IMPIANTO DI RETE PER LA CONNESSIONE ALLA RETE MT DI E-DISTRIBUZIONE SPA DI UN LOTTO DI DUE IMPIANTI DI PRODUZIONE DA FONTE SOLARE FOTOVOLTAICO

POTENZA TOTALE IN IMMISSIONE 14.030,00 kW

SITO IN Comuni di TRAVERSETOLO (PR) e MONTECHIARUGOLO (PR)

PRODUTTORE: GREEN FROGS PARMA SRL

Iter autorizzativo impianto di produzione ed opere di rete per la connessione: PAUR art.27-bis Dlgs 152/2006

r_emiro.Giunta - Prot. 16/04/2025.0386070.E Copia conforme dell'originale sottoscritto digitalmente da SIGNORONI FILIPPO, Pluchino Corrado, Morello Gianluca

PROGETTO DEFINITIVO

DOCUMENTAZIONE TECNICA

STANDARDS TECNICI UNIFICATI DEL PROGETTO

IDENTIFICAZIONE ELABORATO

Livello prog.	Codice Rintracc.	Tipo docum.	N° elaborato	N° foglio	Tot. fogli	NOME FILE	DATA	REVISIONE
PD	381295977	02	10	---	---		04/2025	0

	DESCRIZIONE	ESEGUITO	VERIFICATO	APPROVATO
01				
02				
03				
04				
05				
06				

PROGETTAZIONE:

Montana

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Dott. Ing. Gianluca Morello
Ordine Ingegneri Palermo n.8306
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firma digitale

IL PROGETTISTA

GESTORE RETE ELETTRICA

e-distribuzione SpA
Area Regionale ER-TOU (AT-MT)
Unità Sviluppo Rete

e-distribuzione

FIRMA PER BENESTARE

PRODUTTORE

GREEN FROGS PARMA Srl

Via Fratelli Cairoli, 2
25122 Brescia (BS
P.Iva 04479760987

RAPPRESENTANTE LEGALE

FIRMA PER BENESTARE

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ELENCO DELLE PRINCIPALI SPECIFICHE TECNICHE PD PRODUTTORE

CODICE RINTRACCIABILITA': 381295977

MATERIALE	interno/esterno/ sconnettibile/taglia/ quantità/tipologia	Specifica E-DISTRIBUZIONE	Presente nel PD
CABINA DI SEZIONAMENTO	1x BOX DISTRIBUZIONE DG2061/1 porte in vtr matr.227280	DG2061 ed 9 del 09/2021	SI
QUADRI MODULARI MT	4x DY803/2 tipo "LE" 162325 + 1x DY803/3 tipo "T" 162326	DY803	SI
TRASFORMATORE MT/bt	1x '15/0,420 kV 160 kVA GST001/042 matr.112612	GST001	SI
CABINA CONSEGNA	2x BOX CLIENTE DG2061/7 porte in vtr matr.220008	DG2061 ed 9 del 09/2021	SI
QUADRI RMU MT	2x GSM001/2 config. "3L+T" matr. 162117	GSM001	SI
QUADRO MISURE CONSEGNA CLIENTE	2x DY808 15kV	DY808	SI
CONNETTORI per cavi MT	Sconnettibili "a T" a cono est. unip. GSCC006/7 630A-24kV	GSCC006	SI
PASSACAVO per cabine secondarie	kit passacavo per cabine secondarie 'DS920 m. 226721	DS920	SI
Armadio RACK	3x DY3005/1 previsto in cabina DG2061	DY3005	SI
UP TELECONTROLLO	3x previsto in cabina DG2061	GSTR001	SI
RGDAT	3x previsto in cabina DG2061	GSTP001	SI
Quadro Serv. Aux. per rack	3x quadro per rack per servizi ausiliari GSCL001/3 (DY3016)	GSCL001	SI
Cavi MT INTERRATI 240 ALLUMINIO	trip. el.visib. matr. 332285 sigla ARE4H5EX oppure ARP1H5EX	GSC001 tipo/004 oppure /008	SI
Cavi MT INTERRATI 240 RAME	trip. el.visib. GSCC023/008 matr. 330059 sigla RG7H1EX	GSCC023	SI
Giunti MT	270001 - dritti unipolari per cavi tripolari ad elica visibile 12/20(24)kV sezione 240mmq	GSCC004	SI
Nastro monitore	Nastro segnalatore presenza cavi interrati DS4285 matr.858833	DS4285	SI
Tubo corrugato	in rotoli - in barre	DS4247 - DS4235	SI
Tubo Pead	per la posa con T.O.C.	PE100 - UNI EN 12201-2 (riga rossa)	SI
Telaio supporto Quadri BT	x1 previsto in cabina di sezionamento	DS3055	SI
Interruttori automatici BT	x3 previsti in cabina di sezionamento	GSCL003	SI

SI ALLEGANO STRALCI DALLE SPECIFICHE TECNICHE RELATIVE AI PRINCIPALI COMPONENTI D'IMPIANTO

Box in calcestruzzo armato prefabbricato per apparecchiature elettriche per altitudini fino a 1000 metri sul livello del mare

STANDARD BOX DISTRIBUZIONE – STANDARD BOX SATELLITE – STANDARD BOX CLIENTE

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Edizione	Data	Natura della modifica
07.1	10/02/2012	Errata Corrige: Modifiche redazionali Introdotto Sistema passacavi da parete per cavi antenne
08	15/09/2016	Riduzione dimensione del foro a pavimento per quadri MT compatti in SF_6 Introduzione altezza massima box Rimozione dalla dotazione di cabina dei passacavi Introduzione specifiche tecniche aggiornate/di nuova edizione DS918 - DS920 – DY3021 Introduzione nella dotazione di cabina dell'armadio rack (DY3005) e del supporto QBT (DS3055) Modifica della dimensione del sistema passacavo per cavi temporanei Introduzione disegno costruttivo telaio per quadri BT con fissaggio sia inferiore che superiore Introduzione inserti per fissaggio quadro rack Introduzione prove di tipo e accettazione sullo spessore zincatura telaio per quadri BT Introduzione della verifica di isolamento degli elementi metallici accessibili dall'esterno Introduzione prova di accettazione provini cls Introduzione prova sclerometrica non distruttiva del cls indurito Introduzione richiesta di certificato di conformità impianto elettrico (D.M. 22 gennaio 2008, n.37) Introduzione della documentazione di tipo C "cabine box da terzi"
09	Settembre 2021	Adeguamento al D.M. 17 gennaio 2018 Introduzione Standard Box Satellite Introduzione Standard Box Cliente Introduzione Standard Box Cliente Rid Introduzione impiego cls fibrorinforzato Adeguamento normativa CPR per cavi impianto elettrico Adeguamento alla UNI EN ISO 1461 per elementi zincati Introduzione lampada di emergenza Introduzione tavolino Introduzione pittura pavimento

	Emissione	Collaborazioni	Verifiche	Approvazione
Unità	**DIS-ESM-PCS-STD**		**DIS-ESM-PCS-STD**	**DIS-ESM-PCS**
	S. Di Cesare		**L. Giansante**	**G. Valtorta**

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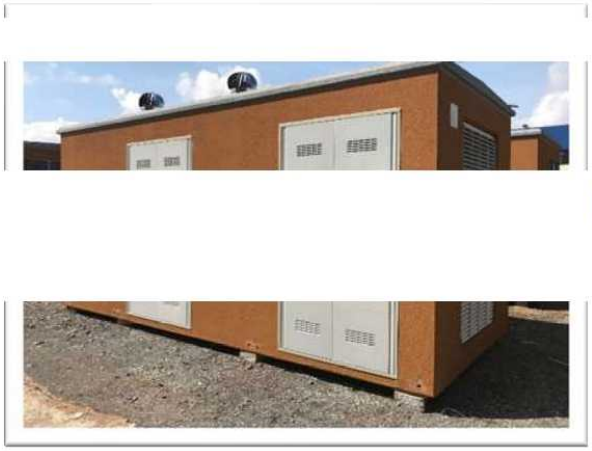

STANDARD BOX DISTRIBUZIONE

STANDARD BOX CLIENTE RID

STANDARD BOX SATELLITE

STANDARD BOX CLIENTE

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Descrizione	Tipologia	Matricola
Standard Box Distribuzione con porte vetroresina	DG2061/1	227280
Standard Box Distribuzione con porte acciaio zincato	DG2061/2	227282
Standard Box Distribuzione con porte acciaio inox	DG2061/3	227283
Standard Box Satellite con porte vetroresina	DG2061/4	220015
Standard Box Satellite con porte acciaio zincato	DG2061/5	220014
Standard Box Satellite con porte acciaio inox	DG2061/6	220012
Standard Box Cliente con porte vetroresina	DG2061/7	220008
Standard Box Cliente con porte acciaio zincato	DG2061/8	220003
Standard Box Cliente con porte acciaio inox	DG2061/9	220002
Standard Box Cliente Rid con porte vetroresina	DG2061/10	220011
Standard Box Cliente Rid con porte acciaio zincato	DG2061/11	220010
Standard Box Cliente Rid con porte acciaio inox	DG2061/12	220009

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4.2 Layout

4.2.1 Standard Box Distribuzione

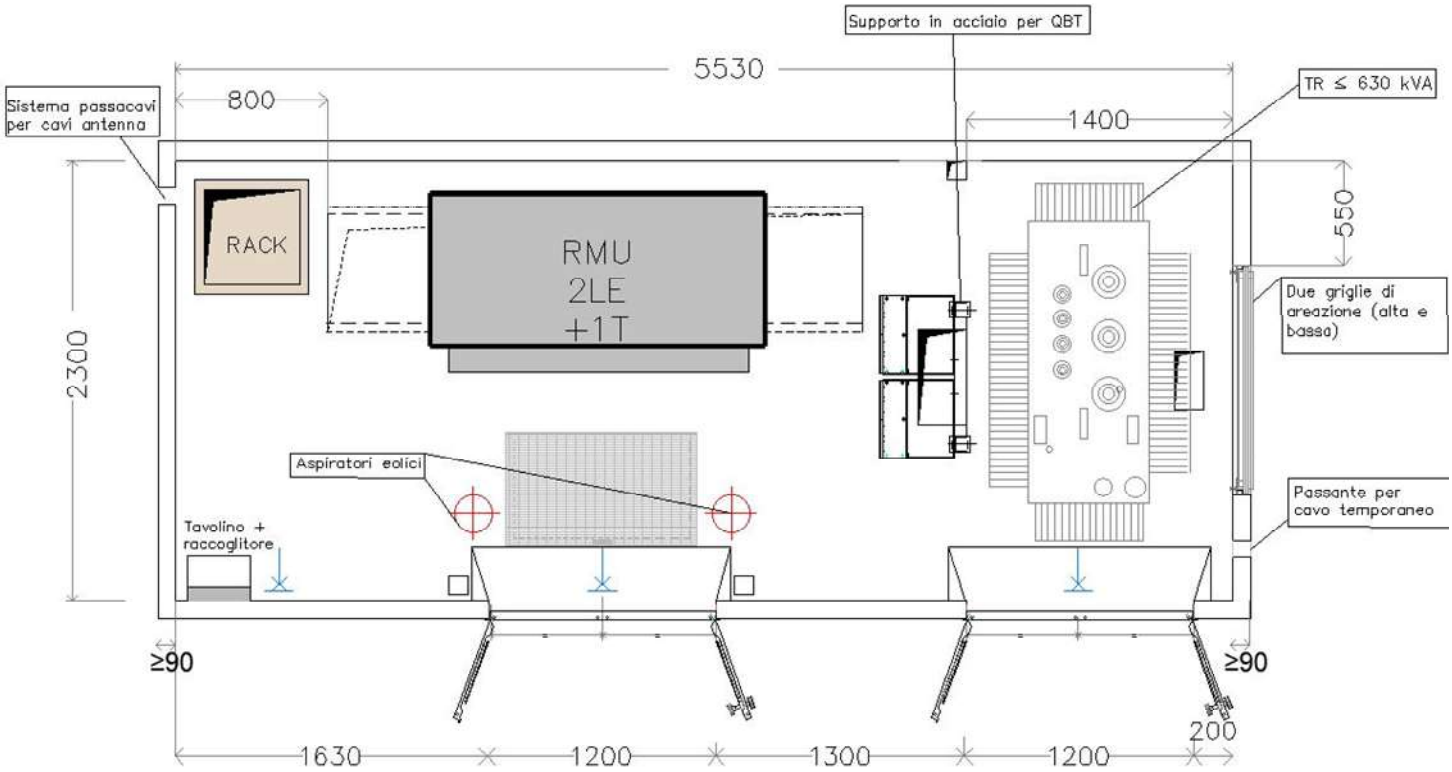

Figura 1 - Pianta dimensionale e funzionale Standard Box Distribuzione (esempio installazione RMU 2LE+1T) – Ulteriori dimensioni nel §14.1

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4.2.3 Standard Box Cliente

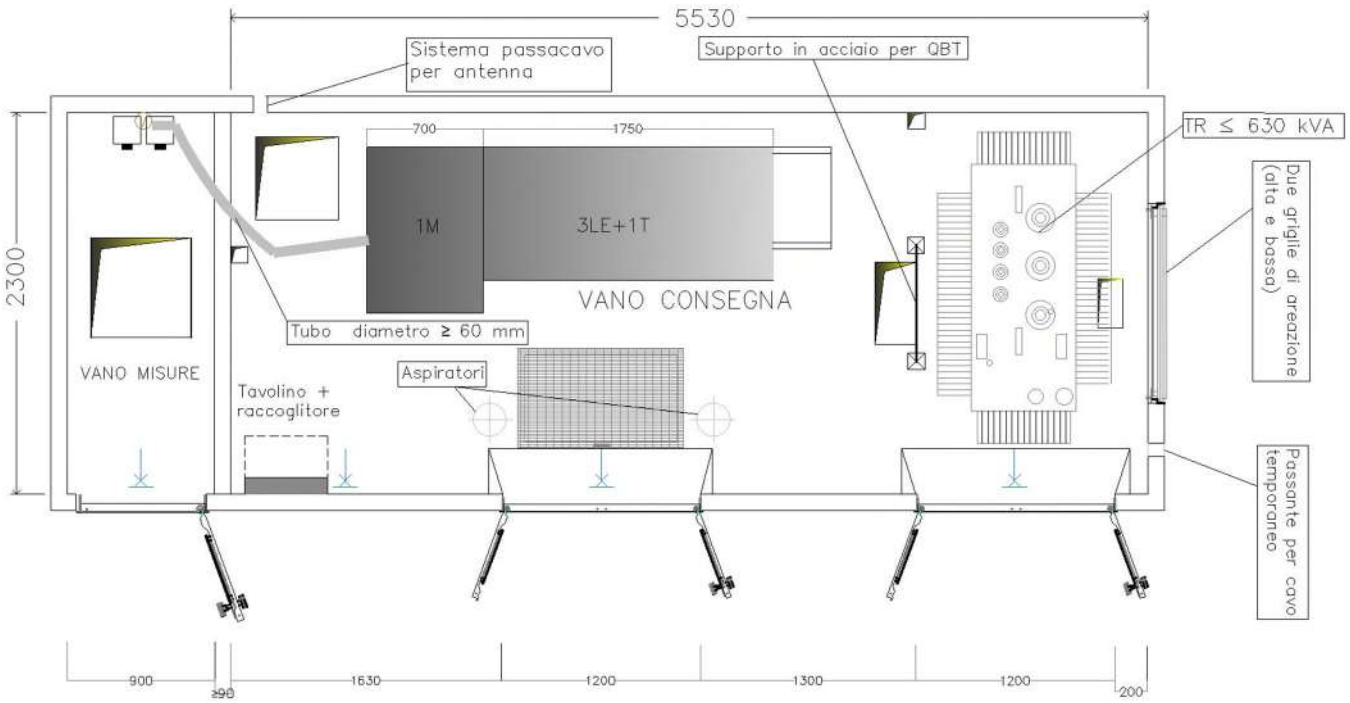

Figura 3 - Pianta dimensionale e funzionale Standard Box Cliente – Ulteriori dimensioni nel §14.3

