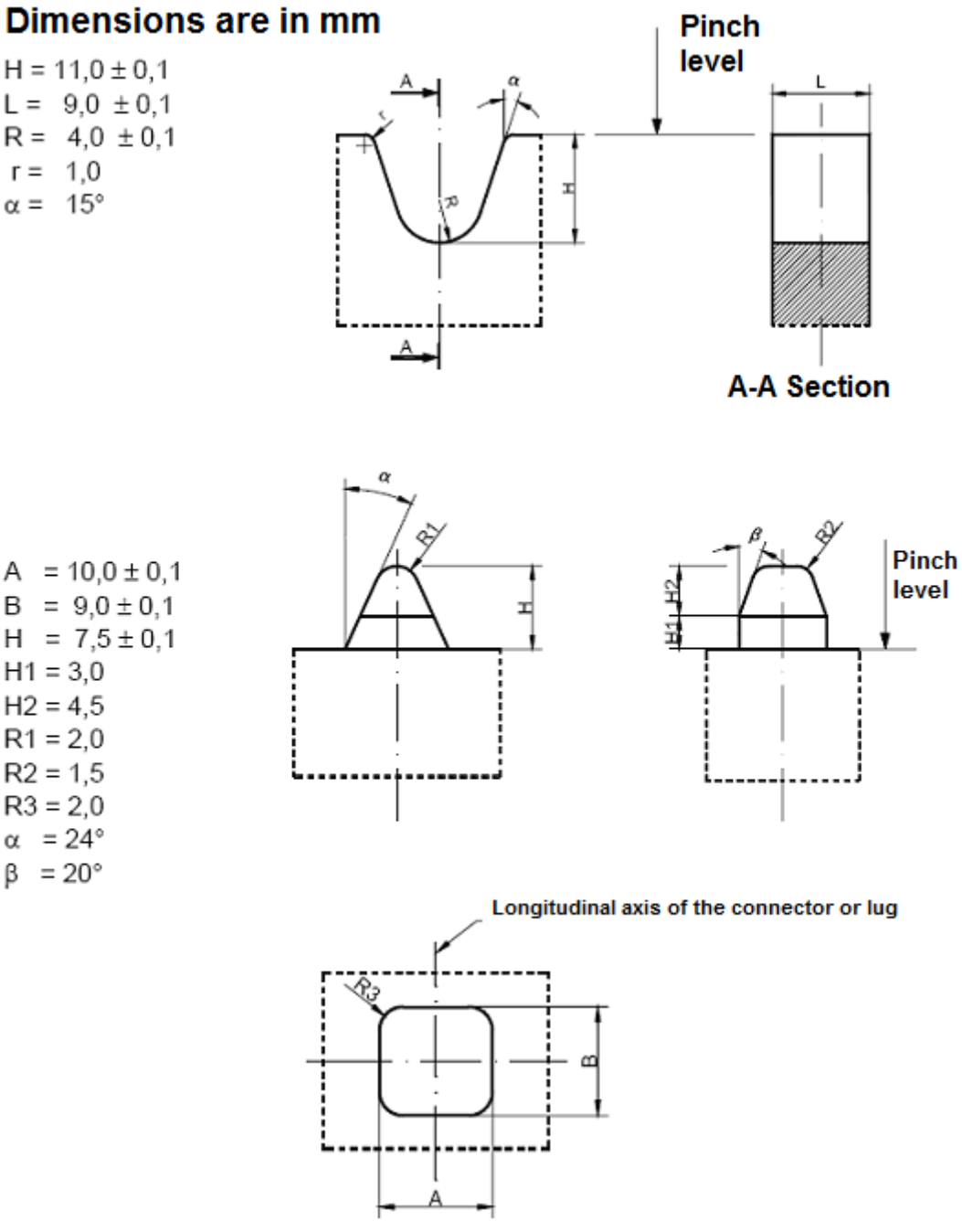


Figure 6 – Tool for compressing the earthing lug

The lug shall be suitable for connecting the metallic screen sections reported in Table 8. 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) Enel Distribuição Ceará (Brazil) Enel Distribuição Goiás (Brazil) Enel Distribución Chile (Chile) Enel Distribución Colombia (Colombia)	≤ 240	25
	400 and 630	50
Enel Distribución Perú (Perù) Endesa Distribución Eléctrica (Spain) E-distributie Banat (Romania) E-distributie Dobrogea (Romania) E-distributie Muntenia (Romania) E-Distribuzione (Italy)	all sections[a]	25
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 8 – Earthing lug section

