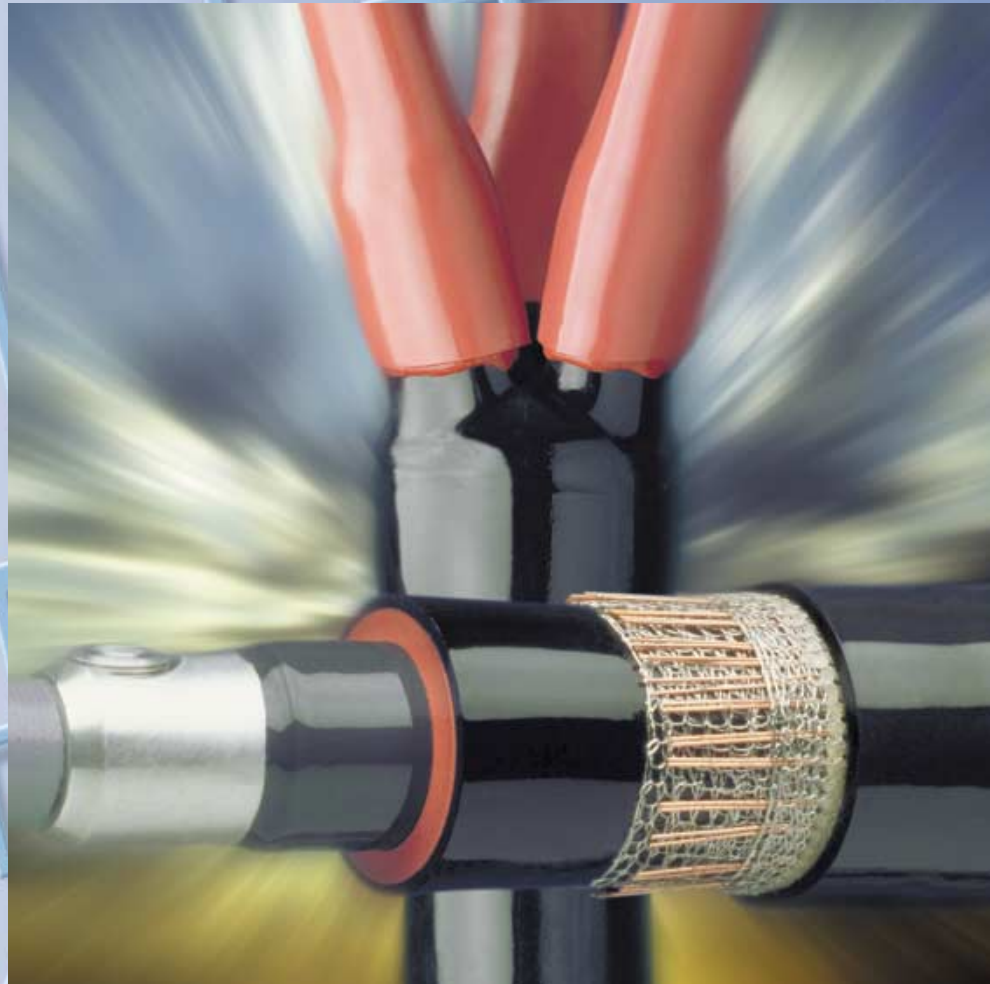
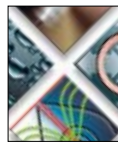


Power Cable Accessories



Catalogue 2003/2004





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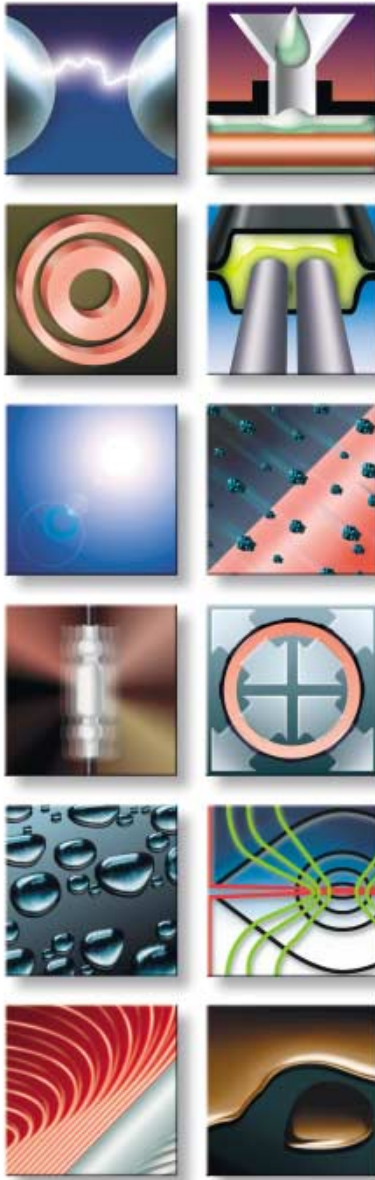
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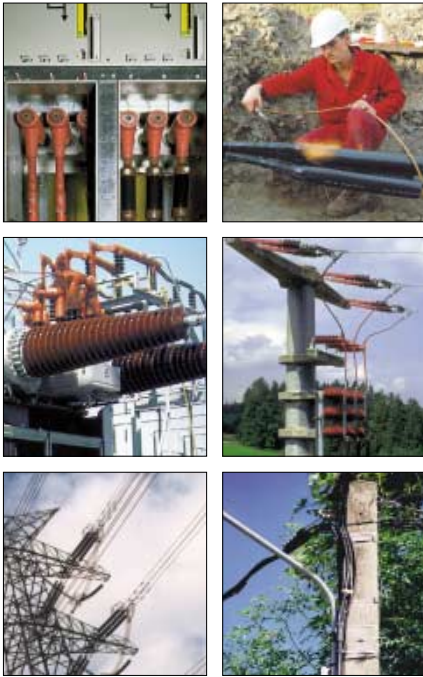
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Introduction

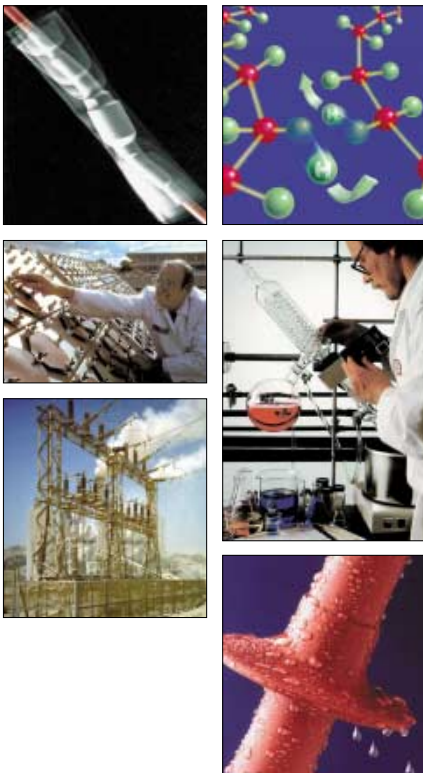
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Tyco Electronics Energy Division

We develop, manufacture and market innovative products which benefit from its advanced know-how in the field of material science. All products are designed to help our customers to improve the reliability and economy of their electrical networks and equipment. Our broad portfolio of products offered for the electrical power industry include cable accessories, surge arresters, insulators, insulation enhancement products, components for electrical equipment as well as connectors and fittings for up to 800 kV.

This catalogue contains terminations, joints, connection boxes and accessories for cable types most commonly used in the electrical distribution and industrial networks of *Central & Eastern Europe / CIS (change to your country!)*. As one of the largest suppliers of cable accessories in the world, Raychem products are offered for nearly all special and foreign cable constructions. Please contact the Raychem products representative for technical support and additional information about cable accessories or the other product lines.



Raychem cable accessories

As a result of sustained and extensive research and long experience in technical support work, Raychem products are developed during the last 3 decades to become a complete system of cable accessories up to 170 kV.

The long-term performance of Raychem heat-shrinkable materials has been demonstrated by the well-proven Raychem accessory system. Millions of installations in some of the most severe service conditions have confirmed the reliability of the Raychem heat-shrinkable technique under high electrical, thermal and environmental stress.

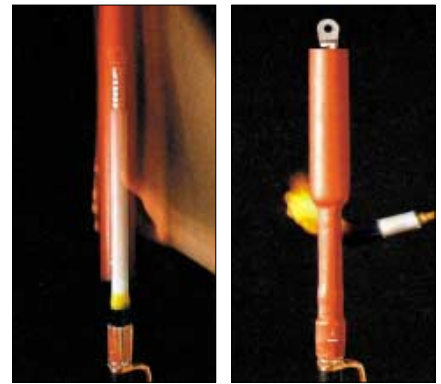
The technology that is common to all Raychem heat-shrinkable cable accessories is based on radiation crosslinked polymers with an elastomeric shape memory. They provide a significantly improved mechanical, chemical and thermal resistance compared to non-crosslinked products.

Raychem cable accessories are distinguished by their good insulating and sealing characteristics, high mechanical toughness and resistance to weathering and chemicals, such as UV radiation and alkaline soils. Because of the large shrink area of the individual parts, it is possible to use a few standard accessories to cover a large range of different cable types and cross sections. This means that warehousing is simple and economical. In addition, Raychem cable accessories can be stored for an unlimited length of time under normal conditions.

The product line includes indoor and outdoor terminations, inline and transition joints as well as universal insulation, sealing and repair systems for use in the cable network. All medium voltage accessories include a stress control system either as separate stress control tubing or integrated as stress control coating in an insulating tubing. In terminations, the insulating tubing ensures a non-tracking and erosion resistant surface and provides an environmental seal to the cable lug and the oversheath. The connection area of joints is covered by an elastomeric dual-wall tubing which provides an interface free insulation and an outer screening.

Installation

No special tools are required for the cable preparation. The installation of the heat-shrinkable parts is performed with a propane gas torch which is usually also used for the preparation of paper and plastic cables. When delivered, all individual parts are stretched so far that they can easily be slid over the prepared cable end. When sufficiently heated, they shrink and firmly enclose the cable and protect it against moisture, while the adhesive melts and fills all grooves and voids. Raychem cable accessories are constructed in a similar way to the cables themselves and can, like these, be bent in narrow spaces. Upside-down installations of terminations are possible simply by turning the heat-shrinkable sheds. The accessories can immediately put into operation after installation.



Test process and qualification

Raychem cable accessories are designed and fully tested to meet Raychem specification PPS 3013 which encompasses the requirements of major national and international standards, e.g.: IEC, CENELEC, GOST, BS CSN, MSZ, PN, STN, STR, VDE, etc. Test reports are available which document the tests performed in test institutes and in Raychem laboratories on the long-term electrical and environmental behaviour of cable accessories and materials.

The currently relevant CENELEC standards tested to are:

HD623.S1:1995 – Specifications for joints, stop ends and outdoor terminations for distribution cables of rated voltage 0,6/1,0 (1.2) kV

HD629.1.S1:1996 – Test requirements on accessories for use on power cables of rated voltages from 3,6/6 (7,2) kV up to 20,8/36 (42) kV.
Part 1: Cables with extruded insulation.

HD629.2.S1:1997 – Test requirements on accessories for use on power cables of rated voltages from 3,6/6 (7,2) kV up to 20,8/36 (42) kV.
Part 2: Cables with impregnated paper insulation.

For product testing and selection we follow the classifications for rated voltages U_0/U (U_m) as referred to in IEC and Cenelec standards:

U_0 is the rated power-frequency voltage between phase conductor and earth or metallic screen for which the cable accessory is designed.

U is the rated power-frequency voltage between phase conductors for which the cable accessory is designed.

U_m is the maximum value of the 'highest system voltage' for which the cable accessory may be used.

To cover all typical voltages in distribution networks, Tyco Electronics Energy Division tests cable accessories to the highest sets of rated voltages: 3,8/6,6 (7,2) kV, 6,35/11 (12) kV, 8,7/15 (17,5) kV, 12,7/22 (24) kV, 19/33 (36) kV and 20,8/36 (42).

The quality standards of all materials throughout the entire manufacturing process beginning with the raw materials and continuing through to the packaged product are continuously monitored and documented. Materials as well as complete accessories are regularly requalified. As a result of our well established Quality Management System including quality assurance, Tyco Electronics Energy Division was one of the first in the industry to achieve a certification according to ISO 9001.



Service

Even the best technology can be applied in the wrong way. To avoid such situations, we have established a technical support service to provide technical information and application guidelines for our customers, such as cable fitters, project and maintenance engineers, constructors, equipment manufacturers and specification and purchasing engineers.

A sound and practice oriented range of services is provided:

- Presentations and Seminars
- Technical papers focusing on new industry trends and products
- Training in cable preparation, installation techniques and product selection for engineers and installers
- Practical demonstrations and field installations
- Solutions to specific customer problems





Quality Standards, Environment, Health and Safety

The quality standards of all materials throughout the entire manufacturing process beginning with the raw materials and continuing through to the packaged product are continuously monitored and documented. Materials as well as complete accessories are regularly requalified. As a result of our well established Quality Management System including quality assurance, Tyco Electronics Energy Division continuously achieves re-certification according to ISO 9001.

Regular installations of Raychem heat-shrinkable cable accessories are considered to present no risk to health based on investigations by independent test institutes and customer evaluations. Moreover, hazards typically associated with cable accessory installations can be eliminated by avoiding any soldering or handling of conventional 2 component or bitumen fillers. No messy or harmful residues requiring special or costly disposal are left over after installation.

Only ecologically sound and recyclable components are used and packaging materials are continuously reduced. Our efforts and investments over the years in improving the environment led not only to the elimination of ozone-depleting materials and substantial reductions of waste materials and water consumption but also to new processes allowing crosslinked materials to be recycled. As a result of these efforts, we have successfully completed the environmental assessment in accordance with ISO 14001 and received a certification as one of the first companies in the industry.



Ordering and delivery

All cable accessories come complete with the necessary electrical insulation materials, installation instructions (in local language) and a bill of material. Solderless earth connections are either included in the kits or can be ordered separately. Cable lugs and connectors are only included if specifically stated. Medium voltage termination kits and joint kits for 3-core cables include materials for all 3 phases, joint kits for single core cables only material for one phase.

We continuously monitor delivery performance and lead times, look for opportunities to shorten cycle times and improve service. We also analyse our responsiveness throughout our distribution network to customers. This is not static, but rather a constantly improving process directed towards our goal: complete customer satisfaction.



Raychem Low Voltage Jointing System

With extensive application over the last decades, the Raychem jointing system for mechanical or crimp connectors is widely used and acknowledged as a highly dependable and easy-to-install jointing method for conventional and modern cable types. The principle of the construction and the simple way of installation are described with a joint for 1 kV plastic insulated cables.

Installation

After preparation of the cable ends according to the installation instruction, the smaller inner tubings as well as the outer tubing are slipped over the cores.

The conductors are now connected with mechanical or crimp connectors. All joints are designed to allow crossing of the cable cores.



The inner tubings are positioned over the connectors and shrunk down to tightly fit the connectors and the core insulation ensuring an adequate wall thickness even around the more bulky mechanical connectors. At the same time the heat causes the adhesive, pre-coated on the inside of the tubings, to melt and flow. The resulting bond seals out moisture and corrosion and conforms to the thermal expansion of the cable.



The outer tubing is positioned over the jointing area and shrunk. The mechanical and sealing functions of the oversheath are assured by this thick-walled tubing. A durable and repeatable seal is produced by means of a hot-melt adhesive pre-applied to the entire length of the tubing.



The joint is complete and can be put into operation immediately.

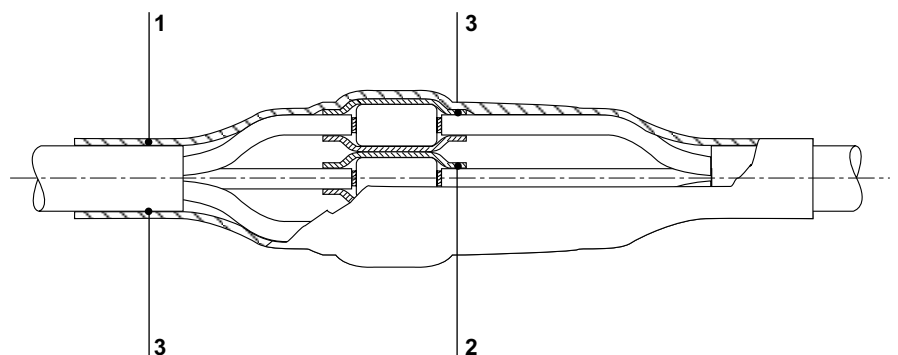


Construction

1 Outer tubings: Thick-wall protection against mechanical stresses and against moisture by sealing onto the oversheath.

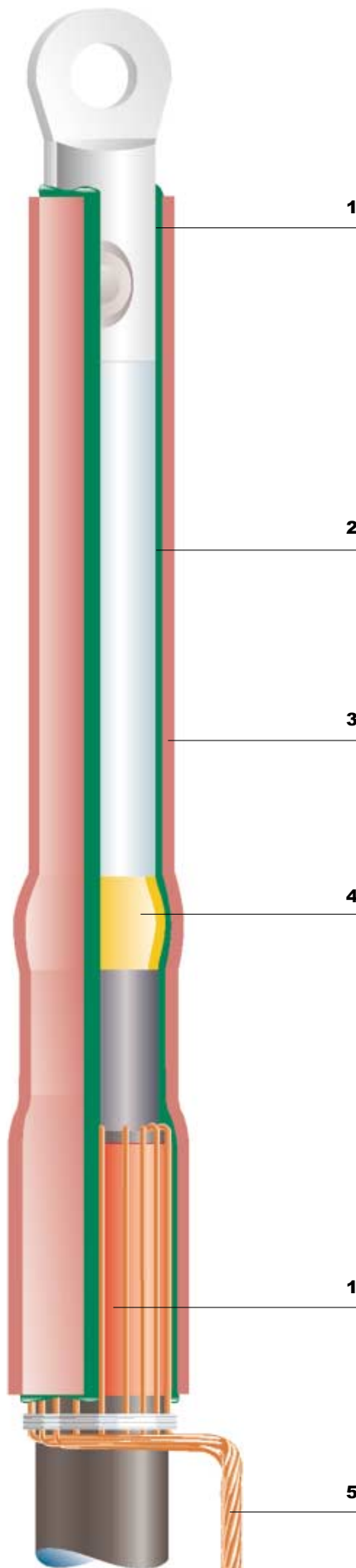
2 Inner tubings: Thick wall tubing providing electrical insulation and protection of the connection area against moisture inside the cable.

3 Hot-melt adhesive



Raychem Medium Voltage Termination System

Raychem developed during the 60's a series of new polymers for use at medium and high voltage. The resulting materials possess exceptional resistance to prolonged electrical stress and weathering, but are also capable of being shrunk down quickly to fit and seal a cable. Raychem accessories provide an universal system of indoor and outdoor terminations for paper or plastic insulated cables, for single or three core cables, for cables with round or sector shaped conductors and most types of screening or armouring.



The following describes the typical modules of a modern medium voltage termination:

1 Moisture sealing

Durable sealing is achieved by special Raychem sealants on the inside of non-tracking, weather-resistant components. At the same time as the installer heats the tubings, the shrinking action causes the sealant to melt and flow into place.

In case of three core cables, a sealant-lined heat-shrinkable breakout installed over the cores and cable crutch provides a sealed and weather-resistant surface from the connecting lugs to the oversheath.

2 Compact and versatile stress control

To meet the need for space-saving, flexible termination design, adaptable to different types of compact equipment, we developed a Raychem material with a carefully controlled non-linear impedance based on ceramic semiconductor technology (ZnO), which is applied in the form of a coating inside the tubing. When the tubing is shrunk, the stress control coating is softened by the applied heat and conforms and bonds to even irregular insulation surfaces to ensure a void free contact. Details of electrical stress control in Raychem terminations can be found on page 10.

3 Non-tracking insulation tubing

The superior non-tracking characteristics and long-term erosion resistance of Raychem terminations have been exhaustively demonstrated in comparative tests at major independent laboratories and Raychem's own extensive development facilities. These results are borne out by the continuing performance of over a million units installed in tropical, desert, arctic and industrially polluted climates, confirming that Raychem terminations do not track even in severe service conditions and verifying their exceptional erosion resistance and reliability. The phenomenon of tracking and erosion is explained on page 11.