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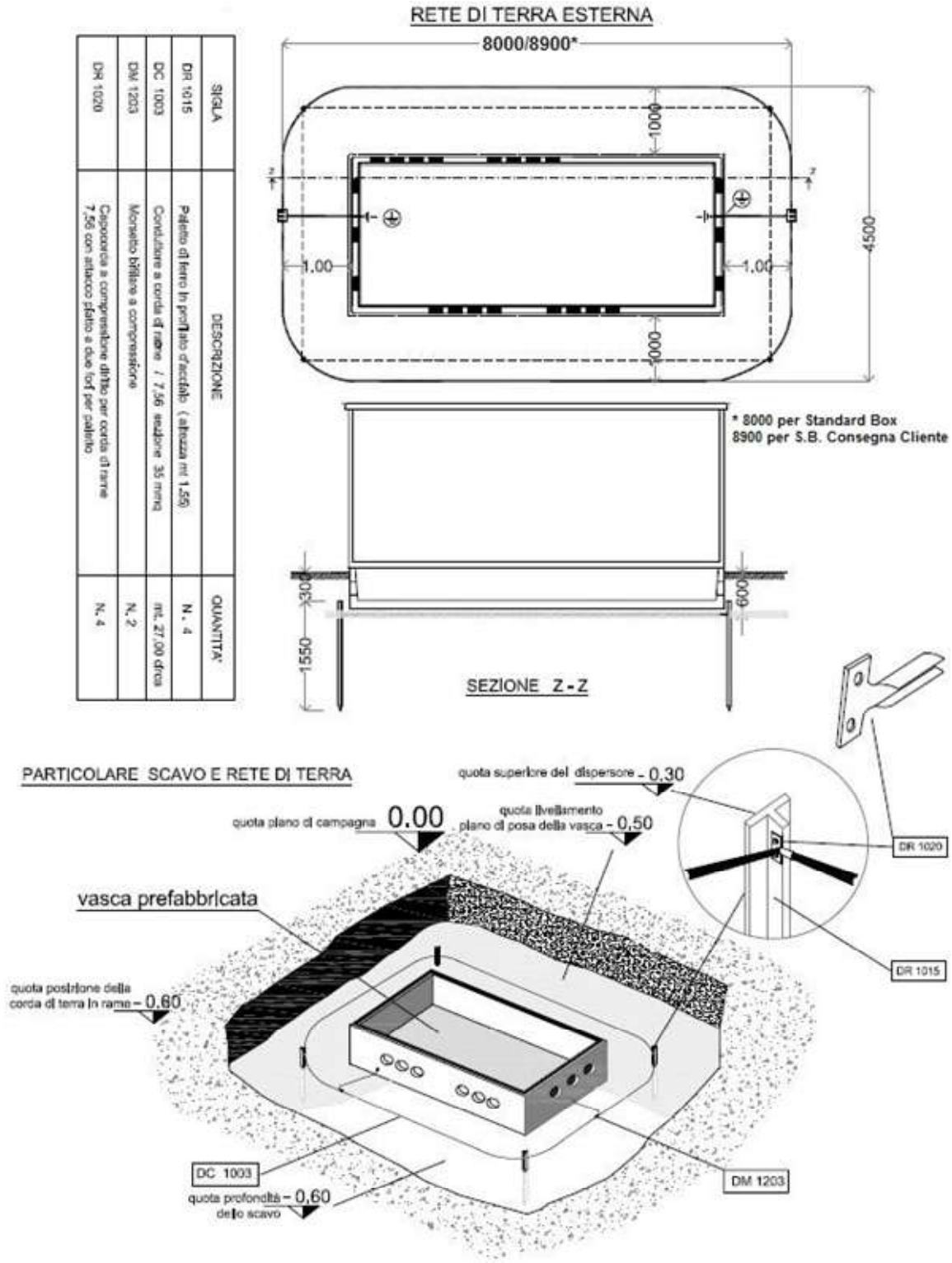

SIGLA	DESCRIZIONE	QUANTITA'
DR 1020	Copocorda a compressione diritto per corda di rame 7,56 con attacco piatto a due fori per zoccolo	N. 4
DM 1203	Morsetto bifilare a compressione	N. 2
DC 1003	Conduttore a corda di rame / 7,56 sezione 35 mmq	mt. 27,00 circa
DR 1015	Piatto di ferro in profilato d'acciaio (altezza mt 1,55)	N. 4

MV/LV TRANSFORMERS

Country	Distribution Company
Argentina	**R. De Antoni**
Brazil	**V. Robadey**
Chile	**D. Gonzalez**
Colombia	**J. C. Gomez**
Spain	**J. Gonzalez Lara**
Italy	**L. Giansante**
Peru	**R. Sanchez**
Romania	**V. Obrejan**

	Elaborated by	Verified by	Approved by
Global I&N – O&M/NCS	**G. Andreella** **J. M. Rey Sanchez**	**F. Mauri**	**F. Giammanco**

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Revision	Data	List of modifications
00	30/09/2012	First emission
01	31/10/2012	Common List: LV bushing types updated for code /237 and /241 and noise level values reduced in accordance with relevant standards for Italy, Romania and Peru. Local Section A: additional requirements for rating plates indicated in 6.10.8. Local Section C: acceptable noise limits for reduced losses indicated in 5.12 and eyebolt positions and dimensions updated in 5.16.
02	02/02/2015	Commission Regulation (EU) N. 548/2014 (Ecodesign requirements), Type and Country Codes updated and other improvements. Local Section LATAM: for Edelnor and Codensa updated paragraphs and tables, added new country code /516 and other improvements. Local Section Spain: updating for R.D. 337/2014. Local Sections Italy and Romania: windings only aluminium up to 160 kVA, colour of painting RAL 6002, nylon-wheels accepted up to 250 kVA).
03	31/01/2018	Local Part of Spain: Standard references updating and editorial corrections. Local part Italy and Romania: added rating plate example in compliance with Ecodesign Common List European countries: updated with new country codes for Spain and some editorial improvements for Italy and Spain. (updatings are highlighted in yellow).

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GS Type Code	Distribution Company and Country	Country Code	Rated Power (kVA)	Rated MV (kV)	Volt. Reg. (steps number x step %)	Rated LV (kV)	MV insulation level Um/LI/AC (kV)	LV Insulation level Um/LI/AC (kV)	f (Hz)	N. of phases 1P, 2P, 3P	Connection Symbol	Zsc (%)	MV bushing type (ref. GS p. 6.5.1)	MV Minimum creepage distance (mm)	LV bushing type (ref. GS p. 6.5.2)	Losses classes or max values	Load Loss (W)	No Load Loss (W)	Noise level - Sound Power (dB)	Wheels (Yes/No)	Overall dimensions HxLxW (mm)	Painting (ref. GS p. 6.9)	Brackets for pole (Yes/ No)	Brackets for arrester (Yes/ No)
GST001/040	ED-Italy	11 26 10	50	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 1	CkAo	1100	90	42	N	1500x1200x750	Medium	No	No
GST001/041	ED-Italy	11 26 11	100	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 1	CkAo	1750	145	44	N	1600x1200x750	Medium	No	No
GST001/042	ED-Italy	11 26 12	160	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 2	CkAo	2350	210	47	Y	1600x1350x750	Medium	No	No
GST001/043	ED-Italy	11 26 32	160	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 2	CkAo	2350	210	47	Y	1600x1350x750	Medium	No	No
GST001/044	ED-Italy	11 26 37	250	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	3250	300	50	Y	1750x1400x800	Medium	No	No
GST001/045	ED-Italy	11 26 38	400	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	4600	430	53	Y	1850x1600x1030	Medium	No	No
GST001/046	ED-Italy	11 26 39	630	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	6	Sol. 4	N/A	Sol. 7	CkAo	6500	600	55	Y	1850x1800x1030	Medium	No	No
GST001/047	ED-Italy	11 36 10	50	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 1	CkAo	1100	90	42	N	1500x1200x750	Medium	No	No
GST001/048	ED-Italy	11 36 11	100	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 1	CkAo	1750	145	44	N	1600x1200x750	Medium	No	No
GST001/049	ED-Italy	11 36 12	160	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 2	CkAo	2350	210	47	Y	1600x1350x750	Medium	No	No
GST001/050	ED-Italy	11 36 21	100	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 1	CkAo	1750	145	44	N	1600x1200x750	Medium	No	No
GST001/051	ED-Italy	11 36 22	160	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 1	600	Sol. 2	CkAo	2350	210	47	Y	1600x1350x750	Medium	No	No
GST001/053	ED-Italy	11 36 32	160	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 2	CkAo	2350	210	47	Y	1600x1350x750	Medium	No	No
GST001/054	ED-Italy	11 36 42	160	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 2	CkAo	2350	210	47	Y	1600x1350x750	Medium	No	No
GST001/055	ED-Italy	11 36 37	250	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	3250	300	50	Y	1750x1400x800	Medium	No	No
GST001/056	ED-Italy	11 36 38	400	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	4600	430	53	Y	1850x1600x1030	Medium	No	No
GST001/057	ED-Italy	11 36 39	630	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	6	Sol. 4	N/A	Sol. 7	CkAo	6500	600	55	Y	1850x1800x1030	Medium	No	No
GST001/058	ED-Italy	11 36 47	250	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	3250	300	50	Y	1750x1400x800	Medium	No	No
GST001/059	ED-Italy	11 36 48	400	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	4600	430	53	Y	1850x1600x1030	Medium	No	No
GST001/060	ED-Italy	11 36 49	630	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	6	Sol. 4	N/A	Sol. 7	CkAo	6500	600	55	Y	1850x1800x1030	Medium	No	No
GST001/061	ED-Italy	11 36 54	250	22	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 2	CkAo	3250	300	50	Y	1800x1400x800	Medium	No	No
GST001/062	ED-Italy	11 36 55	400	22	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 3	CkAo	4600	430	53	Y	1800x1400x800	Medium	No	No
GST001/063	ED-Italy	11 36 56	630	22	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	6	Sol. 4	N/A	Sol. 4	CkAo	6500	600	55	Y	1800x1400x800	Medium	No	No
GST001/064	ED-Italy	11 36 06	250	23	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 2	CkAo	3250	300	50	Y	1750x1400x800	Medium	No	No
GST001/065	ED-Italy	11 36 07	400	23	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 3	CkAo	4600	430	53	Y	1850x1600x930	Medium	No	No
GST001/066	ED-Italy	11 36 08	630	23	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	6	Sol. 4	N/A	Sol. 4	CkAo	6500	600	55	Y	1850x1800x930	Medium	No	No
GST001/067	ED-Italy	11 26 21	250	9	±2x2.5%	0,42	12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	3250	300	50	Y	1750x1400x800	Medium	No	No
GST001/068	ED-Italy	11 26 22	400	9	±2x2.5%	0,42	12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 7	CkAo	4600	430	53	Y	1850x1600x1030	Medium	No	No
GST001/069	ED-Italy	11 26 23	630	9	±2x2.5%	0,42	12/75/28	1.1/--/10	50	3P	Dyn11	6	Sol. 4	N/A	Sol. 7	CkAo	6500	600	55	Y	1850x1800x1030	Medium	No	No
GST001/070	ED-Italy	11 26 31	100	15	±2x2.5%	0,42	17.5/95/38	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 1	CkAo	1750	145	44	N	1600x1200x750	Medium	No	No
GST001/071	ED-Italy	11 36 31	100	20	±2x2.5%	0,42	24/125/50	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 1	CkAo	1750	145	44	N	1600x1200x750	Medium	No	No
GST001/072	ED-Italy	11 36 41	100	20-10	±2x2.5%	0,42	24/125/50 12/75/28	1.1/--/10	50	3P	Dyn11	4	Sol. 4	N/A	Sol. 1	CkAo	1750	145	44	N	1600x1200x750	Medium	No	No

AUTOMATIC FOUR-POLE CIRCUIT-BREAKERS WITH 40 A ÷ 630 A RATED CURRENT FOR SECONDARY SUBSTATIONS

Countries' I&N	Elaborated by
Iberia	**J. Gonzalez**
Italy	**M. Neri**
Romania	**V. Obrejan**

	Elaborated by	Verified by	Approved by
Solution Development Center	**M. Neri**	**L. Giansante**	**I. Gentilini**
Global I&N – NT/NCS	**-**	**N. Cammalleri** **G. Egea Brufau**	**F. Giammanco**

Revision	Type of modification
00	First edition –

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MANUAL OPERATING CIRCUIT-BREAKERS with VDS