9.2.8.2 Cables with aluminum tape screen

For cables with aluminum tape metallic screen, the earthing connection shall be made by means of:

a) a plate of tin-plated hard copper with a tin coating having minimum thickness of 0,5 μm. The plate shall be as shown in the figure Figure 7 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 7. These asperities shall have a particular shape (see example in Figure 7) 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 7) but a small rounded edge lower than the asperities.

b) 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 7; the other end shall be connected to the lug described in 9.2.8.1. The section of the tin copper braid shall be compatible with the sections prescribed in Table 8.

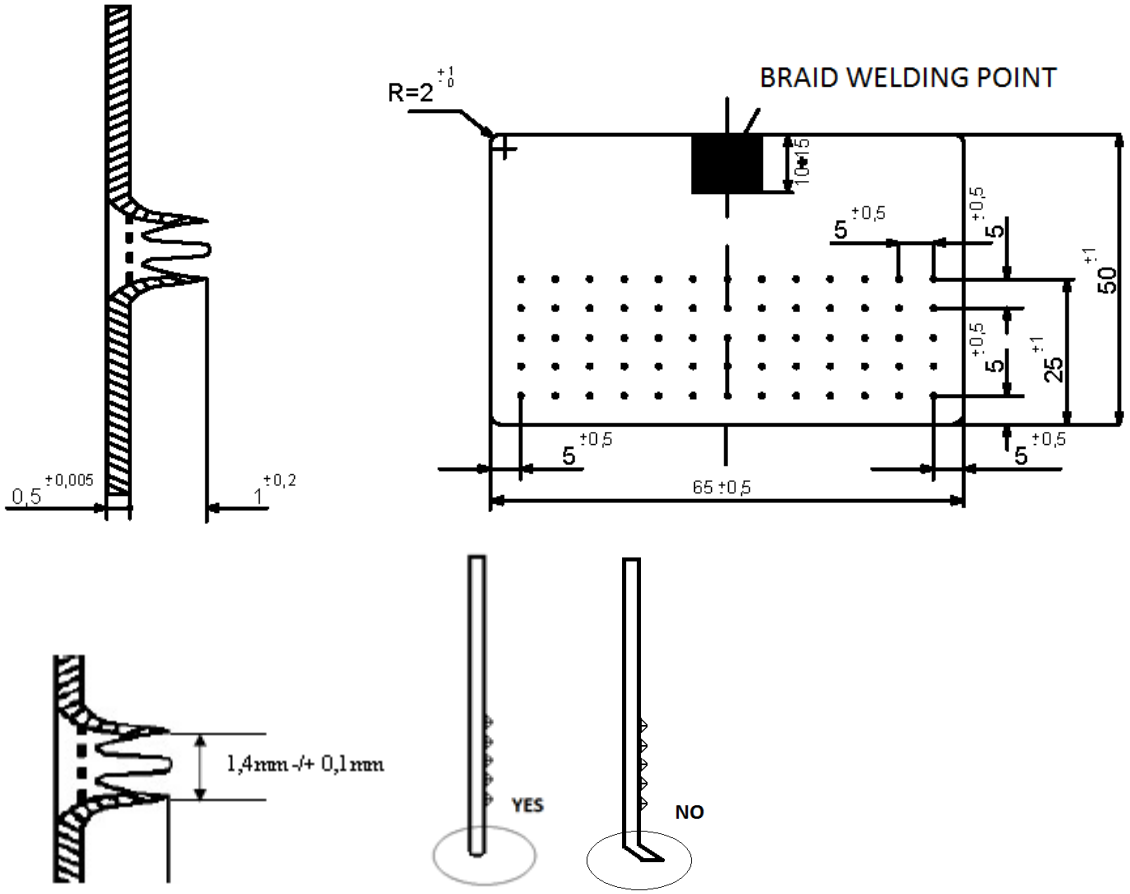


Figure 7 – Detail of rectangular plate for aluminum tape screen connection

9.2.8.3 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 9.2.8.2, 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 9.2.8.3.1. 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 9.2.8.1.