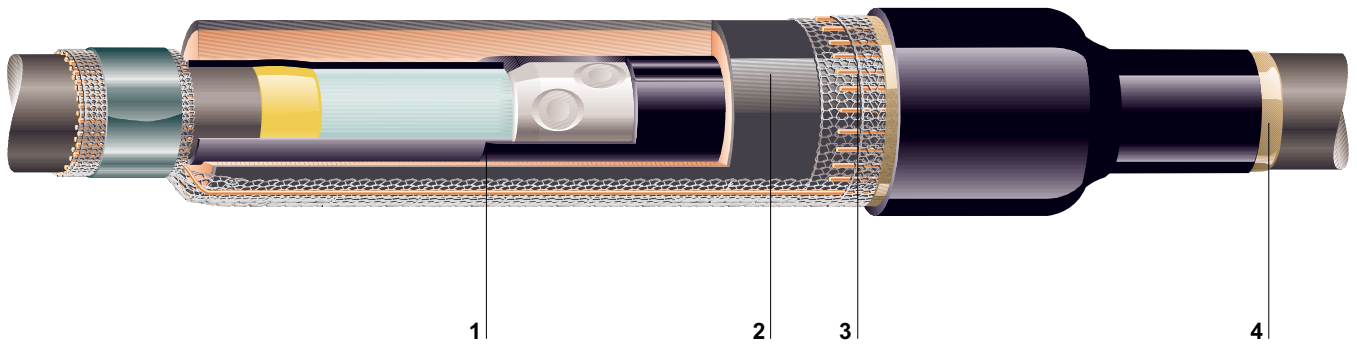
4 Yellow void filler

The semi-conducting void filler is easily applied in form of a short adhesive tape. It ensures that, independent of the type of semi-conductive screen or removal method, no air voids can cause discharges in the high stress area of the screen end.

5 Earthing

Earthing wires or braids are imbedded in the sealing mastic to prevent any corrosion by moisture ingress. For cables with tape screen or metal sheaths with armour solderless earthing systems are either provided within the termination kit or can be ordered separately.

Raychem Medium Voltage Jointing System



Product design

The design of a single-core joint for a polymeric insulated cable is described here. The same design principles are used for 3-core cables. For transition joints, special oil barrier tubings are used to transform draining oil (MI) as well as non draining oil (MIND) paper insulated cable into a quasi polymeric insulated cable with a radial field.

Installation procedure

The elastomeric joint component and the outer sealing sleeve are slid over the prepared cable end. The screen ends are electrically smoothed with a void filling compound and stress control tubings are shrunk over the cable ends. By simply tightening the bolts of the mechanical connector, the conductors are jointed and then covered with a stress control patch. The elastomeric component is quickly shrunk over the connection area. Roll springs and copper mesh rebuild the cable shield and the oversheath is replaced by an adhesive-coated sealing sleeve. All kits are supplied with illustrated step by step instructions.

1 Electrical stress control

The stress control tubing and the patch have a precisely defined impedance characteristic which smoothes the electrical field over the connector and cable screen ends. During installation of the tubings, its shrinking action compresses the special void filler (yellow) and the patch into position round the screen ends and the connector. Pencilling of the insulation at the connector is not necessary.

2 Insulation and screen

The elastomeric sleeve provides the correct thickness of insulation (red) in one step. The insulation screen is provided by the outer wall of the sleeve, which is of heat-shrinkable conductive polymer (black). This technique saves installation time and ensures a flawless bond between joint insulation and screen.

3 Metallic shielding

Copper mesh and roll springs ensure the correct screen connection across the joint area and make electrical contact with the outer screen of the joint.

4 Outer sealing and protection

The heat used to shrink the outer sleeve causes the pre-coated adhesive to melt and flow, resulting in a lasting moisture and corrosion barrier on the cable oversheath. The outer sleeve provides mechanical impact and chemical resistance as expected from cable oversheaths. For armoured cables, Raychem joints incorporate a quick to install galvanised steel joint case or steel tape.



Elastomeric technology – ECIC

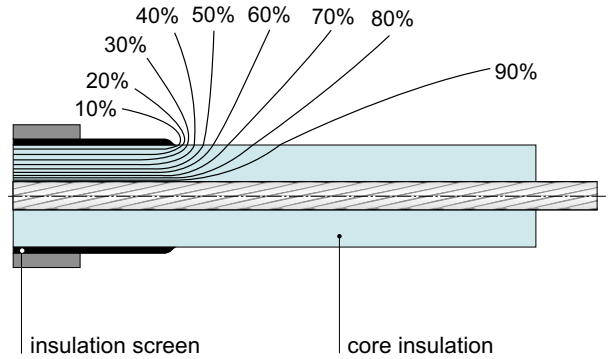
The elastomeric joint component is supplied in an expanded form, in which the heat-shrinkable outer wall holds the insulating at a wide diameter. Application of heat causes the outer wall to shrink, allowing the elastomeric, insulating layer to contract at the same time and closely fit the joint. Elastomers typically experience a reducing of the contraction force after storage and at cold temperatures. By applying heat this effect is overcome allowing an unlimited storage time and installations at low temperatures. The rubber-like characteristics of the insulation material combined with the rigid outer heat-shrinkable wall enable the joint to follow the thermally induced dimensional changes of the cable insulation.

Electrical stress control in cable accessories

Uncontrolled electrical field at the end of a cable

At the end of medium voltage cables where the insulation screen is removed, the equipotential lines are very close indicating high electric stresses. This stress is high enough to ionise the air at the cable surface causing discharges. The temperature and by-products of this ionisation will, over a period of time, degrade the insulation surface. In addition, the stress at the screen end is that high that even the smallest notch would cause a breakdown.

Without stress control

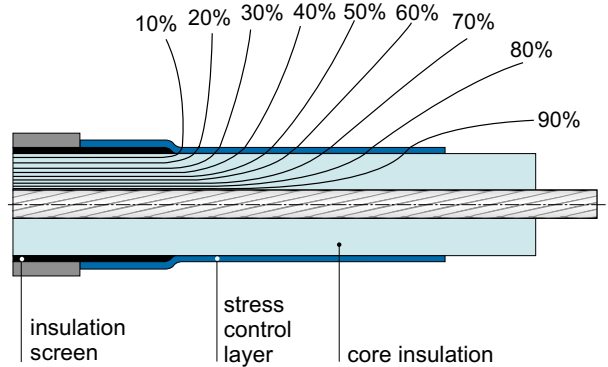


Electrical field with a stress control system (tubing or coating)

Raychem terminations include stress control coatings or tubings with a carefully controlled volume resistivity and permittivity to smooth out the high stress areas. The electrical field strength at the end of the screen cut is reduced to a level well below the upper limit for long term operation.

This slim stress control system can be used on a variety of cable types, including paper cables, and accommodates variations of cable dimensions.

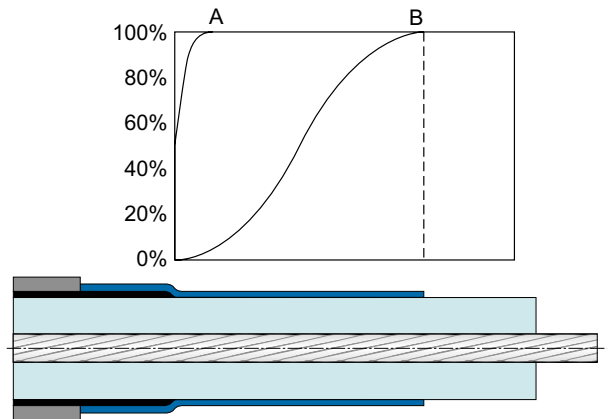
With stress control



Non linear stress distribution

The stress control coatings are made of a material which behaves similar to a varistor. The resulting voltage distribution is non-linear and allows a short termination length while the electrical stress at the screen end area is kept low. In addition, the stress control coating is pressed into small surface irregularities by the shrinking action of the tubing. The result is a perfect interface fit over the insulation which prevents any discharge during operation. Most of the Raychem terminations include this stress control system.

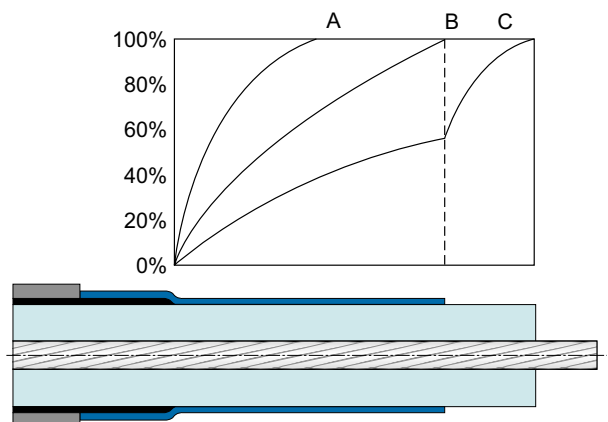
A – without stress control
B – stress control coating



Linear stress distribution

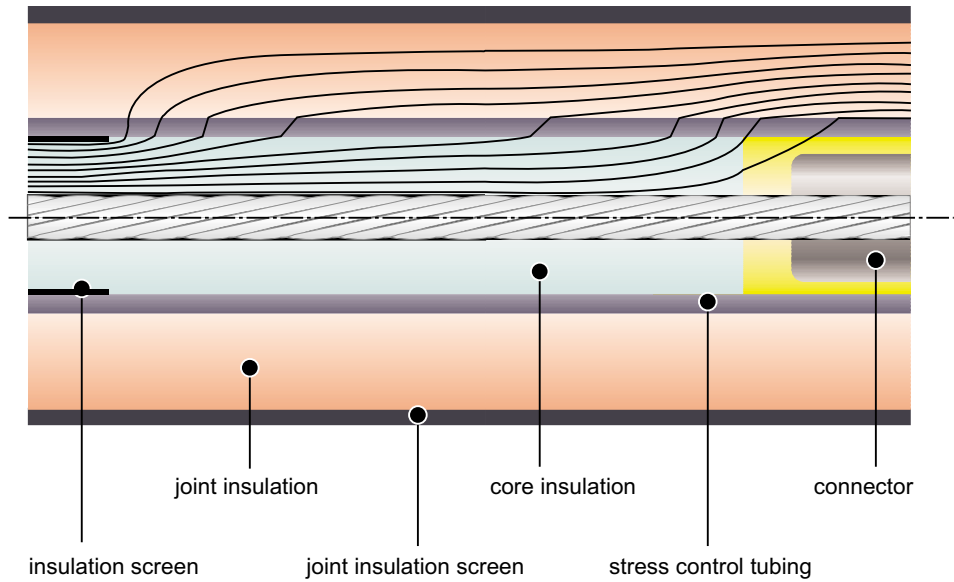
The non-linear impedance of the stress control tubing leads to a linear stress distribution (B). The resulting field depends on correct selection of material properties and length of the tubing. Improper selection of the materials impedance would lead to an unacceptable steep voltage rise at the screen end (A). Reducing the length or wrong positioning would result in discharge at the tubing end (C). All Raychem designed accessories take these effects into account.

A – improper impedance
B – stress control tubing
C – short length



Stress distribution inside a joint

The stress control tubing contacts and overlaps the screen at each end of the joint and controls the stress at these areas in the same way as in terminations. Together with the high permittivity yellow void filler, the stress control tubing separates the equipotentials thus reducing the electrical stresses at the end of the connector. The single layer of insulation bonded to the outer conductive layer has a thickness designed to the rated voltage of the joint and prevents any interfacial discharge. The stress control system of this joint makes it unnecessary to chamfer the cable insulation or to use a connector with specially profiled shape.



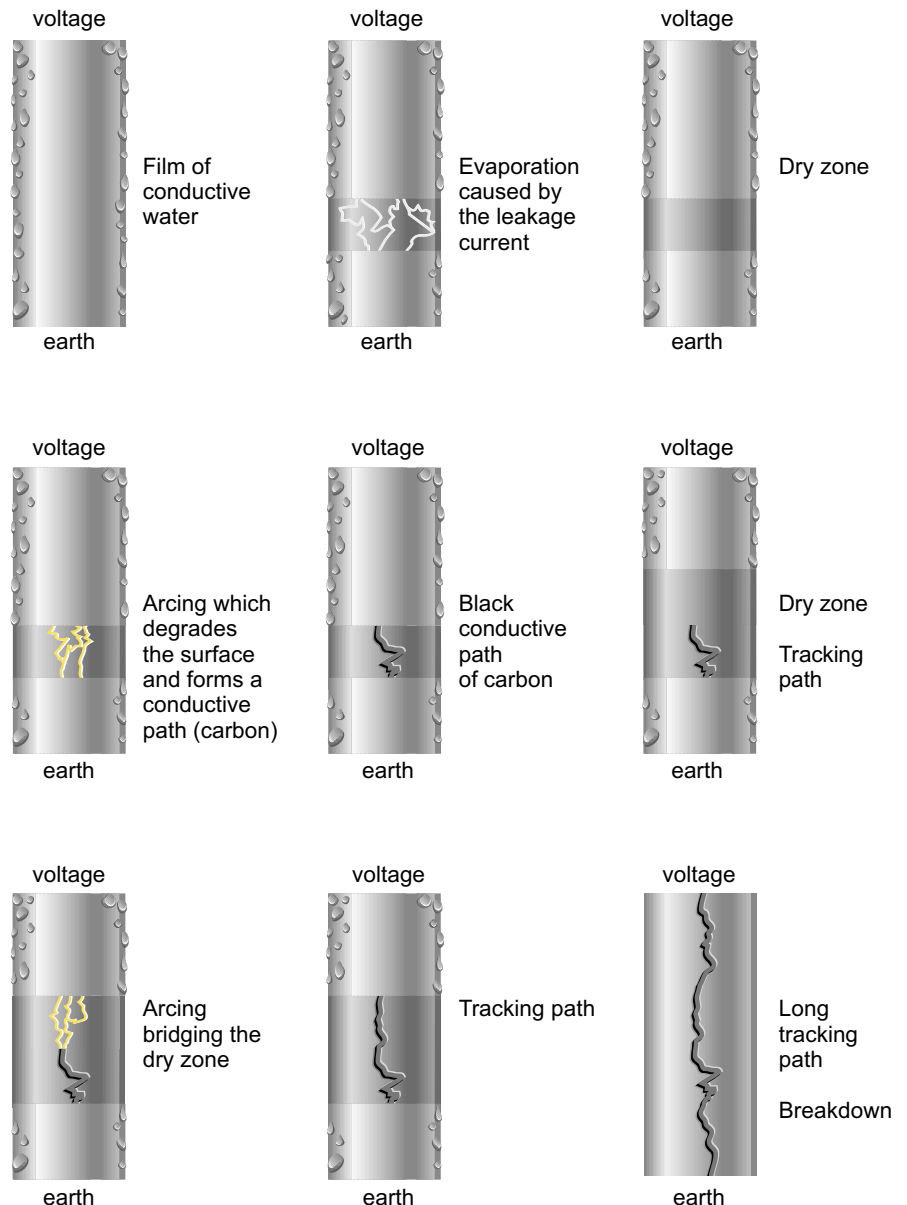
Weathering and ageing resistivity

The excellent weathering and ageing resistance of Raychem cable accessories is continuously proven by natural and accelerated ageing tests. These tests include even 10 years lasting service tests with intensive UV radiation.

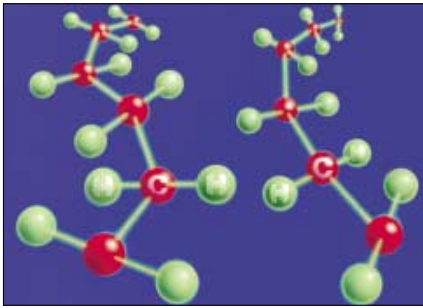
Phenomenon of tracking and erosion

Naturally over time, the surface of terminations, especially in outdoor applications, will become contaminated and leakage currents will develop in wet conditions. Under certain environmental conditions, these leakage currents can deteriorate the surface of a termination by building tracking paths or by erosion. Both would finally lead to a failure of the termination by breakdown.

We have developed specially formulated Raychem insulation materials for heat-shrinkable accessories which resist this phenomenon of tracking as well as other degrading factors like erosion, UV-light or other environmental stresses. This formulation consists of a blend of polymers and a sophisticated additive package which is designed to retain its performance over the lifetime even in the most severe environments.

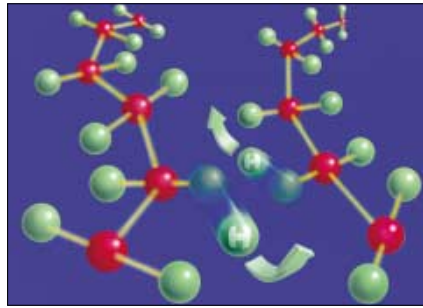


Technology of Heat-Shrinkable Products

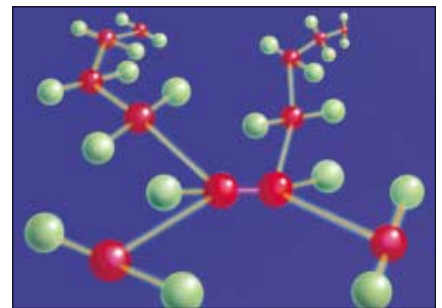


Cross linking and Shape Memory

Thermoplastic materials are composed of extremely long, very thin molecules in a random arrangement. The strength of such a material depends upon the distance between its molecules and the crystalline nature of its molecular structure. As the material is heated, these crystals disappear. The molecules can then slip past each other easily and the material flows. While in this heated condition the material may be formed into almost any desired shape. Then, when the material is subsequently allowed to cool, the crystals reform and again provide substantial strength to retain the plastic in the shape in which it has been formed.



With the advent of atomic energy, the important discovery was made that the exposure of some plastic materials to high-energy electron beams can cause the permanent crosslinking, or intermolecular joining, of adjacent molecules. This crosslinking results in the chemical bonding of the plastic structure into a new three-dimensional system.



Once the material has been crosslinked, it will not melt or flow at any temperature. When the material is heated, the crystals still disappear as before, but it will no longer flow or change shape because the crosslinks act as ties between the molecules. The crosslinked structure, however, is elastic. Thus, when it is heated to a temperature where the crystals have melted, the material behaves like rubber.

Manufacture and Installation of heat-shrinkable tubing



Beaming the tubing causes permanent crosslinking of adjacent molecules. The graphic is an enlarged schematic view of a very small crosslinked section of extremely long molecules and an end view of a piece of heat-shrinkable tubing.



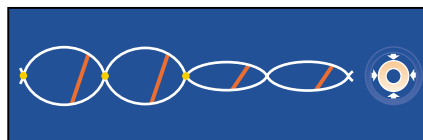
Once the tubing has been crosslinked, the next step in imparting elastic memory is to heat the compound above its crystalline melting point. The molecules are then tied together only by the crosslinks.



While hot, the tubing is deformed by applying pressure, thus stretching the crosslinked molecule.



While in this deformed position, the tubing is cooled; the crystals then reappear, thereby locking the structure together in this deformed condition indefinitely. This is the form in which tubing is supplied to customers.



The customer then heats the tubing, melting the crystals. The crosslinks allow the material to return to its original shape.



After cooling, the crystals reform and the tubing is locked in its recovered form.

