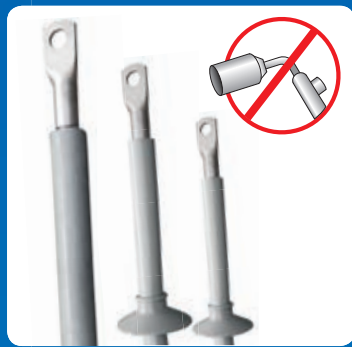




A

COLD-SHRINK



TERMINATIONS
JOINTS

page 155

HEAT-SHRINK



TERMINATIONS
JOINTS

164

Medium Voltage



HEAT-SHRINK 72 kV



TERMINATIONS
JOINTS

180



SEPARABLE
CONNECTORS

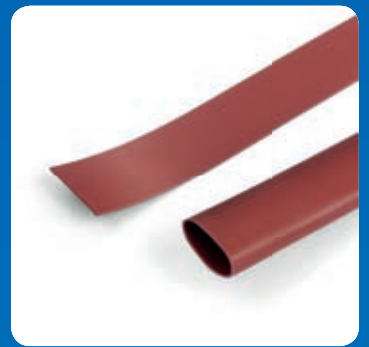


PLUG
SCREW

182



SHEATHS AND TAPES
FOR INSULATION



SHEATHS UP TO 36 kV
TAPES UP TO 36 kV

184



COLD-SHRINK

Terminations

COLD-SHRINK FOR INDOOR AND OUTDOOR USE



Terminations for **indoor use**

For extruded cables
up to 2/20 kV (Um 24 kV)



Terminations for **outdoor use**

For extruded cables
up to 12/20 kV (Um 24 kV)



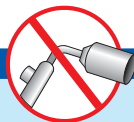
Terminations for **indoor/outdoor use**

For extruded cables
up to 18/30 kV (Um 36 kV)

Joints

COLD-SHRINK

New



Joints

For extruded cables up to 18/30 kV (Um 36 kV)



Electrical performance:
CEI 20-24 • CEI 20-62/1 • HD 629-1

Ranges of application:
For single core cables type



Extruded wire



Extruded tapes

For voltages from 6/10 kV (U_{max} 12 kV)
to 12/20 kV (U_{max} 24 kV)

Cold-shrink terminations for **indoor use**

Silicone rubber terminations with electric field control.
For extruded cables up to **12/20 kV (U_m 24 kV)**.

Cold-shrink technology is based on pre-dilated insulating sheaths on a removable spiral support, which is removed without tools during installation to allow for complete covering of the cable insulation. The Raytech silicone sheath, supplied pre-expanded, is flame retardant, is highly anti-tracking, has very high elastic characteristics, is able to maintain pressure on the cable during operation, is water-repellent and is extremely sturdy. Raytech terminations are suitable for indoor, very compact applications, with a smooth structure and complete with all components. Each kit contains 3 single core indoor terminations. The components are cold-installed without tools, unwinding the pigtail wire.

- Rapid installation for lower labour costs
- Highly reliable and safe for operators
- Installing without heating and without tools

For cables (A)RG7H1R
insulation thickness
FULL

Product	Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Length without cable lug (mm)
AUTO 10 / 120-I	12	15,3 - 20,2	24,6 - 29,6	50 - 120	320
AUTO 10 / 240-I		18,7 - 25,6	28,0 - 35,8	95 - 240	320
AUTO 10 / 630-I		28,2 - 37,8	38,5 - 49,4	300 - 630	320
AUTO 15 / 70-I	17,5	16,3 - 19,2	25,6 - 28,7	35 - 70	320
AUTO 15 / 240-I		19,2 - 27,8	28,7 - 38,1	70 - 240	320
AUTO 15 / 630-I		27,8 - 40,0	38,1 - 52,1	240 - 630	320
AUTO 20 / 50-I	24	17,3 - 19,5	27,8 - 29,0	25 - 50	320
AUTO 20 / 185-I		19,5 - 27,4	29,0 - 37,8	50 - 185	320
AUTO 20 / 630-I		29,8 - 42,0	40,2 - 54,2	240 - 630	320

For cables RG7H1M1
insulation thickness
LOW

Product	Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Length without cable lug (mm)
AUTO 20 / 50-I	24	17,0 - 19,0	23,3 - 25,3	25 - 70	320
AUTO 20 / 185-I		21,0 - 28,0	26,7 - 34,5	95 - 240	320
AUTO 20 / 630-I		28,0 - 41,0	34,6 - 48,3	240 - 630	320

To select the correct termination:
cable code, section in mm², nominal voltage, for indoor and outdoor installation.

Cold-shrink terminations for **outdoor use**

Silicone rubber outdoor terminations with electric field control and bell-shaped insulators. For extruded cables up to **12/20 kV (U_m 24 kV)**.

The Raytech silicone sheath, supplied pre-expanded, is flame retardant, is highly anti-tracking, has very high elastic characteristics, is able to maintain pressure on the cable during operation, is water-repellent and is extremely sturdy. With pre-dilated silicone fins on a spiral support for modular installation of the outdoor accessory for upside-down installation. Raytech terminations are suitable for external, very compact applications, complete with all components. Each kit contains 3 single core outdoor terminations. The components are cold-installed without tools, unwinding the pigtail wire.

- Rapid installation for lower labour costs
- Highly reliable and safe for operators
- Installing without heating and without tools

For cables (A)RG7H1R insulation thickness FULL	Nominal voltage U _{max} (kV)	Ø on insulation (mm)	Ø on external sheath (mm)	Conductor cross section (mm ²)	Length without cable lug (mm)
Product					
AUTO 10 / 120-E	12	15,3 - 20,2	24,6 - 29,6	50 - 120	410
AUTO 10 / 240-E		18,7 - 25,6	28,0 - 35,8	95 - 240	410
AUTO 10 / 300-E		28,0 - 29,0	35,5 - 39,0	300	410
AUTO 10 / 630-E		28,3 - 37,8	38,5 - 49,4	300 - 630	420
AUTO 15 / 70-E	17,5	16,3 - 19,2	25,6 - 28,7	35 - 70	410
AUTO 15 / 240-E		19,2 - 27,8	28,7 - 38,1	70 - 240	410
AUTO 15 / 300-E		30,0 - 31,0	38,0 - 41,0	300	410
AUTO 15 / 630-E		30,4 - 40,0	40,2 - 52,1	300 - 630	420
AUTO 20 / 50-E	24	17,3 - 19,5	27,8 - 29,0	25 - 50	410
AUTO 20 / 185-E		19,5 - 27,4	29,0 - 37,8	50 - 185	410
AUTO 20 / 240-E		27,5 - 31,0	35,7 - 41,0	185 - 240	410
AUTO 20 / 630-E		29,8 - 42,0	40,2 - 54,2	240 - 630	420

For cables RG7H1M1 insulation thickness LOW	Nominal voltage U _{max} (kV)	Ø on insulation (mm)	Ø on external sheath (mm)	Conductor cross section (mm ²)	Length without cable lug (mm)
Product					
AUTO 20 / 50-E	24	17,0 - 19,0	23,3 - 25,3	25 - 70	410
AUTO 20 / 185-E		21,0 - 28,0	26,7 - 34,5	95 - 240	410
AUTO 20 / 240-E		28,0 - 31,5	34,6 - 42,0	240 - 300	410
AUTO 20 / 630-E		31,0 - 41,0	37,4 - 48,3	300 - 630	420

To select the correct termination:
cable code, section in mm², nominal voltage, for indoor and outdoor installation.



Electrical performance:
CEI 20-24 • CEI 20-62/1 • HD 629-1

Ranges of application:
For single core cables type



Extruded wire



Extruded tapes

For voltages from 6/10 kV (U_{max} 12 kV)
to 12/20 kV (U_{max} 24 kV)



Electrical performance:
CEI 20-24 • CEI 20-62/1 • HD 629-1

Ranges of application:
For single core cables type



Extruded tube AL



Extruded wire



INSTALLATION TIPS:

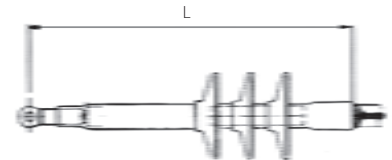
- Follow the dimensions stated in the installation instructions.
- Be careful not to cut through the insulation on the primary cable when removing the semi-conductive.
- The semiconductor cable must not have spikes or irregular profiles in the cutting zone.
- Carefully clean cable insulation.
- Install the correct cable terminal.

Cold-shrink terminations for indoor/outdoor use

Silicone rubber terminations with electric field control. For extruded cables up to **18/30 kV (Um 36 kV)**.

The Raytech silicone sheath, supplied pre-expanded, is flame retardant, is highly anti-tracking, has very high elastic characteristics, is able to maintain pressure on the cable during operation, is water-repellent and is extremely sturdy. With pre-dilated silicone fins on a spiral support for modular installation of the accessory, for upside-down installation. Suitable for outdoor and indoor, very compact applications, complete with all components. Each kit contains 3 single core indoor terminations. The components are cold-installed without tools, unwinding the pigtail wire.

- Rapid installation for lower labour costs
- Highly reliable and safe for operators
- Installing without heating and without tools



FOR INDOOR USE

For cables (A)RG7H1R insulation thickness FULL		Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Dimensions L (mm)
Product						
AUTO 30/95-I	36		22,3 - 27,9	33,5 - 38,5	25 - 95	410
AUTO 30/120-I			29,4 - 31,0	37,3 - 41,2	120 - 150	410
AUTO 30/400-I			30,6 - 40,3	39,0 - 51,3	150 - 400	410

For cables RG7H1M1 insulation thickness LOW		Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Dimensions L (mm)
Product						
AUTO 30/95-I	36		25,0 - 27,0	31,2 - 33,4	50 - 120	410
AUTO 30/120-I			28,0 - 29,0	32,3 - 35,0	150 - 185	410
AUTO 30/400-I			28,0 - 40,0	34,6 - 47,9	150 - 500	410

FOR OUTDOOR USE

For cables (A)RG7H1R insulation thickness FULL		Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Dimensions L (mm)
Product						
AUTO 30/95-E	36		22,3 - 27,9	33,5 - 38,5	25 - 95	680
AUTO 30/120-E			29,4 - 31,0	37,3 - 41,2	120 - 150	680
AUTO 30/400-E			30,6 - 40,3	39,0 - 51,3	150 - 400	680

For cables RG7H1M1 insulation thickness LOW		Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Dimensions L (mm)
Product						
AUTO 30/95-E	36		25,0 - 27,0	31,2 - 33,4	50 - 120	680
AUTO 30/120-E			28,0 - 29,0	32,3 - 35,0	150 - 185	680
AUTO 30/400-E			28,0 - 40,0	34,6 - 47,9	150 - 500	680

Three-core cold-shrink terminations for indoor/outdoor use

Terminations for armoured and non armoured extruded cables up to **36 kV**.