9.2.8.3.1 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 9.2.8.2, b) by means of a compression straight connector with the tools indicated in Figure 6 or equivalent. The section of the connector shall be compatible with the screen sections prescribed in Table 8.

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

9.2.9 Equipotential connection

The main housing shall be stably connected to the cable screen earth connection through an annealed tinned copper wire of 1.0÷1.2 mm in diameter (or a equivalent system).

9.2.10 Fastening device

Elbow and straight separable connectors must be equipped with fastening devices made out of austenitic stainless steel to to lock the connector of the outer cone interface and ensure the required pressure.
The sizes of the fastening devices for connectors are indicated in Figure 8 and Figure 9. The geometric details of the figures are provided only as a guideline.

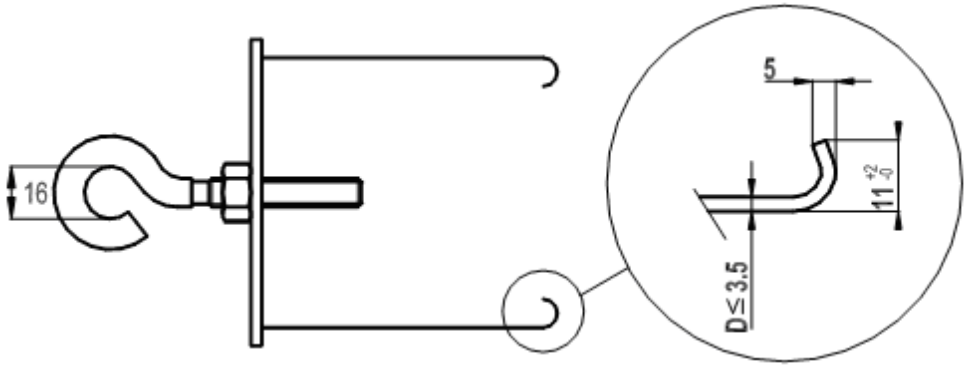


Figure 8 – Fastening device for elbow separable connectors

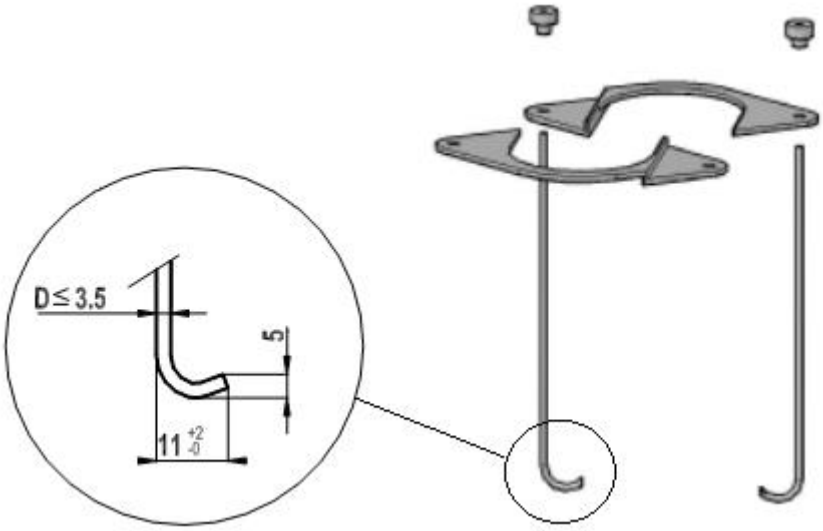


Figure 9 - Fastening device for straight separable connectors

9.2.11 Phase marking plates

Separable connectors shall be provided with anodized aluminum plates, 0.3-0.5 mm thick, bearing the numbers 4, 8 and 12 screen printed in black; the characters shall be 20 ± 2 mm in height; They shall be fastened to the cable by means of polyamide hose clamps.