Advantages of Raychem heat-shrinkable products

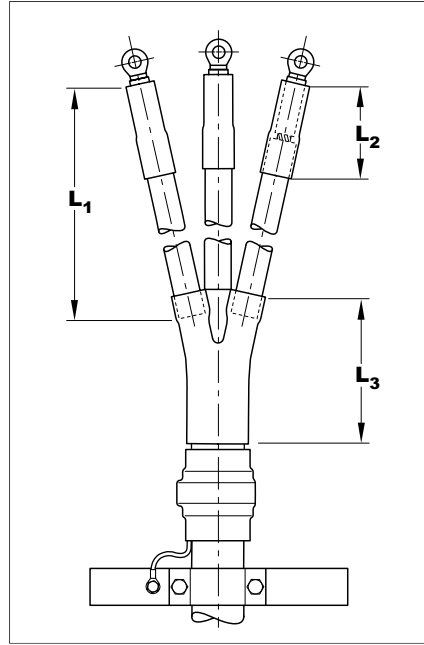
Properties	Advantages	Benefits
Crosslinked material	<ul style="list-style-type: none"> No shelf life Mechanical resistance Chemical resistance Putting into service immediately after installation 	<ul style="list-style-type: none"> No warehouse losses Long lifetime Long lifetime Reduced outage time
Heat-shrinkable	<ul style="list-style-type: none"> Excellent range taking Independent of large cable tolerances Use of hot melt adhesives No reduction of shrink strength Possible to install at low temperatures 	<ul style="list-style-type: none"> Less stock required Installation and operation reliability Excellent sealing and operational reliability Installation reliability Universal use
Raychem design	<ul style="list-style-type: none"> Exceeding specifications Fits on different cable types and sizes of different manufacturers Consistent installation procedures Tolerates typical variations of cable preparation in the field 	<ul style="list-style-type: none"> Operational reliability in demanding environments Universal use Installation reliability Installation reliability
Non toxic and environmentally friendly	<ul style="list-style-type: none"> No health hazards Minor waste, environmentally friendly 	<ul style="list-style-type: none"> Health and safety Low disposal cost
Complete kits with factory tested insulation	<ul style="list-style-type: none"> Simple installation Fast installation 	<ul style="list-style-type: none"> Operational reliability Reduced outage time
Dual wall tubing: elastomeric insulation/ heat-shrinkable screen	<ul style="list-style-type: none"> Improved interfaces Reduced partial discharges 	<ul style="list-style-type: none"> Operational reliability Operational reliability
Stress control tubing, coating or patch	<ul style="list-style-type: none"> Single piece, less risk of misplacement Improved level of partial discharge 	<ul style="list-style-type: none"> Operational reliability Operational reliability



Terminations – Low and Medium Voltage

Terminations for polymeric and paper insulated cables 1 kV	16
Terminations for belted, paper insulated cables (MI and MIND) with one common metal sheath 6 kV and 10 kV	18
Terminations for screened, paper insulated cables (MIND) with one metal sheath per phase 10 kV, 20 kV and 35 kV	20
Indoor terminations for screened, paper insulated (MI) cables with one metal sheath per phase 10 kV and 20 kV	22
Terminations for flexible, screened, rubber insulated cables 6 kV	24
Terminations for unscreened, 3-core polymeric insulated cables 6 kV and 10 kV	26
Terminations for screened, 3-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV	28
Terminations for screened, 1-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV	30
Elastomeric terminations for screened, 1-core polymeric insulated cables with wire screen 10 kV, 15 kV, 20 kV and 35 kV	32
Terminations for screened, polymeric insulated filter cables up to 150 kV D.C.	34
Terminations for polymeric insulated cables for electrified Railway systems 25 kV A.C.	35

Terminations for paper and polymeric insulated cables 1 kV



Dimensions L_1 , L_2 , L_3 see table page 17

Cable

The terminations are designed for 3- and 4-core polymeric insulated cables with or without armour and 3- and 4-core paper insulated cables including cables with reduced neutral conductor.

For example: NAYY, NAYBY, NAKBA, BBГ, ABBГ, ПBГ, AПBГ, AпBГб, AAБBY, ACБY, YAKY, XAKXS, KпFtA, AYKY, CYKY, CNKODY, ANKOY, ANKOPV, NAYY, NAYBY, NAKBA, PP 00-A, XP 00-A, N(A)YY, PP 41-A, N(A)YBY, N(A)YC(W)Y, IPO 13, N(A)KBA.

Design of terminations for polymeric cables

The cable crutch is sealed by an adhesive lined heat-shrinkable breakout, which is installed over the cores and the end of the oversheath. Heat-shrinkable tubings seal between the cable lug and the end of the core insulation. All materials are resistant to UV-light and weathering. A solderless earth connection system consisting of a roll spring and an earth braid is included in terminations for armoured cables. In case UV-light protection of the core insulation is required, a CGPT insulating tubing can be ordered separately. All terminations can be ordered as complete kits or as components. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Design of terminations for paper cables

The cores of the paper cable are covered with heat-shrinkable tubings. All materials are resistant to UV-light, weathering and cable oil. The cable cores can be cut to the required length at the place of installation. A heat-shrinkable breakout and tubings prevent any moisture ingress or oil leakage at the end of the metal sheath or of the cable cores. The kit includes a solderless earth connection system for the metal sheath, consisting of a roll spring, an earth braid, copper mesh and insulating tubing. The kit includes supplementary materials for cable preparation. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

For 3-core cables

The termination includes in addition a solderless neutral connection system for the aluminium sheath, consisting of stainless steel hose clamps, an earth braid and a mechanical lug.

Selection tables for polymeric insulated cables

Complete terminations for 3- and 4-core plastic cables

Terminations without lugs			Terminations including mechanical lugs			Dimensions	
Cross section (mm ²)	Ordering description for cables		Cross section (mm ²)	Ordering description for cables		L ₃ (mm)	L ₂ (mm)
	without armour	with tape armour		without armour	with tape armour		
4– 35	EPKT 0015	EPKT 0015-CEE01				95	50
25– 70	EPKT 0031	EPKT 0031-CEE01	25– 70	EPKT 0031-L12	EPKT 0031-L12-CEE01	165	100
70–150	EPKT 0047	EPKT 0047-CEE01	50–150	EPKT 0047-L12	EPKT 0047-L12-CEE01	215	100
150–400	EPKT 0063	EPKT 0063-CEE01	120–240	EPKT 0063-L12	EPKT 0063-L12-CEE01	220	150

Note: For 3-core cables the concentric neutral wires are sealed with sealing tape S1052-1-500 (length needed per termination approx. 50 mm) and insulated with MWTM tubing (see table for paper cables). Sealing tape S1052 and MWTM tubing have to be ordered separately.

Breakout and tubing components for plastic cable terminations

Cross section (mm ²)	Ordering description Breakout		Cross section (mm ²)	Ordering description Lug sealing tubing	Dimensions (mm)	
		Insulating tubing*			L ₃	L ₂
1,5– 10	502S012/S	CGPT 9/ 3-0	1,5– 10	MWTM 10/ 3- 50/S	60	50
4– 35	502K033/S	CGPT 12/ 4-0	4– 35	MWTM 16/ 5- 50/S	95	50
25– 95	502K046/S	CGPT 18/ 6-0	25– 70	MWTM 25/ 8-100/S	165	100
50–150	502K016/S	CGPT 24/ 8-0	70–150	MWTM 35/12-100/S	215	100
120–400	502K026/S	CGPT 39/13-0	150–400	MWTM 50/16-150/S	220	150

* For outdoor terminations the cores can be protected against weathering and UV-light with the insulating tubing CGPT. Tubing lengths depend on the local installation requirements, technical and ordering details of MWTM and CGPT tubing see pages 98 and 99. For single core cables only a lug sealing tubing is needed

Selection tables for paper insulated cables

Complete terminations for 3-core paper cables

Cross section (mm ²)	Ordering description Core length L1 (mm)*				Dimensions (mm)	
		250 x 4 = 1000	750 x 4 = 3000	1000 x 4 = 4000	L ₃	L ₂
without lugs						
25– 70	GUST 01/3x 25- 70/ 250	GUST 01/3x 25- 70/ 750	GUST 01/3x 25- 70/1000		165	80
70–120	GUST 01/3x 70-120/ 250	GUST 01/3x 70-120/ 750	GUST 01/3x 70-120/1000		215	100
120–240	GUST 01/3x120-240/ 250	GUST 01/3x120-240/ 750	GUST 01/3x120-240/1000		220	150
including mechanical lugs						
25– 70	GUST 01/3x 25- 70/ 250-L12	GUST 01/3x 25- 70/ 750-L12	GUST 01/3x 25- 70/1000-L12		165	80
70–120	GUST 01/3x 70-120/ 250-L12	GUST 01/3x 70-120/ 750-L12	GUST 01/3x 70-120/1000-L12		215	100
120–240	GUST 01/3x120-240/ 250-L12	GUST 01/3x120-240/ 750-L12	GUST 01/3x120-240/1000-L12		220	150

Note: All terminations kits include 1 mechanical lug for the neutral connection.

* The core length L1 can be individually cut to the required length at the place of installation, minimum length is 100 mm. The sum of the core lengths L1 must not exceed 4 times the standard length L1 as given in the table.

Complete terminations for 4-core paper cables

Cross section (mm ²)	Ordering description Core length L1 (mm)*				Dimensions (mm)	
		250 x 4 = 1000	750 x 4 = 3000	1000 x 4 = 4000	L ₃	L ₂
without lugs						
4– 25	GUST 01/4x 4- 25/ 250	GUST 01/4x 4- 25/ 750	GUST 01/4x 4- 25/1000		95	50
16– 70	GUST 01/4x 16- 70/ 250	GUST 01/4x 16- 70/ 750	GUST 01/4x 16- 70/1000		165	80
70–150	GUST 01/4x 70-150/ 250	GUST 01/4x 70-150/ 750	GUST 01/4x 70-150/1000		215	100
120–240	GUST 01/4x120-240/ 250	GUST 01/4x120-240/ 750	GUST 01/4x120-240/1000		220	150
including mechanical lugs						
25– 70	GUST 01/4x 25- 70/ 250-L12	GUST 01/4x 25- 70/ 750-L12	GUST 01/4x 25- 70/1000-L12		165	80
70–150	GUST 01/4x 70-150/ 250-L12	GUST 01/4x 70-150/ 750-L12	GUST 01/4x 70-150/1000-L12		215	100
120–240	GUST 01/4x120-240/ 250-L12	GUST 01/4x120-240/ 750-L12	GUST 01/4x120-240/1000-L12		220	150

* The core length L1 can be individually cut to the required length at the place of installation, minimum length is 100 mm. The sum of the core lengths L1 must not exceed 4 times the standard length L1 as given in the table.

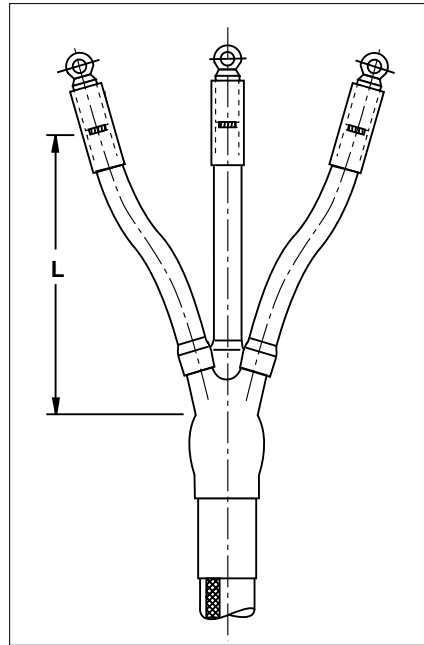
Breakout and tubing components for paper cable terminations

Cross section (mm ²)	Ordering description Breakout		Insulating tubing*	Lug sealing tubing	Dimensions (mm)	
					L ₃	L ₂
4– 25	502K033/S		MWTM 10/ 3-A/U	MWTM 16/ 5- 50/S	95	50
16– 35	502K033/S		MWTM 16/ 5-A/U	MWTM 25/ 8-100/S	95	100
35– 70	502K046/S		MWTM 25/ 8-A/U	MWTM 25/ 8-100/S	165	100
70–150	502K016/S		MWTM 25/ 8-A/U	MWTM 35/12-100/S	215	100
185–300	502K026/S		MWTM 35/12-A/U	MWTM 50/16-150/S	220	150

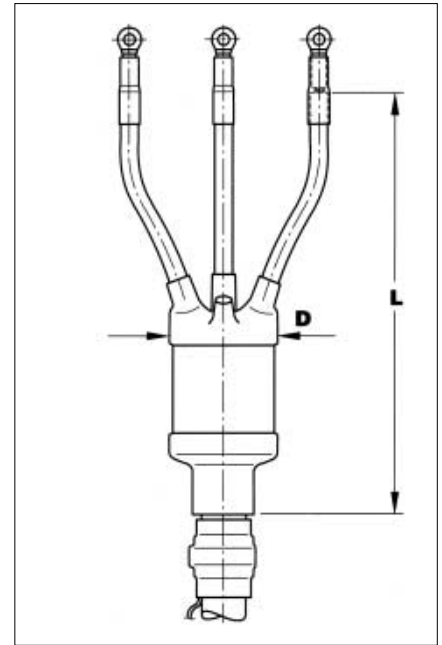
* Tubing lengths depend on the local installation requirements, technical and ordering details of MWTM tubing see pages 98.

Terminations and components for other cable types are available on request.

Indoor terminations for belted, paper insulated cables (MI and MIND) with one common metal sheath 6 kV and 10 kV



Dimension L see table (L min = 450 mm)



EPKT Termination only for MI cables

Cable

The indoor termination is designed for 6 and 10 kV three core belted, paper insulated (MI, MIND) cables. For example: SB, ASB, SAAB, AABY, ASBY, AABY, ACBY, CB2ЛГ, ACБ2ЛГ, СБнГ, ACБнГ, АлвВГ, ПвПГ, Кпу, КнFтly, АкнFтА, АкнFтy, ANKOPV, ANKOPV, CNKOY, CNKODY, IPO 13, IPO 14, NPO 13, NPO 14, N(A)KBA, N(A)KLEY

Design of termination

The paper cores are covered with oil barrier tubing. The crutch is filled with an oil

resistive yellow mastic and is sealed with an adhesive lined, conductive breakout which is installed over the cores and the end of the metal sheath. Yellow stress control mastic is laid around the ends of breakout fingers and the cores are covered with red non-tracking tubing. The end of the termination is sealed either to the cable lug or to the solid conductor with a sealing boot. The kit includes a solderless earth connection. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Design of oil filled terminations for MI cables

The cores are covered with brown, pressure-resistant, oil-barrier tubing. A transparent oil pot with heat-shrinkable moulded parts seals onto the oil barrier tubing and the metal sheath. The pot has to be filled with regular cable oil (not supplied with the termination). Adhesive coated sealing boots ensure an oil tight sealing to the cable lug. Solderless earth connections can be ordered separately.

Termination for MI and MIND cables

Nominal voltage Uo/U (kV)	Cross section (mm ²)	Ordering description without cable lug	with cable lug	Dimension L (mm)
3,5/6 and 6/10	25– 50	GUST 12/ 25- 50/ 450	GUST 12/ 25- 50/ 450-L12	450
		GUST 12/ 25- 50/ 800	GUST 12/ 25- 50/ 800-L12	800
		GUST 12/ 25- 50/1200	GUST 12/ 25- 50/1200-L12	1200
	70– 120	GUST 12/ 70-120/ 450	GUST 12/ 70-120/ 450-L12	450
		GUST 12/ 70-120/ 800	GUST 12/ 70-120/ 800-L12	800
		GUST 12/ 70-120/1200	GUST 12/ 70-120/1200-L12	1200
	150– 240	GUST 12/150-240/ 450	GUST 12/150-240/ 450-L12	450
		GUST 12/150-240/ 800	GUST 12/150-240/ 800-L12	800
		GUST 12/150-240/1200	GUST 12/150-240/1200-L12	1200

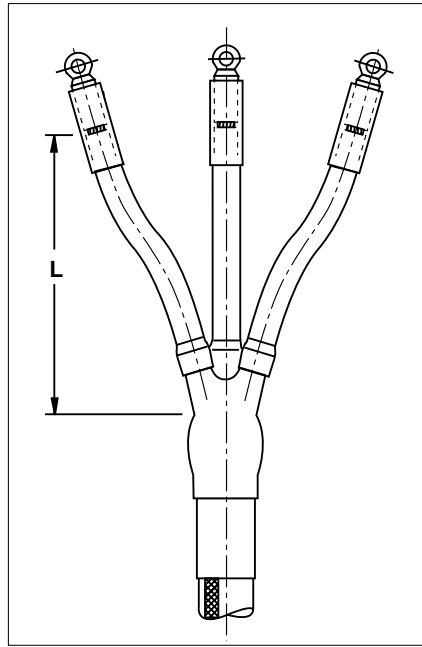
Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 450 mm.

Termination only for MI cables

Nominal voltage Uo/U (kV)	Cross section (mm ²)	Ordering description by length		Dimension D (mm)	Solderless earth connection
		L = 550 mm	L = 900 mm		
3,5/6	16– 35	EPKT-4541	EPKT-4543	101	EAKT-1668-DE01
	50– 120	EPKT-4547	EPKT-4549	101	EAKT-1669-DE01
	150– 240	EPKT-4559	EPKT-4561	125	EAKT-1670-DE01
	300– 400	EPKT-4565	EPKT-4567	125	EAKT-1671-DE01
6/10	16– 35	EPKT-4541	EPKT-4543	101	EAKT-1668-DE01
	50– 95	EPKT-4547	EPKT-4549	101	EAKT-1669-DE01
	120– 185	EPKT-4559	EPKT-4561	125	EAKT-1670-DE01
	240– 300	EPKT-4565	EPKT-4567	125	EAKT-1671-DE01

Note: Longitudinally sealed cable lugs are to be used. The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 550 mm. Solderless earth connection must be ordered separately, it consists of 2 roll springs, earth lead, protection tubing and sealing adhesive.

Outdoor terminations for belted, paper insulated cables (MI and MIND) with one common metal sheath 6 kV and 10 kV



Dimension L see table
 (L min = 450 mm for U_o/U = 3,5/6 kV)
 (L min = 800 mm for U_o/U = 6/10 kV)

Cable

The outdoor termination is designed for 6 and 10 kV three core belted, paper insulated (MI, MIND) cables.
 For example: SB, ASB, SAAB, ASBY, AABY, AABY, ACBY, Kny, KnFty, AknFtA, AknFty, ANKOP, ANKOPV, CNKOOY, CNKODY, ANKOY, IPO 13, IPO 14, NPO 13, NPO 14, N(A)KBA, N(A)KLEY

Design of termination

The paper cores are covered with oil barrier tubing. The crutch area is filled with an oil resistive yellow mastic and is sealed with an adhesive lined, conductive breakout which is installed over the cores and the end of the metal sheath. Yellow stress control mastic is laid around the ends of breakout fingers, and the cores are covered with red non-tracking tubing. The end of the termination is sealed either to the cable lug or to the solid

conductor with a sealing boot. The kit includes a solderless earth connection. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description		Dimension L (mm)
		without cable lug	with cable lug	
3,5/6	25– 50	GUST 12/ 25- 50/ 450	GUST 12/ 25- 50/ 450-L12	450
		GUST 12/ 25- 50/ 800	GUST 12/ 25- 50/ 800-L12	800
		GUST 12/ 25- 50/1200	GUST 12/ 25- 50/1200-L12	1200
	70–120	GUST 12/ 70-120/ 450	GUST 12/ 70-120/ 450-L12	450
		GUST 12/ 70-120/ 800	GUST 12/ 70-120/ 800-L12	800
		GUST 12/ 70-120/1200	GUST 12/ 70-120/1200-L12	1200
150–240	GUST 12/150-240/ 450	GUST 12/150-240/ 450-L12	450	
	GUST 12/150-240/ 800	GUST 12/150-240/ 800-L12	800	
	GUST 12/150-240/1200	GUST 12/150-240/1200-L12	1200	
6/10	25– 50	GUST 12/ 25- 50/ 800	GUST 12/ 25- 50/ 800-L12	800
		GUST 12/ 25- 50/1200	GUST 12/ 25- 50/1200-L12	1200
	70–120	GUST 12/ 70-120/ 800	GUST 12/ 70-120/ 800-L12	800
		GUST 12/ 70-120/1200	GUST 12/ 70-120/1200-L12	1200
	150–240	GUST 12/150-240/ 800	GUST 12/150-240/ 800-L12	800
		GUST 12/150-240/1200	GUST 12/150-240/1200-L12	1200

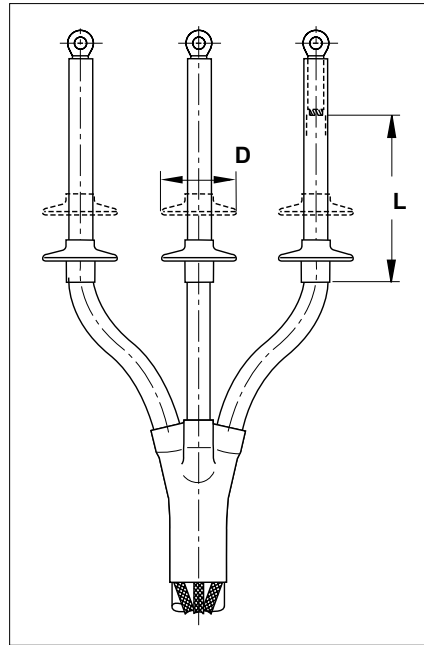
Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 450 mm for U_o/U = 3,5/6 kV and 800 mm for U_o/U = 6/10 kV.