Hybrid technology that provides heat-shrink trifurcation and cold-shrink termination

FOR INDOOR USE

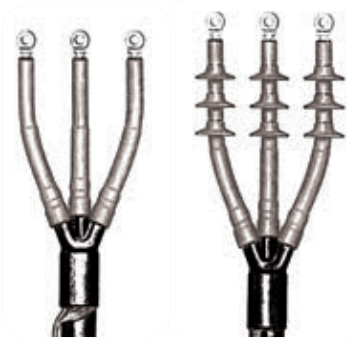
For NON ARMoured cables	For ARMoured cables	U _{max} 12 kV sez. (mm ²)	U _{max} 17,5 kV sez. (mm ²)	U _{max} 24 kV sez. (mm ²)
Product	Product			
AUTO 20/50-I-3	AUTO 20/50-I-3ARM	50 - 120	35 - 70	25 - 50
AUTO 20/185-I-3	AUTO 20/185-I-3ARM	95 - 240	70 - 240	50 - 185
AUTO 20/630-I-3	AUTO 20/630-I-3ARM	300 - 500	240 - 400	240 - 300

For NON ARMoured cables	For ARMoured cables	Voltage U _{max} (kV)	Conductor cross section (mm ²)
Product	Product		
AUTO 30/95-I-3	AUTO 30/95-I-3ARM	36	25 - 95
AUTO 30/240-I-3	AUTO 30/240-I-3ARM		120 - 240

FOR OUTDOOR USE

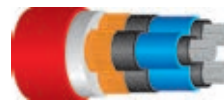
For NON ARMoured cables	For ARMoured cables	U _{max} 12 kV sez. (mm ²)	U _{max} 17,5 kV sez. (mm ²)	U _{max} 24 kV sez. (mm ²)
Product	Product			
AUTO 20/50-E-3	AUTO 20/50-E-3ARM	50 - 120	35 - 70	25 - 50
AUTO 20/185-E-3	AUTO 20/185-E-3ARM	95 - 240	70 - 240	50 - 185
AUTO 20/630-E-3	AUTO 20/630-E-3ARM	300 - 500	240 - 400	240 - 300

For NON ARMoured cables	For ARMoured cables	Voltage U _{max} (kV)	Conductor cross section (mm ²)
Product	Product		
AUTO 30/95-E-3	AUTO 30/95-E-3ARM	36	25 - 95
AUTO 30/240-E-3	AUTO 30/240-E-3ARM		120 - 240

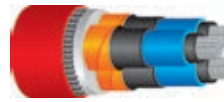


Electrical performance:
CEI 20-24 • HD 629-1

Note: for three-core cables, insulation thickness low, please contact Raytech



Three-core extruded cable, wire screened



Three-core extruded cable, tape screened, armoured



Electrical performance:
CEI 20-24 • CEI 20-62/1 • HD 629-1

Ranges of application
For single core cables type



Extruded wire



Extruded tapes

For voltages from 6/10 kV (U_{max} 12 kV)
to 12/20 kV (U_{max} 24 kV)

Single core cold-shrink joints

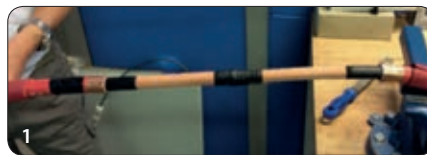
Suitable for outdoor, underground and even underwater applications. Very compact and complete with all components. Each kit contains 1 single core joint. Each joint component is pre-dilated on a spiral support and is extremely easy to remove for fast, safe installation without the use of any tools or heating.

Monoblock joints for extruded cables up to 12/20 kV (U_m 24 kV).

Product	Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Length (mm)
JMAUTO 20 / 95-1	12	17 - 23	26 - 33	70 - 150	550
JMAUTO 20 / 240-1		22 - 32	33 - 42	185 - 400	600
JMAUTO 20 / 400-1		32 - 36	42 - 48	400 - 630	600
JMAUTO 20 / 95-1	17,5	17 - 23	26 - 33	50 - 150	550
JMAUTO 20 / 240-1		22 - 32	33 - 42	150 - 300	600
JMAUTO 20 / 400-1		32 - 36	42 - 48	400 - 500	600
JMAUTO 20 / 95-1	24	17 - 23	26 - 33	25 - 95	550
JMAUTO 20 / 240-1		22 - 32	33 - 42	120 - 240	600
JMAUTO 20 / 400-1		32 - 36	42 - 48	300 - 400	600

Product	Nominal voltage U _{max} (kV)	∅ on insulation (mm)	∅ on external sheath (mm)	Conductor cross section (mm ²)	Length (mm)
JMAUTO 20 / 95-1	24	17 - 23	26 - 33	25 - 120	550
JMAUTO 20 / 240-1		22 - 32	33 - 42	120 - 300	600
JMAUTO 20 / 400-1		32 - 36	42 - 48	300 - 500	600

Installation sequence



1 Cables are prepared and connected



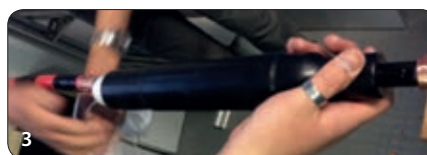
4 The metal shield is rebuilt



2 Position at the centre of the connection



5 The outer protective sheath is positioned and installed



3 The spiral support is removed



6 The joint is ready and can be used immediately



Single core cold-shrink singleblock joints 30 kv

Raytech joints for 30 kV (U_{max} 36 kV) voltage are singleblock type. They are characterised by a pre-assembled body, composed of an elastomeric sleeve containing side deflector electrodes and the central electrode inside (Faraday cage), on which the metal shield for cable shielding continuity and the external protection sheath are already set.

This allows for

- Reduced overall size of the joint
- Smaller dig size
- Shorter installation times
- Easier installation
- Increased reliability
- Reduced possibility of error

The joints are suitable for all types of indoor, outdoor, underground and even submerged installation.

Singleblock joints for extruded cables up to 18/30 kV (U_m 36 kV).

Product	Nominal voltage U _{max} (kV)	Ø on insulation (mm)	Ø on external sheath (mm)	Conductor cross section (mm ²)	Length (mm)
JMAUTO 30 / 95-1	36	25 - 29	31,2 - 38,3	50 - 95	750
JMAUTO 30 / 185-1		27 - 31	33,4 - 42	120 - 185	750

JMAUTO 30/ -1 joints are suitable for all extruded cable types.

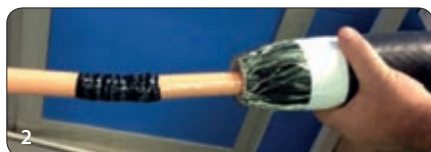
Installation sequence



1 The body of the joint carries the integrated shield and outer sheath



3 Position at the centre of the connection and collapsed on the cable removing the inner support



2 The joint is fitted on the connected cable



4 The joint is completed and can be used immediately



Electrical performance:
CEI 20-24 • CEI 20-62/1 • HD 629-1

Ranges of application
For single core cables type



Extruded wire



Extruded tapes

For voltages 18/30 kV (U_{max} 36 kV)



Raytech self-retractable joints for medium voltage cables

Raytech cold shrink joints are retractable. The body of the joint, which includes integrated elements for controlling the electric field (side deflector electrodes + central electrode which makes up a Faraday cage around the connector), is composed of an insulating elastomer singleblock with very high dielectric, mechanical, elastic and thermal retentive characteristics suitable to withstand stresses during expansion, storage, installation and the life of the joint.



In its laboratories and on its production lines, Raytech has developed a sophisticated profile spiral support on which joints can dilate. The support, extruded on Raytech dies, formed to the diameter of application on special automated packaging lines, is fitted into the body of the joint.



The particular shape and profile of the support section allow for safe expansion of the joint body, avoiding harmful stresses for the duration in storage but also above all easy, light removal during installation without tearing or dangerous stresses.

Type tests are performed in the company's laboratories in accordance with standard CENELEC HD 629-1 and operating experience has demonstrated its extreme reliability and ease of assembly.

Medium voltage testing details for terminals and joints up to 36 kV.

TEST	TEST METHOD (VOLTAGES IN kV)	MAXIMUM VOLTAGE PER CABLE UM (kV)					RESULTS
		7,2	12	17,5	24	36	
INDUSTRIAL FREQUENCY AC	a) 1 min. (dry)	27	35	45	55	75	Neither perforations nor discharges
	b) 1 min. (in the rain)	27	35	45	55	75	
	c) 4 h.	14	24	36	48	73	
PARTIAL DISCHARGES	PE, XLPE, EPR, PVC (voltages in kV)	4,5	7,5	10,9	15	22,5	< 3 pC
		7,2	12	17,5	24	-	< 20 pC
IMPULSE	a) 10 positive 10 negative 1,2/50 μ s (voltages in kV)	60	75	95	125	170	Neither perforations nor discharges
	b) 10 positive 10 negative 1,2/50 μ s (voltages in kV)	70	95	110	150	200	
THERMAL CYCLES WITH APPLIED VOLTAGE	a) 63 cycles of 5 h. of heating, 3 h. of air cooling	-	-	-	-	-	Neither perforations nor discharges
	b) 63 cycles of 5 h. of heating, 3 h. of water cooling (1m of water head)	-	-	-	-	-	
	Extruded cable and non-migrant mixture paper cable	9	15	22	30	45	
	Migrant mixture paper cable	6,5	11	15	22	32	
THERMAL SHORT-CIRCUIT TEST	a) short-circuit of 1s f/f at maximum temperature specified for the cable	-	-	-	-	-	No visible damage
	b) short-circuit of 1s f/t at maximum temperature specified for the cable	-	-	-	-	-	
DIRECT CURRENT	30 min	28	48	72	96	144	Neither perforations nor discharges
MOISTURE TEST WITH APPLIED VOLTAGE	a) 100 h. in saturated air	4,5	7,5	10,9	15	22,5	Neither perforations nor discharges, nor visible carbonisation nor erosion
	b) 1000 h. in saturated air	4,5	7,5	10,9	15	22,5	
DYNAMIC SHORT-CIRCUIT TEST	63 kA - Standard	-	-	-	-	-	No visible damage
	125 kA - High Current	-	-	-	-	-	
IMPACT	Fall from a height of 2 m at a weight of 4 kg, 6 times (only reinforced joints)	-	-	-	-	-	
SALT SPRAY WITH APPLIED VOLTAGE	1h of sealing salinity 224 kg/m ³ (voltages in kV)	4,5	7,5	10,9	15	22,5	No discharge