9.2.12 Greases and sealing compounds

Greases are not allowed, except those:

- over the main insulation and the lug.

Sealing compounds are not allowed, except those:

- to seal the separable connector,

- to protect the junction of the metallic screen
- inside the lug screws cavities

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

10 CONTENT OF THE KIT

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

- 1 (one) shear bolt lug (see 9.2.1)
- 1 (one) cable adapter (see 9.2.2)
- 1 (one) main insulating housing (see 9.2.3)
- 1 (one) capacitive socket (see 9.2.4) (except for tee symmetric with joint element)
- 1 (one) protection cap (see 9.2.5) (except for tee symmetric with joint element)
- 1 (one) contact device (see 9.2.6)
- 1 (one) earthing lug (see 9.2.8.1)
- 1 (one) plate for aluminum tape screen cables (see 9.2.8.2) (only in the Countries which use them, see Table 8)
- 1 (one) connector for copper wire screen (see 9.2.8.3.1)
- 1 (one) equipotential connection (see 9.2.9)
- 1 (one) fastening device (only for elbow and straight separable connectors) (see 9.2.10)
- 3 (three) phase marking plates (see 9.2.11)
- 1(one) joint element (only for tee symmetric with joint element) (see 9.2.7)
- Greases and sealing compounds (see 9.2.12)
- Accessories for cleaning;
- Plastic bag for collecting residual materials of installation;
- List of materials;
- Identification label (see 13.2.2);
- Installing instructions and templates (see 13.3);
- Other materials, tools and accessories (according to supplier’s design).

The separable connector shall be sealed in a PE-bag in order to avoid contamination.

11 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:

Distribution Company (Country)	**Type: GSCC006/1, GSCC006/2, GSCC006/4, GSCC006/5, GSCC006/7, GSCC006/9**					
Enel Distribuição Rio (Brazil) Enel Distribuição Ceará (Brazil) Enel Distribuição Goiás (Brazil)	6776218 a1 6812157 b1	6797083 a1 6812126 b1	6812191 a2 6812127 b2	6812160 c1 6812192 d1	6812128 c1 6812129 d1	-
Enel Distribución Chile (Chile)	-	-	-	-	-	-
Enel Distribución Colombia (Colombia)	-	6805272 b1 6811871 c1	6805270 c1	6805273 c1	-	-
Enel Distribución Perú (Perù)	6810090 c1	6812081 b1 6812082 c1 6811511 d1	-	6812280 c1 6811512 d1	6812083 c1 6811513 d1	-
Edesur (Argentine)	-	-	-	-	-	-
Endesa Distribución Eléctrica (Spain)	270006 c1 270319 d1	270118 a1 270119 a2 270121 b1 110574 d1 270005 c1	270112 c1 110575 d1	270113c1 110576 d1	270114c1 110577d1	-
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	273171 a1 273170 b1	273142 a1 273163 b1 273226 c1 273227 d1	273247 c1 273248 d1	-	-	-
Characteristics of the cable						
Cable section (mm^2)	35 ÷ 50	70 ÷ 120	150 ÷ 185	240	400	630
Min/max diameter over insulation (mm)	14.9/21.8	17.6/26.6	22.3/28	26.1/32.2	31/37.5	39.5/43.5
Rated voltage of the cables U_0/U (U_m) (kV)	See Table 3					
a1: for GSCC006/1; a2: for GSCC006/2; b1: for GSCC006/4; b2: for GSCC006/5; c1: for GSCC006/7; d1: for GSCC006/9						