Explanation of MI and MIND:

MI = Mass Impregnated = cable impregnated with draining compound

MIND = Mass Impregnated Non Draining = cable impregnated with non draining compound

Indoor terminations for screened paper insulated (MIND) cables with one metal sheath per phase 10 kV, 20 kV and 35 kV



Dimensions L, D see table

Cable

The indoor termination is designed for 20 and 35 kV screened three and single core paper insulated (MIND) cables with one metal sheath per phase.

For example: ЦАОСБУ, HAKnFtA, HAKNY, HknFty, AMKTQYPVsp., AMKTOYPVsp., AOSB, NPZO 13, NPZOP 13, NPZO 23

Design of termination

Yellow, oil resistant void filling tape is laid around the end of the metal sheath, and the paper cores are completely covered with oil barrier tubing. An oil resistant sealing boot ensures a pressure tight seal to the cable lug. A short conductive tubing rebuilds the screen from the metal sheath to the covered paper core.

Yellow stress grading mastic is laid around the end of the conductive tubing and a stress control tubing is shrunk over the conductive tubing and the covered paper insulation. The end of the cores and the stress control tubing are insulated with non-tracking insulating tubing. Additional skirts are installed onto the tubing (see table). Solderless earth connections can be ordered separately.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)		No. of skirts
			L	D	
6/10	35– 70	EPKT 24B1MI-CEE01	330	85	3 x 1
	95–240	EPKT 24C1MI-CEE01	330	95	3 x 1
12/20	35– 50	EPKT 24B1MI-CEE01	330	85	3 x 1
	70–185	EPKT 24C1MI-CEE01	330	95	3 x 1
	240–300	EPKT 24D1MI-CEE01	330	115	3 x 1
20/35	50– 95	EPKT 36C1MI-CEE01	430	95	3 x 2
	120–185	EPKT 36D1MI-CEE01	430	115	3 x 2
	240–500	EPKT 36E1MI-CEE01	430	115	3 x 2

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used.

Solderless earth connection

Cross section (mm ²)	Ordering description three core cables including breakout	single core cable with lead sheath	single core cable with AL sheath
35–150	EAKT 1678	EAKT 1668-DE01*	
70–150	EAKT 1678	EAKT 1668-DE01*	SMOE 61832*
150–240	EAKT 1679	EAKT 1669-DE01*	SMOE 61832*

* 3 Earth connection kits have to be ordered per termination kit.

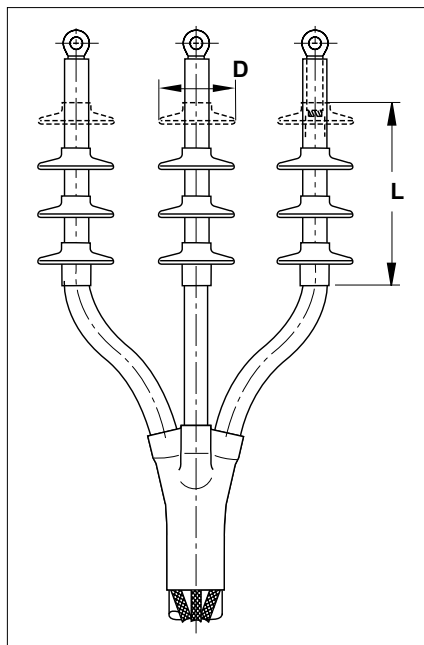
Note: The solderless earth connection kit must be ordered separately. The EAKT include roll springs, earth leads and protection tubings and a heat-shrinkable breakout for three-core cables. The SMOE kit includes a Ligarex connection system (see also tools at page 107).

Explanation of MI and MIND:

MI = Mass Impregnated = cable impregnated with draining compound

MIND = Mass Impregnated Non Draining = cable impregnated with non draining compound

Outdoor terminations for screened, paper insulated (MIND) cables with one metal sheath per phase 10 kV, 20 kV and 35 kV



Dimensions L, D see table

Cable

The outdoor termination is designed for 20 and 35 kV screened three and single core paper insulated (MIND) cables with one metal sheath per phase.

For example: ЦАОСБУ, HAKnFtA, HAKNY, HknFty, AMKTQYPVsp., AMKTOYPVsp., AOSB, NPZO 13, NPZOP 13, NPZO 23

Design of termination

Yellow, oil resistant void filling tape is laid around the end of the metal sheath and the paper cores are completely covered with oil barrier tubing. An oil resistant sealing boot ensures a pressure tight seal to the cable lug. A short conductive tubing rebuilds the screen from the metal sheath to the covered paper core. Yellow, stress grading mastic is laid around the end of the conductive tubing, and a stress

control tubing is shrunk over the conductive tubing and the covered paper insulation. The end of the cores and the stress control tubing are insulated with non-tracking insulating tubing. Additional skirts are installed onto the tubing (see table). Solderless earth connections can be ordered separately.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)		No. of skirts
			L	D	
6/10	35– 70	EPKT 24B1MO-CEE01	410	85	3 x 3
	95–240	EPKT 24C1MO-CEE01	410	95	3 x 3
12/20	35– 50	EPKT 24B1MO-CEE01	410	85	3 x 3
	70–185	EPKT 24C1MO-CEE01	410	95	3 x 3
	240–300	EPKT 24D1MO-CEE01	410	115	3 x 3
20/35	50– 95	EPKT 36C1MO-CEE01	560	95	3 x 4
	120–185	EPKT 36D1MO-CEE01	560	115	3 x 4
	240–500	EPKT 36E1MO-CEE01	560	115	3 x 4

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used.

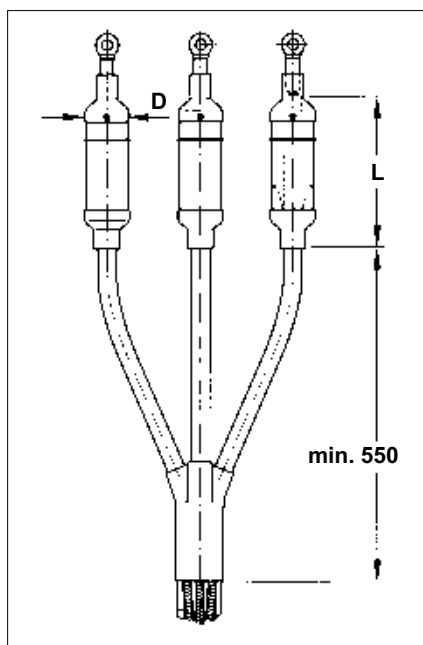
Solderless earth connection

Cross section (mm ²)	Ordering description three core cables including breakout	single core cable	
		with lead sheath	with AL sheath
35–150	EAKT 1678	EAKT 1668-DE01*	
70–150	EAKT 1678	EAKT 1668-DE01*	SMOE 61832*
150–240	EAKT 1679	EAKT 1669-DE01*	SMOE 61832*

* 3 Earth connection kits have to be ordered per termination kit.

Note: The solderless earth connection kit must be ordered separately. The EAKT include roll springs, earth leads and protection tubings or a breakout. The SMOE kit includes a Ligarex connection system (see also tools at page 107).

Indoor terminations for screened, paper insulated (MI) cables with one metal sheath per phase 10 kV and 20 kV



Dimensions L, D see table

Cable

The indoor termination is designed for 10 and 20 kV screened three and single core paper insulated (MI) cables with one metal sheath per phase.

For example: AOUSZB, ЦАОСБУ, АОСБГУ, ОСБУ, АНКООУ, СНКООУ, АНКТОУ-Vsp., АНКТОУР, АОУСЗБ, IPZO 13, IPZOP 13, IPZO 23, N(A)KLEY, N(A)HEKBA, N(A)EKBA

Design of termination

A metallic stress control cone is fixed with binding wire to the end of the metal sheath and screen cut. A transparent oil pot with heat-shrinkable moulded parts seals onto the cable lug and the metal sheath. The pot has to be filled with regular cable oil (not supplied with the termination). Solderless earth connections can be ordered separately.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
6/10	50*	IDST 5121-E11	300	71
	70*	IDST 5121-E12	300	71
	70**	IDST 5121	300	71
	95	IDST 5121	300	71
	120–185	IDST 5122	300	71
	185–300	IDST 5122	300	71
12/20	50*	IDST 5121-E11	300	71
	70*	IDST 5121-E12	300	71
	70**	IDST 5121	300	71
	95–150	IDST 5122	300	71
	150–240	IDST 5123	300	71

* Only for cables with Cu conductor (95 mm² crimp cable lugs and reduction sleeves are included in the kit).

** Only for cables with aluminium conductor.

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. The terminations can be filled with regular cable oil (not included). For filling funnels and cable oil see page 95.

Solderless earth connection

Cross section (mm ²)	Ordering description three core cables including breakout	single core cable with lead sheath	single core cable with AL sheath
35–150	EAKT 1678	EAKT 1668-DE01*	
70–150	EAKT 1678	EAKT 1668-DE01*	SMOE 61832*
150–240	EAKT 1679	EAKT 1669-DE01*	SMOE 61832*

* 3 Earth connection kits have to be ordered per termination kit.

Note: The solderless earth connection kit must be ordered separately. The EAKT include roll springs, earth leads and protection tubings or a breakout. The SMOE kit includes a Ligarex connection system (see also tools at page 107).

Explanation of MI and MIND:

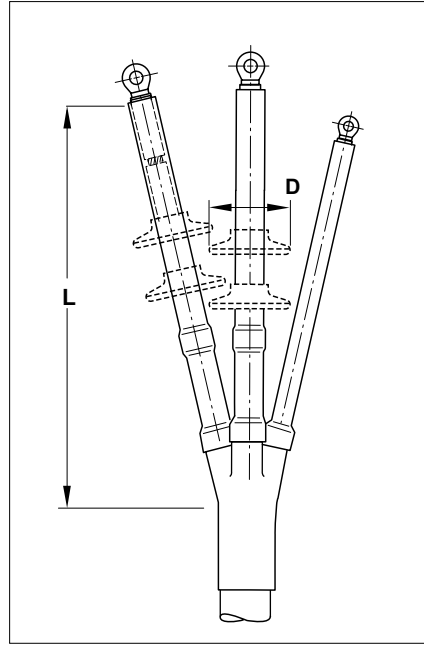
MI = Mass Impregnated = cable impregnated with draining compound

MIND = Mass Impregnated Non Draining = cable impregnated with non draining compound

Long term testing of 10 kV paper cable accessories type GUSJ and GUST at Raychem products development laboratories.



Indoor terminations for flexible, screened, rubber insulated cables 6 kV



Dimension L see table

Cable

The termination is designed for 6 kV screened, flexible, rubber insulated cables with one or three earth cores.

For example: NTSC, КГЭ, КГЭТ, Ogb, Ogc-G, CHCU, CBVU, EpN 64i65, EpN (BN) 64i74, EpN (BN) 76i78, EpN (BN) 78/53.

Design of termination

Stress grading mastic is wrapped around the area of the screen cut. All cores are covered with non-tracking insulating tubing. The area between the end of the oversheath and the cores is sealed and protected by a 6- or 4-finger breakout. The cores remain flexible and can be bent like the cable.

Terminations for other voltages or core lengths are available on request.

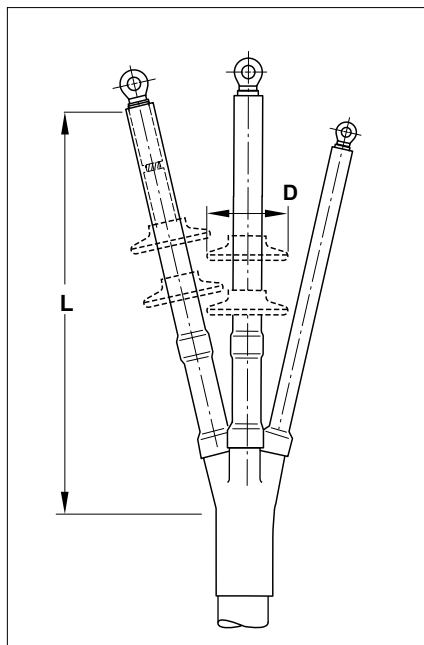
Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description by length	
		L = 450 mm	L = 1200 mm
3,5/6	Cables with 1 earth core		
	10/10 – 70/ 70	EMKT 7A4IH2	EMKT 7A4IH5
	95/95 – 185/185	EMKT 7B4IH2	EMKT 7B4IH5
	Cables with 3 earth cores		
	25/10 – 70/16	EMKT 7E6IH2	EMKT 7E6IH5
	95/16 – 185/35	EMKT 7F6IH2	EMKT 7F6IH5

Note: One termination kit includes material for 3 phases.

The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 300 mm.

Terminations for other voltages or core lengths are available on request.

Outdoor terminations for flexible, screened, rubber insulated cables 6 kV



Dimension L, D see table

Cable

The termination is designed for 6 kV screened, flexible, rubber insulated cables with one or three earth cores.

For example: NTSC, КГЭ, КГЭТ, Ogb, Ogc-G, CHCU, CBVU, EpN 64i65, EpN (BN) 64i74, EpN (BN) 76i78, EpN (BN) 78/53.

Design of termination

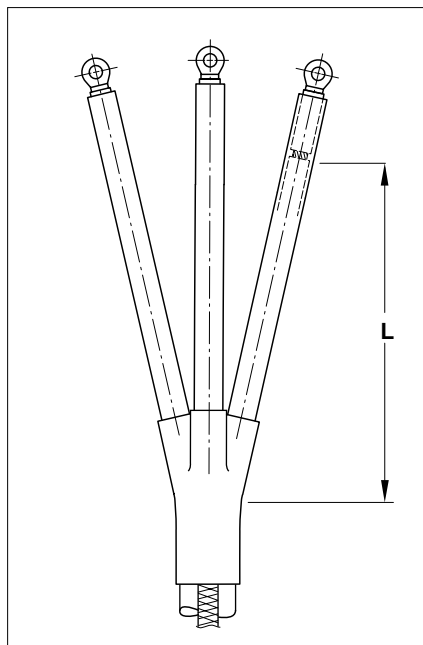
Stress grading mastic is wrapped around the area of the screen cut. All cores are covered with non-tracking insulating tubing. The area between the end of the oversheath and the cores is sealed and protected by a 6- or 4-finger breakout. Outdoor terminations include in addition 2 sheds per phase. The cores remain flexible and can be bent like the cable.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description by length		D (mm)	No. of skirts	
		L = 450 mm	L = 1200 mm			
3,5/6	Cables with 1 earth core					
	10/10– 70/ 70	EMKT 7A4OH2	EMKT 7A4OH5	76	3 x 2	
	95/95– 185/185	EMKT 7B4OH2	EMKT 7B4OH5	85	3 x 2	
	Cables with 3 earth cores					
	25/10– 70/16	EMKT 7E6OH2	EMKT 7E6OH5	76	3 x 2	
	95/16– 185/35	EMKT 7F6OH2	EMKT 7F6OH5	85	3 x 2	

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 450 mm.

Terminations for other voltages or core lengths are available on request.

Indoor termination for unscreened, 3-core polymeric insulated cables 6 kV and 10 kV



Dimension L see table

Cable

The indoor termination is designed for 6 kV and 10 kV unscreened three core plastic insulated cables with armour or copper earth shield.

For example: АПВГ, YAKYFtly, YKYFoY, YAKYFpy, AYKCY, CYKCY, NAYFGY, PP 41-(A), PP 44-(A), PP45-(A), N(A)YFGY.

Design of termination

The cores are covered with non-tracking insulating tubing. The area between the end of the oversheath and the cores is sealed and protected by a non-tracking insulating breakout. Solderless earth connections can be ordered separately

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm) L
3,5/6 and 6/10	16– 50	EPKT 2041	450
		EPKT 2042	650
		EPKT 2043	800
		EPKT 2044	1200
	70–120	EPKT 2051	450
		EPKT 2052	650
		EPKT 2053	800
		EPKT 2054	1200
	150–240	EPKT 2061	450
		EPKT 2062	650
		EPKT 2063	800
		EPKT 2064	1200

Note: One termination kit includes material for 3 phases.

The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 250 mm (450 mm for 10 kV).

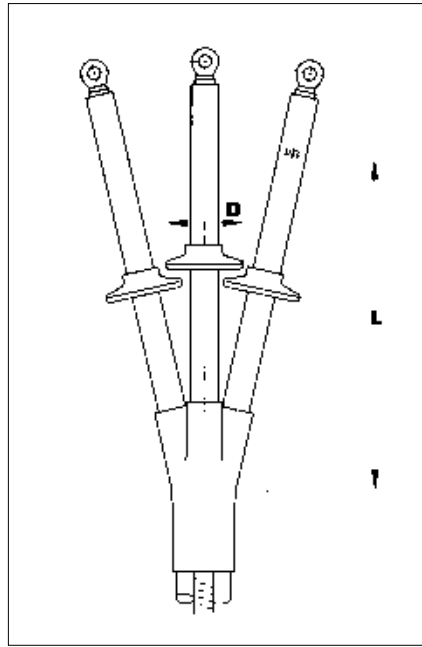
Solderless earth connection for cables with armour or copper tape shield

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description
3,5/6	16– 95	SMOE 60805
	120–300	SMOE 60873
6/10	16	SMOE 60805
	25– 95	SMOE 60873
	120–300	SMOE 62176

Note: The solderless earth connection kit must be ordered separately. It includes a roll spring and an earth lead.

Terminations for motor connection boxes are available on request.

Outdoor termination for unscreened, 3-core polymeric insulated cables 6 kV and 10 kV



Dimensions L, D see table

Cable

The indoor termination is designed for 6 kV and 10 kV unscreened three core plastic insulated cables with armour or copper earth shield.

For example: АПВГ , YAKYFtly, YKYFoy, YKYFtly, AYKCY, CYKCY, NAYFGY, PPO 41-(A), PP 44-(A), PP45-(A), N(A)YFGY.

Design of termination

The cores are covered with non-tracking insulating tubing. The area between the end of the oversheath and the cores is sealed and protected by a non-tracking insulating breakout. Additional skirts are installed onto the tubing (see table).

Solderless earth connections can be ordered separately.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)		No. of skirts
			L	D	
3,5/6 and 6/10	16– 50	EPKT 2292	650	76	3 x 1
		EPKT 2294	1200	76	3 x 1
	70– 120	EPKT 2302	650	95	3 x 1
		EPKT 2304	1200	95	3 x 1
150–240	150–240	EPKT 2312	650	95	3 x 1
		EPKT 2314	1200	95	3 x 1

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 450 mm.

Solderless earth connection for cables with armour or copper tape shield

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description
3,5/6	16– 95	SMOE 60805
	120–300	SMOE 60873
6/10	16	SMOE 60805
	25– 95	SMOE 60873
	120–300	SMOE 62176

Note: The solderless earth connection kit must be ordered separately. It includes a roll spring and an earth lead.

Terminations for motor connection boxes are available on request.

Indoor termination for screened, 3-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV



Cable

The indoor termination is designed for 10, 15, 20 kV and 35 kV screened, three core plastic insulated cables with or without armour or copper tape shield.

For example: N(A)YSEY, NA2XSY, N2XSEY, NA2XS2Y, АпвБ, АпвБШв, АХЕКVCY, АХЕКVCEY, N(A)2XSY, XHP 81, EpHP 81, PHP 48, PHP 84, XHP 48.