TESTING SEQUENCE

Indoor terminations 1a,2,3a, 4a,2,5, 4a, 1c, 3a,6,7a, 8

Outdoor terminations 1b, 2, 3b, 4a,2, 5,4a, 2, 1c,3b, 6,7b, 8, 10

Joints 9, 1a,2,3b,4a,2,5, 4b,2,5, 4b,2,1c,3b, 6,8

HEAT-SHRINK

Terminations



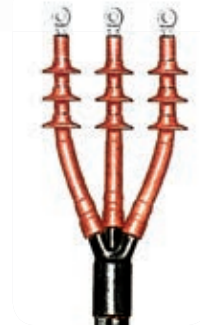
HEAT-SHRINK FOR INDOOR AND OUTDOOR USE



Single core terminations for **indoor use**
For extruded cables up to 36 kV



Single core terminations for **outdoor use**
For extruded cables up to 36 kV



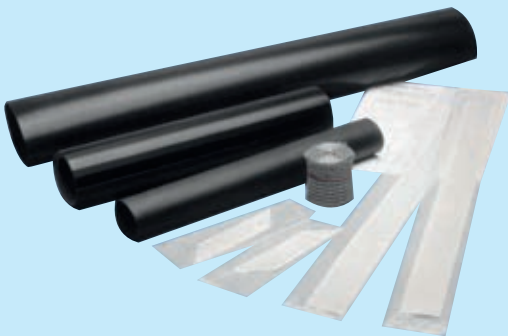
Three-core terminations for **indoor/outdoor use**
For extruded cables up to 36 kV



ENEL **certified** terminations

Joints

HEAT-SHRINK



- Single core joints
- Three-core joints
- Transition joints
- ENEL **certified** joints



Three-core extruded cable (A) RG7H10R



Three-core paper cable (A) RC1HLOR(X)



Single core extruded cable (A) RG7H1R(X)



Single core paper cable (A) RC1HLR(X)





Heat-shrink terminations

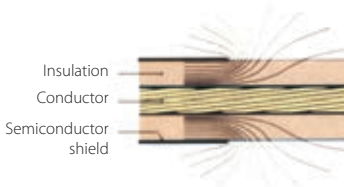
Indoor and outdoor use terminations for single core, three-core armoured and non armoured cables.

Heat-shrink terminations are immediately energizable, fast to package and reliable. High shrinkage ratios serve to broaden the ranges of application and reduce the number of kits to be put into stock.

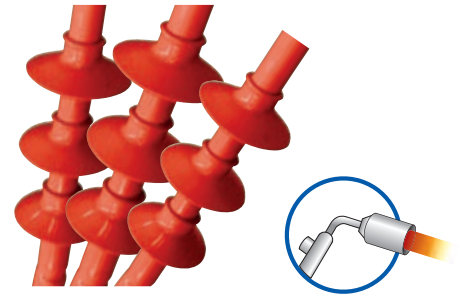
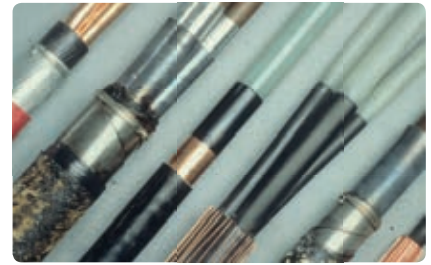
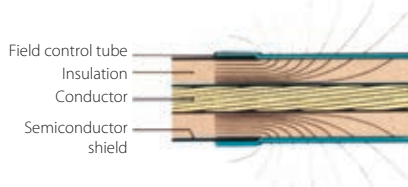
The first problem to solve with medium voltage accessories is avoiding the concentration of voltage on the shield cutting line. The use of polymers charged with metal oxides with non-linear characteristics has allowed for optimal distribution of the electrical field without enlarging the terminal. The field control element can be a sheath to be applied directly on the cable head or an extruded layer made with external covering sheath.

- Extremely simple
- Do not require special labour
- Can be installed in all conditions
- No shelf life

WITHOUT FIELD CONTROL



WITH FIELD CONTROL TUBE

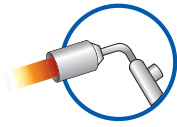


MV TERMINATIONS

HOW TO IDENTIFY AND ORDER COMPLEMENTARY ACCESSORIES

Accessory	Abbreviation to add to the product code		Example
Grounding braid for aluminium tube shields	/H5		THVE 20/A-RC/H5
Grounding braid with roll spring (only for single core)	/24	For cables (mm ²) up to 25	THVE 20/A-RC/24
	/25	from 35 to 95	THVE 20/B-RC/25
	/26	from 120 to 300	THVE 20/C-RC/26
	/27	from 400 to 630	THVE 20/C-RC/27
Copper cable terminal	-C	+ Conductor cross section	THVE 20/A-RC-C50
Aluminium cable terminal	-CA	+ Conductor cross section	THVE 20/A-RC-CA50
Shear bolt lug	-CPR	+ Conductor cross section	THVE 20/A-RC-CPR50
Multiple choice	With cable lug and grounding accessory, add codes		THVE 20/A-RC/24-C50





Heat-shrink terminations for **indoor use**

Terminations for **SINGLE CORE** extruded cables up to **36 kV**.



Electrical performance:
CEI 20-24 • CEI 20-62/1

Kit composition:
Three single core terminations



Single core cable extruded wires



Single core cable extruded tapes

FOR NON ARMoured CABLES

For cables (A)RG7H1R insulation thickness **FULL**

Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
THVE 6/A-RC	7,2	25 - 120	210
THVE 6/B-RC		150 - 400	210
THVE 6/C-RC		500 - 630	210
THVE 15/A-RC	12	25 - 95	320
THVE 15/B-RC		120 - 300	320
THVE 15/C-RC		400 - 630	320
THVE 15/A-RC	17,5	25 - 50	320
THVE 15/B-RC		70 - 300	320
THVE 15/C-RC		400 - 800	320
THVE 20/A-RC	24	25 - 50	320
THVE 20/B-RC		70 - 240	320
THVE 20/C-RC		240 - 630	320
THVE 30/A-RC	36	35 - 95	430
THVE 30/B-RC		120 - 185	430
THVE 30/C-RC		240 - 500	430

For shielded aluminium tube cables, add terminal abbreviation **H5**

For cables RG7H1M1Afumex insulation thickness **LOW**

Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
THVE 20/A-RC	24	25 - 120	320
THVE 20/B-RC		95 - 300	320
THVE 20/C-RC		240 - 630	320
THVE 30/A-RC	36	50 - 185	430
THVE 30/B-RC		120 - 240	430
THVE 30/C-RC		240 - 630	430

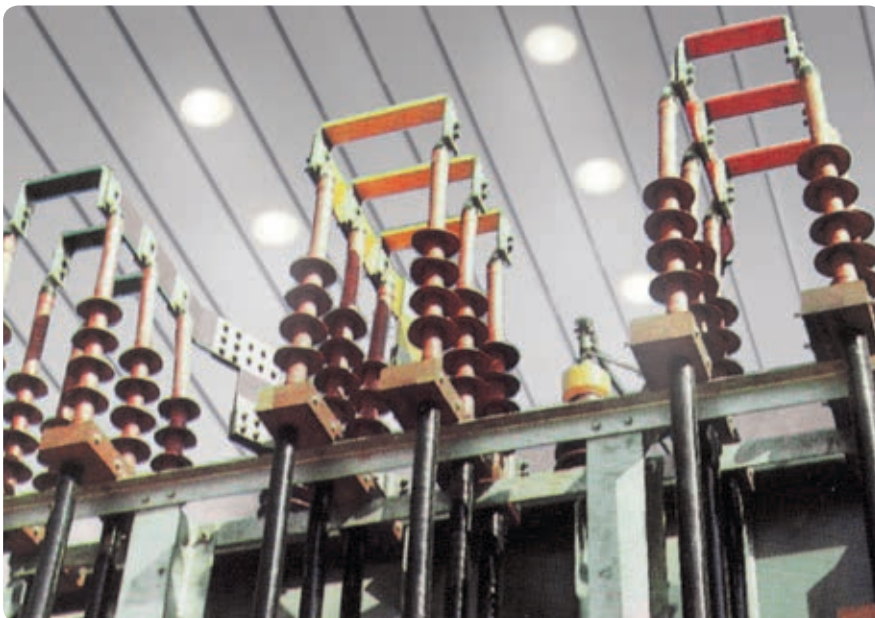


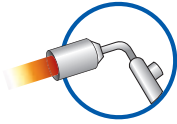
FOR CABLES ARMoured WITH WIRES OR ALUMINIUM TAPE

For Umax cables 7,2 kV	Voltage Umax (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
Product			
THVI 6/0-ARM	7,2	25 - 70	460
THVI 6/A-ARM		95 - 120	460
THVI 6/B-ARM		150 - 400	460
THVI 6/C-ARM		500 - 630	460

For Umax cables from 12 to 24 kV	Umax		Thickness FULL	Thickness LOW	Length without cable lug (mm)
	12 kV	17,5 kV	Umax 24 kV	Umax 24 kV	
Product	sect. (mm ²)	sect. (mm ²)	sect. (mm ²)	sect. (mm ²)	
THVI 20/A-ARM	25 - 95	25 - 50	25 - 50	25 - 120	600
THVI 20/B-ARM	120 - 300	70 - 300	70 - 240	95 - 300	600
THVI 20/C-ARM	400 - 800	400 - 800	240 - 630	240 - 630	600

For Umax cables 36 kV	Voltage Umax (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
Product			
THVI 30/A-ARM	36	35 - 95	730
THVI 30/B-ARM		120 - 185	730
THVI 30/C-ARM		240 - 500	730





Heat-shrink terminations for **outdoor use**

Terminations for **SINGLE CORE** extruded cables up to **36 kV**.