Table 9 – Material codes for 12/20(24) kV separable connectors

Distribution Company (Country)	**Type: GSCC006/3, GSCC006/6, GSCC006/8, GSCC006/10**					
Enel Distribuição Rio (Brazil) Enel Distribuição Goiás (Brazil)	-	T270004 c2	T270006 c2	T270016 c2	-	-
Enel Distribución Chile (Chile)	-	6812360 a3 6812363 b3 6812283 c2	-	6812282 c2	6812281 c2	6812284 c2
Enel Distribución Colombia (Colombia)	-	-	-	-	-	-
Enel Distribuição Ceará (Brazil)	-	-	-	-	-	-
Enel Distribución Perú (Perù)	-	-	-	-	-	-
Edesur (Argentine)	-	-	-	-	-	-
Endesa Distribución Eléctrica (Spain)	270004 c2 270320 d2	270003 c2 270321 d2	270120a3 270122b3 270115c2 110578d2	270116c2 110579d2	270117c2 110580d2	-
E-distributie Banat (Romania); E-distributie Dobrogea (Romania); E-distributie Muntenia (Romania); E-Distribuzione (Italy)	-	-	-	-	-	-
Characteristics of the cable						
Cable section (mm^2)	35 ÷ 50	70 ÷ 120	150 ÷ 185	240	400	630
Min/max diameter over insulation (mm)	21/26.6	24/30	27.3/33	31.2/37.2	34.9/42.5	41.3/49.7
Rated voltage of the cables U_0/U (U_m) (kV)	See Table 3					
a3: for GSCC006/3 b3: for GSCC006/6 c2: for GSCC006/8 d2: for GSCC006/10						

Table 10 – Material codes for 18/30(36) kV separable connectors

12 TESTS

12.1 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.

12.2 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 9 and Table 10, respectively for U_o/U (U_m) 12/20(24) kV and 18/30(36) kV (e.g. 270112 shall be tested on a 185 mm^2 – 12/20(24) kV cable and 270122 on a 185 mm^2 18/30(36) 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.

Type tests shall be carried out at the maximum rated voltage level prescribed for separable connector (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.

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

12.2.1 UV resistance test

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

12.2.2 ADDITIONAL TYPE TESTS

For each material code, the extension of compliance from maximum section to minimum section shall be verified on a cable having the minimum diameter over insulation (or lower) specified in Table 9 and Table 10, 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 separable connector (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.

12.3 ACCEPTANCE TESTS

For each material code, acceptance tests shall be carried out using the smallest cable section (see Table 9 and Table 10 for reference) with the rated voltage of the cable according to Table 3, (e.g. 270120 shall be tested on a 150 mm^2 – 18/30(36) kV cable).
For Enel Distribución Peru acceptance tests shall be carried out using the smallest cable section with 12/20(24) kV rated voltage[2] (e.g. 6810090 shall be tested on a 35 mm^2 – 12/20(24) kV cable).

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

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 according to Table 11.

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 11 – 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 separable connector being tested. This will facilitate the assembly of the separable connector and reduce the testing time, which benefits both parties.

12.4 RETIE Certification (only apply to Enel Distribución Colombia)

For Codensa (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).

13 SUPPLY REQUIREMENTS

13.1 LABELLING

The separable connector and its accessories must bear the following information:
a) name of the manufacturer;
b) rated current in A;
c) maximum voltage U_m in kV;
d) year and month of manufacture (e.g.: 15/2);

In particular, this information shall be placed on the external surface of the main insulating housing of the separable connector by means of indelible and permanent screen printing or an equivalent method accepted by the Distribution Companies of Enel Group.

13.2 PACKAGING

Separable connectors 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 separable connector (e.g. elbow separable connector);
- 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 13.2.1) ;
- production batch number;

- identification abbreviation;
- maximum voltage U_m in kV;
- expiry date (year/month) of the materials.

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 13.2.1)

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

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

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

13.2.2 Identification label

It shall include blank fields to be filled after installation:

Name: ……
Date: ……
Company: ……

13.3 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 code[3] 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 separable connector. 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.

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