Design of termination

The cable is transformed to quasi 3 single core cables which allows to cross the cores even in confined connection spaces. The cores are covered with conductive tubing from the crutch area close to the screen end. The crutch area is sealed and protected with an adhesive lined, conductive breakout which is installed over the cores and the end of the oversheath. Yellow stress grading mastic is laid around the end of the screen cut. A non-tracking insulating tubing coated with stress control and sealing mastic is installed between the end of the conductive tubing and the cable lug. Solderless earth connections for cables with tape shield or armour have to be ordered separately. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Nominal voltage U _o /U (kV)	Terminations without lugs		Terminations with mechanical lugs			
	Cross section (mm ²)	Ordering description by length	Cross section (mm ²)	Ordering description by length		
		L = 450 mm	L = 1200 mm	L = 450 mm	L = 1200 mm	
6/10	10– 16	POLT-12A/3XI-H1	POLT-12A/3XI-H4			
	25– 70	POLT-12C/3XI-H1	POLT-12C/3XI-H4			
8,7/15	95–240	POLT-12D/3XI-H1	POLT-12D/3XI-H4	25– 50	POLT-12C/3XI-H1-L12	POLT-12C/3XI-H4-L12
				70– 120	POLT-12D/3XI-H1-L12A	POLT-12D/3XI-H4-L12A
				120–240	POLT-12D/3XI-H1-L12B	POLT-12D/3XI-H4-L12B
	240–400	POLT-12E/3XI-H1	POLT-12E/3XI-H4			
12/20	35– 70	POLT-24C/3XI-H1	POLT-24C/3XI-H4	25– 50	POLT-24C/3XI-H1-L12	POLT-24C/3XI-H4-L12
	70–240	POLT-24D/3XI-H1	POLT-24D/3XI-H4	70– 120	POLT-24D/3XI-H1-L12A	POLT-24D/3XI-H4-L12A
	185–400	POLT-24E/3XI-H1	POLT-24E/3XI-H4	120–240	POLT-24D/3XI-H1-L12B	POLT-24D/3XI-H4-L12B
20/35	10– 25	POLT-24B/3XI-H1	POLT-24B/3XI-H4	25– 50	POLT-24C/3XI-H1-L12	POLT-24C/3XI-H4-L12
	25– 50	POLT-24C/3XI-H1	POLT-24C/3XI-H4	50– 120	POLT-24D/3XI-H1-L12A	POLT-24D/3XI-H4-L12A
	70–185	POLT-24D/3XI-H1	POLT-24D/3XI-H4	120– 185	POLT-24D/3XI-H1-L12B	POLT-24D/3XI-H4-L12B
	185–400	POLT-24E/3XI-H1	POLT-24E/3XI-H4	185–300	POLT-24E/3XI-H1-L12	POLT-24E/3XI-H4-L12
20/35	50– 120	–	POLT-42D/3XI-H4	50– 120	–	POLT-42D/3XI-H4-L12
	120–300	–	POLT-42E/3XI-H4	120–300	–	POLT-42E/3XI-H4-L12
	300–500	–	POLT-42F/3XI-H4			

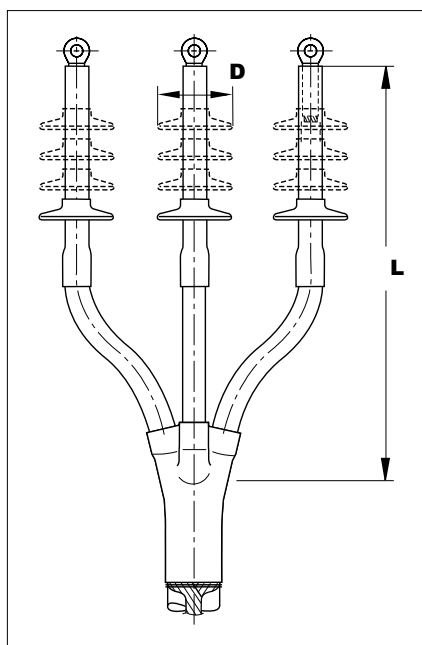
Note: The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 320 mm for U_o/U = 6/10 kV 360 mm for U_o/U = 12/20 kV and 600 mm for U_o/U = 20/35 kV. For terminations with mechanical lugs for M16 bolts use modification code -L16. Solderless earth connections for cables with tape screen have to be ordered separately.

Solderless earth connection for copper tape shielded cables with or without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for cables with tape shield		
		without armour	with tape armour	with wire armour
6/10	10– 50	EAKT-1655	–	–
	35– 120	EAKT-1656	EAKT-1675-CEE01	–
	95–240	EAKT-1657	EAKT-1676-CEE01	EAKT-1657 + EAKT-1643
	240–500	EAKT-1658	EAKT-1677-CEE01	EAKT-1658 + EAKT-1645
8,7/15	35– 95	EAKT-1656	EAKT-1675-CEE01	–
	70–185	EAKT-1657	EAKT-1676-CEE01	EAKT-1657 + EAKT-1643
	185–400	EAKT-1658	EAKT-1677-CEE01	EAKT-1658 + EAKT-1645
12/20	25– 70	EAKT-1656	EAKT-1675-CEE01	–
	50–150	EAKT-1657	EAKT-1676-CEE01	EAKT-1657 + EAKT-1643
	120–400	EAKT-1658	EAKT-1677-CEE01	EAKT-1658 + EAKT-1645
20/35	50–150	EAKT-1658	EAKT-1677-CEE01	EAKT-1658 + EAKT-1644
	50–300	EAKT-1658	EAKT-1677-CEE01	EAKT-1658 + EAKT-1645
	300–500	EAKT-1659	–	–

Note: The solderless earth connection kit must be ordered separately. It includes 3 roll springs and 3 earth leads, for cables with tape armour in addition one larger roll spring. For cables with wire armour, it includes clamping rings, an earth lead and a sealing sleeve.

Outdoor termination for screened, 3-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV



Design of termination

The design and installation is the same as for indoor terminations. In addition skirts are installed onto the tubing (see table). Solderless earth connections for cables with tape shield or armour have to be ordered separately.

Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Dimensions L, D see table

Terminations including mechanical lugs

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description by length		D (mm)	No. of skirts
		L = 450 mm	L = 1200 mm		
6/10	25– 50	POLT-12C/3XO-H1-L12	POLT-12C/3XO-H4-L12	85	3 x 1
	70– 120	POLT-12D/3XO-H1-L12A	POLT-12D/3XO-H4-L12A	95	3 x 1
	120–240	POLT-12D/3XO-H1-L12B	POLT-12D/3XO-H4-L12B	95	3 x 1
8,7/15	25– 50	POLT-24C/3XO-H1-L12	POLT-24C/3XO-H4-L12	85	3 x 3
	70– 120	POLT-24D/3XO-H1-L12A	POLT-24D/3XO-H4-L12A	95	3 x 3
	120–240	POLT-24D/3XO-H1-L12B	POLT-24D/3XO-H4-L12B	95	3 x 3
12/20	25– 50	POLT-24C/3XO-H1-L12	POLT-24C/3XO-H4-L12	85	3 x 3
	50– 120	POLT-24D/3XO-H1-L12A	POLT-24D/3XO-H4-L12A	95	3 x 3
	120– 185	POLT-24D/3XO-H1-L12B	POLT-24D/3XO-H4-L12B	95	3 x 3
	185–300	POLT-24E/3XO-H1-L12	POLT-24E/3XO-H4-L12	115	3 x 3
20/35	50– 120	–	POLT-42D/3XO-H4-L12	95	3 x 4
	120–300	–	POLT-42E/3XO-H4-L12	115	3 x 4

Note: The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 320 mm for U_o/U = 6/10 kV, 460 mm for U_o/U = 12/20 kV and 800 mm for U_o/U = 20/35 kV. For terminations with mechanical lugs for M16 bolts use modification code -L16. Solderless earth connections for cables with tape screen have to be ordered separately, see page 28.

Terminations without lugs

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description by length		D (mm)	No. of skirts
		L = 450 mm	L = 1200 mm		
6/10	10– 16	POLT-12A/3XO-H1	POLT-12A/3XO-H4	76	3 x 1
	25– 70	POLT-12C/3XO-H1	POLT-12C/3XO-H4	85	3 x 1
	95–240	POLT-12D/3XO-H1	POLT-12D/3XO-H4	95	3 x 1
	240–400	POLT-12E/3XO-H1	POLT-12E/3XO-H4	115	3 x 1
8,7/15	10– 25	POLT-24B/3XO-H1	POLT-24B/3XO-H4	76	3 x 3
	35– 70	POLT-24C/3XO-H1	POLT-24C/3XO-H4	85	3 x 3
	70–240	POLT-24D/3XO-H1	POLT-24D/3XO-H4	95	3 x 3
	185–400	POLT-24E/3XO-H1	POLT-24E/3XO-H4	115	3 x 3
12/20	10– 25	POLT-24B/3XO-H1	POLT-24B/3XO-H4	76	3 x 3
	25– 50	POLT-24C/3XO-H1	POLT-24C/3XO-H4	85	3 x 3
	70– 185	POLT-24D/3XO-H1	POLT-24D/3XO-H4	95	3 x 3
	185–400	POLT-24E/3XO-H1	POLT-24E/3XO-H4	115	3 x 3
20/35	50– 120	–	POLT-42D/3XO-H4	95	3 x 4
	120–300	–	POLT-42E/3XO-H4	115	3 x 4
	300–500	–	POLT-42F/3XO-H4	135	3 x 4

Note: The core lengths can be reduced to the requirements at the place of installation, the minimum core length is 320 mm for U_o/U = 6/10 kV, 460 mm for U_o/U = 12/20 kV and 800 mm for U_o/U = 20/35 kV. Longitudinally sealed cable lugs are to be used. Solderless earth connections for cables with tape screen have to be ordered separately, see page 28.

Indoor termination for screened, 1-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV



Cable

The indoor termination is designed for 10, 15, 20 and 35 kV screened single core plastic insulated cables.

For example: АПВВ, ПВП, YHAKXS, XUHAKXS, YHKXS, AXEKVCY, AXEKVCEY, CXEKVCEY, N(A)2XSY, SZAQkrKM, SZAXRkKM, XHE 49, XHP 48, EHP 48, N(A)2XS(F)2Y, AHXAMK-W, NF C 33-223

Design of termination

The screen wires or the earth lead are embedded in sealing mastic. Yellow stress grading mastic is laid around the end of the screen cut. A non-tracking insulating tubing coated with stress control and sealing mastic insulates and seals between the end of the oversheath and the cable lug. Solderless earth connections can be ordered separately. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Nominal voltage U _o /U (kV)	Terminations without lugs		Terminations with mechanical lugs		Dimensions (mm) L
	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description	
6/10	25– 95 95–240	POLT-12C/1XI	25– 70	POLT-12C/1XI-L12	300
		POLT-12D/1XI	70– 150	POLT-12D/1XI-L12A	300
	240–500 500–800	POLT-12E/1XI	120–240	POLT-12D/1XI-L12B	300
		POLT-12F/1XI	185–300	POLT-12E/1XI-L12	300
			400–630	POLT-12F/1XI-L20*	300
8,7/15 and 12/20	25– 70 70–240	POLT-24C/1XI	25– 70	POLT-24C/1XI-L12	340
		POLT-24D/1XI	50– 150	POLT-24D/1XI-L12A	340
	185–400 400–800	POLT-24E/1XI	120–240	POLT-24D/1XI-L12B	340
		POLT-24F/1XI	185–300	POLT-24E/1XI-L12	340
			400–630	POLT-24F/1XI-L20*	340
20/35	50– 120 120–300 300–500	POLT-42D/1XI	50– 120	POLT-42D/1XI-L12	500
		POLT-42E/1XI	120–240	POLT-42E/1XI-L12	500
		POLT-42F/1XI	185–300	POLT-42F/1XI-L12	500
			400–500	POLT-42F/1XI-L20*	500

* terminations with modification code L20 include mechanical lugs with fixing hole for M20 bolts, for copper conductors only up to 500 m²

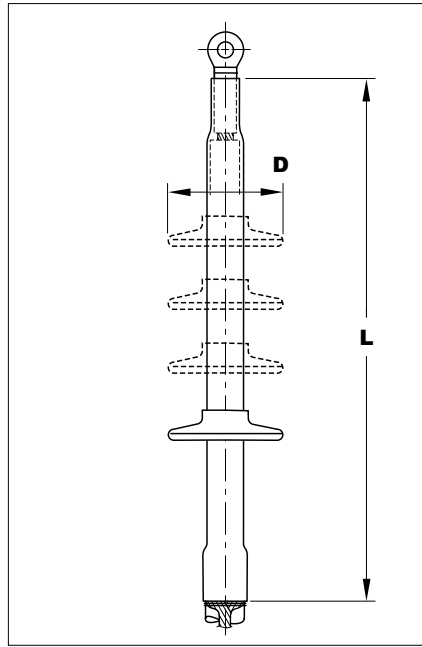
Note: One termination kit includes material for 3 phases. For terminations with mechanical lugs for M16 bolts use modification code -L16. Solderless earth connections for cables with tape screen have to be ordered separately.

Solderless earth connection for cables with tape shield

Cross section (mm ²) for cables with nominal voltage U _o /U				Ordering description
6/10 kV	8,7/15 kV	12/20 kV	22/35 kV	
Cables with bonded aluminium tape shield without armour				
25– 120	25– 120	25– 120		SMOE 62609
95–400	70–300	50–240		SMOE 62589
Cables with copper tape shield without armour				
25– 70				EAKT 1655
35–120	35– 95	25– 70		EAKT 1656
95–240	70–185	50–150	25– 70	EAKT 1657
240–500	185–400	120–400	35–300	EAKT 1658
630–800	500–800	500–800	240–800	EAKT 1659
Cables with copper tape shield and with aluminium wire armour				
70–240	70–185	70–150		SMOE-62822

Note: The solderless earth connection kit must be ordered separately. The SMOE kits include 3 roll springs, 3 earth leads and copper mesh. The EAKT kits for copper tape include 3 roll springs and 3 earth leads. The EAKT kits for cables with wire armour include clamping rings, an earth lead and a sealing sleeve.

Outdoor termination for screened 1-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV



Design of termination

The design and installation is the same as for indoor terminations. In addition, skirts are installed onto the tubing (see table). Solderless earth connections can be ordered separately. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code L16 for M16 bolts.

Dimensions L, D see table

Nominal voltage U _o /U (kV)	Terminations without lugs		Terminations with mechanical lugs		Dimensions (mm)		No. of skirts
	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description	L		
6/10	25– 95	POLT-12C/1XO	25– 70	POLT-12C/1XO-L12	300	85	3 x 1
	95–240	POLT-12D/1XO	70–150	POLT-12D/1XO-L12A	300	95	3 x 1
			120–240	POLT-12D/1XO-L12B	300	95	3 x 1
	240–500	POLT-12E/1XO	185–300	POLT-12E/1XO-L12	300	115	3 x 1
	500–800	POLT-12F/1XO	400–630	POLT-12F/1XO-L20*	300	135	3 x 1
8,7/15 and 12/20	25– 70	POLT-24C/1XO	25– 70	POLT-24C/1XO-L12	440	85	3 x 3
	70–240	POLT-24D/1XO	50–150	POLT-24D/1XO-L12A	440	95	3 x 3
			120–240	POLT-24D/1XO-L12B	440	95	3 x 3
	185–400	POLT-24E/1XO	185–300	POLT-24E/1XO-L12	440	115	3 x 3
	400–800	POLT-24F/1XO	400–630	POLT-24F/1XO-L20*	440	135	3 x 3
20/35	50–120	POLT-42D/1XO	50–120	POLT-42D/1XO-L12	560	95	3 x 4
	120–300	POLT-42E/1XO	120–300	POLT-42E/1XO-L12	560	115	3 x 4
			185–300	POLT-42F/1XO-L12	560	135	3 x 4
	300–500	POLT-42F/1XO	400–500	POLT-42F/1XO-L20*	560	135	3 x 4

* terminations with modification code L20 include mechanical lugs with fixing hole for M20 bolts, for copper conductors only up to 500 m²

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. For terminations with mechanical lugs for M16 bolts use modification code -L16. Solderless earth connections for cables with tape screen have to be ordered separately.

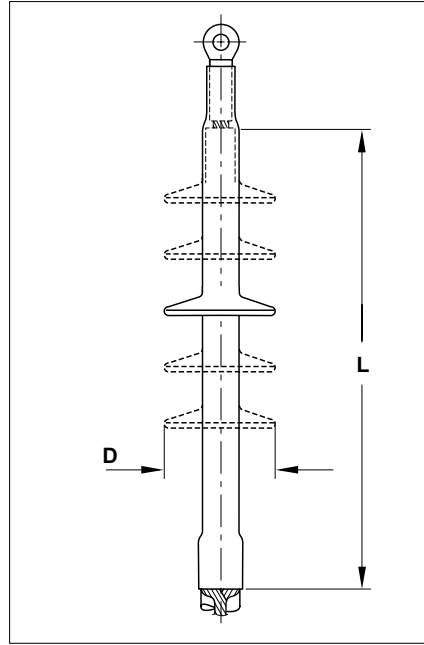
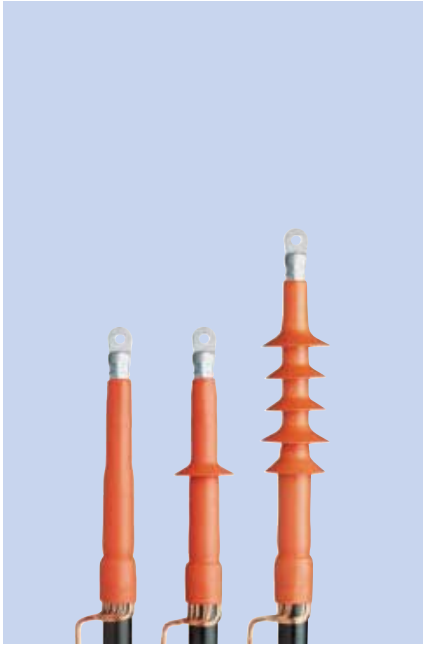
Solderless earth connection for cables with tape shield

Cross section (mm²) for cables with nominal voltage U_o/U

6/10 kV	8,7/15 kV	12/20 kV	22/35 kV	Ordering description
Cables with bonded aluminium tape shield without armour				
25–120	25–120	25–120		SMOE 62609
95–400	70–300	50–240		SMOE 62589
Cables with copper tape shield without armour				
25– 70				EAKT 1655
35–120	35– 95	25– 70		EAKT 1656
95–240	70–185	50–150	25– 70	EAKT 1657
240–500	185–400	120–400	35–300	EAKT 1658
630–800	500–800	500–800	240–800	EAKT 1659
Cables with copper tape shield and with aluminium wire armour				
70–240	70–185	70–150		SMOE-62822

Note: The solderless earth connection kit must be ordered separately. The SMOE kits include 3 roll springs and 3 earth leads and copper mesh. The EAKT kits for copper tape include 3 roll springs and 3 earth leads. The EAKT kits for cables with wire armour include clamping rings, an earth lead and a sealing sleeve.

Elastomeric indoor termination for screened, 1-core polymeric insulated cables with wire screen 10 kV, 15 kV, 20kV and 35 kV



Dimensions L, D see table

Cable

The termination is designed for 10, 15, 20 and 35 kV screened single core plastic insulated cables with wire screen. For example: NA2XS2Y, YHAKXS, XUHAkXS, AXEKVCEY, CXEKVCEY, N(A)2XSY, XHE 49, XHP 48, EHP 48, N(A)2XS(F)2Y.

Design of termination

The screen wires or the earth lead are embedded in sealing mastic. A stress control mastic patch is laid around the end of the screen cut. A highly elastic, non-tracking insulating tubing is slid over the core up to the end of the oversheath. Sealing mastic prevents any

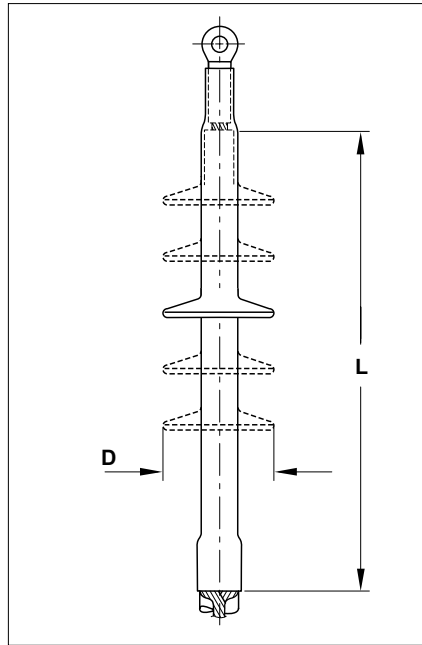
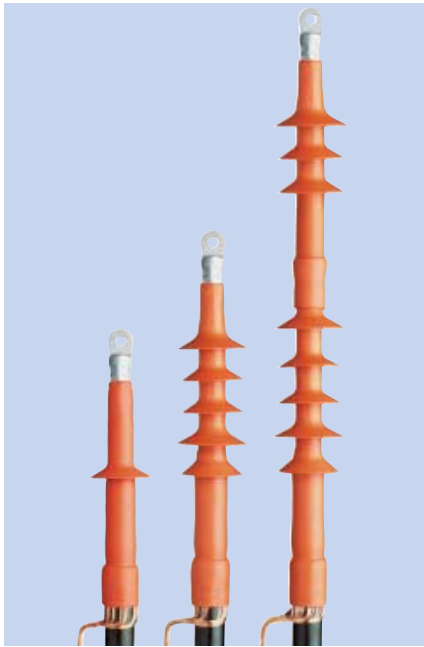
moisture ingress at the cable lug. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Nominal voltage U _o /U (kV)	Terminations without lugs		Terminations with mechanical lugs		Dimensions (mm)		No. of skirts
	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description	L	D	
6/10	25– 70	TFTI-3111	25– 70	TFTI-3111-L12	190	26	
	50–185	TFTI-3121	70–150	TFTI-3121-L12	190	35	
	150–400	TFTI-3131	150–300	TFTI-3131-L12	190	41	
8,7/15	25–120	TFTI-4121	25– 70	TFTI-4121-L12	190	35	
	95–300	TFTI-4131	70–150	TFTI-4131-L12	190	41	
				120–240	TFTI-4131-L12	190	41
	240–400	TFTI-4141	240–400	TFTI-4141-L12	190	46	
12/20	25– 95	TFTI-5121	25– 70	TFTI-5121-L12	300	65	3 x 1
	70–240	TFTI-5131	70–150	TFTI-5131-L12	300	75	3 x 1
				120–240	TFTI-5131-L12	300	75
	240–400	TFTI-5141	240–400	TFTI-5141-L12	300	85	3 x 1
20/35	35– 95	TFTI-6131	35– 70	TFTI-6131-L12	550	75	3 x 5
	95–185	TFTI-6141	70–150	TFTI-6141-L12	550	85	3 x 5
				120–185	TFTI-6141-L12	550	85
	240–300	TFTI-6151	240–300	TFTI-6151-L12	550	95	3 x 5

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. For terminations with mechanical lugs for M16 bolts use modification code -L16.