Electrical performance:
CEI 20-24 • CEI 20-62/1

Kit composition:
Three single core terminations



Single core cable extruded wires



Single core cable extruded tapes

FOR NON ARMoured CABLES

For cables (A)RG7H1R insulation thickness **FULL**

Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
THVE 6/120-E	7,2	25 - 120	340
THVE 6/400-E		150 - 400	340
THVE 6/630-E		500 - 630	340
THVE 15/50-E	12	25 - 95	450
THVE 15/300-E		120 - 300	450
THVE 15/800-E		400 - 630	450
THVE 15/50-E	17,5	25 - 50	450
THVE 15/300-E		70 - 300	450
THVE 15/800-E		400 - 800	450
THVE 20/25-E	24	25 - 50	520
THVE 20/240-E		70 - 240	520
THVE 20/630-E		240 - 630	520
THVE 30/95-E	36	35 - 95	720
THVE 30/185-E		120 - 185	720
THVE 30/500-E		240 - 500	720

For shielded aluminium tube cables, add terminal abbreviation **H5**

For cables RG7H1M1Afumex insulation thickness **LOW**

Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
THVE 20/25-E	24	25 - 120	520
THVE 20/240-E		95 - 300	520
THVE 20/630-E		240 - 630	520
THVE 30/95-E	36	50 - 185	720
THVE 30/185-E		120 - 240	720
THVE 30/500-E		240 - 630	720



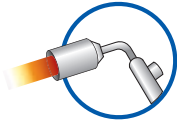
FOR CABLES ARMoured WITH WIRES OR ALUMINIUM TAPE

For Umax cables 7,2 kV	Voltage Umax (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
Product			
THVO 6/70-ARM	7,2	25 - 70	600
THVO 6/120-ARM		95 - 120	600
THVO 6/400-ARM		150 - 400	600
THVO 6/630-ARM		500 - 630	600

For Umax cables from 12 to 24 kV	Umax		Thickness FULL	Thickness LOW	Length without cable lug (mm)
	12 kV	17,5 kV	Umax 24 kV	Umax 24 kV	
Product	sect. (mm ²)	sez. (mm ²)	sect. (mm ²)	sect. (mm ²)	
THVO 20/25-ARM	25 - 95	25 - 50	25 - 50	25 - 120	800
THVO 20/240-ARM	120 - 300	70 - 300	70 - 240	95 - 300	800
THVO 20/630-ARM	400 - 800	400 - 800	240 - 630	240 - 630	800

For Umax cables 36 kV	Voltage Umax (kV)	Conductor cross section (mm ²)	Length without cable lug (mm)
Product			
THVO 30/95-ARM	36	35 - 95	1020
THVO 30/185-ARM		120 - 185	1020
THVO 30/500-ARM		240 - 500	1020





Three-core heat-shrink terminations for indoor/outdoor use

Terminations for armoured and non armoured extruded cables up to **36 kV**.



Electrical performance:
CEI 20-24 • HD 629-1

Note: contact Raytech regarding smaller cable insulation thickness



Three-core cable extruded wires



Three-core cable extruded tapes

FOR INDOOR USE

For NON ARMoured cables	For ARMoured cables	Voltage U _{max} (kV)	Conductor cross section (mm ²)	
Product	Product			
THVI 6/0-3	THVI 6/0-3-ARM	7,2	25 - 35	
THVI 6/A-3	THVI 6/A-3-ARM		50 - 120	
THVI 6/B-3	THVI 6/B-3-ARM		150 - 400	
THVI 6/C-3	THVI 6/C-3-ARM		500	

For NON ARMoured cables	For ARMoured cables	U _{max} 12 kV sez. (mm ²)	U _{max} 17,5 kV sez. (mm ²)	U _{max} 24 kV sez. (mm ²)
Product	Product			
THVI 20/A-3	THVI 20/A-3-ARM	25 - 95	25 - 50	25 - 50
THVI 20/B-3	THVI 20/B-3-ARM	120 - 300	70 - 300	70 - 240
THVI 20/C-3	THVI 20/C-3-ARM	400 - 500	400	300

For NON ARMoured cables	For ARMoured cables	Voltage U _{max} (kV)	Conductor cross section (mm ²)	
Product	Product			
THVI 30/A-3	THVI 30/A-3-ARM	36	35 - 95	
THVI 30/B-3	THVI 30/B-3-ARM		120 - 185	
THVI 30/C-3	THVI 30/C-3-ARM		240	

FOR OUTDOOR USE

For NON ARMoured cables	For ARMoured cables	Voltage U _{max} (kV)	Conductor cross section (mm ²)	
Product	Product			
THVO 6/35-3	THVO 6/35-3-ARM	7,2	25 - 35	
THVO 6/120-3	THVO 6/120-3-ARM		50 - 120	
THVO 6/400-3	THVO 6/400-3-ARM		150 - 400	
THVO 6/500-3	THVO 6/500-3-ARM		500	

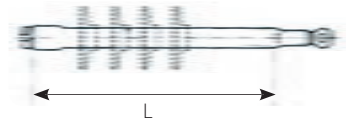
For NON ARMoured cables	For ARMoured cables	U _{max} 12 kV sez. (mm ²)	U _{max} 17,5 kV sez. (mm ²)	U _{max} 24 kV sez. (mm ²)
Product	Product			
THVO 20/25-3	THVO 20/25-3-ARM	25 - 95	25 - 50	25 - 50
THVO 20/240-3	THVO 20/240-3-ARM	120 - 300	70 - 300	70 - 240
THVO 20/630-3	THVO 20/630-3-ARM	400 - 500	400	300

For NON ARMoured cables	For ARMoured cables	Voltage U _{max} (kV)	Conductor cross section (mm ²)	
Product	Product			
THVO 30/95-3	THVO 30/95-3-ARM	36	35 - 95	
THVO 30/185-3	THVO 30/185-3-ARM		120 - 185	
THVO 30/240-3	THVO 30/240-3-ARM		240	



ENEL certified heat-shrink terminations

For single core type indoor and outdoor use.



Elicord type extruded cable (ARG7H5EXY 12/20 kV)

Product	Type	ENEL serial number	Conductor cross section (mm ²)	L (mm)
THVE 20/150-I/U	With 2 INTERNAL sheaths	273047	35 ÷ 150	365
IXSU-F-5131-IT02	Single INTERNAL tube	273047	35 ÷ 150	365
THVE 20/150-E/U	With 2 EXTERNAL sheaths	273066	35 ÷ 150	450
OXSU-F-5131-IT02	Single EXTERNAL tube	273066	35 ÷ 150	450

Electrical performance:

CEI 20-24 • CEI 20-62/1
ENEL tables: DJ 4456/3 • DJ 4476/2
ENEL certification: DJ 4853 • DJ 4854



Single core cable AL extruded tube

Extruded cable for underground installation ([A] RG7H1R 12/20 kV)

Product	Type	ENEL serial number	Conductor cross section (mm ²)	L (mm)
IXSU-F-5121-IT01	Single INTERNAL tube	273045	25	360
THVE 20/185-I/U	With 2 INTERNAL sheaths	273046	50 - 185	360
IXSU-F-5131-IT01	Single INTERNAL tube	273046	50 - 185	360
THVE 20/240-I/U	With 2 INTERNAL sheaths	273048	240	360
IXSU-F-5151-IT01	Single INTERNAL tube	273049	400 - 630	360
THVE 20/185-E/U	With 2 EXTERNAL sheaths	273065	50 - 185	450
OXSU-F-5131-IT01	Single EXTERNAL tube	273065	50 - 185	450

Electrical performance:

CEI 20-24 • CEI 20-62/1
ENEL tables: DJ 4456
ENEL certification: DJ 4853 • DJ 4854



Single core cable extruded wires

Insulated cable made of paper impregnated with stabilised mixture ([A] RC 1HLRX 12/20 kV)

Product	Type	ENEL serial number	Conductor cross section (mm ²)	L (mm)
THVP 20/240-I/U	INTERNAL	273042	50 - 240	370
THVP 20/240-E/U-N1	EXTERNAL	273083	50 - 240	600

Electrical performance:

CEI 20-24 • CEI 20-62/1
ENEL tables: DJ 4453 • DJ 4473
ENEL certification: DJ 4854 • DJ 4851



Single core cable paper lead

Extruded cable for underground installation with aluminium tube shield (ARE4H5EX 12/20 kV)

Product	Type	ENEL serial number	Conductor cross section (mm ²)	Ø (mm) insulation		L (mm)
				min	max	
IXSU-F-5131-IT04	INTERNAL	273040	70 - 185	19	27	350
OXSU-F-5131-IT03	EXTERNAL	273064	70 - 185	19	27	450

Electrical performance:

CEI 20-24 • CEI 20-62/1
ENEL tables: DJ4456/6 • DJ4476/7
ENEL certification: DJ4853



Single core cable AL extruded tube



Identification data of appropriate **termination**



TERMINATION

<input type="radio"/> For indoor use	<input type="radio"/> Single core	<input type="radio"/> Copper conductor
<input type="radio"/> For external use	<input type="radio"/> Three-core	<input type="radio"/> Aluminium conductor

NOMINAL VOLTAGE

<input type="radio"/> 6 kV (U _{max} 7,2)
<input type="radio"/> 10 kV (U _{max} 12)
<input type="radio"/> 15 kV (U _{max} 17)
<input type="radio"/> 20 kV (U _{max} 24)
<input type="radio"/> 30 kV (U _{max} 36)

CABLE INSULATION

<input type="radio"/> Extruded cable	<input type="radio"/> Full <input type="radio"/> Low
<input type="radio"/> Low insulation thickness	
<input type="radio"/> Belted cable	
<input type="radio"/> 3 lead paper	
<input type="radio"/> 1 lead paper with shielded phases	

ARMOUR

<input type="radio"/> Non armoured
<input type="radio"/> Armoured wire
<input type="radio"/> Armoured tape

SHIELD

<input type="radio"/> Copper wire
<input type="radio"/> Copper tapes
<input type="radio"/> Aluminium tube
<input type="radio"/> Lead sheath

CABLE SECTION

<input type="radio"/> 25 mm²
<input type="radio"/> 35 mm²
<input type="radio"/> 50 mm²
<input type="radio"/> 70 mm²
<input type="radio"/> 95 mm²
<input type="radio"/> 120 mm²
<input type="radio"/> 150 mm²
<input type="radio"/> 185 mm²
<input type="radio"/> 240 mm²
<input type="radio"/> 300 mm²
<input type="radio"/> 400 mm²
<input type="radio"/> 500 mm²
<input type="radio"/> 630 mm²

TYPE

<input type="radio"/> Self-shrinking
<input type="radio"/> Heat-shrink

INCLUDES GROUNDING BRAID

<input type="radio"/> Yes
<input type="radio"/> No



INCLUDES CABLE TERMINAL

<input type="radio"/> Yes
<input type="radio"/> No



Heat-shrink joints

The preparation of cables and the installation techniques for medium voltage joints are identical to those for terminations. Even cable made with paper impregnated with non-migrant mixture up to 36 kV uses the same basic design. In this way, the heat-shrink system sets new standards regarding the effectiveness, reliability and simplicity of cable installation. The performance and ease of installation of heat-shrink materials are not affected by stocking, even if long and in adverse environmental conditions. A low number of "kits" per cable type covers the entire range of sections, allowing use with any type of connector, regardless of the type of conductor (round or sectoral) and different shields.