NUMBER COMPONENTS	G.S. MCCB	DESCRIPTIVE ABBREVIATION	NEUTRAL	I_U (A)	I_{CS} (KA)	REFERENCE CHARACTERISTICS	MAIN USE
GSCL003/01	3101/22	250/S/25	DISCONNECTABLE	250	25	A	SECONDARY SUBSTATIONS
GSCL003/02	3101/23	180/S/25		180		B	
GSCL003/03	3101/24	125/S/25		125		C	
GSCL003/04	3101/25	125/S/10		125	10	D	POLE MOUNTED TRANSFORMERS
GSCL003/05	3101/26	80/S/10		80		E	
GSCL003/06	3101/27	40/S/10		40		F	
GSCL003/07	3101/28	250/C/25	UNINTERRUPTED	250	25	A	SECONDARY SUBSTATIONS
GSCL003/08	3101/29	180/C/25		180		B	
GSCL003/09	3101/30	125/C/25		125		C	
GSCL003/10	3101/31	125/C/10		125	10	D	POLE MOUNTED TRANSFORMERS
GSCL003/11	3101/32	80/C/10		80		E	
GSCL003/12	3101/33	40/C/10		40		F	
GSCL003/13	3101/34	180/S/10	DISCONNECTABLE	180	10	G	POLE MOUNTED TRANSFORMERS
GSCL003/14	3101/35	180/C/10	UNINTERRUPTED	180		G	
GSCL003/15	3102/7	350/S/25	DISCONNECTABLE	350	25	-	SECONDARY SUBSTATIONS
GSCL003/16	3102/8	350/C/25	UNINTERRUPTED	350		-	
GSCL003/17	3103/3	630/S/25	DISCONNECTABLE	630	25	-	SECONDARY SUBSTATIONS
GSCL003/18	3103/4	630/C/25	UNINTERRUPTED	630		-	

MOTOR-DRIVEN CIRCUIT-BREAKERS with VDS

NUMBER COMPONENTS	G.S. MCCB	DESCRIPTIVE ABBREVIATION	NEUTRAL	I_U (A)	I_{CS} (KA)	REFERENCE CHARACTERISTICS	MAIN USE
GSCL003/19	3101/36	250/S/25/M	DISCONNECTABLE	250	25	A	SECONDARY SUBSTATIONS
GSCL003/20	3101/37	125/S/25/M		125		C	
GSCL003/21	3101/38	250/C/25/M	UNINTERRUPTED	250		A	
GSCL003/22	3101/39	125/C/25/M		125		C	
GSCL003/23	3102/09	350/S/25/M	DISCONNECTABLE	350	25	-	SECONDARY SUBSTATIONS
GSCL003/24	3102/10	350/C/25/M	UNINTERRUPTED	350		-	

By way of example, please note that the descriptive abbreviation 250/S/25 stands for a 250 A disconnectable neutral circuit-breaker with 25 kA rated short-circuit breaking capacity, while the abbreviation 80/C/10 stands for an 80 A uninterrupted neutral circuit-breaker with 10 kA rated short-circuit breaking capacity.

These circuit-breakers can be grouped into two distinct families, based on the location of their installation and on the I_{cs} value; the first one is for circuit-breakers installed in secondary substations (using Low Voltage assemblies according to GSCL002 – Fig. 1a):

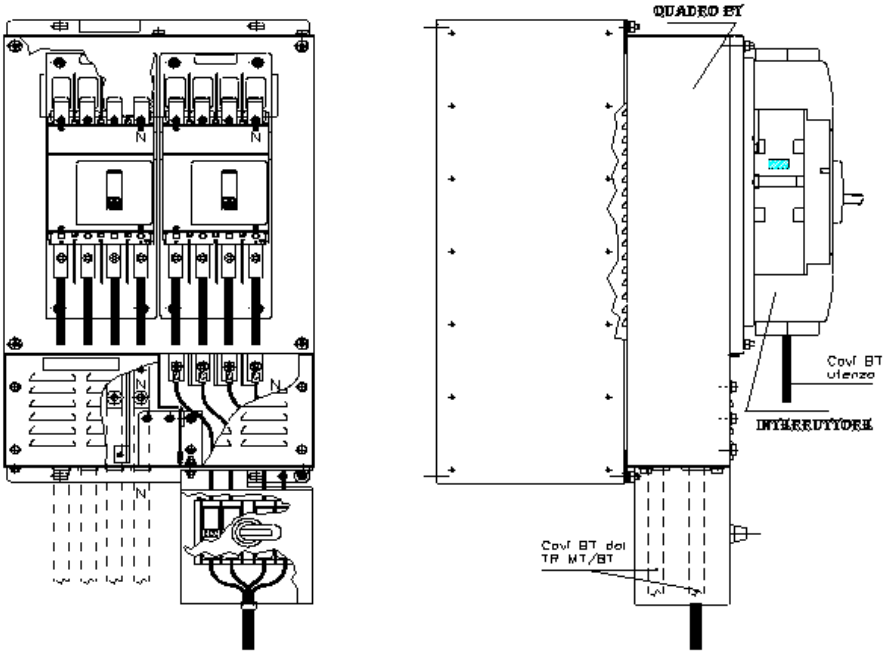

Figure 1a

and the second one is for circuit-breakers on Pole Mounted Transformers (using type UE DY3018 – Fig. 1b or type DY3023):

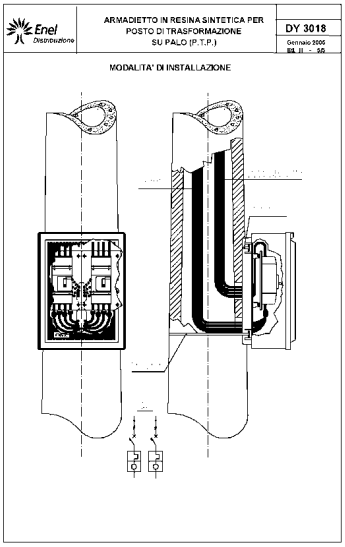

Figure 1b

6. UNIT MEASUREMENT

The circuit-breakers of this specification are managed as single units (i.e. as numbers). The following is an example of a circuit-breaker description used in ENEL:

I	N	T	E	R	R	U	T	T	O	R	E		A	U	T	O	M	A	T		B	T		4	P		2	5	0	/	C	/	2	5		U	E	

PASSACAVO
PER CABINE SECONDARIE MT/BT

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Edizione	Data	Natura della modifica
00	15/09/2016	Prima emissione
01	15/03/2017	Modifiche di editing – Integrazione dei dati di composizione dei materiali

	Emissione	Collaborazioni	Verifiche	Approvazione
Ente	**DIS-NTC-NCS**		**DIS-NTC-NCS**	**DIS-NTC-NCS**
	S. Di Cesare		**L. Giansante**	**I. Gentilini**

MATRICOLA PASSACAVO
226721

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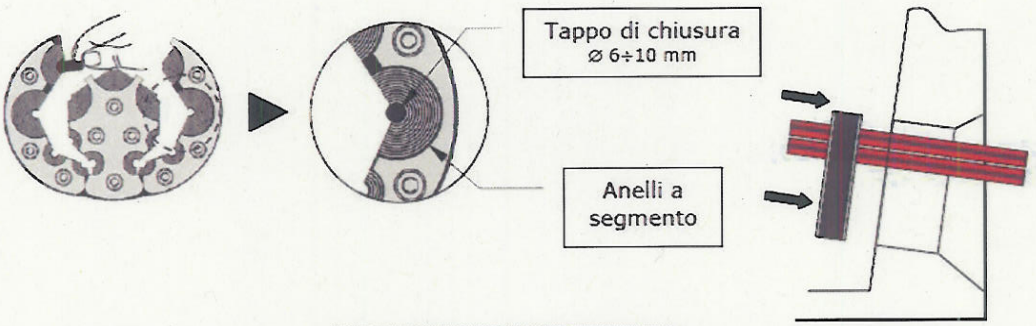
Esempio di "Kit" passacavo

Il "Kit" passacavo di figura è predisposto con n° 3 fori per la sigillatura di cavi con diametro 26÷54 mm (utilizzabile per cavi MT ad elica visibile di qualsiasi tipo e sezione o BT con neutro concentrico di sezione ≤ 150 mm^2) più n° 4 cavi con diametro 6÷26mm (utilizzabile, ad esempio, per cavi BT ad elica visibile).
L'installazione si effettua aprendo il Kit prima del fissaggio definitivo nel foro predisposto nella fondazione, rimuovendo i tappi di chiusura dei fori da utilizzare e successivamente gli anelli a segmento sovrapposti (n° 11 anelli sui fori per cavi di diametro 26÷54 mm e n° 4 anelli sui fori per cavi di diametro 10÷26 mm) fino a raggiungere il diametro desiderato.



Esempio di "Kit" per cavi MT installato (vista dall'esterno)

Technical Specification code: GRI-GRI-MAT-E&C-0002

Version no.3 dated 03/10/2022

Subject: Enel Grids - GSM001 - Medium Voltage Gas Insulated Switchgears for secondary distribution substations

Application Areas

Perimeter: Global

Staff Function: -

Service Function: -

Business Line: Enel Grids

CONTENTS

	GLOBAL STANDARD	
	MV RMU WITH SWITCH-DISCONNECTOR	GSM001

3LE+1T

Technical Specification code: GRI-GRI-MAT-E&C-0002

Version no.3 dated 03/10/2022

Subject: Enel Grids - GSM001 - Medium Voltage Gas Insulated Switchgears for secondary distribution substations

Application Areas

Perimeter: Global

Staff Function: -

Service Function: -

Business Line: Enel Grids

7 DESCRIPTION

7.1LIST OF COMPONENTS

Type code	Configuration	GIS technology	Distribution Company and Contry	Country Code	Rated frequency fr [Hz]	Rated normal current I_r [A]	Rated Voltage U_r [kV]	Rated power-frequency withstand voltage U_d [kV]	Rated lightning impulse withstand voltage U_p [kV]	Rated short-time withstand current Ik [kA]	Rated duration of short circuit t_k [s]	Rated peak withstand current I_p [kA]	Rated supply voltage of closing and opening devices and of auxiliary circuit Vcc	IK degree	IP degree	SD - Mechanical endurance class- Electrical endurance class	ES - Mechanical endurance class- Electrical endurance class	Classification IAC	Arc fault current and duration I_A (kA); t_A (s)	Protective Coating	Command Type	Busbar Socket	Description
GSM001/1	2L+1T	SF6	ED-Italy	162116	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Italy	140117	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6	ED-Chile	140275	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6	ED-Colombia	140401	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Colombia	140596	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6	ED-Romania	140042	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Romania	140117	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6	ED-Spain	140224	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	No	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Spain	140806	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	No	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6	ED-Brazil	141183	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Brazil	140828	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6	ED-Argentina	0109-0492	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Argentina	0109-0499	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/1	2L+1T	SF6 FREE	ED-Chile	141201	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 2L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/1
GSM001/2	3L+1T	SF6 FREE	ED-Argentina	0109-0500	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Argentina	0109-0493	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Italy	162117	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6 FREE	ED-Italy	140318	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Colombia	140402	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Romania	140043	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6 FREE	ED-Romania	140318	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Spain	140226	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	No	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6 FREE	ED-Spain	140827	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	No	MV Switchgear 3L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Brazil	141186	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6 FREE	ED-Brazil	140827	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6 FREE	ED-Colombia	140770	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 FREE 24 kV 16 kA AFL IP3X C3H GSM001/2
GSM001/2	3L+1T	SF6	ED-Chile	141195	50 and 60	630	24	50	125	16	1	41,6	24V -15% +20%	IK08	IP3X	M1 – E3	M0 – E2	AFL	16; 1	C3H	Electrical	Yes	MV Switchgear 3L+1T SF6 24 kV 16 kA AFL IP3X C3H GSM001/2

7.3.2 Rated characteristics

Rated Voltage (U_r)		[kV]	24	36
Rated short-duration power-frequency withstand voltage (U_d) – Common value		[kV]	50	70
Rated short-duration power-frequency withstand voltage (U_d) – Across the isolating distance		[kV]	60	80
Rated lightning impulse withstand voltage (U_p) – Common value		[kV]	125	170
Rated lightning impulse withstand voltage (U_p) - Across the isolating distance		[kV]	145	195
Rated frequency (f_r) (*)		[Hz]	50 and 60	
Rated normal current (I_r)				
- for busbars and lines		[A]	630	
- for transformer derivation		[A]	200	
Rated short-time withstand current (I_k)		[kA]	16/20	
Rated peak withstand current (I_p)		[kA]	41,6/52	
Rated duration of short-circuit (t_k)		[s]	1	
Degree of protection for the whole enclosure except for the operating devices:				
- Argentina			IP3X**	
- Italy				
- Romania				
- Spain				
- Brazil				
- Chile				
- Colombia				
- Peru				
Degree of protection for the operating devices (even with the operating lever inserted)			IP2XC	
Degree of protection of the external part of the switchgear			IK08	
Internal arc test	Type of accessibility		AFL	
	Rated arc fault current (I_A)	[kA]	16/20	
	Rated arc fault duration (t_A)	[s]	1	
Rated supply voltage of closing and opening devices and of auxiliary circuit		[Vcc]	24V -15% +20%	
Expected operating life regarding leakage performance			40 years	

Table 2 - Characteristics of the switchgear

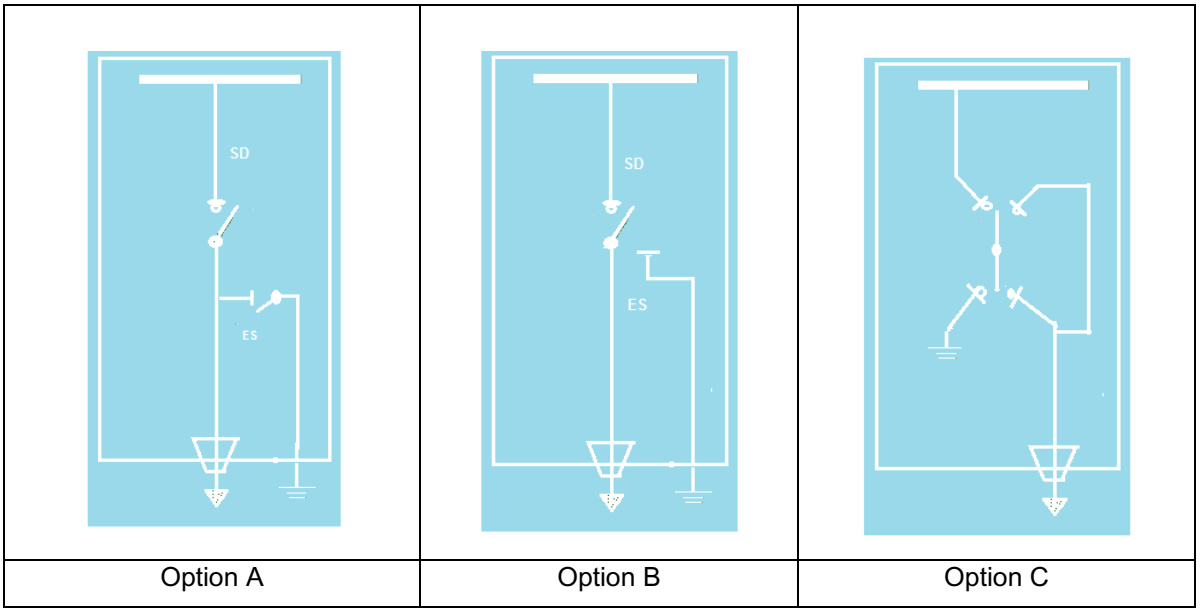
(*) The range of rated frequencies can vary according to the National Regulations and shall not affect the proper behavior of the equipment.