Terminations for other cross sections, voltages and cable types are available on request.

Elastomeric outdoor termination for screened 1-core polymeric insulated cables with wire screen 10 kV, 15 kV, 20 kV and 35 kV



Dimensions L, D see table

Cable

The termination is designed for 10, 15, 20 and 35 kV screened single core plastic insulated cables with wire screen. For example: NA2XS2Y, YHAKXS, XUHAkXS, AXEKVCEY, CXEKVCEY, N(A)2XSY, XHE 49, XHP 48, EHP 48, N(A)2XS(F)2Y.

Design of termination

The screen wires or the earth lead are embedded in sealing mastic. A stress control mastic patch is laid around the end of the screen cut. A highly elastic, non-tracking insulating tubing is slid over the core up to the end of the oversheath. Sealing mastic prevents any

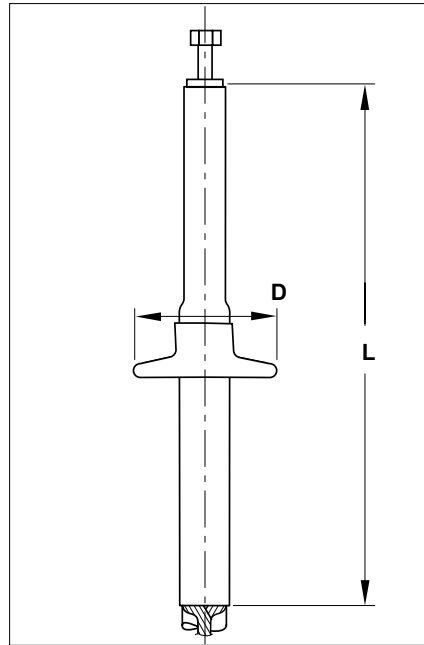
moisture ingress at the cable lug. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts.

Nominal voltage U _o /U (kV)	Terminations without lugs		Terminations with mechanical lugs		Dimensions (mm)		No. of skirts
	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description	L	D	
6/10	25– 70	TFTO-3111	25– 70	TFTO-3111-L12	190	61	3 x 1
	50–185	TFTO-3121	70–150	TFTO-3121-L12	190	70	3 x 1
	150–400	TFTO-3131	150–300	TFTO-3131-L12	190	76	3 x 1
8,7/15	25–120	TFTO-4121	25– 70	TFTO-4121-L12	190	61	3 x 3
	95–300	TFTO-4131	70–150	TFTO-4131-L12	190	70	3 x 3
	240–400	TFTO-4141	120–240	TFTO-4131-L12	190	70	3 x 3
12/20	240–400	TFTO-4141	240–400	TFTO-4141-L12	190	76	3 x 3
	25– 95	TFTO-5121	25– 70	TFTO-5121-L12	300	67	3 x 5
	70–240	TFTO-5131	70–150	TFTO-5131-L12	300	75	3 x 5
	240–400	TFTO-5141	120–240	TFTO-5131-L12	300	75	3 x 3
20/35	240–400	TFTO-5141	240–400	TFTO-5141-L12	300	85	3 x 5
	35– 95	TFTO-6131	35– 70	TFTO-6131-L12	550	75	3 x 8
	95–185	TFTO-6141	70–150	TFTO-6141-L12	550	85	3 x 8
	240–300	TFTO-6151	120–185	TFTO-6141-L12	550	85	3 x 8
			240–300	TFTO-6151-L12	550	95	3 x 8

Note: One termination kit includes material for 3 phases. Longitudinally sealed cable lugs are to be used. For terminations with mechanical lugs for M16 bolts use modification code -L16.

Terminations for other cross sections, voltages and cable types are available on request.

Termination for polymeric insulated Filter Cables up to 150 kV D.C.



Dimensions L, D see table

shrunk over the stress control system and ensure a reliable seal to the lug and the overshield. A mechanical lug covering cross sections from 35 mm² to 95 mm² is supplied with the kit. The mechanical lug has a M10 thread on the top for easy connection to connecting busbars. The termination is supplied as a single phase termination. A solderless earth connection for cables with metal sheath is included in the termination kit.

Testing and performance

Neither national nor international specification exist for filter cable terminations. By understanding the specific operation requirements of a filter cable termination, Raychem developed a test specification and qualified the filter cable termination FCEV to these requirements. The overview of qualification tests is summarized in a table below.

Cable

The termination is designed for screened single core polymeric insulated cables with wire shield or metal sheath, cross section from 35 mm² to 95 mm² and diameter over insulation between 26 mm and 45 mm. Cables designed for A.C. voltages 72,5, 111 or 150 kV usually meet the dimensional requirements.

Design of termination

The cable is prepared in the same simple and easy way as for Raychem medium voltage terminations without sanding or pencilling. Based on the design of Raychem high voltage terminations, the filter cable termination consists of a staggered layer of stress control tubings and patches. A heat-shrinkable non-tracking insulation tubing and shed are

Ordering Description	Cable dimensions				Termination dimensions		
	Cross section mm ²	Diameter of conductor mm	Diameter over dielectric mm	Max. diameter of cable mm	Length mm	Shed diameter mm	Number of sheds
FCEV-111	35–95	6–11,5	24–38	53	500	155	1
FCEV-150	35–95	6–11,5	30–45	60	700	155	2

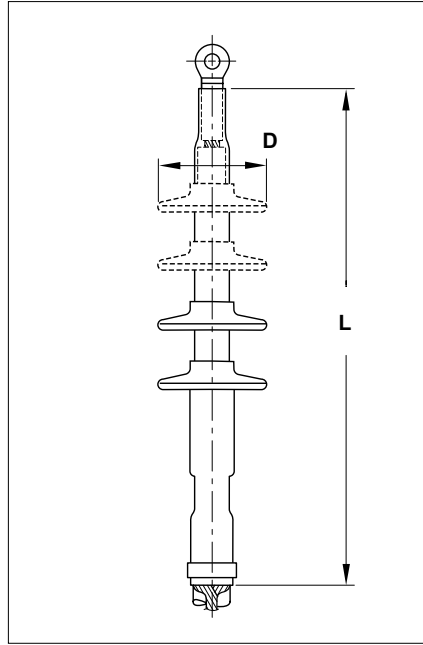
Note: The termination FCEV is supplied as a single phase termination. Terminations for other cable types or dimensions are available on request.

Overview of qualification tests:

Type of test	Passed requirements	
	FCEV 111	FCEV 150
Partial discharge test	< 5 pC at 42 kV AC	< 5 pC at 52 kV AC
DC withstand test	> 8 hours at – 200 kV > 8 hours at + 200 kV	> 8 hours at – 300 kV > 8 hours at + 300 kV
Impulse test (wave shape 1,2/50 µs, chopped)	> 200 times at – 240 kV > 200 times at + 240 kV	> 50 times at – 325 kV > 50 times at + 325 kV
AC withstand test	> 10 minutes at 80 kV	> 10 minutes at 150 kV

Detailed test reports are available on request.

Termination for polymeric insulated cables for electrified Railway systems 25 kV A.C.



Dimensions L, D see table

Cable

The termination is designed for screened single core polymeric insulated cables with wire shield, cross section from 150 mm² to 240 mm² and diameter over insulation between 30 mm and 45 mm. Cables designed for A.C. voltages (3 phase systems) U₀/U_m of 30/52kV or 41/72,5 kV usually meet the dimensional requirements. The termination is tested to IEEE-48-1990 which exceeds the requirements of IEC-60840-1999-2 for cables and accessories with max. system voltages up to U_m 52 kV. This covers applications in railway networks with nominal voltage of 25 kV (phase to ground) as defined in EN 50163 with U_{max1} of 27,5 kV (no time limit) and U_{max2} of 29 kV (max. 5 min).

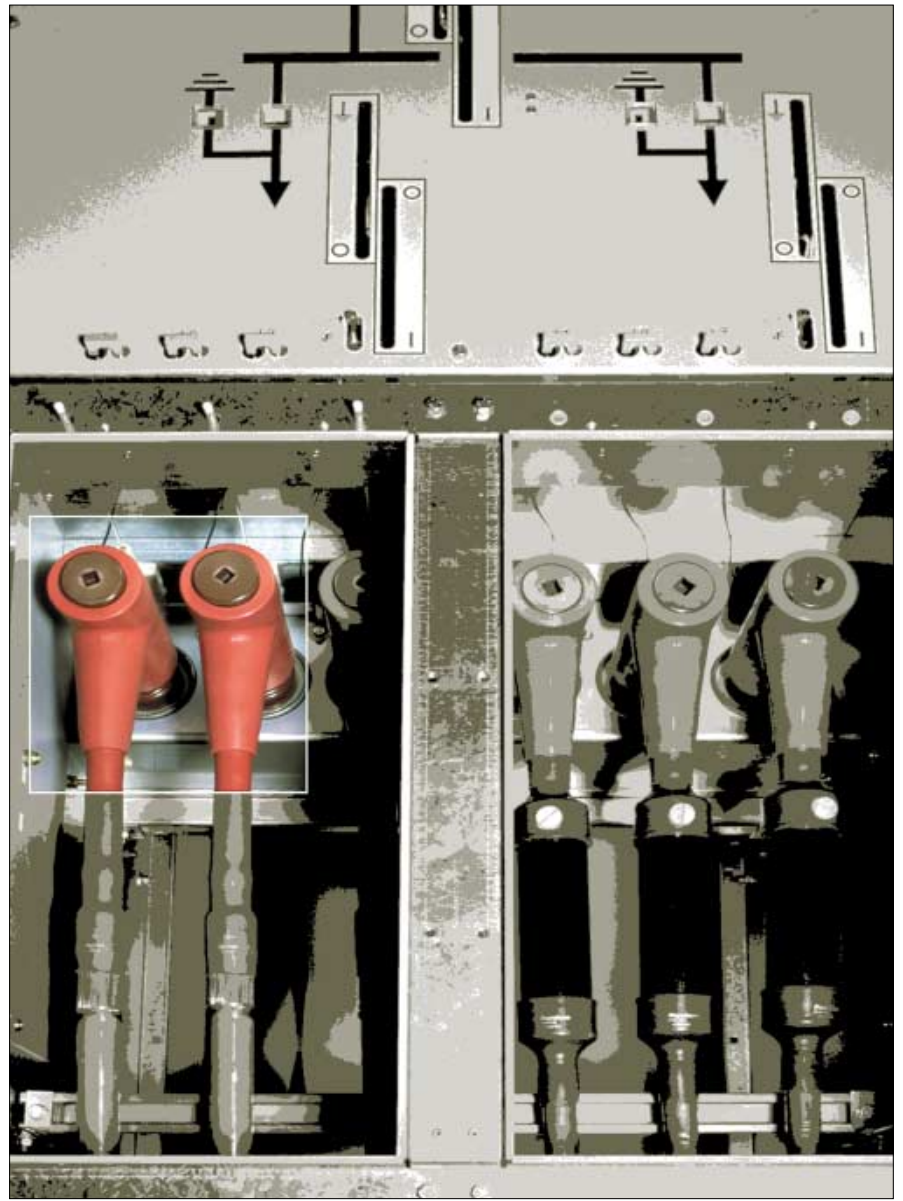
Design of termination

The cable is prepared in the same simple and easy way as for Raychem medium voltage terminations without sanding or pencilling. Based on the design of Raychem high voltage terminations, the termination consists of a staggered layer of stress control tubings and patches. A heat-shrinkable non-tracking insulation tubing is shrunk over the stress control system and ensures a reliable seal to the lug and the oversheath. In addition skirts are separately installed onto the tubing thus allowing also upside down installations.

A mechanical lug covering cross sections from 150 mm² to 240 mm² is supplied with the kit. Kits with the modification code -L12 include mechanical lugs with a busbar connection hole for M12 connection bolts, with code -L16 for M16 bolts. The termination is supplied as a single phase termination. The termination has no supporting function and needs to be fixed at top and bottom. A solderless earth connection for cables with metal sheath is available on request.

Ordering Description	Cable dimensions			Termination dimensions		
	Cross section mm ²	Diameter over dielectric mm	Max. diameter of cable mm	Length mm	Shed diameter mm	Number of sheds
Indoor termination RWIT-25/1x150-240-L12	150–240	30–45	60	750	155	2
Outdoor termination RWOT-25/1x150-240-L12	150–240	30–45	60	900	155	4

Note: The termination is supplied as a single phase termination. Terminations for other cable types or dimensions are available on request.



Connection Systems for gas-insulated switchgear

Universal connection system for gas-insulated switchgear	38
Insulated T-adapter and straight adapter system for gas-insulated switchgear with bushings according to EN-50181 type C (400/630 A), 10 kV, 15 kV and 20 kV	40
Screened, separable T-connection system for gas-insulated switchgear with bushings according to EN-50181 type C (400/630 A), 10 kV, 15 kV, 20 kV and 35 kV	42
Screened elbow and straight adapter system for gas-insulated switchgear and transformers with bushings according to EN-50181 type A (250 A), 10 kV, 15 kV and 20 kV	44

Universal connection system for gas-insulated switchgear

The increasing popularity of gas-insulated switchgear called for the development of an appropriate connection to the bushing profile according to EN 50181 type C (400/630A) and type A (250A).

For bushings to EN 50181 type C (400/630A):

The RICS and RCAB insulating adapter is compatible with all Raychem terminations and can thus be used to connect any type of cable, irrespective of whether it is paper or polymeric insulated or has one or three cores. For more details see below and on page 40.

The RSTI screened connection system is designed to connect polymeric insulated cables; details are given on page 42.

For bushings to EN 50181 type A (250A):

The RSES and RSSS screened connection system is a push-on termination for polymeric insulated cables, designed for the connection between the switchgear and the transformer; details are given on page 44.

Simplified installation

The compact design of the connection systems and their clear cut profiles simplify installation. Standard cabinets need no costly modifications to connect paper cables or surge arresters.

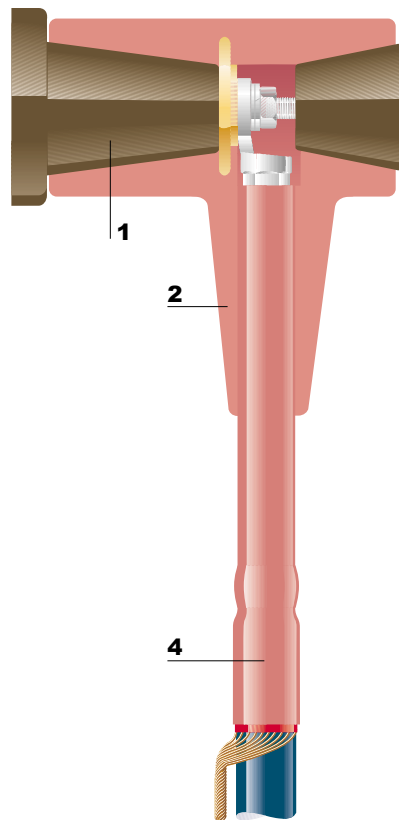
Reliability

With several decades of experience in the field of hermetically insulated termination systems for medium voltage applications, Raychem adapters are water tight and guarantee uninterrupted operation, even under extreme environmental conditions with severe pollution.

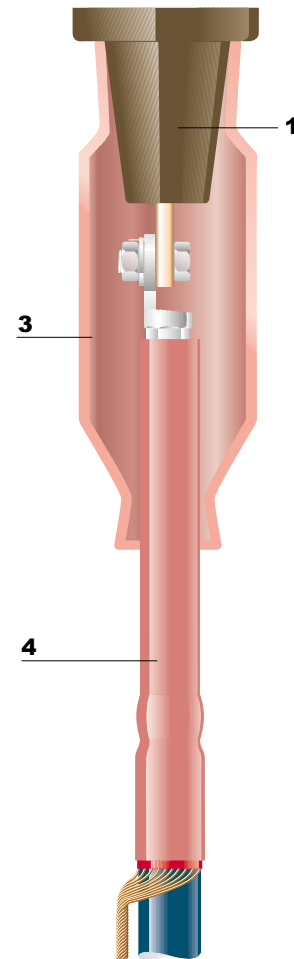
Tests

The adapters meet Cenelec HD629.1S1, IEC 540, VDE 0278 and ANSI IEEE 386 standards, as well as the Raychem specification PPS 3013, in addition they were type tested together with most switchgear. The test requirements and results are summarised in Raychem test reports, which are available on request.

Insulated T-adapter RICS



Insulated straight adapter RCAB



- 1 Bushing Cone
- 2 RICS-adapter
- 3 RCAB-adapter
- 4 Raychem termination

Insulated adapter termination system for SF₆-insulated switchgear up to Um 24 kV

The insulated adapter termination system provides perfect sealing, electrical insulation and an electrical connection between Raychem terminations and gas-insulated switchgear up to 24 kV. It is designed to fit bushing profiles according to EN 50181 type C (400/630A).

The insulating adapters are compatible with all Raychem terminations.

The cable box of the switchgear must be provided with suitable protection against electric shock. This is usually achieved by self-locking metal covers the switchgear is generally equipped with. In addition it ensures that nobody can accidentally start working in an unearthed connection zone.

RICS – Insulated T-adapter with or without surge arrester

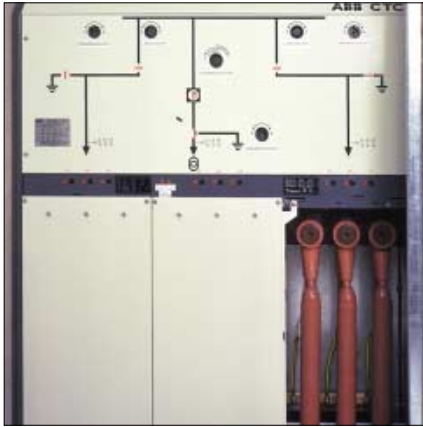
Thick walled insulator made of high quality elastomer with sealing face over the termination, bushing cone and plug. The electrical connection is made with a terminal stud and the cable lug of the termination. A special plug which allows cable testing without disconnecting the adapter is also offered. The design of the adapter for connecting the surge arrester is basically identical. The elastomer insulator has an additional lead-in duct for the surge arrester type RDA. Adapters for two cable connections are also available.

RCAB – Insulated straight adapter

A highly flexible insulator made of high quality elastomer provides a hermetic seal over the cone of the bushing and the termination. The cable lug of the termination is simply connected to a terminal stud with a screw and bolt. Even in confined spaces the adapter can be easily pulled down from the bushing giving access for e.g. cable testing. The high flexibility of the elastomer integrated in the design of the sealing interface allows to use the same product for all cable types and common cross sections.