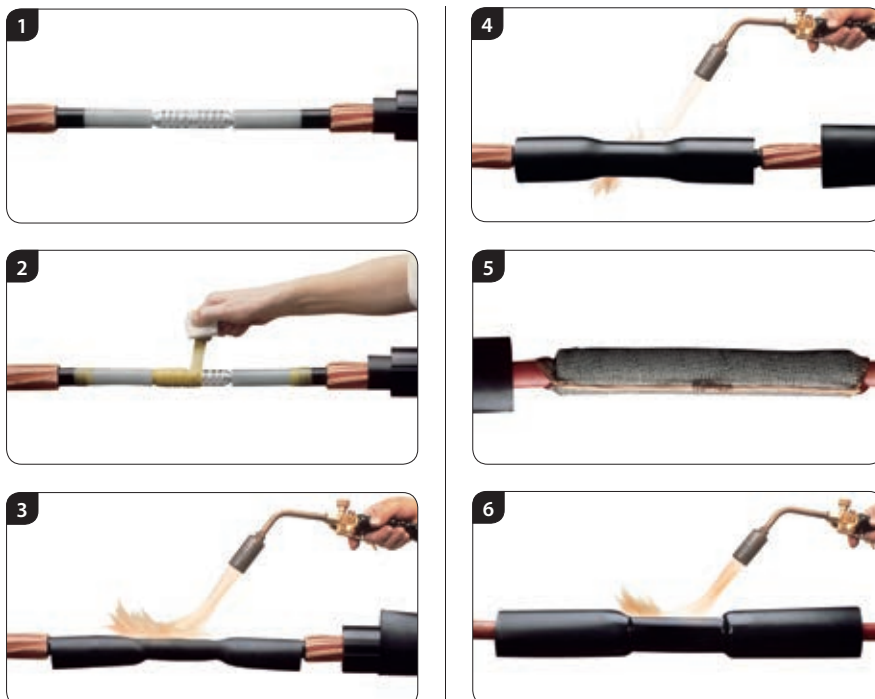
Electrical field distribution

When the cable shield is cut, the electrical field is controlled by a material that has already been experimented in terminations: the electrical gradient control tube. This tube is made of non-linear impedance insulating material that is able to control the electrical field both at the end of the cable shield and on the metal connector. As with the terminations, thanks to the heat-shrink components, the range of joints includes practically all the configurations of the existing cables, as well as the joints mixed between different types of cable. The kit references that appear on the selection tables are those that are most used by national installers for cable applications up to 36 kV. In the described cases, please contact Raytech regardless of the type of cable.

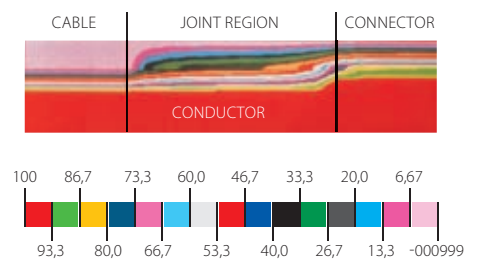
HOW TO IDENTIFY AND ORDER COMPLEMENTARY ACCESSORIES

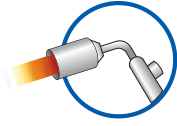
Accessory	Abbreviation to add to the product code	Example
Copper connectors	-C + Conductor cross section	GHVE 20/185-C95
Aluminium connectors	-CA + Conductor cross section	GHVE 20/185-CA95
Shear bolt connectors	-CPR + conductor cross section	GHVE 20/185-CPR95

Installation sequence



VOLTAGE DISTRIBUTION (PERCENT)
HEAT-SHRINKABLE JOINT



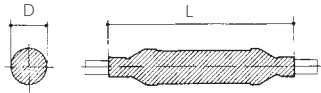


Single core heat-shrink joints

High reliability and superior electrical, mechanical and sealing properties make these joints the ideal solution for all types of cables and installation.

Single core heat-shrink joints for extruded insulation cables with copper wire shield

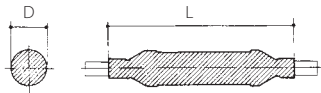
type (A)RG7H1R(X), (A)RE4H1E(X), (A)RG7H1M1(X)



Electrical performance:
CEI 20-24 • HD 629-1



Product	Voltage Umax (kV)	Conductor cross section from (mm ²) a (mm ²)		L max (mm)	D max (mm)
GHVE 15/50-1	7,2 - 17,5	25	50	700	75
GHVE 15/300-1	7,2 - 17,5	70	300	700	80
GHVE 15/630-1	7,2 - 17,5	400	630	1000	100
GHVE 20/240-1	24	25	240	700	80
GHVE 20/630-1	24	240	630	1000	100
GHVE 30/240-1	36	35	240	1000	90
GHVE 30/500-1	36	300	500	1000	100



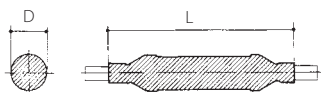
Electrical performance:
CEI 20-24 • HD 629-1



Single core heat-shrink joints for extruded insulation cables with aluminium tube shield

type (A)RG7H5R(X), (A)RE4H5E(X), (A)RG7H5M1(X)

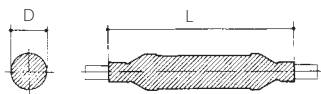
Product	Voltage Umax (kV)	Conductor cross section from (mm ²) a (mm ²)		L max (mm)	D max (mm)
GHVE 15/50-1-H5	17,5	25	50	700	75
GHVE 15/300-1-H5	17,5	50	300	700	80
GHVE 15/630-1-H5	17,5	400	630	1000	100
GHVE 20/240-1-H5	24	25	240	700	80
GHVE 20/630-1-H5	24	240	630	1000	100
GHVE 30/240-1-H5	36	35	240	1000	90
GHVE 30/500-1-H5	36	300	500	1000	100



Heat-shrink joints for single core extruded insulation cables armoured with aluminium wires

type (A)RG7H1RFR(X), (A)RE4H1EFE(X)

Product	Voltage Umax (kV)	Conductor cross section from (mm ²) a (mm ²)		L max (mm)	D max (mm)
GHVE 20/240-1-ARM	24	25	240	1700	80
GHVE 20/630-1-ARM	24	240	630	1700	100
GHVE 30/240-1-ARM	36	35	240	1850	100
GHVE 30/500-1-ARM	36	300	500	1850	110



Electrical performance:
CEI 20-24 • HD 629-2



Single core heat-shrink joints for insulated cables made of paper impregnated with mixture type (A)RC1HLR(X)

Product	Voltage Umax (kV)	Conductor cross section from (mm ²) a (mm ²)		L max (mm)	D max (mm)
GHVP 20/70-1	24	35	70	1000	75
GHVP 20/240-1	24	50	240	1000	75
GHVP 20/400-1	24	300	400	1000	80

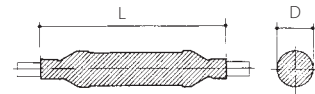
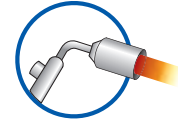
Supplies do not include connectors which must be requested separately.

Three core heat-shrink joints

High reliability and superior electrical, mechanical and sealing properties make these joints the ideal solution for all types of cables and installation.

Three core heat-shrink joints for extruded insulation cables type (A)RG7H1OR, (A)RE4H1OR

Product	Voltage U _{max} (kV)	Conductor cross section from (mm ²)		L max (mm)	D max (mm)
		a	a		
GHVE 15/50-3	7,2 - 17,5	25	50	1500	105
GHVE 15/300-3	7,2 - 17,5	70	300	1500	110
GHVE 15/630-3	7,2 - 17,5	400	630	1600	130
GHVE 20/240-3	24	25	240	1500	110
GHVE 20/630-3	24	300	630	1600	140
GHVE 30/240-3	36	50	240	1800	120
GHVE 30/300-3	36	300		1900	150

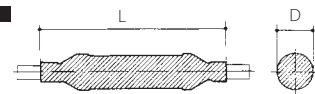


Electrical performance:
CEI 20-24 • HD 629-1



Three core heat-shrink joints for insulated armoured cables with galvanic continuity of armour

Product	Voltage U _{max} (kV)	Conductor cross section from (mm ²)		L max (mm)	D max (mm)
		a	a		
GHVE 15/50-ARM	7,2 - 17,5	25	50	1500	75
GHVE 15/300-ARM	7,2 - 17,5	70	300	1500	110
GHVE 15/630-ARM	7,2 - 17,5	400	630	1600	130
GHVE 20/240-ARM	24	25	240	1500	110
GHVE 20/630-ARM	24	300	630	1600	140
GHVE 30/240-ARM	36	50	240	1800	120
GHVE 30/300-ARM	36	300		1900	150



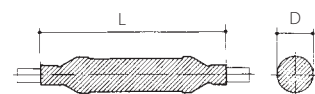
Electrical performance:
CEI 20-24 • HD 629-1



Supplies do not include connectors which must be requested separately
Note: contact Raytech for three core armoured cables with low insulation thickness