(**) For special applications IP51 could be requested.

7.3.3 Functional Unit Schemes

In the figures below the options for each functional unit are depicted.

L – LINE FUNCTIONAL UNIT



Option A	Option B	Option C

Figure 1 – Line Functional unit single line diagrams

OPTION A: Configuration with:

- 1 Switch-disconnector with 2 positions (OPEN – CLOSED)
- 1 Earthing switch with 2 positions (OPEN – EARTHED)

OPTION B/C: Configuration with:

- 1 Switch-disconnector / Earthing switch with 3 positions (EARTHED - OPEN – CLOSED)

Further single line diagrams could be proposed and implemented after Enel technical department approval.

7.3.4 Line Functional Unit (L)

The three-pole switch-disconnector and earthing switches shall comply with IEC 62271-103 and IEC 62271-102 respectively.

The operating point of the earthing switch functionality shall be separated from the operating point of the switch-disconnector functionality and interlocked with it.

The movement of the blades of the switching devices shall be simultaneous.

The three-pole manual operating device of the switch-disconnectors shall be dead-center overcoming both in opening and closing, vertical, rotational, or translational movement (IEC 60447).

The operations shall be performed by applying a moment that does not exceed 200 Nm, and the opening and closing speed shall be independent of the action of the operator.

In case that switch-disconnectors and earthing switches are separated, the shaft of the earthing switch shall be mechanically interlocked with the shaft of the switch-disconnector.

7.3.4.1 Rated characteristics

The rated characteristics of the switch–disconnector and the earthing switch are shown in Table 4 and Table 7.

Switch-Disconnector				
Rated Voltage (U_r)		[kV]	24	36
Rated normal current (I_r)		[A]	630	
Rated short-time withstand current (I_k)		[kA]	16/20	
Rated peak withstand current (I_p)		[kA]	41,6/ 52	
Rated duration of short-circuit (t_k)		[s]	1	
Mechanical endurance class			M1	
Electrical endurance class			E3	
Rated breaking current	of a mainly active load	[A]	630	
	of a no-load line	[A]	1,5	2
	of a no-load cable	[A]	16	20
	in case of earth fault	[A]	60	
	with cable-charging in case of earth fault	[A]	40	

Table 3 - Characteristics of the switch-disconnector for Lines Functional Unit

Earthing Switch			
Rated Voltage (U_r)	[kV]	24	36
Rated short-time withstand current (I_k) and Rated establishment short circuit current (I_{ma})	[kA]	16/20	
Rated peak withstand current (I_p)	[kA]	41,6 / 52	
Rated duration of short-circuit (t_k)	[s]	1	
Mechanical endurance class	M0		
Electrical endurance class	E2		

Table 4 - Characteristics of the switch–disconnector and earthing switch in line unit

7.3.4.2 Line Functional unit front panel

The elements displayed on the front panel of the line unit shall be such as to make them easily visible, readable, and accessible.

The front panel is divided in three areas:

a) Switch-disconnector operation area.
b) Earthing switch operation area.
c) Common area.

All three areas shall be the same vertical than the related cable compartment.

If the operation of the switchgear is vertically oriented, the order of the areas shall be, from top to bottom: Switch-disconnector operation area → Earthing switch operation area.

If the operation of the switchgear is horizontally oriented, the order of the areas shall be, from left to right: Switch-disconnector operation area → Earthing switch operation area.

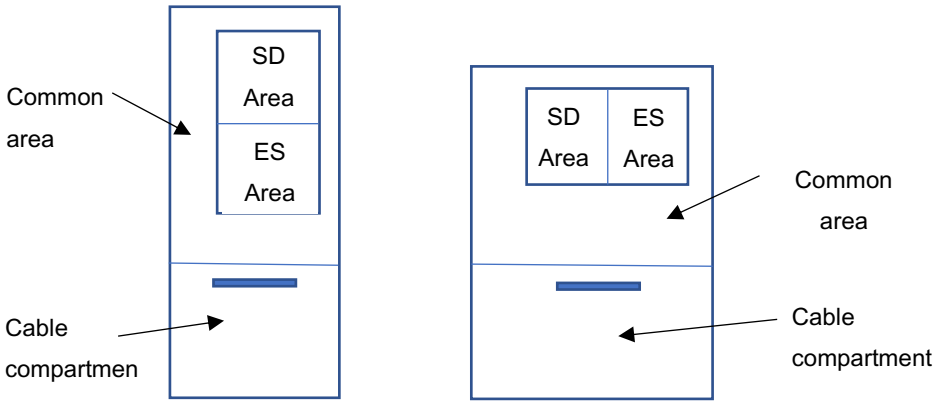


Figure 3 - Disposition of areas in the front panel in line unit

The earthing points on the outside of the switchgear shall have an earthing symbol.

Figure 25 – Earth connections

7.3.8 Design requirement for installation

The switchgear shall be fixed to the floor through M12 screws.

The switchgear shall be able to be installed and operate correctly even with a floor unevenness up to 5 millimeters per meter, both longitudinally and transversely.

Figure 26 – Floor fixing example

7.3.9 Cable compartments

For each line functional unit and each transformer protection functional unit single-core steel supports or insulating supports, suitable for the installation of MV cables in a vertical plane, shall be provided. The separable connectors will be according to GSCC006. In case of metallic supports induced current shall be avoided.

For Line Functional Units it shall be possible to install T Separable Connector according to GSCC006.

For Transformer protection functional unit, it shall be possible to install elbow separable connector according to GSCC006.

The installation height of the supports shall be at least 450 mm from the connector.

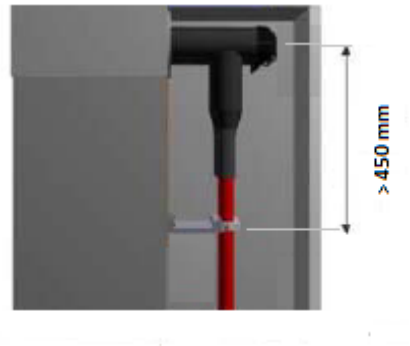


Figure 27 – Examples height of the supports

Cable supports shall be suitable for installation cables with cross-section ranges from 50 mm^2 to 630 mm^2, according to GSC001.

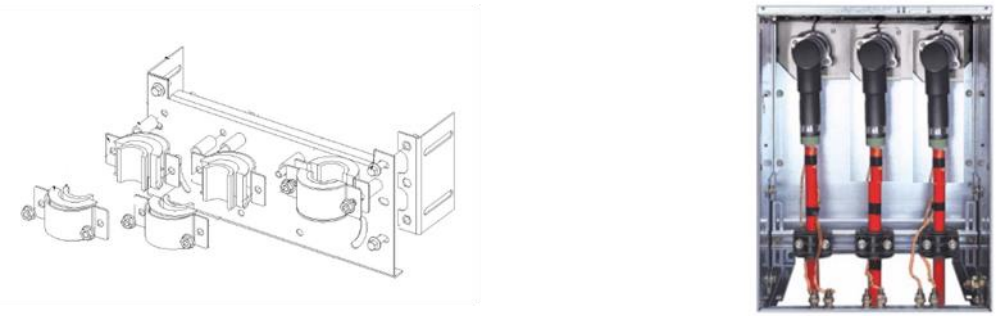
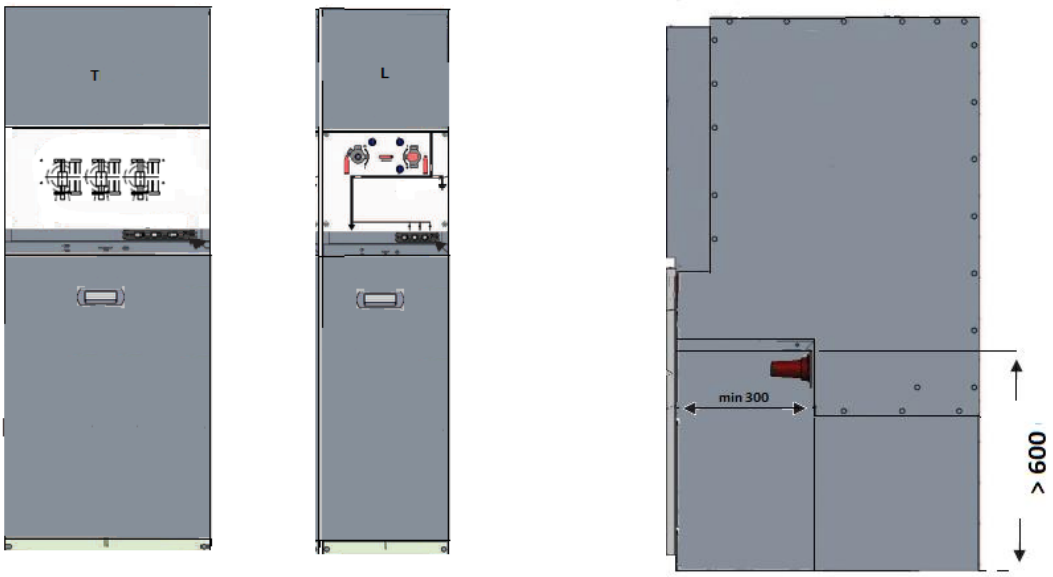


Figure 28 - Examples of Supports and Separable connectors installation

The identification of the phases of each bushing shall be carried out using labels according to Table 8 and Figure 29.

Destination country	Marking of the phases
Colombia	L1 – L2 - L3
Chile	L1 – L2 - L3
Brazil	L1 – L2 - L3
Spain	L1 – L2 - L3
Peru	L1 – L2 - L3
Italy	L1 – L2 - L3
Romania	L1 – L2 - L3
Argentina	R – S - T

Table 8 – Phase designation



Functional Unit	Max Width [mm] 24 kV	Max Width [mm] 36 kV	Max Depth [mm] 24 kV**	Max Depth [mm] 36 kV*	Max Height [mm]*
Transformer	520	600	900	1100	2000
Line	400	450	900	1100	2000

Table 10 – Overall dimensions

*** Including fault detector (RGDM/RGDAT) support.**

**** Including the free space required between the switchgear and the rear wall.**

The height from the floor level to the lowest operation point shall be at least 1,0 m.

Dimensions other than those shown in Table 10 could be accepted after evaluation by Enel.

7.3.15 Modular MV switchgears

The modular functional units (1L and 1T) shall be equipped with busbar extension consisting of a contact coupling, e.g screened silicone coupling, to allow extension from both sides.

The functional units will connect each other through insulated connectors. IP3X degree of protection between assembled modular switchgears shall be ensured. All connection accessories will be part of the supply.

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**

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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 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.

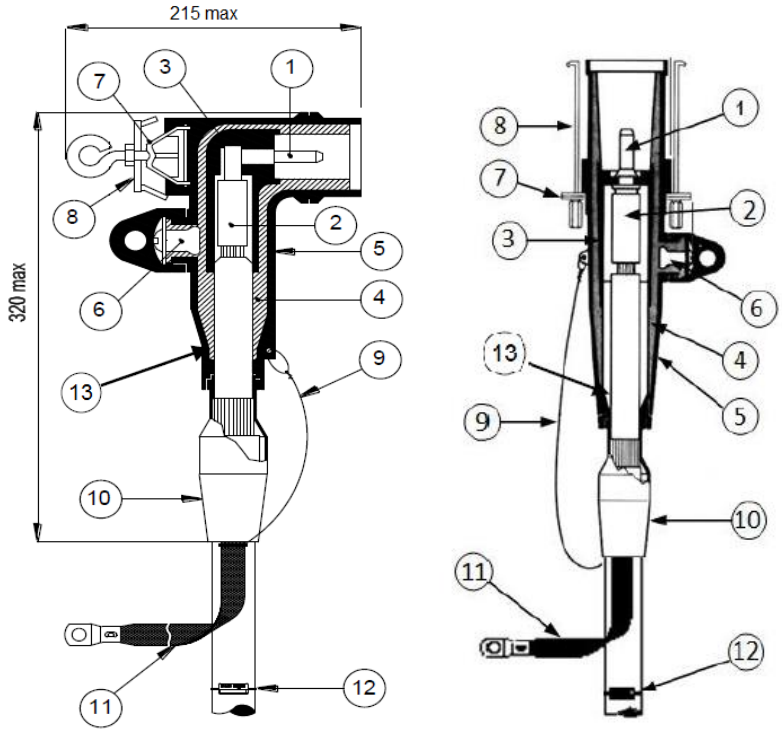
6 TYPES OF SEPARABLE CONNECTORS

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

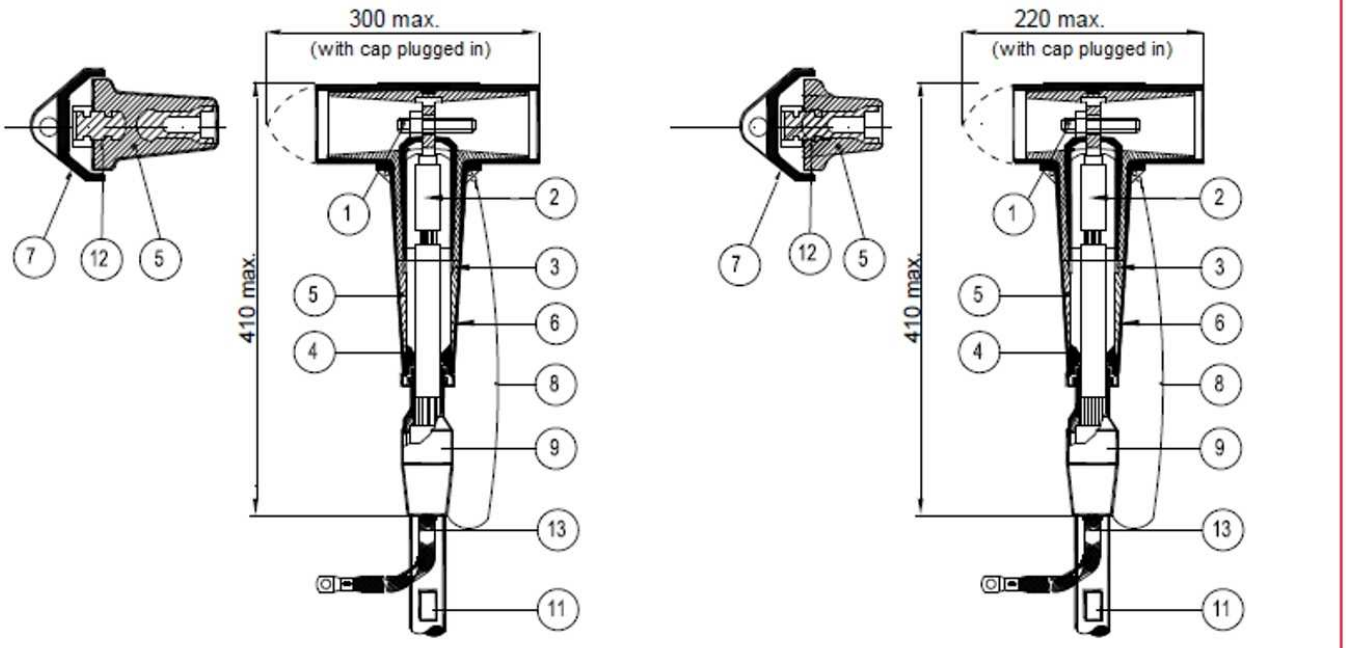
elbow connector = a squadra (a L) (a cono esterno, unipolari, sconnettibili)
tee connector= a T (a cono esterno, unipolari, sconnettibili)
straight connector= dritto (a cono esterno, unipolari, sconnettibili)
nota: il tipo "a T" SIMMETRICO può essere con o senza elemento di giunzione
nota: il tipo "a T" ASIMMETRICO non può avere l'elemento di giunzione



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.