Universal adapter system for all types of cables and your switchgear

ABB CTC



ALSTOM FBA



Groupe Schneider RM6



ABB ZL4



Moeller GA



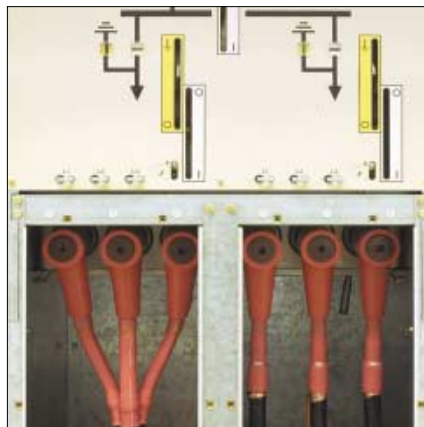
ALSTOM FBA



Konçar VDA 24



Siemens 8DJ10



Holec



Driescher G.I.S.E.L.A



For technical information regarding connections to other switchgear please contact your local Raychem products representative.

RICS, RCAB – Insulated T-adapter and straight adapter system for gas-insulated switchgear with bushings according to EN 50181 type C (400/630A), 10 kV, 15 kV and 20 kV

Scope of supply

RICS – T-adapter

The insulating body, fixing bolts, terminal stud and backplug are supplied in a 3-phase set complete with installation instruction. Cable lugs and terminations are not included.

For double T-connections, only the second adapter is of special design and includes connection plug, insulating body, fixing bolts, terminal stud and backplug. It can be combined with any first adapters with M16 lugs, but not with adapter for surge arresters type RICS-51x9

RCAB – Straight adapter

The insulating body is supplied in a 3-phase set complete with installation instruction. Fixing bolts, terminal stud and cable lugs are not included. Terminal studs with a M16 thread can be ordered separately as EXRM-1366. The adapter is to be used in combination Raychem terminations:

Up to 12 kV	
35–300 mm ²	RCAB4120
Up to 24 kV	
50–300 mm ²	RCAB5120

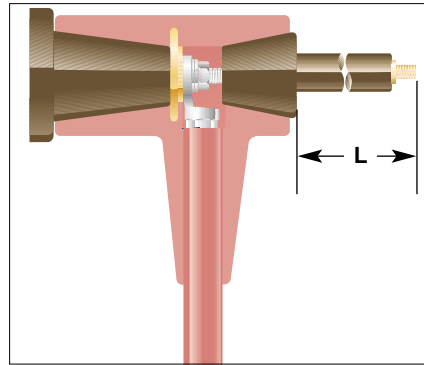
Accessories for RICS adapter

Test plug for cable testing:

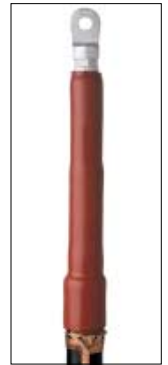
Cables can be tested while the T-adapter and the cable are connected to the switchgear. The backplug of the RICS adapter is removed and the test plug is screwed in instead of the backplug. For phase to phase testing, test plugs of different lengths (2 x Normal, 1 x Long version) must be used.

Normal version, Length = 290 mm
RICS 5002-50-24

Long version, Length = 390 mm
RICS 5002-50-25



POLT
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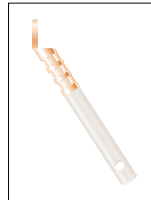
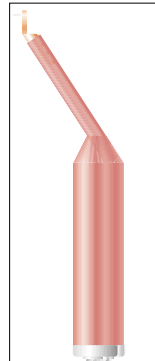


POLT, TFTI
page 30, 32

Surge arrester type RDA for T-Adapters type RICS 51x9:

The surge arrester type RDA are specially developed for applications in gas-insulated switchgear. They are available for voltages from 6 kV to 24 kV. Detail information and technical data are available from your local Raychem products representative.

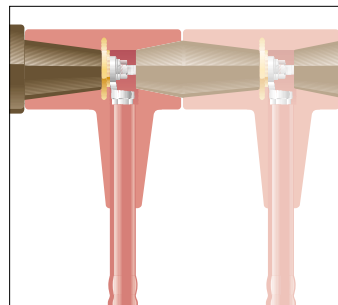
Blind Plugs type RICS 5009-50-22 can be temporarily installed instead of RDA surge arresters.



GUST
page 18

T-adapters for connections to 1250 A rated bushings with profile according to EN 505181 type C:

Each RICS adapter is rated for max. 630A. For double T-connections, a special first adapter of type RICS-5143-Cu must be used.



EPKT
page 20



IDST
page 22

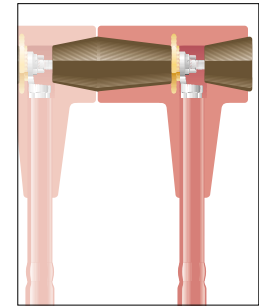
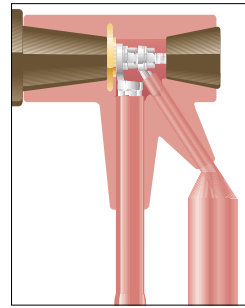
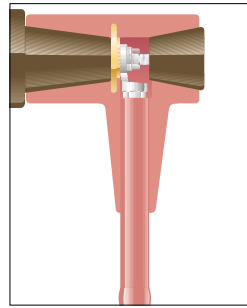
RICS, RCAB – Insulated T-adapter and straight adapter system for gas-insulated switchgear with bushings according to EN 50181 type C (400/630A), 10 kV, 15 kV and 20 kV

Type of termination

RICS – T-adapter

RICS – T-adapter for parallel connection of surge arrester type RDA

RICS – double-T-adapter



	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description
Polymeric insulated cables						
1- and 3-core cables	25– 50	RICS 5113				
10 kV	70–150	RICS 5123				
type POLT, IXSU, TFTI	185–240	RICS 5133	185–240	RICS 5139	185–240	RICS 5137
	300	RICS 5143	300	RICS 5149	300	RICS 5147
1- and 3-core cables	25– 35	RICS 5113				
15 kV	50– 95	RICS 5123				
type POLT, IXSU, TFTI	120–185	RICS 5133	120–185	RICS 5139	120–185	RICS 5137
	240–300	RICS 5143	240–300	RICS 5149	240–300	RICS 5147
1- and 3-core cables	10– 70	RICS 5123				
20 kV	95–185	RICS 5133	95–185	RICS 5139	95–185	RICS 5137
type POLT, IXSU, TFTI	240–300	RICS 5143	240–300	RICS 5149	240–300	RICS 5147
1- and 3-core cables	25– 70	RICS 5123				
10, 15 and 20 kV	50–150	RICS 5133	50–150	RICS 5139	50–150	RICS 5137
type POLT-L16, IXSU-L16	120–300	RICS 5143	120–300	RICS 5149	240–300	RICS 5147
Paper insulated cables						
Belted 3-core cables	35	RICS 5113				
(MI and MIND) 10 kV	50– 95	RICS 5123				
type GUST, EPKT-45	120–185	RICS 5133	120–185	RICS 5139	120–185	RICS 5137
	240	RICS 5143	240	RICS 5149	240	RICS 5147
with mech. lugs	35– 50	RICS 5123				
type GUST-L16	70–120	RICS 5133	70–120	RICS 5139	70–120	RICS 5137
	150–240	RICS 5143	150–240	RICS 5149	150–240	RICS 5147
Screened or belted 3-core cables (MIND) 10 kV	35– 70	RICS 5113				
type EPKT	95–150	RICS 5123				
	185–240	RICS 5133	185–240	RICS 5139	185–240	RICS 5137
	300	RICS 5143	300	RICS 5149	300	RICS 5147
Screened or belted 3-core cables (MIND) 15 kV	25– 50	RICS 5113				
type EPKT	70–120	RICS 5123				
	150–240	RICS 5133	150–240	RICS 5139	150–240	RICS 5137
	300	RICS 5143	300	RICS 5149	300	RICS 5147
Screened 1- and 3-core cables (MIND) 10 kV	35– 70	RICS 5113				
type EPKT	95–150	RICS 5123				
	185–240	RICS 5133	185–240	RICS 5139	185–240	RICS 5137
	300	RICS 5143	300	RICS 5149	300	RICS 5147
Screened 1- and 3-core core cables (MIND) 20 kV	25– 70	RICS 5123				
type EPKT	95–185	RICS 5133	95–185	RICS 5139	95–185	RICS 5137
	240–300	RICS 5143	240–300	RICS 5149	240–300	RICS 5147
Screened three and single core cables (MI) 10 kV	35– 95	RICS 5133-01-12				
type IDST	120–185	RICS 5133-01				
	185–240	RICS 5143-01				
Screened three and single core cables (MI) 20 kV	35– 70	RICS 5133-01-12				
type IDST	95–150	RICS 5133-01				
	150–240	RICS 5143-01				

Note: Adapters RICS 5113 and RICS 5123 are designed for use with cable lugs with 13 mm hole diameter.

All other sizes are designed for use with cable lugs with 17 mm hole diameter. If a modification code -12 is added to these descriptions, cable lugs with 13 mm hole diameter can be used, e.g. RICS 5133-12. Modification code -12 products are not available for surge arrester connections or double connections.

Adapters for other types of bushing and for other cable are available on request.

RSTI – Screened, separable T-connection system for gas-insulated switchgear with bushings according to EN 50181 type C (400/630A), 10 kV, 15 kV, 20 kV and 35 kV

Raychem screened separable connectors are designed to connect single-core polymeric insulated cables to gas-insulated switchgear or other equipment with bushings according to EN 50181 type C up to 42 kV. Connections can be made in a right-angle configuration, also for 2 or 3 cables in parallel, such configurations require mechanical fixing of each cable in the switchgear. For connections to 1250 A rated bushings with profile according to EN 50181 type C, parallel connections are possible with each RSTI rated for max. 630A.

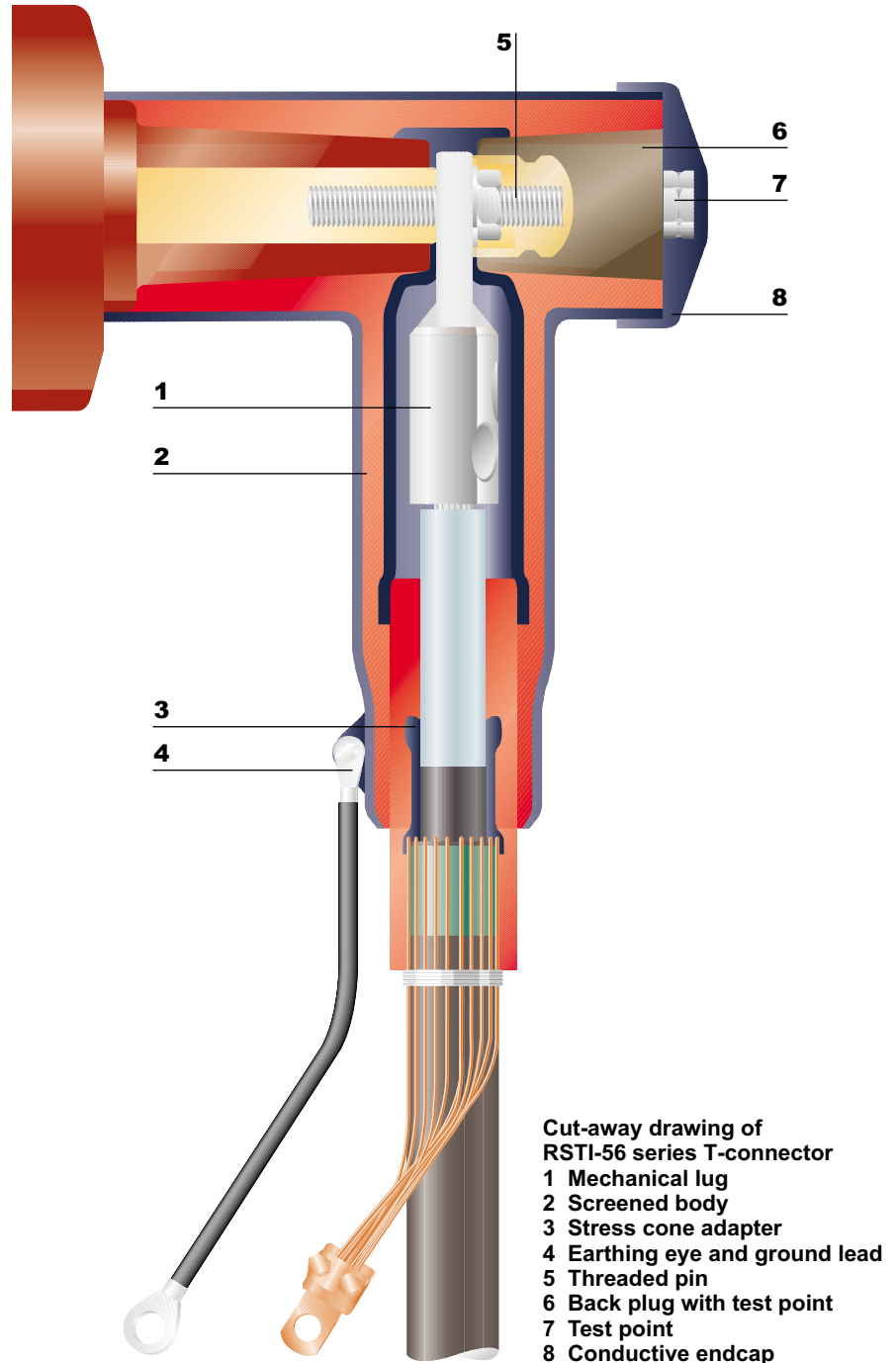
Made of a highly modified silicone rubber and protected with a thick wall moulded outer conductive shield connected to earth, Raychem screened connectors RSTI are thus suitable for both indoor and outdoor installations. Oversheath testing can be performed without removal of the screened connector

The modern design and material selection in combination with the Raychem designed high performance mechanical lug allows a large application range, covering most common cable sizes with just one kit.

The overall and cut back dimensions are designed for use of minimum space required in the termination box, even double connections fit within most standard boxes.

Raychem screened connectors RSTI are equipped with a capacitive test point to determine if the circuit is energised. The capacitive test point is protected by a conductive cap.

The screened cable connector exceeds the requirements of CENELEC HD 629.1 S1 which includes BS, VDE and other international specifications.



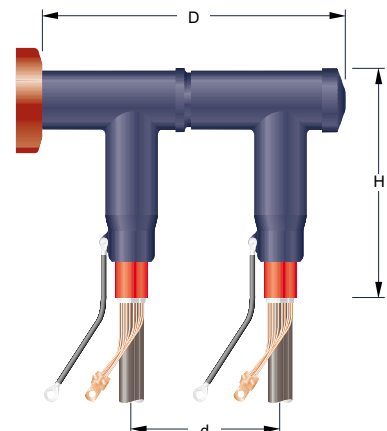
Installation

After cable preparation, the lubricated stress control adapter is simply slid into place. The high performance multi range mechanical lugs are quickly installed by shearing off the bolts. When lubricated, the screened connector body can easily be slid onto the cable end and fixed to the bushing by a threaded pin and nut. The open end is sealed by a backplug or by a connection plug, which allows parallel connection of two cables.

Double connections

For double connections of RSTI-56 series a T-connector and a coupling connector (2 T-connectors and a connection plug) have to be ordered. Installation dimensions D/d/H of 290 (365)/125 (175)/285 mm are required.

For double connections of RSTI-76 series a T-connector and a coupling connector have to be ordered. Installation dimensions D/d/H of 325/125/300 mm are required.



Configuration of RSTI-56 as double T-connection

RSTI – Screened, separable T-connection system for gas-insulated switchgear with bushings according to EN 50181 type C (400/630A), 10 kV, 15 kV, 20 kV and 35 kV

RSTI-T-Connectors

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description T-connector	Coupling connector	Diameter over core insulation (mm)
6/10	35– 95	RSTI-5651-CEE01	RSTI-CC-5651-CEE01	12,7–25,0
	95–240	RSTI-5653-CEE01	RSTI-CC-5653-CEE01	17,0–32,6
	300	RSTI-5655-CEE01	RSTI-CC-5655-CEE01	21,2–34,6
8,7/15 and 12/20	35– 95	RSTI-5651-CEE01	RSTI-CC-5651-CEE01	12,7–25,0
	95–240	RSTI-5654-CEE01	RSTI-CC-5654-CEE01	21,2–34,6
	300	RSTI-5655-CEE01	RSTI-CC-5655-CEE01	21,2–34,6
20/35	50–120	RSTI-7651-CEE01	RSTI-CC-7651-CEE01	22,4–33,6
	150–240	RSTI-7654-CEE01	RSTI-CC-7654-CEE01	30,9–42,8

Scope of supply: Screened connector body, stress control adapter, mechanical lug (for aluminium and copper conductors), fixing bolts, terminal stud, backplug and lubricant supplied in a 3-phase set complete with installation instruction. Solderless earth connections for cables with tape screen have to be ordered separately. The kit design allows the use of all common screen removal tools with a minimum cutback dimension up to 40 mm. RSTI connectors including DIN compression lugs up to 630 mm² are available on request.

Solderless earth connection for cables with aluminium or copper tape shield

Cross section (mm²) for cables with nominal voltage U_o/U

6/10 kV	8,7/15 kV	12/20 kV	Ordering description
35–120	35–120	35–120	SMOE 62871
95–400	70–300	50–240	SMOE 62872

RSTI system accessories

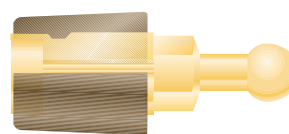
RSTI-56TR Test rod for cable testing

Cables can be tested while the RSTI-connector and the cable are connected to the switchgear.



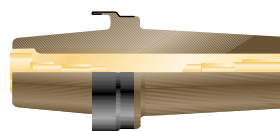
RSTI-56EA25 Earthing adapter for cable earthing

Cables can be earthed while the RSTI-connector and the cable are connected to the switchgear.



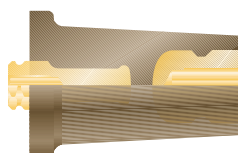
RSTI-56CP Connection plug for parallel connection of 2 RSTI-56

To connect 2 cables in parallel to the switchgear, the connecting plug is screwed in the first RSTI-56 instead of the backplug. The second RSTI is simply installed onto the other end of the connection plug as on a bushing. Not to be used for RSTI-CC-56 series and RSTI-76 series.



RSTI-56TP Termination plug as live end seal

The RSTI connector can be terminated by installing it onto the plug instead of the bushing. In case the RSTI connector is not installed on a bushing, the termination plug must be installed before applying any voltage (e.g. cable system test) or if sealing is necessary.



RSES, RSSS – Screened elbow and straight connection system for gas-insulated switchgear and transformers with bushings according to EN 50181 type A (250A), 10 kV, 15 kV and 20 kV

Raychem screened adapters are designed to connect single-core polymeric cables to gas-insulated switchgear or transformers up to 24 kV. The adapter seals on bushings according to EN 50181 type A (250A). Connection can be made in a straight or right-angle configuration.

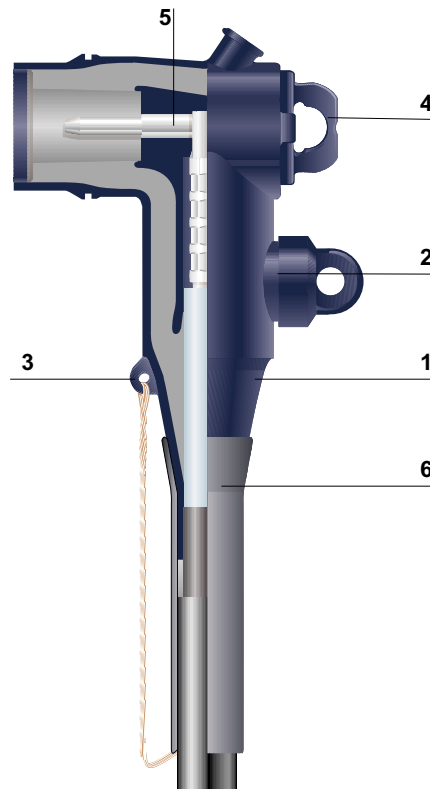
Design

The thick walled adapter with an integrated stress control provides sealing and electrical connection to the cone of the bushing and the cable. Made of crosslinked EPDM and protected with a minimum 3 mm moulded conductive shield connected to earth, the adapter is suitable for both indoor and outdoor installations. The special design and material selection of the adapters allows the use on a wide range of cable dimensions. Thus the adapters are independent of cable tolerances and special cable adapters are not required. The cable preparation and cut-back dimensions are the same for straight or elbow adapters.