Three core heat-shrink joints for insulated cables made of paper impregnated with mixture type (A)RC1HLOR (3 lead)

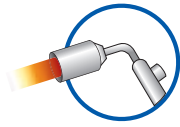
Product	Voltage U _{max} (kV)	Conductor cross section from (mm ²)		L max (mm)	D max (mm)
		a	a		
GHVP 20/70-3	24	35	70	1600	130
GHVP 20/240-3	24	95	240	1600	140
GHVP 20/400-3	24	300	400	1600	150



Electrical performance:
CEI 20-24 • CEI 20-62/2



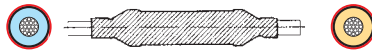
Supplies do not include connectors which must be requested separately



Transition joints between single **core cables**

Transition joints between **single core** paper insulated cable and extruded cable

respectively type (A)RG7H1R(X) and single pole cable made of paper impregnated with mixture type (A)RC1HLRX



Electrical performance:
CEI 20-24 • CEI 20-62/2



Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)		ENEL serial number
		paper cable	extruded cable	
GHVE 20/25-1-T	24		25	-
GHVE 20/240-1-T	24	50 - 240	35 - 185	271074
GHVE 20/400-1-T	24		240 - 400	-

Supplies do not include connectors which must be requested separately



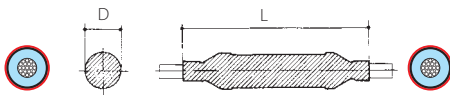
Electrical performance:
CEI 20-24 • CEI 20-62/2



Transition joints between **single core** paper insulated cable and extruded cable with aluminium sheet screen

type (A)RC1HLRX and type ARG7H5EXY

Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)		ENEL serial number
		paper cable	extruded cable	
GHVE 20/240-1-TE	24	50 - 240	35 - 150	270118



Electrical performance:
CEI 20-24 • HD 629-1



Transition joints between **single core** extruded cable with wire screen and extruded cable with aluminium foil screen

type (A)RG/H1R(X) or (A)RG7H1M1 and extruded single core cable type ARG7H5EXY

Product	Voltage U _{max} (kV)	Conductor cross section		L max (mm)	D max (mm)
		from (mm ²)	to (mm ²)		
GHVE 20/240-1X-TE	24	25	240	1000	75

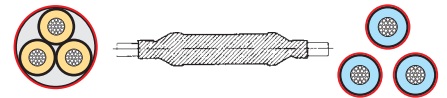
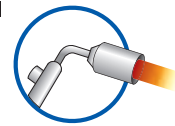
Transition joints between multi core cables

Transition joints between **3-core** paper insulated cable and **3 single core** extruded cables

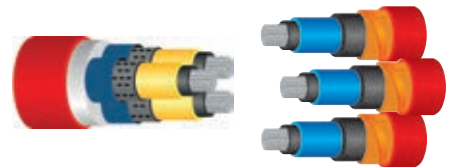
respectively type (A) RC1HLOR and (A) RG7H1R(X)

Product	Voltage U _{max} (kV)	Conductor cross section (mm ²)	
		paper cable	extruded cable
GHVT 20/25-1X-3H	24	25	25
GHVT 20/240-1X-3H	24	50 - 240	35 - 185
GHVT 20/400-1X-3H	24	300 - 400	240 - 400

Supplies do not include connectors which must be requested separately



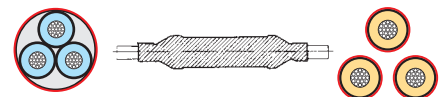
Electrical performance:
CEI 20-24 • CEI 20-62/2



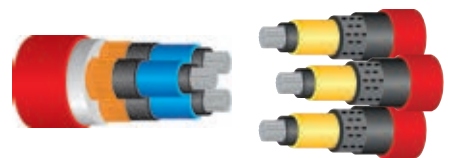
Transition joints between **3-core** extruded cable and **3 single core** paper insulated cables

respectively type (A) RG7H10R and (A) RC1HLRX

Product	Voltage U _{max} (kV)	Conductor cross section	
		from (mm ²)	to (mm ²)
GHVT 20/70-3X-1H	24	25	70
GHVT 20/240-3X-1H	24	95	240
GHVT 20/400-3X-1H	24	300	400

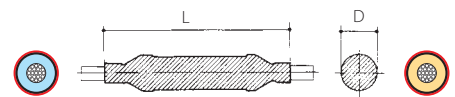


Electrical performance:
CEI 20-24 • CEI 20-62/2



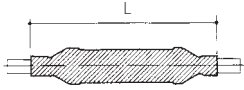
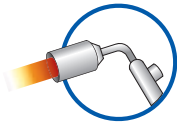
Single core plastic or paper insulated cable joint with screen interruption

Product	Type of cable	Voltage U _{max} (kV)	Conductor cross section		L max (mm)	D max (mm)
			from (mm ²)	to (mm ²)		
GHVP 20/240-1-IS	(A)RC4HLR(X)	24	50	240	1000	75
GHVE 20/240-1-IS	(A)GR7H1R(X)	24	50	240	1000	75
GHVE 20/150-1-IS	ARG7H5EXY	24	35	150	1000	75



Electrical performance:
CEI 20-24 • HD 629-1





Electrical performance:
CEI 20-24 • CEI 20-62/1
Tabelle Enel: DJ 4376
ENEL certification: DJ 4853 • DJ 4854

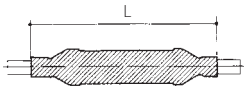


ENEL certified heat-shrink

Single core joints for extruded insulation cables

Type (A)RG7H1RX 12/20 kV (copper wire shield - external PVC sheath)

Product	Voltage U _{max} (kV)	Conductor cross section		L max (mm)	ENEL serial number
		from (mm ²)	to (mm ²)		
GHVE 20/185 - 1/U	24	50	185	700	271071



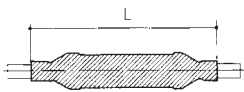
Electrical performance:
CEI 20-24 • CEI 20-62/1
Tabelle Enel: DJ 4376
ENEL certification: DJ 4853 • DJ 4854



Single core joints for wire carrying overhead cables

Type ARG7H5EXY 12/20 kV (aluminium tube shield - external PE sheath)

Product	Voltage U _{max} (kV)	Conductor cross section		L max (mm)	ENEL serial number
		from (mm ²)	to (mm ²)		
GHVE 20/150 - 1/U	24	35	150	700	271072



Electrical performance:
CEI 20-24 • CEI 20-62/2
Tabelle Enel: DJ 4373
ENEL certification: DJ 4851 • DJ 4854

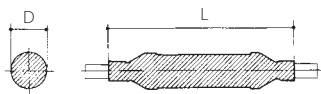


Single core joints for insulated cables with impregnated paper

Type RC4HLRX with copper conductors from 50 to 150 mm² and ARC4HLRX with aluminium conductors from 95 to 240 mm²

Product	Voltage U _{max} (kV)	Conductor cross section		L max (mm)	ENEL serial number
		from (mm ²)	to (mm ²)		
GHVP 20/150 - 1/U	17,5 e 24	50	150	1000	-
GHVP 20/240 - 1/U	17,5 e 24	95	240	1000	271042

Supplies do not include connectors which must be requested separately.



Electrical performance:
CEI 20-24 • CEI 20-62/1
Tabelle Enel: DJ 4387/2
ENEL certification: DJ 4853



Extruded cable for underground installation with aluminium tube shield (ARE4H5EX 12/20 kV)

Product	Voltage U _{max} (kV)	Conductor cross section		L max (mm)	D insulation Ø (mm)	ENEL serial number
		from (mm ²)	to (mm ²)			
GHVE 20/185-1X-H5	24	70	185	1000	19-30	271021

Supplies do not include connectors which must be requested separately.



Identification data of appropriate junction

**Ray
tech**

www.raytech.it

CABLE DATA

- 6 kV** (U_{max} 7,2)
 10 kV (U_{max} 12)
 15 kV (U_{max} 17)
 20 kV (U_{max} 24)
 30 kV (U_{max} 36)

CABLE DATA 1

CABLE

- Single core**
 Three-core

CONDUCTOR

- Copper**
 Aluminium

CABLE INSULATION

- Extruded cable**
 Belted cable
 3 lead paper
 1 lead paper with shielded phases

ARMOUR

- Non armoured**
 Armoured wire
 Armoured tape

CABLE SECTION

- 25 mm²**
 35 mm²
 50 mm²
 70 mm²
 95 mm²
 120 mm²
 150 mm²
 185 mm²
 240 mm²
 300 mm²
 400 mm²
 500 mm²
 630 mm²

SHIELD

- Copper wire**
 Copper tapes
 Aluminium tube
 Lead sheath

INCLUDES CONNECTOR

- Yes**
 No

TYPE

- Cold-shrink**
 Heat-shrink

CABLE DATA 2

CABLE

- Single core**
 Three-core

CONDUCTOR

- Copper**
 Aluminium

CABLE INSULATION

- Extruded cable**
 Belted cable
 3 lead paper
 1 lead paper with shielded phases

ARMOUR

- Non armoured**
 Armoured wire
 Armoured tape

CABLE SECTION

- 25 mm²**
 35 mm²
 50 mm²
 70 mm²
 95 mm²
 120 mm²
 150 mm²
 185 mm²
 240 mm²
 300 mm²
 400 mm²
 500 mm²
 630 mm²

SHIELD

- Copper wire**
 Copper tapes
 Aluminium tube
 Lead sheath

INCLUDES CONNECTOR

- Yes**
 No

TYPE

- Cold-shrink**
 Heat-shrink

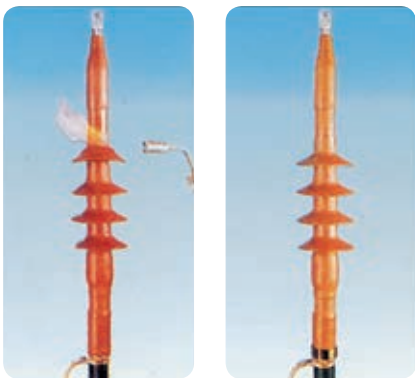
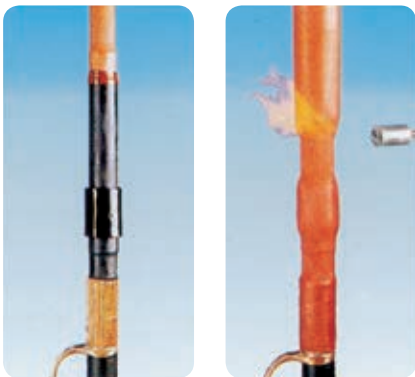
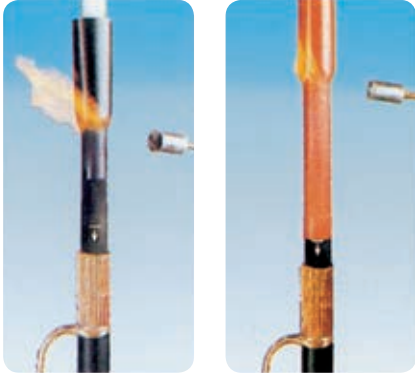
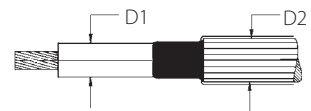


Heat-shrink terminations for **high voltage** up to 72 kV

Kit contains a limited number of components with unlimited shelf life at normal storage conditions. Three basic kits cover all possible cable sections, with the advantage of keeping a reduced and effective stock. The lightness and limited volume of the kits facilitate their handling and transport. No special additional training is required. Simple installation for reliable results. Terminations are in compliance with international specifications (for example IEEE 48, IEC 840, SEN 241434, ESI 09-16, EdF HN-62/5448/2, KEMA S10, CEI 20.24) all included in internal certification testing.