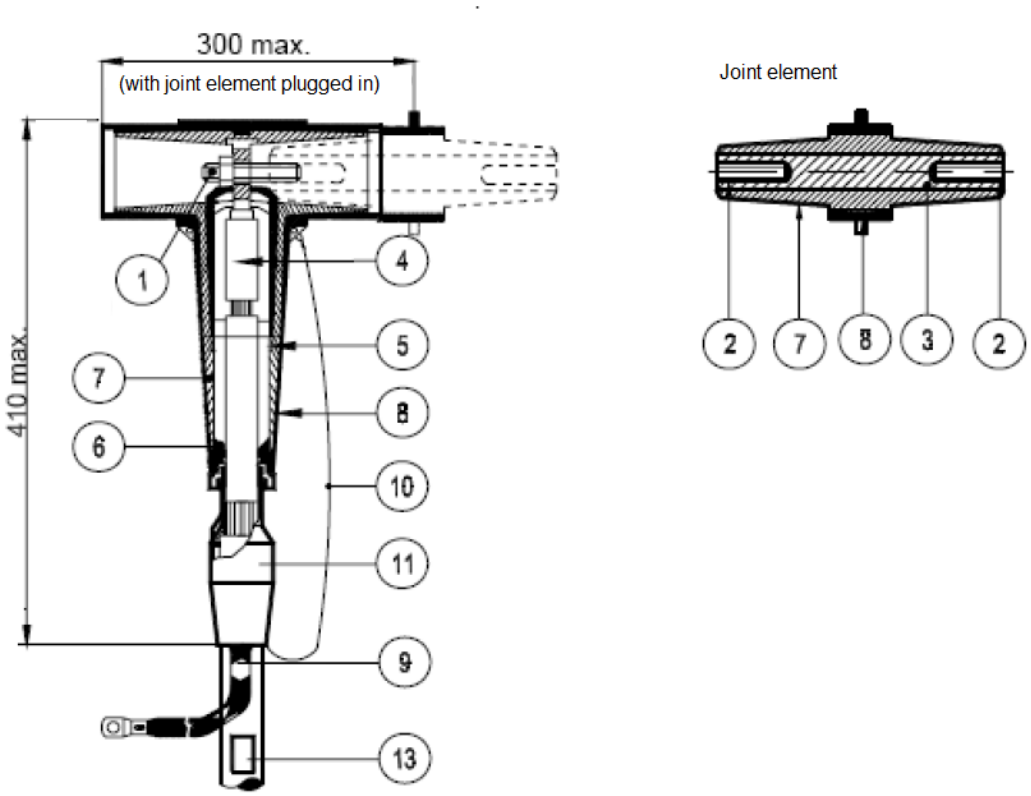
1	Contact pin	8	Fastening device
2	Lug	9	Equipotential connection
3	Internal semiconductor layer	10	Cable adapter
4	Insulating layer	11	Earthing connection
5	External semiconductor layer	12	Phase marking plate
6	Capacitive socket with protection cap	13	Electric field control
7	Coupling device for fastening		

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

Enel Distribuzione	SPECIFICA TECNICA	Pagina 1 di 28
	CABINE SECONDARIE Apparecchiature prefabbricate con involucro metallico isolate in SF_6 quadro di trasformatori di misura utente MT	**DY808** ed.4 marzo 2015

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CABINE SECONDARIE APPARECCHIATURE PREFABBRICATE CON INVOLUCRO METALLICO ISOLATE IN SF_6 QUADRO DI TRASFORMATORI DI MISURA UTENTE MT

Revisione	Natura della modifica
04	Aggiornamento specifica tecnica TA (DMI031052) Aggiornamento specifica tecnica cordone di misura (DMI031082) Aggiornamento riferimento specifica quadro di alimentazione GSM001 Aggiornamenti normativi

	Emissione		Verifiche	Approvazione	
Ente	DIS-TER-UCR	DIS-TER-TAM	DIS-TER- UCR	DIS-TER-TAM	DIS-TER-UCR
Firmato	D. Lamanna	F. Mancini	L. Giansante	P. Giubbini	A. Cammarota

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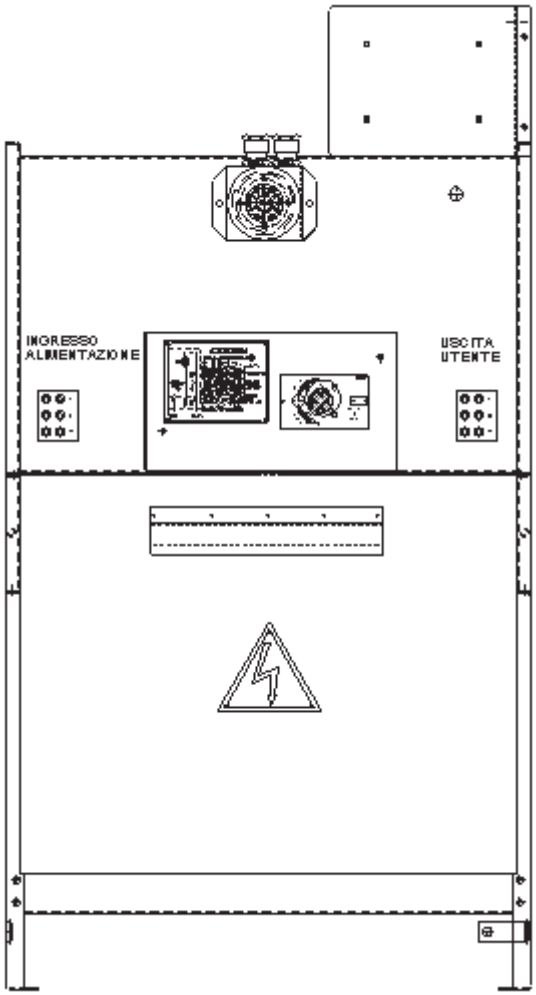

Figura 1: DY808

MATRICOLA	TIPO	CARATTERISTICHE TV DMI 031015		CARATTERISTICHE TA DMI 031052		
		MATRICOLA	RAPPORTO (V / V)	MATRICOLA	RAPPORTO (A / A)	I_{cc} (kA)
16 20 32	DY808 / 1	53 50 17	15000 / 100	53 20 57	50 / 5	16
16 20 33	DY808 / 2			53 20 70	400 / 5	
16 20 34	DY808 / 3			53 20 71	630 / 5	
16 20 35	DY808 / 4	53 50 24	20000 / 100	53 20 57	50 / 5	
16 20 36	DY808 / 5			53 20 70	400 / 5	
16 20 37	DY808 / 6			53 20 71	630 / 5	

Q	U	A	D	R	O		U	T	E	N	T	E		S	F	6		D	Y	8	0	8	/	X		X	X	X	/	5		X	X	k	V	

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Per quanto riguarda le specifiche di riferimento, valgono quelle riportate nella precedente tabella fino a che non saranno emesse le nuove edizioni che le andranno a sostituire.

Ogni riferimento alla norma CEI EN 60694, richiamata dalle norme citate nella presente specifica tecnica, è da intendersi alla CEI EN 62271-1.

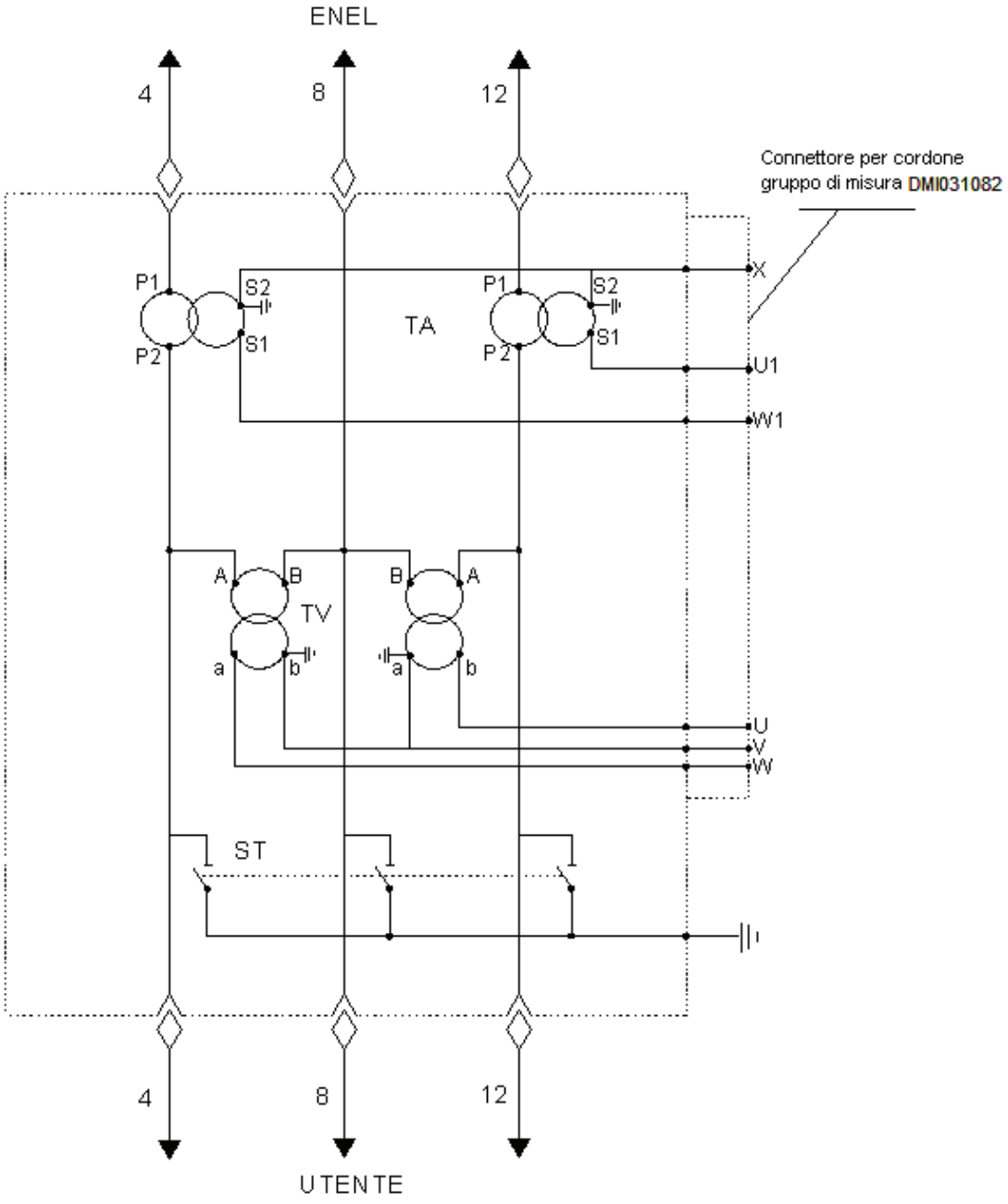

Figura 2: Schema elettrico dei circuiti del Quadro Utente (per la presa femmina vedere figura 3)

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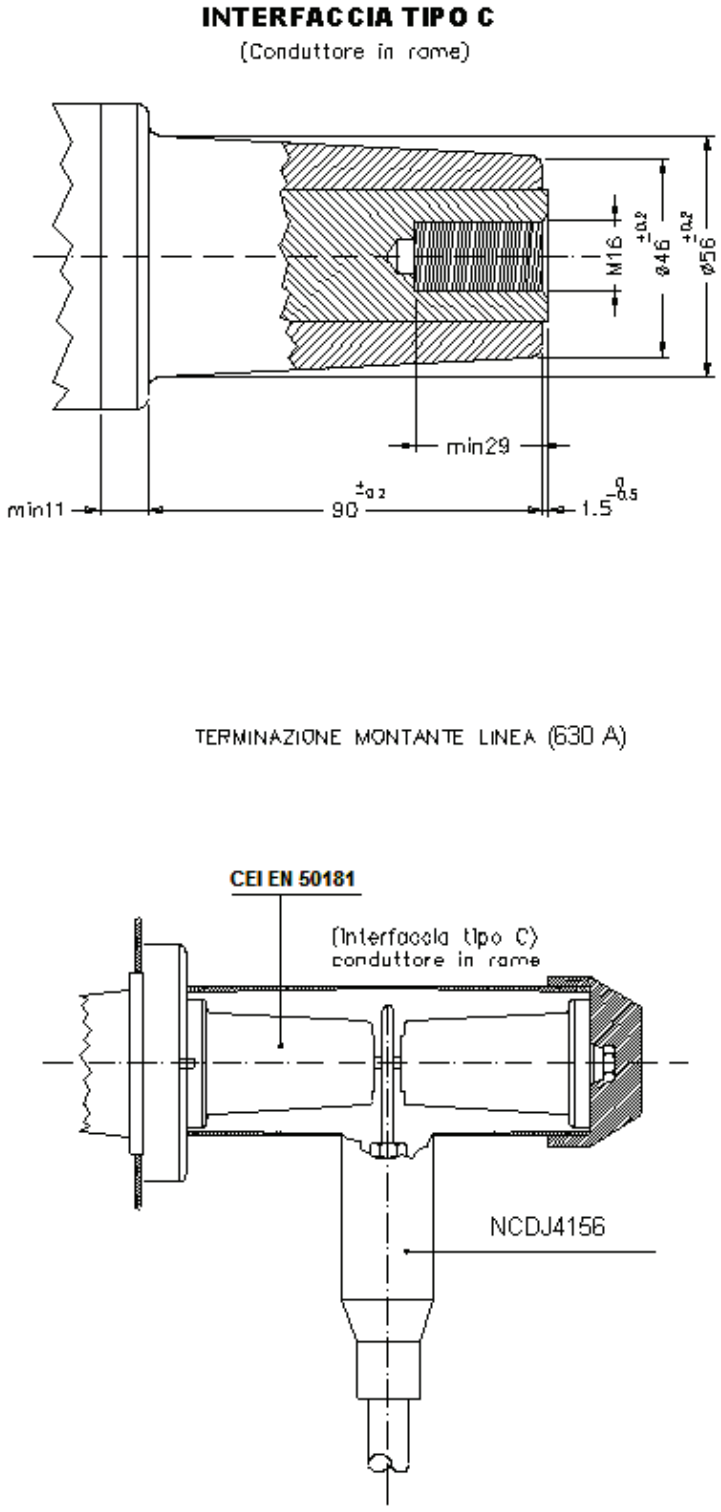