Currently available in 2 classes of HV terminations

- U_o/U=26/45 kV (U max 52 kV)
- U_o/U=36/60 kV (U max 72 kV)



U max 52 kV

FOR INDOOR			
Product	Voltage U _{max} (kV)	∅ D1 insulation (mm)	∅ D2 max. external (mm)
THVE 45/A-I	52	30 - 45	60

FOR OUTDOOR			
Product	Voltage U _{max} (kV)	∅ D1 insulation (mm)	∅ D2 max. external (mm)
THVE 45/A-E	52	30 - 45	60

U max 72 kV

FOR INDOOR			
Product	Voltage U _{max} (kV)	∅ D1 insulation (mm)	∅ D2 max. external (mm)
THVE 60/A-I	72	32 - 40	51
THVE 60/B-I	72	38 - 52	67
THVE 60/C-I	72	50 - 65	82
THVE 60/D-I	72	63 - 77	100

FOR OUTDOOR			
Product	Voltage U _{max} (kV)	∅ D1 insulation (mm)	∅ D2 max. external (mm)
THVE 60/A-E	72	32 - 40	51
THVE 60/B-E	72	38 - 52	67
THVE 60/C-E	72	50 - 65	82
THVE 60/D-E	72	63 - 77	100

Heat-shrink joints for **high voltage** 72 kV

RELIABILITY

The simplicity and lightness of heat-shrink joints for high voltage make these a highly reliable accessory.

SCREW CONNECTORS

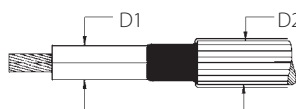
These joints are provided with a special screw connector that allows you to splice large section conductors without special tools and without heat treatment. Screws have a pre-determined breakaway head which ensures perfect electrical connection.

ELECTRICAL FIELD CONTROL

Apply a sheath with electric field control properties of the above the connector and the ends of the cable semiconductor. This heat-shrink tube is rendered conductive at the centre to shield the connector (Faraday system). The field control tube, which covers the cable dielectric, accompanies the expansion due to load cycles.

ADVANCED TECHNOLOGY

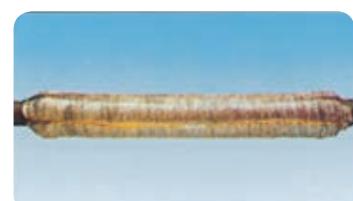
Insulation and shielding are obtained with two double wall heat-shrink elastomeric tubes. The internal tube is formed by two walls co-extruded in insulating material (red). The external tube is formed by a co-extruded insulating wall (red) with a black conductor part which acts as the joint shield. The external wall of the co-extruded wall is heat-shrink, while the internal wall is an elastomer maintained in expanded form thanks to close union with the external part. The application of heat to the external part causes this to contract up to a predetermined diameter, at the same time allowing the internal part to perfectly adapt to the underlying layer.



Product	Voltage U _{max} (kV)	Ø D1 insulation (mm)	Ø D2 max. external (mm)
GEHV 40/A	42	23 - 28	40
GEHV 40/B	42	28 - 40	52
GEHV 40/C	42	38 - 55	68
GEHV 45/A	52	28 - 45	52
GEHV 45/B	52	41 - 61	72
GEHV 45/C	52	53 - 73	83
GEHV 60/A	72	34 - 45	51
GEHV 60/B	72	43 - 60	72
GEHV 60/C	72	52 - 65	77
GEHV 60/D	72	63 - 77	97

Add **SF** to code for wire shielded, **SN** for belt shielded or lead sub-sheath.

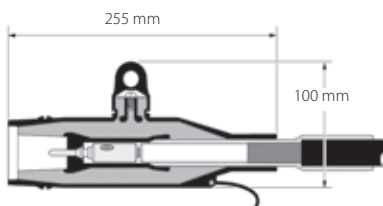
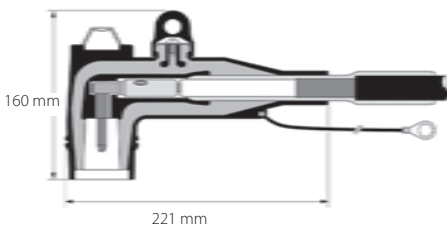
Contact Raytech to choose the most suitable joint.





Complies with standards
CEI 20-62/1
Cenelec HD 629.1 S2

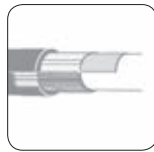
Kit composition:
One single core termination



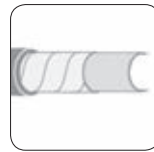
Single core separable connectors with external cone with contact plug In=250 A

Separable connectors for MV cables with extruded radial field for voltages up to 19/33 (36) kV.

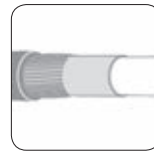
Single core separable connectors with contact plug In=250 A, elbow or straight for extruded cables. External coating in semi-conductive rubber protects personnel from electrocution. Each termination is factory tested before delivery with dielectric strength testing and measurements of partial discharges.



Contact Raytech for aluminium shield cables



Kit available for tape screen. Add "A" to the end of the "Product code"



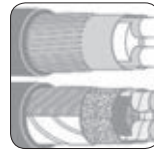
Connection kit for wire shield included



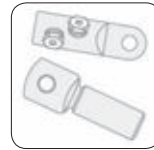
Contact Raytech for information regarding other types of cable



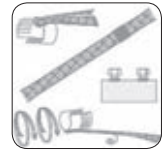
Kit available for three core cables. Order kit "TK." See table



Contact Raytech for different armour grounding systems available



Different types of cable lugs available



Contact Raytech about different shield grounding systems available

SEPARABLE INTERFACE "A" TERMINATION 24KV - 250 A

ELBOW Product	Voltage U _{max} (kV)	Cable insulation diameter range (mm)	Copper/aluminium mechanical conductor cross section range (mm ²)
250 RTS-20/A	24	14,6 - 18,7	25 - 95
250 RTS-20/B	24	17,5 - 20,2	
250 RTS-20/C	24	18,4 - 21,2	
250 RTS-20/D	24	19,7 - 22,5	
250 RTS-20/E	24	21,0 - 23,8	
250 RTS-20/F	24	23,6 - 26,4	

STRAIGHT Product	Voltage U _{max} (kV)	Cable insulation diameter range (mm)	Copper/aluminium mechanical conductor cross section range (mm ²)
250 RTD-20/A	24	14,6 - 18,7	25 - 95
250 RTD-20/B	24	17,5 - 20,2	
250 RTD-20/C	24	18,4 - 21,2	
250 RTD-20/D	24	19,7 - 22,5	
250 RTD-20/E	24	21,0 - 23,8	
250 RTD-20/F	24	23,6 - 26,4	

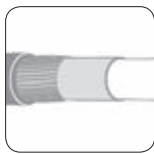
Single core separable connectors with external cone with contact screw $I_n=630/800/1250 A$

Separable connectors for MV cables with extruded radial field, for voltages up to 19/33 (36) kV.

Single core separable connectors with contact screw, for extruded cables. External coating in semi-conductive rubber protects personnel from electrocution. Each termination is factory tested before delivery with dielectric strength testing and measurements of partial discharges.



Kit available for tape screen. Add "A" to the end of the "Product code"



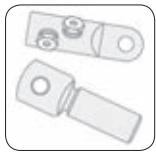
Connection kit for wire shield included



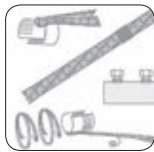
Kit available for three core cables. Order kit "TK." See table



For use in potentially explosive areas (12kV max.) Order: -/ATEX



Different types of cable lugs available



Contact Raytech for different shield grounding systems available



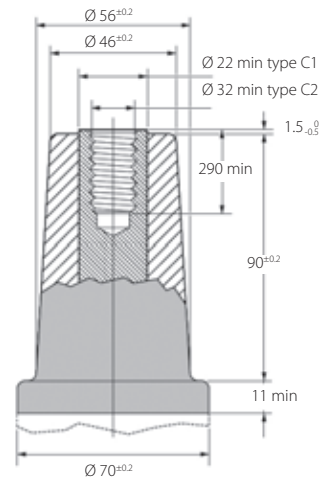
When installed on the appropriate bushing: 1250A continuous



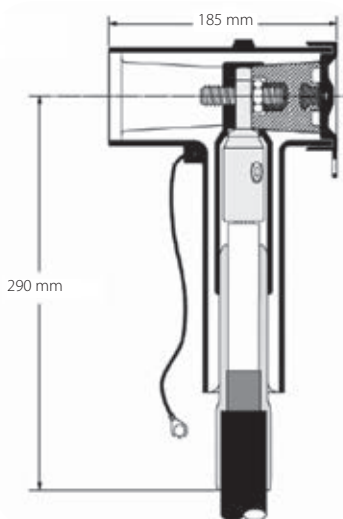
When installed on the appropriate bushing: 800A continuous