Figura 4: Isolatori passanti

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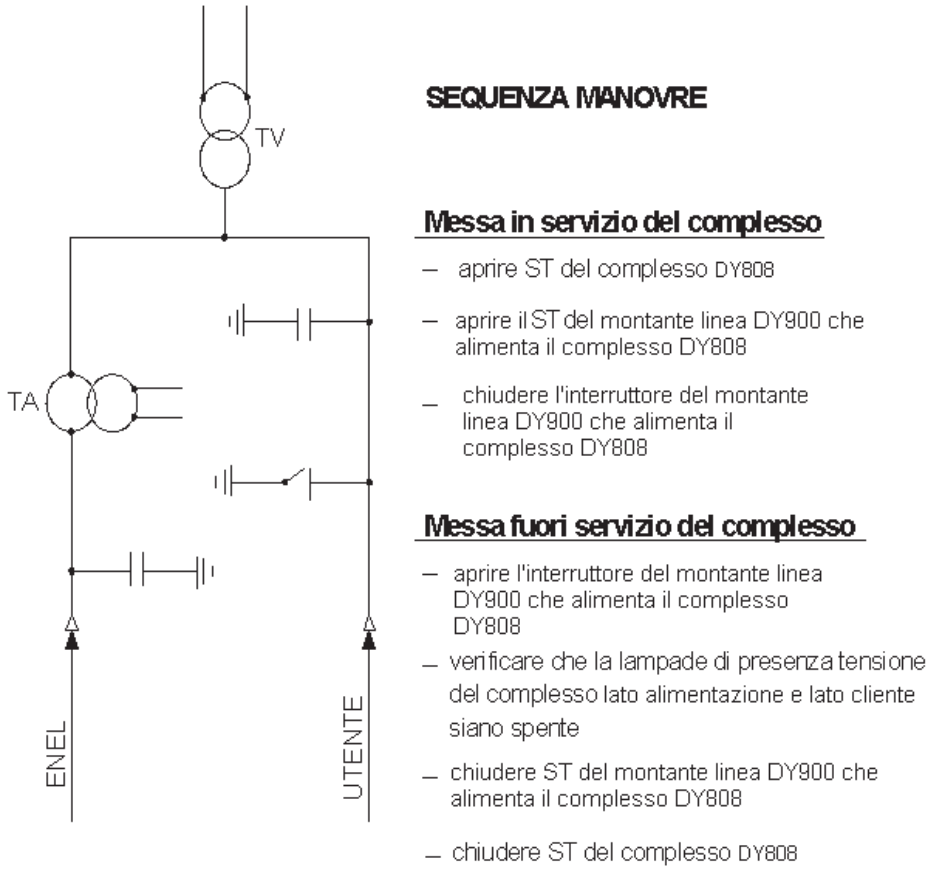

Figura 6: Esempio targa sequenza manovre

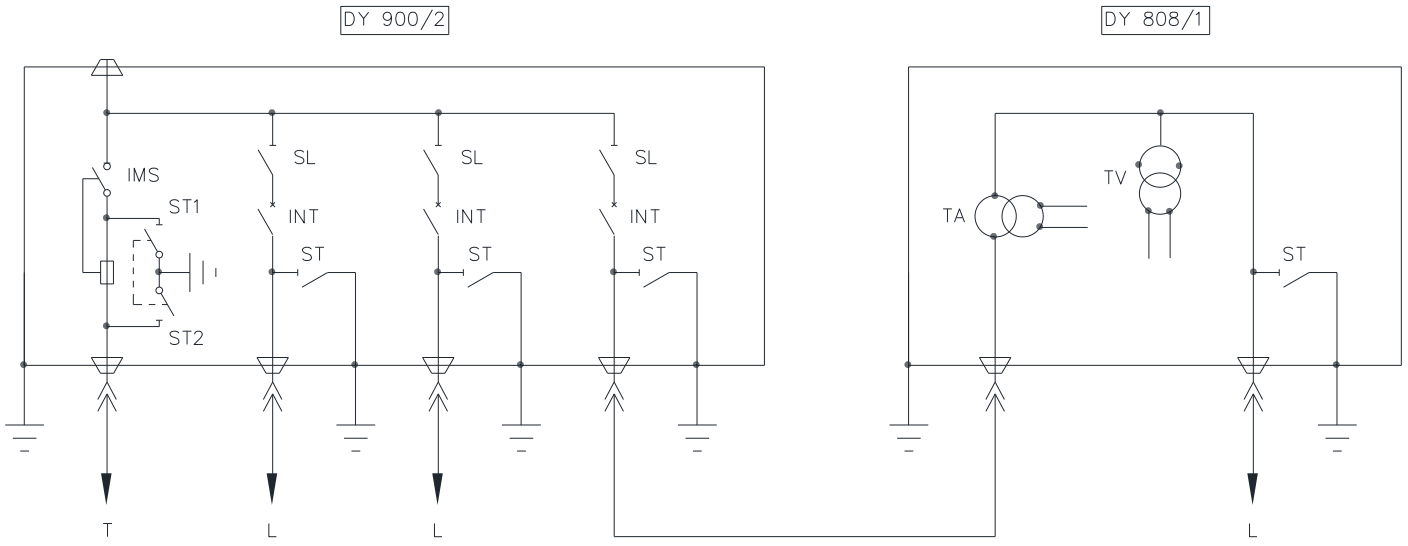

Figura 7: Esempio schema sinottico

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APPARECCHIATURE PREFABBRICATE 24 kV CON INVOLUCRO METALLICO A TENUTA D'ARCO INTERNO CON IMS ISOLATO IN SF_6 PER CABINE SECONDARIE

Revisione	Natura della modifica
6	Corrente nominale di 630 A Arco interno IAC AF 16 kA x 0,5 s Introduzione carpenteria per scomparti con larghezza 700 mm compatibile con scomparti in aria Aggiunta scomparto con TV autoprotetto Aggiornamenti normativi

	Emissione	Collaborazioni e verifiche	Approvazione
Ente	**IR - IUN/UML**	**IR - IUN/UML**	**IR - IUN/UML**
Firmato	**D. Lamanna**	**L. Giansante**	**R. Lama**

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MATRICOLA	SIGLA	TIPOLOGIA	DIMENSIONI [mm]			Riferimenti costruttivi
			L	P	A	
16 23 24	DY803/1	SCOMPARTO "RC"	350	1050	1850	DY809 / DY810
16 23 25	DY803/2	SCOMPARTO "LE"	500			
16 23 26	DY803/3	SCOMPARTO "T"	600			
16 23 27	DY803/4	SCOMPARTO "UTM"	700			
16 23 28	DY803/5	SCOMPARTO "TMA10"	350			
16 23 29	DY803/6	SCOMPARTO "TMA15"				
16 23 30	DY803/7	SCOMPARTO "TMA20"				
16 23 31	DY803/8	SCOMPARTO "RC"	350	1150	1950	DY421 / DY411
16 23 32	DY803/9	SCOMPARTO "IM"	700			
16 23 33	DY803/10	SCOMPARTO "TM"				
16 23 34	DY803/11	SCOMPARTO "UM"				
16 23 35	DY803/12	SCOMPARTO "TMA10"	350			
16 23 36	DY803/13	SCOMPARTO "TMA15"				
16 23 37	DY803/14	SCOMPARTO "TMA20"				

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7.5.3 Linee MT in uscita

Il seguente capitolo definisce i criteri generali per la costruzione e progettazione delle linee MT interrate in uscita dalla sezione MT.

7.5.3.1 Tipi di cavi MT in uscita e prestazioni

I cavi di riferimento per le uscite dalla cabina primaria seguono la specifica tecnica GSC001 (A.50) in cui si esamina il tipo di cavo ARE4H5EX attualmente utilizzato in impianto (Figura 23). Per la costruzione delle linee dorsali si utilizzano cavi tripolari ad elica visibile con isolamento solido estruso in polietilene reticolato (XLPE) e in elastomero termoplastico polipropilene (HPTE). Per soluzioni particolari che richiedono maggior potenza trasmessa è possibile utilizzare il cavo in rame di tipo RG7H1EX secondo la specifica tecnica GSCC023 (A.51).

Le sezioni unificate per le linee in uscita sono, per i conduttori in alluminio, di 185 mm^2 e 240 mm^2 rispettivamente con matricole 332284 e 332285. Il conduttore in rame è unificato per la sola sezione di 240 mm^2 con matricola 330059.

I cavi in alluminio, come prescritto dalla GRI-GRI-OPI-E&C-0001 “HV/MV Liberty Substation Specification” (rif.R123), hanno caratteristiche tecniche descritte nella nota tecnica GUI-CON-PDI-24-0003-EDIS (rif. R128) (dati tratti dai cataloghi Prysmian, dalla GSC001 e dalla GSCC023):

Figura 23 – Cavo Prysmian di esempio

Tipo Cavo	Country Code IT	Conduttore	Sezione [mm^2]	U0/U [kV]	Isolamento	Diametro esterno nominale [mm]	Massa indicativa del cavo [kg/km]
ARE4H5EX	332284	Alluminio	185	12/20	XLPE	35	3260
ARE4H5EX	332285	Alluminio	240	12/20	XLPE	37	3930
RG7H1EX	330059	Rame	240	12/20	HEPR	41,2	9430

Tabella 10 – Caratteristiche tecniche cavo ARE4H5EX e cavo RG7H1EX

Di seguito (Tabella 11) si riporta la stima del calcolo delle portate valutato in condizioni di resistività del terreno di 1,0 [K·m/W] e profondità di posa di 1,0 m, come previsto dalla norma IEC 60287-3-1 (rif. R74).

La posa delle vie cavi interrate avviene in polifora, utilizzando tubi di diametro 160 mm distanziati tra loro con interasse 400 mm. Per maggiori dettagli sulla modalità di posa si rimanda al paragrafo 0.

Technical Specification code:
Version no. 0 dated 12/2020

Subject: Global Infrastructure and Networks – GSCC023 SINGLE PHASE MEDIUM VOLTAGE CABLES FOR PRIMARY SUBSTATIONS AND SPECIAL APPLICATIONS / AMENDMENT

Application Areas
Perimeter: *Global*
Staff Function: -
Service Function: -
Business Line: *Infrastructure & Networks*

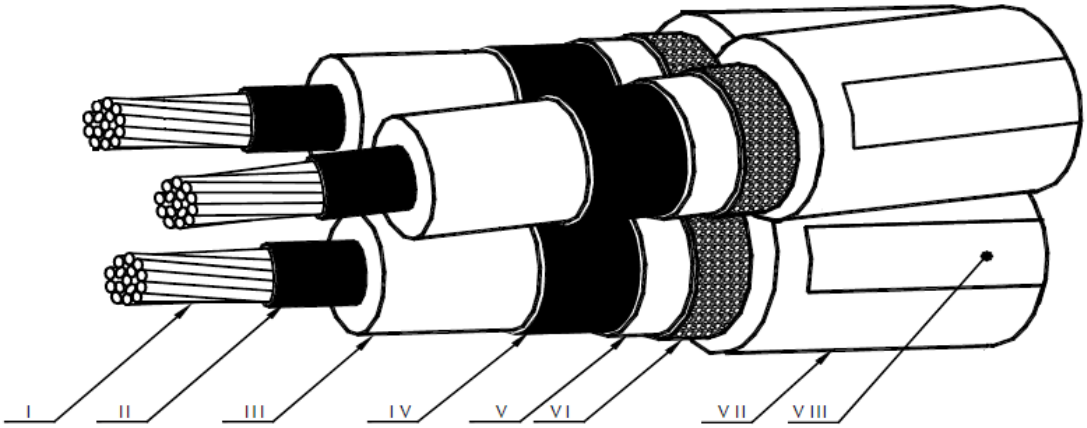
1. COMMON LIST UPDATE

GS Type Code	Distribution Company and Country	Country Code	Rated Voltage Uo/U(Umax) [kV]	Cross-section [mm²]	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]	Outer sheath material	Sheath nominal thickness [mm]	Sheath minimun thickness [mm]	Minimum fire class reaction	Constructive Characteristics
GSCC023/008	ED-Italy	330059	12/20(24)	240	COPPER	0,5	0,3	HEPR	5,5	4,9	0,3	0,5	YES	COPPER	16	PO	2,2	1,7	Eca	TRIPLEX

Table 1: common list

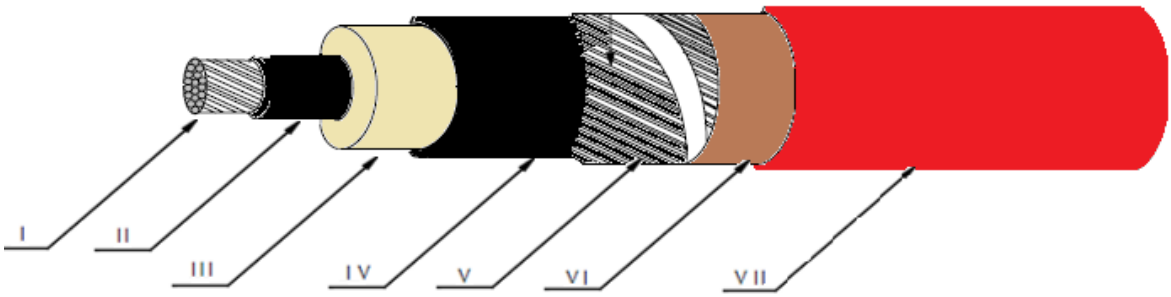
2. CONDITION OF SUPPLY

Formation [n° x mm²]	Maximum Length [m]	Coil Type (GUI 102)
3x240	400 (+50)	25



I – Aluminum Conductor
II – Conductor screen
III –Insulation
IV – Insulation screen
V – Longitudinal watertightness
VI – Aluminum foil earth screen
VII – Outer sheath
VIII – Marking

Figure 2 Type I or Type II three single-core bundled cables (Triplex)



I –Cu or Al Conductor
II – Conductor screen
III –Insulation
IV – Insulation screen
V – Copper wires earth screen
VI – Longitudinal watertightness
VII – Outer sheath

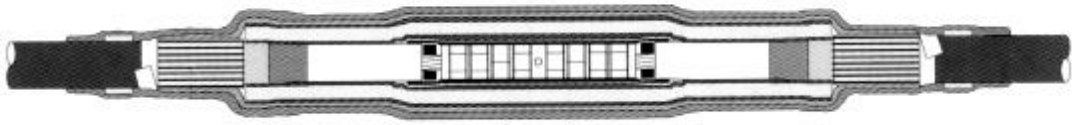
Figure 3 Type III single-core cable

GS Type Code	Distribution Company and Country	Country Code	TAM Description
GSC001/001	ED- Romania	332283	MV UNDERGROUND TRIPLEX CABLES 95 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/001	ED-Italy	332283	MV UNDERGROUND TRIPLEX CABLES 95 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/002	ED- Romania	332284	MV UNDERGROUND TRIPLEX CABLES 185 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/002	ED-Italy	332284	MV UNDERGROUND TRIPLEX CABLES 185 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/003	ED- Romania	332286	MV UNDERGROUND SINGLE CORE CABLES 185 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/003	ED-Italy	332286	MV UNDERGROUND SINGLE CORE CABLES 185 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/004	ED- Romania	332285	MV UNDERGROUND TRIPLEX CABLES 240 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/004	ED-Italy	332285 vedi DC4385 ARE4H5EX	MV UNDERGROUND TRIPLEX CABLES 240 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/005	ED- Romania	332283	MV UNDERGROUND TRIPLEX CABLES 95 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/005	ED-Italy	332283	MV UNDERGROUND TRIPLEX CABLES 95 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/006	ED- Romania	332284	MV UNDERGROUND TRIPLEX CABLES 185 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/006	ED-Italy	332284	MV UNDERGROUND TRIPLEX CABLES 185 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/007	ED- Romania	332286	MV UNDERGROUND SINGLE CORE CABLES 185 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/007	ED-Italy	332286	MV UNDERGROUND SINGLE CORE CABLES 185 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/008	ED- Romania	332285	MV UNDERGROUND TRIPLEX CABLES 240 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/008	ED-Italy	332285	MV UNDERGROUND TRIPLEX CABLES 240 mm2 ALUMINUM CONDUCTORHPTE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/009	ED-Peru	T330108	MV UNDERGROUND SINGLE CORE CABLES 95 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/010	ED-Peru	T330107	MV UNDERGROUND SINGLE CORE CABLES 150 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/011	ED-Peru	6802745	MV UNDERGROUND SINGLE CORE CABLES 240 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH
GSC001/012	ED-Peru	6802746	MV UNDERGROUND SINGLE CORE CABLES 400 mm2 ALUMINUM CONDUCTORXLPE INSULATION ALUMINUM FOIL SCREEN POLYETHYLENE SHEATH

ARE4H5EX

ARP1H5EX

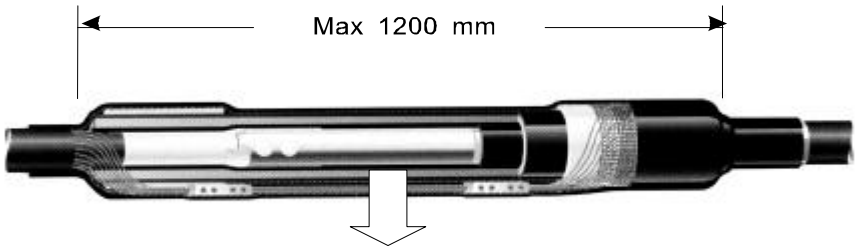
Giunti diritti unipolari per cavi tripolari ad elica visibile



Matricola	Sezione cavo [mm^2]	Soluzione costruttiva	Tabella	Connettore
27 10 71	50 ÷ 185	Retraibile a caldo	DJ 4376	Tabella 1 Tav. M2.5
27 10 73		Elastico o retraibile a freddo		

Giunti diritti unipolari per la riparazione di cavi tripolari ad elica visibile con isolamento estruso o in carta impregnata

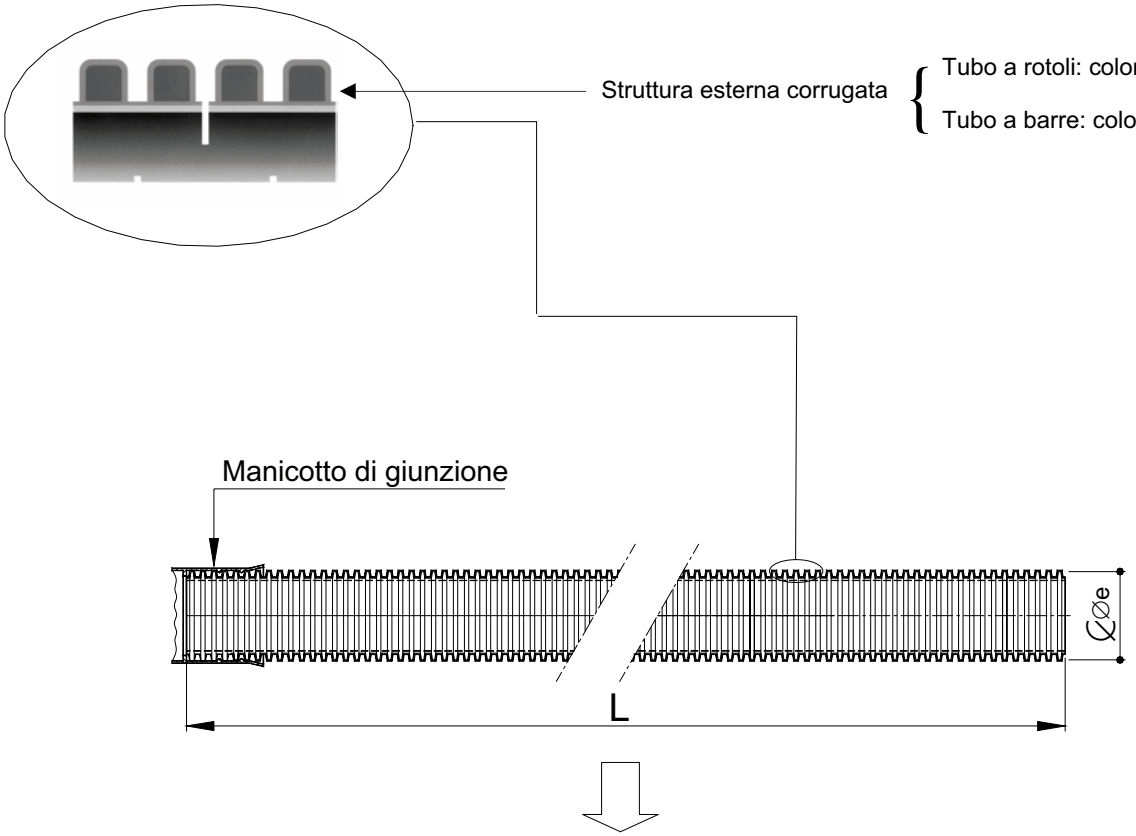
Questo tipo di giunzioni può essere utilizzato per la riparazione di cavi danneggiati, se il tratto del conduttore da riparare non supera i 300 mm circa.



Connettore a compressione diritto di tipo allungato

Matricola	Sezione cavo [mm^2]	Tipo cavo	Tabella	Connettore
27 01 14	70 ÷ 185	Isolato in HEPR o XLPE	DJ 4379	Tabella 2 Tav. M2.5
27 01 16	95 ÷ 240	Isolato in carta		

Protezioni meccaniche: tubi in polietilene



Conformi alle Norme CEI EN 50086-2-4 (23-46) (tubo "N" normale)

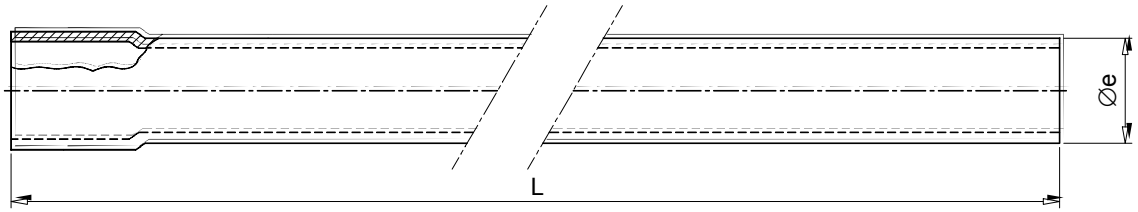
- resistenza all'urto:
  - tubo ∅e 25450 mm: 15 J;
  - tubo ∅e 63 mm: 20 J;
  - tubo ∅e 125 mm: 28 J;
  - tubo **Øe 160 mm: 40 J.**

Tipo	Diametro esterno [mm]	L [m]	Marcature	Matricola(1)	Tabella
Tubo "corrugato" in rotoli	25	50	(da applicare alle estremità del tubo) • sigla o marchio del costruttore • materiale impiegato • anno di fabbricazione • CEI EN 50086-2-2 CEI EN 50086-2-4/tipo **"N"**	295510	DS 4247
	32	50		295511	
	50	50		295512	
	63	50		295513	
	125	50		295514	
	160	**25**		**295515**	
Tubo "corrugato" in barre	125	6	(da applicare sulla superficie esterna con passo ≤ 1 m) • sigla o marchio del costruttore • diametro nominale esterno in mm	295526	DS 4235

(1) Materiale di fornitura impresa o acquistabile a catalogo on-line (piattaforma Ariba-Buyer).

DIREZIONE RETE - SUPPORTO INGEGNERIA

PROTEZIONI MECCANICHE: TUBI IN PVC AUTOESTINGUENTE



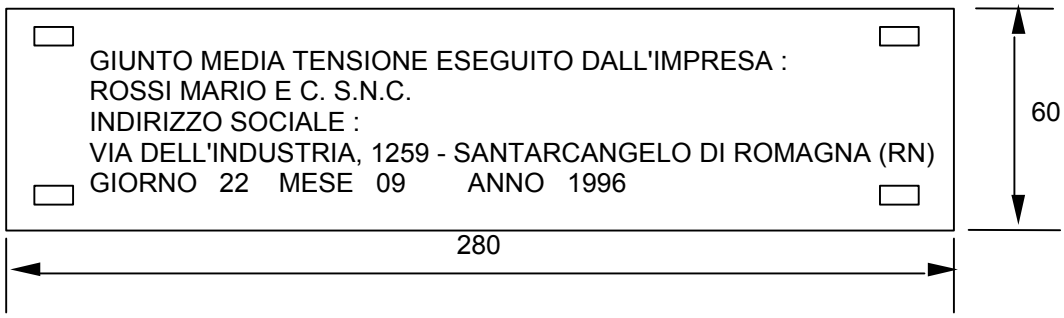
Diametro esterno Æe [mm]	L [m]	Colore	Marcature	Matricola(1)	Tabella
25	3	Grigio	(da applicare sulla superficie esterna con passo = 1 m) • sigla o marchio del costruttore • diametro nominale esterno in mm • ENEL • anno di fabbricazione • marchio IMQ	295520	DS 4235
32				295521	
50				295522	
63		Nero		295523	
125				295524	
160				295525	

(1) Materiale di fornitura impresa o acquistabile a catalogo on-line.

Quote in mm

ENEL·CAVI

Fig. A



(Esempio di targa identificatrice esecutore giunto)
Materiale : PVC Sp.= 4 mm o Acciaio inox Sp.= 1mm

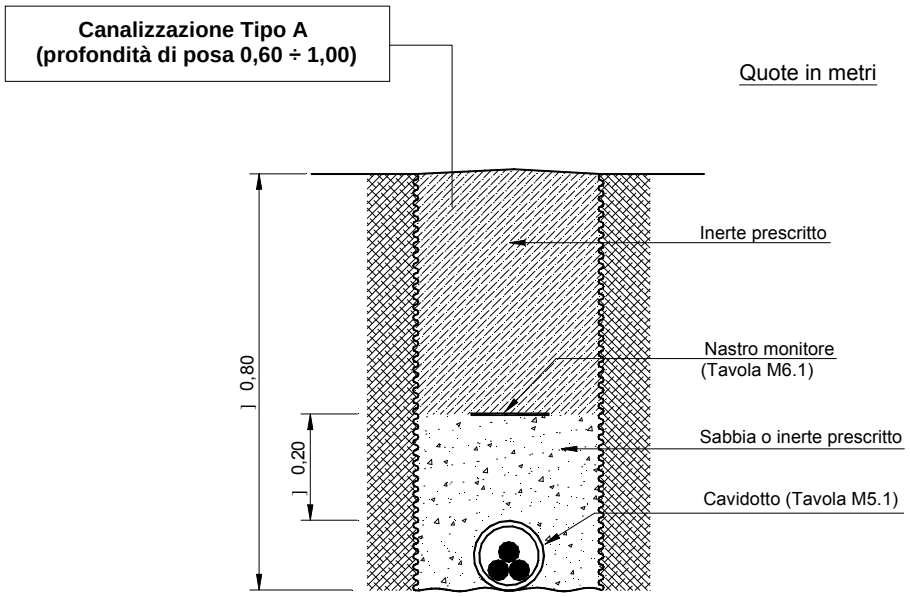
Fig. B

Fig.	Denominazione	Matricola	Tabella
A	Nastro monitore per indicazione della presenza dei cavi elettrici interrati	85 88 33 (1)	DS 4285
B	Targa identificatrice esecutore giunto	----	----