Complies with standards CEI 20-62/1 Cenelec HD 629 .1 S2

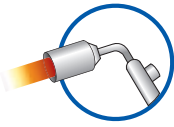


Kit composition:
Three single core terminations



SEPARABLE TEE INTERFACE "C" TERMINATION 24/36KV - 630 A

Product	Voltage Umax (kV)	Cable insulation diameter range (mm)	Copper/aluminium mechanical conductor cross section range (mm ²)
630 RTT-20/A-C95	24	16,0 - 22,0	16 - 95
630 RTT-20/B-C150	24	20,0 - 26,5	50 - 150
630 RTT-20/C-C240	24	23,5 - 31,0	95 - 240
630 RTT-20/D-C240	24	26,5 - 32,5	95 - 240
630 RTT-20/E-C300	24	28,5 - 37,5	120 - 300
630 RTT-30/A-C95	36	16,0 - 22,0	16 - 95
630 RTT-30/B-C150	36	20,0 - 26,5	50 - 150
630 RTT-30/C-C240	36	23,5 - 31,0	95 - 240
630 RTT-30/D-C240	36	26,5 - 32,5	95 - 240
630 RTT-30/E-C300	36	28,5 - 37,5	120 - 300
630 RTO-20/A-C400	24	28,5 - 37,5	185 - 400
630 RTO-20/B-C400	24	34,0 - 42,5	185 - 400
630 RTO-20/C-C630	24	39,0 - 48,5	400 - 630
630 RTO-20/D-C630	24	45,5 - 56,0	400 - 630
630 RTO-30/A-C400	36	28,5 - 37,5	185 - 400
630 RTO-30/B-C400	36	34,0 - 42,5	185 - 400
630 RTO-30/C-C630	36	39,0 - 48,5	400 - 630
630 RTO-30/D-C630	36	45,5 - 56,0	400 - 630



Heat-shrink sheaths

Sheaths for insulating bars inside electrical cabinets or outdoors in primary or secondary cabinets.

APPLICATION

Primary (HV-MV) and secondary (MV-LV) electrical up to 36 kV today come in very compact sizes. Bars need to be insulated to prevent surface discharges and accidental short-circuits that are essentially caused by animal intrusion.

Heat-shrink sheaths for MV can be used on round and rectangular copper or aluminium bars. They are flexible and elastic, can be installed on previously bent bars without any risks of tearing or rippling.

DESCRIPTION

Sheaths utilise a special elastomer cross-linked by irradiation, with an exceptional insulating power and excellent seal over time, even in case of continuous use at high temperature. They do not contain halogens and therefore there is no risk of emission of toxic or corrosive substances in case of fire. They are resistant to solvents, UV radiation, exposure to weather, impact and tear, and therefore are fully suitable for use outdoors.

INSTALLATION

Sheaths for MV can be easily factory installed, when dealing with mass production, using an oven for heat-shrink. In situ, shrinking can be carried out with the aid of a torch or a hot air torch. Heat the sheath to over 120°C and it will shrink on the bar without risk of damage because the material is cross-linked and very resistant to high temperatures. The great elasticity of the sheaths allows, if necessary, for being of the bars during assembly of the electric cabinet with the sheath already installed.



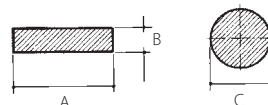
D = \varnothing minimum before shrinkage
 d = \varnothing maximum after free shrinkage
 S1 = nominal thickness as supplied
 S2 = minimum nominal thickness after free shrinkage

BBT

Flexible, **heavy duty** heat-shrink sheath.

Suitable for reducing overhead distances in MV panels up to 36 kV.
 Phase-to-phase distance reduced to approximately 1/3

Product	Size of bus bars (mm)				Heat-shrink sheath (mm)			
	A+B		C		D	d	S ₁	S ₂
BBT 40/16-A/U	28	45	18	32	40	16	1,6	3,8
BBT 65/25-A/U	44	69	28	47	65	25	1,6	3,9
BBT 100/40-A/U	69	102	44	72	100	40	1,6	4,0
BBT 150/60-A/U	102	148	65	105	150	60	1,6	4,0

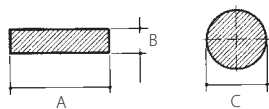


BPM

Flexible, **medium wall** heat-shrink sheath.

Suitable for optimising space in MV panels and for protection from discharges and accidental contact for systems up to 24 kV. Phase-to-phase distance reduced to approximately 1/2

Product	Size of bus bars (mm)				Heat-shrink sheath (mm)			
	A+B		C		D	d	S ₁	S ₂
BPM 15/6-A/U	12	20	6,5	12	15	6	1,1	2
BPM 30/12-A/U	20	38	13,5	25	30	12	1,1	2,2
BPM 50/20-A/U	36	65	22	43	50	20	1,1	2,4
BPM 75/30-A/U	55	95	33	63	75	30	1,1	2,4
BPM 120/50-A/U	90	165	55	105	120	50	1,3	2,8



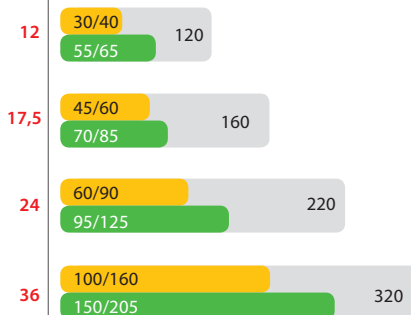
D = Ø minimum before shrinkage
 d = Ø maximum after free shrinkage
 S₁ = nominal thickness as supplied
 S₂ = minimum nominal thickness after free shrinkage

DISTANCES ALLOWED IN BAR SYSTEMS

Phase/phase and phase/bus bars distances recommended with insulated bars with sheaths for MV. Studies and testing carried out on insulated bars have shown that it is possible to significantly reduce space with respect to those used in the case of air insulation. The minimum permitted space is defined by the absence of partial discharges at the time of testing in alternating current and by the seal upon impulse. The values shown can be applied to round or rectangular bars installed inside standard cabinets. Shapes with sharp edges or bar parallels of more than 5 m require larger spaces.

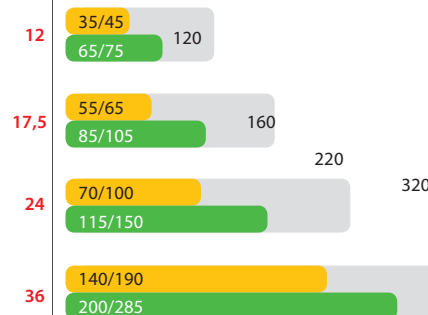
Round bus bars

Voltage Um (kV)



Rectangular bus bars

Voltage Um (kV)



 Spacing in air according to IEC 71-2 phase / phase (mm) phase / bus bars (mm)
 Insulation with BBT
 Insulation with BPM or HVBT with overlap of 2/3

For more information on different possible applications please contact Raytech.

BPTM

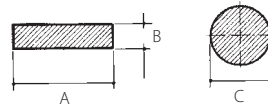
Flexible, **medium wall** heat-shrink sheath.

Suitable for optimising space in MV panels and for protection from discharges and accidental contact for systems up to 24 kV. Phase-to-phase distance reduced to approximately 1/2



D = \varnothing minimum before shrinkage
 d = \varnothing maximum after free shrinkage
 S1 = nominal thickness as supplied
 S2 = minimum nominal thickness after free shrinkage

Product	Size of bus bars (mm)				Heat-shrink sheath (mm)			
	A+B		C		D	d	S ₁	S ₂
BPTM 15/6-A/U	12	20	6,5	12	15	6	1,1	1,9
BPTM 30/12-A/U	20	38	13,5	25	30	12	1,1	2,2
BPTM 50/20-A/U	36	65	22	43	50	20	1,1	2,35
BPTM 75/30-A/U	55	95	33	63	75	30	1,1	2,35
BPTM 100/40-A/U	70	130	44	86	100	40	1,1	2,35
BPTM 120/50-A/U	90	165	55	105	120	50	1,3	2,8
BPTM 175/70-A/U	125	235	80	150	175	70	1,3	2,8
BPTM 205/110-A/U	200	276	127	190	205	110	1,3	2,8



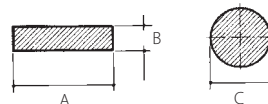
D = \varnothing minimum before shrinkage
 d = \varnothing maximum after free shrinkage
 S1 = nominal thickness as supplied
 S2 = minimum nominal thickness after free shrinkage

BBIT

Flexible, **heavy duty** heat-shrink sheath.

Suitable for reducing overhead distances in MV panels up to 36 kV. Phase-to-phase distance reduced to approximately 1/3

Product	Size of bus bars (mm)				Heat-shrink sheath (mm)			
	A+B		C		D	d	S ₁	S ₂
BBIT 25/10-A/U	17	28	11	20	25	10	1,6	3,6
BBIT 40/16-A/U	28	45	18	32	40	16	1,6	3,6
BBIT 65/25-A/U	44	69	28	47	65	25	1,6	3,6
BBIT 100/40-A/U	69	102	44	72	100	40	1,6	3,6
BBIT 150/60-A/U	102	148	65	105	150	60	1,6	3,6
BBIT 175/80-A/U	133	196	85	125	175	80	1,6	3,6



Heat-shrink tapes

HVBT heat-shrink tape coated in hot melt adhesive for MV.

APPLICATION

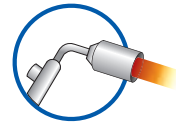
HVBT tape is part of the bar insulation product range. It is a heat-shrink tape coated with a hot melt adhesive on one side.

INSTALLATION

HVBT is installed wrapping it moderately taut on the bar with overlap equal to 2/3. When heated, it shrinks and adheres to the underlying layer. At the same time, the layers of this tape amalgamate to create a continuous insulation sheath.

INSULATION DISTANCE

Refer to the table on page 179 (BPM values) to determine the distances between the bars and toward grounding. HVBT tape is sold in 4 different widths and is coated with adhesive on the outer part. Fibreglass tape used to stop taping is provided with each roll.



HVBT

Self-sealing heat-shrink tape for MV bar insulation.

Product	Width (mm)	Length (m)
HVBT 12-A	25	10
HVBT 14-A	50	10
HVBT 15-A	75	10
HVBT 16-A	100	10