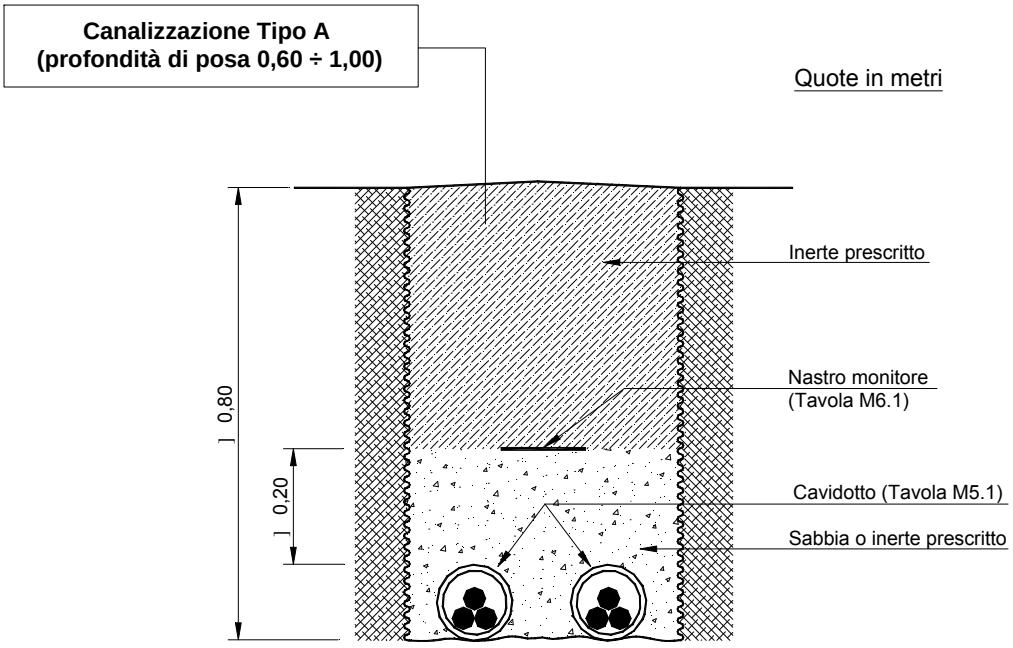
(1) Materiale di fornitura impresa

DIREZIONE RETE – SUPPORTO INGEGNERIA

Posa di n° 1 cavo MT su strada sterrata o terreno agricolo (Norme CEI 11-17)

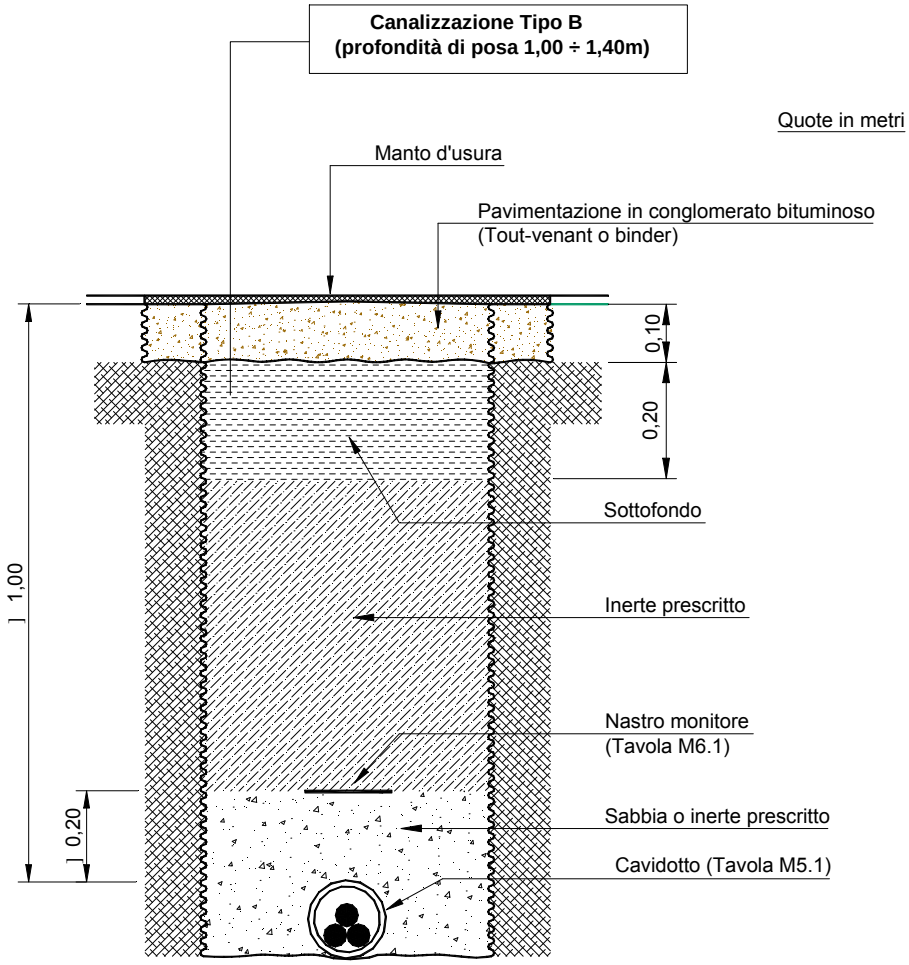


Posa di n° 2 cavi MT su strada sterrata o terreno agricolo (Norme CEI 11-17)



SOLUZIONI COSTRUTTIVE CANALIZZAZIONE PER POSA IN TUBAZIONE

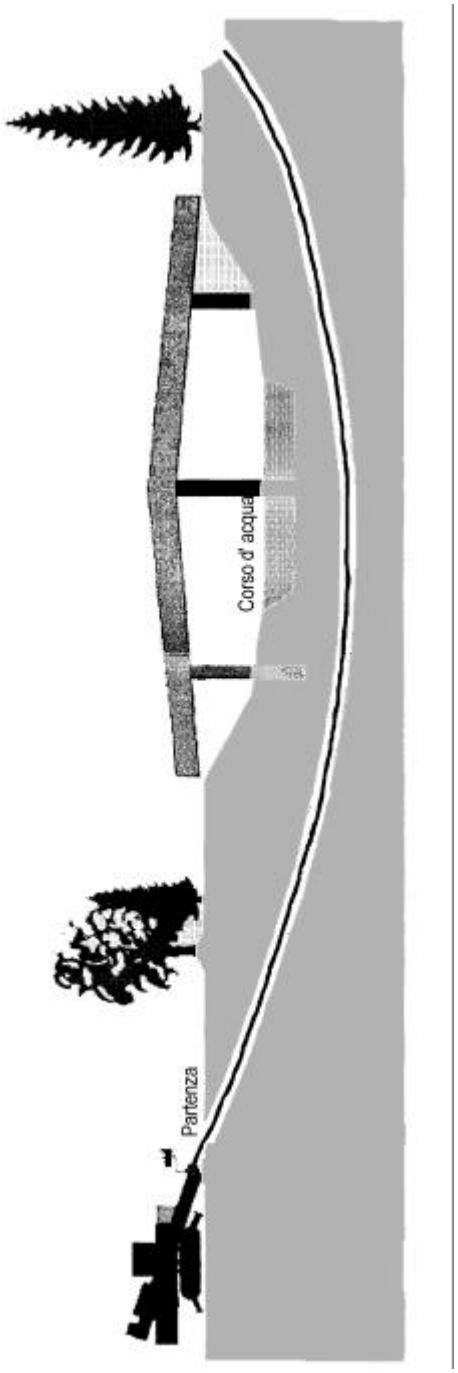
Posa di n° 1 cavo MT su strada asfaltata pubblica (Nuovo codice della strada)



N.B. : - per la posa su strada asfaltata in proprietà privata deve essere prevista la canalizzazione tipo A. In questo caso, infatti, valgono le prescrizioni delle Norme CEI 11-17 (art. 2.3.11.e) che stabiliscono una profondità minima, tra il *piano di appoggio* del cavo e la *superficie del suolo,* di 0,60 m.

DIREZIONE RETE – SUPPORTO INGEGNERIA

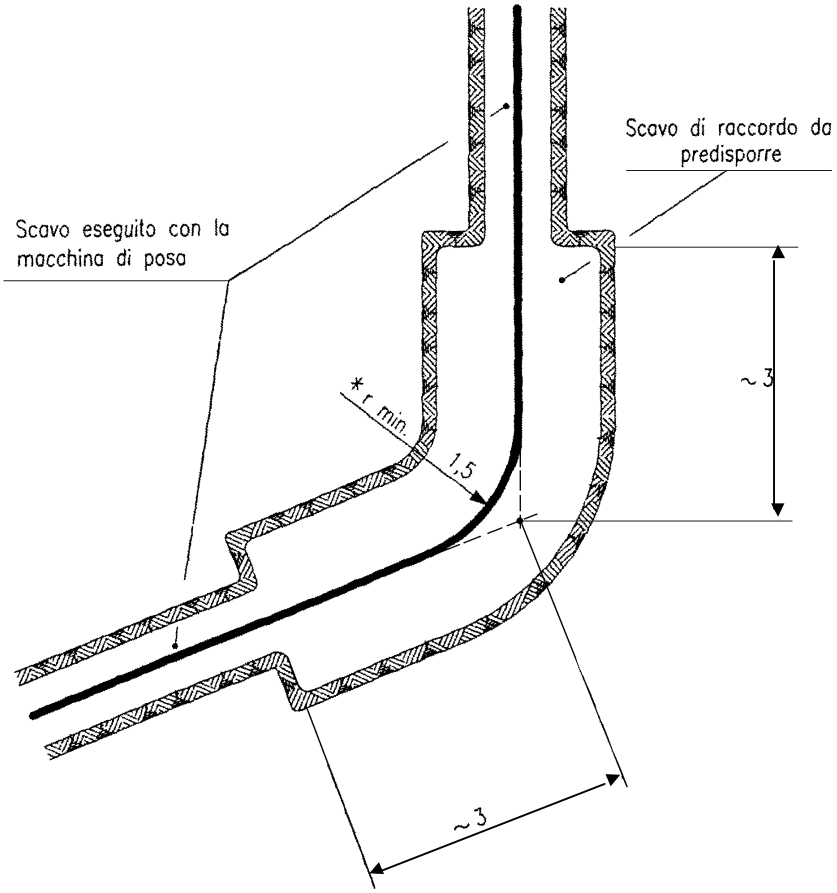
Schema del tracciato della trivella



N.B.: I tubi che vengono abitualmente posati, compatibilmente alla tecnologia intrinseca della T.O.C., sono classificati PEAD UNI 7611-76 tipo 312. Questi tubi, in modo particolare per quanto riguarda la resistenza alle sollecitazioni meccaniche, non costituiscono protezione meccanica supplementare ai sensi delle Norme CEI 11-17 e di conseguenza devono essere posati ad una profondità minima di 1,7 m. Il colore deve essere diverso da arancio, giallo, rosso, nero e nero a bande blu.

Esecuzione di curve incompatibili con le caratteristiche delle macchine di posa

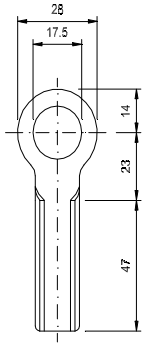
Quote in metri



Le quote riportate hanno carattere del tutto esemplificativo. Il progettista, allo scopo di stabilire se la posa meccanizzata risulta più economica rispetto a quella tradizionale, dovrà tenere conto della tortuosità del tracciato e verificare se le curve possono essere effettuate dal tipo di macchina che prevedibilmente verrà utilizzato per la posa. Se quest'ultima, per le sue dimensioni e caratteristiche, non è in grado di eseguire le deviazioni del tracciato, occorrerà procedere mediante l'esecuzione di un raccordo a posa tradizionale. Tale tipo di "inconveniente" lievita i costi complessivi e potrebbe determinare anche la non convenienza.

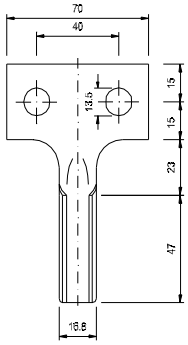
DIREZIONE RETE – SUPPORTO INGEGNERIA

Capocorda a compressione per morsetto di terra



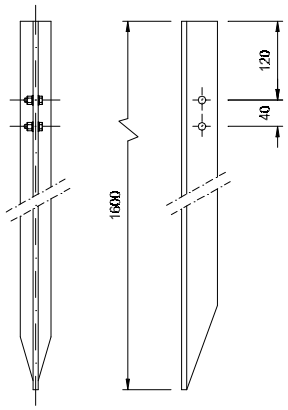
Matricola	Tabella
23 98 01	DR 1025

Capocorda a compressione diritto con attacco piatto a due fori per paletto di terra



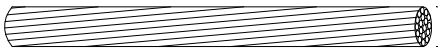
Matricola	Tabella
21 77 03	DR 1020

Paletto di terra in profilato di acciaio



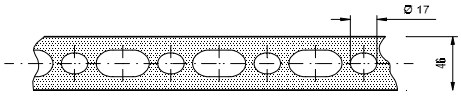
Matricola	Tabella
21 70 00	DR 1015

Conduttore in corda di rame



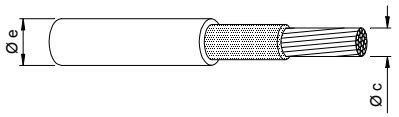
Matricola	Sezione	Tabella
31 04 02	25 mm^2	DC 7
31 04 04	35 mm^2	DC 8

Piattina di zinco



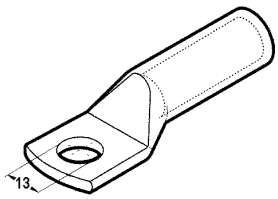
Matricola	Tabella
23 98 05	DR 1010

Cavo 0.6/1 kV



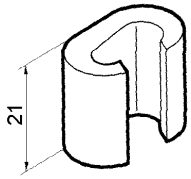
Matricola	Sezione	fc max [mm]	fe [mm]	Tabella
33 00 04	25 mm^2	6.2	12	DC 4141
33 00 05	50 mm^2	8.3	14	

Capocorda a compressione per conduttori nudi e cavi di rame



Matricola	Impiego	Sezione	Tabella
21 05 45	Cond. nudo	25 mm^2	DM 3155
21 05 73		35 mm^2	
21 05 39	Cavo	25 mm^2	DM 4134
21 05 78		50 mm^2	

Connettore di derivazione a “C” a compressione



Matricola	Impiego	Tabella
27 50 37	C25-C25	DM 4121
27 50 38	C35-C35	

DIREZIONE RETE – SUPPORTO INGEGNERIA