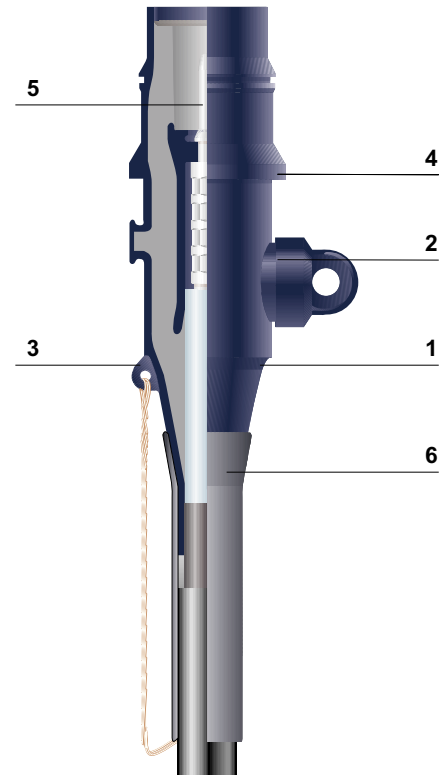
The adapters are equipped with a capacitive test point to ensure that the circuit is not energised before disconnection. The capacitive test point is protected by a conductive cap.

High strength bimetallic DIN-compression connectors tested to VDE 0220 are supplied within the kit to connect both aluminium and copper conductor cables.

Screened Elbow Adapter



Screened Straight Adapter



- 1 Screened body with integrated stress control
- 2 Capacitive test point
- 3 Earthing eye
- 4 Retainer connection point
- 5 Compression pin-connector
- 6 Rayvolve sealing system

Installation

After cable preparation and crimping of the connector, the adapter can be simply slid into place under virtually all conditions. For elbow adapters, the connection pin is screwed into the connector, a hexagon wrench is provided with the kit. A separable mounting system allows an easy installation of the adapter to the bushing. To provide a reliable environmental seal between the adapter and the overshooth a cold-applied Rayvolve tubing or a heat-shrinkable phase marking tubing is offered.



RSES, RSSS – Screened elbow and straight connection system for gas-insulated switchgear and transformers with bushings according to EN 50181 type A (250A), 10 kV, 15 kV and 20 kV

Scope of supply

RSES – Elbow Adapter

The adapter body, compression connector (for aluminium and copper conductors), pin, hexagonal wrench, retaining clamp and lubricant supplied in a 3-phase set complete with installation instruction. Kits with modification code -R include in addition the Rayvolve sealing system, kits with modification code -P the heat-shrinkable phase marking sleeve.

RSSS – Straight Adapter

The adapter body, pin connector (for aluminium and copper conductors), retaining collar and lubricant supplied in a 3-phase set complete with installation instruction. Kits with modification code -R include in addition the Rayvolve sealing system, kits with modification code -P the heat-shrinkable phase marking sleeve.

Nominal voltage Uo/U (kV)	Cross section (mm ²)	Diameter over core insulation (mm)	Ordering description Elbow Adapter	Straight Adapter
6/10	25	13,5–17,4	RSES 5202-R	RSSS 5202-R
	35	13,5–17,4	RSES 5203-R	RSSS 5203-R
	50	13,5–17,4	RSES 5205-R	RSSS 5205-R
	70	16,3–20,8	RSES 5217-R	RSSS 5217-R
	95	16,3–20,8	RSES 5219-R	RSSS 5219-R
	120	19,6–24,1	RSES 5224-R	
8,7/15	25	13,5–17,4	RSES 5202-R	RSSS 5202-R
	35	16,3–20,8	RSES 5213-R	RSSS 5213-R
	50	16,3–20,8	RSES 5215-R	RSSS 5215-R
	70	19,6–24,1	RSES 5227-R	RSSS 5227-R
	95	19,6–24,1	RSES 5229-R	RSSS 5229-R
	120	23,1–28,7	RSES 5234-R	
12/20	25	16,3–20,8	RSES 5212-R	RSSS 5212-R
	35	16,3–20,8	RSES 5213-R	RSSS 5213-R
	50	19,6–24,1	RSES 5225-R	RSSS 5225-R
	70	19,6–24,1	RSES 5227-R	RSSS 5227-R
	95	23,1–28,7	RSES 5239-R	
	120	23,1–28,7	RSES 5234-R	

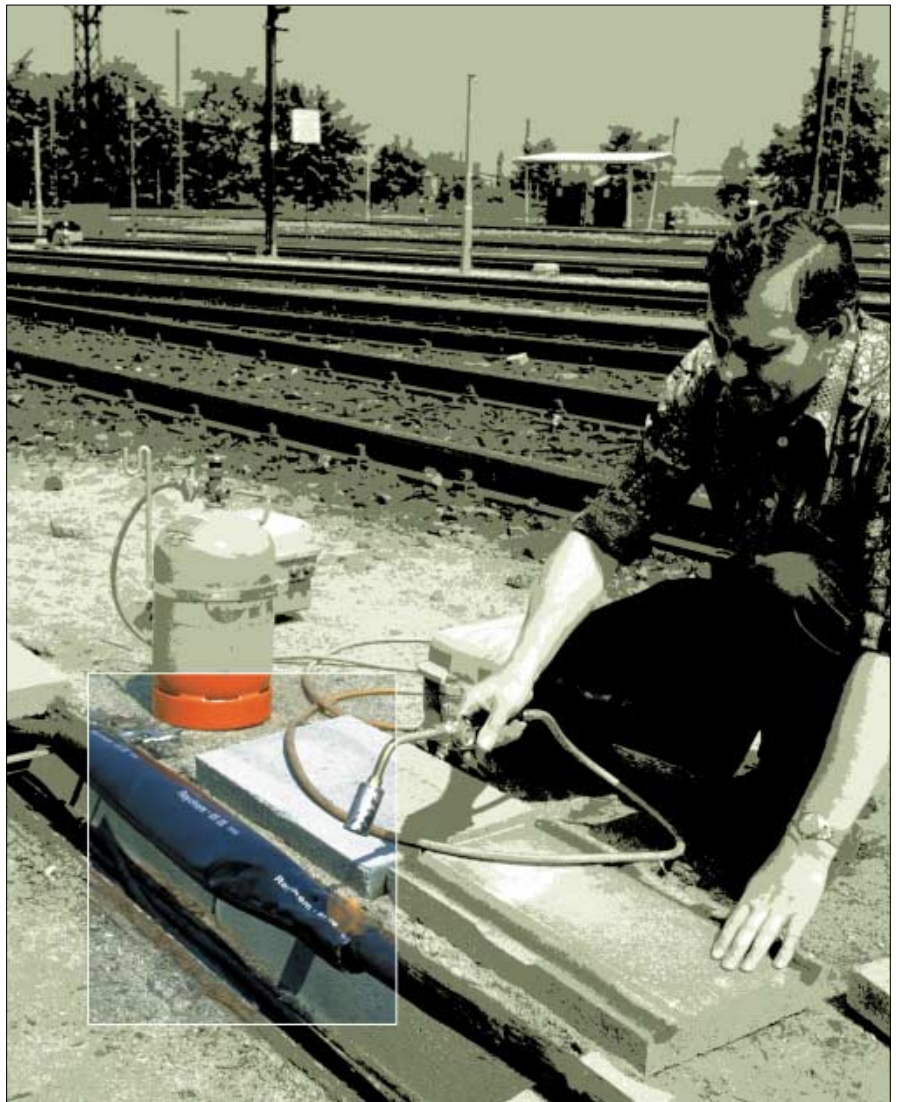
Change modification code to -P for adapters with heat shrinkable phase marking tubing. For example: RSES 5225-P
Omit modification code -R for adapters without additional sealing. For example: RSES 5225

Superior environmental seal

The cold applied Rayvolve sleeve is used in conjunction with a pressure sensitive mastic and is simply rolled into place to provide a reliable moisture seal. Kits with modification code -R include the Rayvolve sealing system.

The heat-shrinkable phase marking tubing provides a moisture seal and additional phase marking. Kits with modification code -P include the phase marking sleeve.





Heat-shrinkable Low Voltage Joints

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Gel-filled Low Voltage Joints

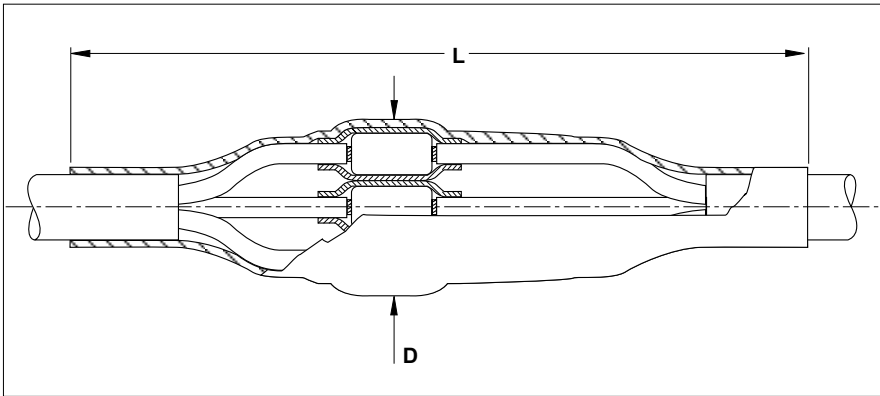
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Guroflex – filled Low Voltage Joints

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Joints for polymeric insulated cables



Dimensions L, D see table

Cable

The joints are designed for 3-, 3,5-, 4- and 5-core polymeric insulated cables with or without armour.

For example: SZAMtKAtM, KAtM, N(A)YY, N(A)YBY, VVG, AVVG, BBГ, ABBГ, YAKY, YKY, YKYFty, AYKY, CYKY, PP 00, XP 00, PP 41, N(A)YC(W)Y.

Design of joints

For cables without armour

The joint consists of four or five inner and one outer heat-shrinkable tubing. The connectors are insulated and sealed by thick-wall tubings which are pre-coated with a hot-melt adhesive. The outer protection and sealing is performed by a thick-wall heat-shrinkable tubing. All joints are designed to allow crossing of cable cores. For joints supplied without connectors, the crimp or mechanical connectors used must not exceed the maximum dimensions given in the tables.

For cables with steel tape armour

The joint consists of four or five inner and one outer heat-shrinkable tubings as well as tinned grid and roll springs. The connectors are insulated and sealed by thick-wall tubings which are pre-coated with a hot-melt adhesive. Wrapped around the jointing area, the tinned grid is mechanically secured and electrically connected to the steel tape by roll springs. The outer protection and sealing is performed by a thick-wall heat-shrinkable tubing. All joints are designed to allow crossing of cable cores. For joints supplied without connectors, the crimp or mechanical connectors used must not exceed the maximum dimensions given in the tables.

Joins for polymeric insulated cables

Joins for polymeric insulated cables including mechanical connectors

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for cables		Dimensions (mm)		
		without armour	with tape armour	L	D	
0,6/1	1,5– 6	POLJ-01/4X	1- 6	230	25	
	1,5– 6	POLJ-01/5X	1- 6*	230	25	
	4– 16	POLJ-01/4X	4- 16	300	35	
	4– 16	POLJ-01/5X	4- 16*	300	35	
	10– 35	POLJ-01/4X	10- 35	POLJ-01/4X 10- 35-T	450	50
	10– 35	POLJ-01/5X	10- 35*		450	50
	25– 70	POLJ-01/4X	25- 70	POLJ-01/4X 25- 70-T	600	70
	70– 120	POLJ-01/4X	70-120	POLJ-01/4X 70-120-T	650	80
	150– 240	POLJ-01/4X	150-240	POLJ-01/4X150-240-T	800	110

* These joints can be used for 4- and 5-core cables

Note: The joints are designed for the included connectors, other connectors must not be used.

Joins without connectors for polymeric insulated cables without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)		Ordering description	Dimensions (mm)		Joint L	D
	Crimp Connectors	Mechanical Connectors		Max. connector Length	Diameter		
for use with crimping and mechanical connectors							
0,6/1	1,5– 10		SMOE 81511	35	8	230	25
	1,5– 10		SMOE 81511-CEE05 *	35	8	230	25
	6– 25		SMOE 81512	75	12	450	40
	6– 25		SMOE 81512-CEE05 *	75	12	450	40
	16– 50		SMOE 81513	95	18	600	50
	70– 150	70– 120	SMOE 81514	130	26	750	80
	95– 300	150– 240	SMOE 81515	150	37	850	110
for use with mechanical connectors							
0,6/1		10– 35	SMOE 81516	45	18	400	50
		10– 35	SMOE 81516-CEE05 *	45	18	400	50
		25– 70	SMOE 81517	60	26	500	70
		70– 120	SMOE 81518	75	29	550	80
		150– 240	SMOE 81519	85	38	700	110

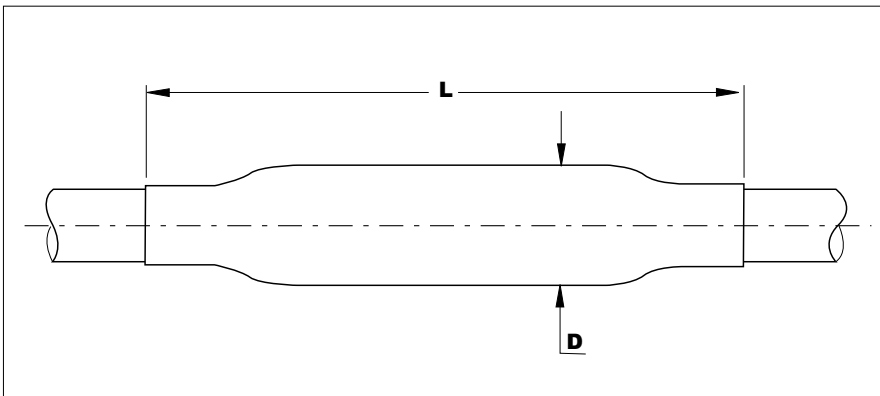
* The joints with modification code CEE05 can be used for 4- and 5-core cables

Joins without connectors for polymeric insulated cables with steel tape armour or aluminium tape shield

Nominal voltage U _o /U (kV)	Cross section (mm ²)		Ordering description	Dimensions (mm)		Joint L	D
	Crimp Connectors	Mechanical Connectors		Max. connector Length	Diameter		
for use with crimping and mechanical connectors							
0,6/1	1,5– 10		SMOE 81521	35	8	300	25
	6– 25		SMOE 81522	75	12	500	40
	16– 50		SMOE 81523	95	18	650	50
	70– 150	70– 120	SMOE 81524	130	26	850	80
	95– 300	150– 240	SMOE 81525	150	37	950	110
for use with mechanical connectors							
0,6/1		10– 35	SMOE 81526	45	18	450	50
		25– 70	SMOE 81527	60	26	600	70
		70– 120	SMOE 81528	75	29	650	80
		150– 240	SMOE 81529	85	38	800	110

Note: Dimensions of connectors must not exceed the dimensions given in the table. The cross section ranges shown in the table apply to all PVC insulated 1 kV cables with crimp connectors according to DIN standards or mechanical connectors within the given limits.

Joins for paper insulated cables with steel tape armour



Dimensions L, D see table

Cable

The joints are designed for 3- and 4-core paper insulated cables with steel tape armour, including cables with reduced neutral conductor.

For example: SZAPKOV, IPO 13, NPO 13, ACHPAbI, AAEY, ACBY, AKFt..., CNKODY, ANKOY, ANKOP, ANKOPV, IPO 14, NPO 14, N(A)KBA.

Design of joints

The cores of the paper cable are covered with oil resistant tubings. Heat-shrinkable breakouts prevent any moisture ingress or oil leakage at the end of the metal sheath or of the cable cores. Mechanical

connectors are included to join the conductors. The connectors are insulated and sealed by thick-wall tubings which are pre-coated with a hot-melt adhesive. Thick-wall heat-shrinkable tubings pre-coated with a hot-melt adhesive seal to the metal sheath and provide the outer sealing and protection. The kit includes supplementary materials for cable preparation.

Joins for 3-core cables

The kit includes a solderless earth and neutral connection system for the aluminium sheaths consisting of stainless steel hose clamps and an earth braid.

Joins for 4-core cables

The kit includes a solderless earth connection system for the lead sheaths consisting of roll springs and an earth braid.

Joins for transitions of 3-core to 4-core cables

The kit includes a solderless earth and neutral connection system for the aluminium sheath and the lead sheath consisting of hose clamps, a roll spring and earth braids.

Joins for 3-core cables

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
0,6/1	16– 70	GUSJ 01/3x 16– 70	800	70
	50– 120	GUSJ 01/3x 50– 120	900	80
	120– 240	GUSJ 01/3x120– 240	1100	120

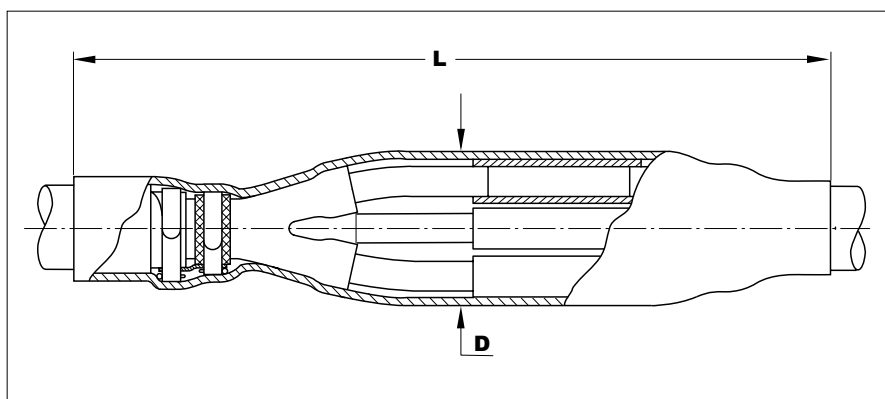
Joins for 4-core cables

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
0,6/1	16– 95	GUSJ 01/4x 16– 95	800	70
	50– 150	GUSJ 01/4x 50– 150	900	80
	120– 240	GUSJ 01/4x120– 240	1100	120

Joins for transitions of 3-core cables to 4-core cables

Nominal voltage U _o /U (kV)	Cross section for cable type		Ordering description	Dimensions (mm)	
	3-core (mm ²)	4-core (mm ²)		L	D
0,6/1	16– 70	16– 95	GUSJ-01/34x 16- 70/ 95	800	70
	50– 120	50– 150	GUSJ-01/34x 50-120/150	900	80
	120– 240	120– 240	GUSJ-01/34x120-240	1100	120

Transition joints for polymeric insulated to paper insulated cables



Dimensions L, D see table

Cable

The joints are designed for 4-core paper and polymeric insulated cables with or without armour.

For example: N(A)YY, SZAPKOV, IPO 13, NPO 13, ACHPAbI, ACBY-ABBΓ, YAKY, YKY, KYFYtly, ANKOY, AYKY, PP 00, PP 41, N(A)YBY, IPO 14, NPO 14, N(A)KBA.

Design of joints

The paper cable is transformed to a quasi polymeric insulated cable with heat-shrinkable oil resistive tubings and a breakout. The connectors are insulated and sealed with adhesive coated heat shrinkable tubing. The outer protection and sealing is performed by heat-shrinkable tubing.

Joints including connectors

The kit includes a solderless earth and neutral connection system for lead or aluminium sheaths.

Joints without connectors

In case of 3-core cables, a separate earth lead has to be soldered to the metal sheath (not provided within the kit).

Joints including mechanical connectors for 3- and 4-core paper to 4-core polymeric insulated cable

Nominal voltage Uo/U (kV)	Cross section (mm ²)	Ordering description for paper cables		Dimensions (mm)	
		3-core	4-core	L	D
0,6/1	10– 35	–	TRAJ-01/4x 10- 35/4SB	500	50
	25– 70	TRAJ-01/4x 25- 70/3SB	TRAJ-01/4x 25- 70/4SB	800	70
	70–120	TRAJ-01/4x 70-120/3SB	TRAJ-01/4x 70-120/4SB	900	80
	150–240	TRAJ-01/4x150-240/3SB	TRAJ-01/4x150-240/4SB	1100	110

Joints without connectors

4-core paper to 4-core unarmoured polymeric insulated cable including solderless earth connection for use with mechanical connectors

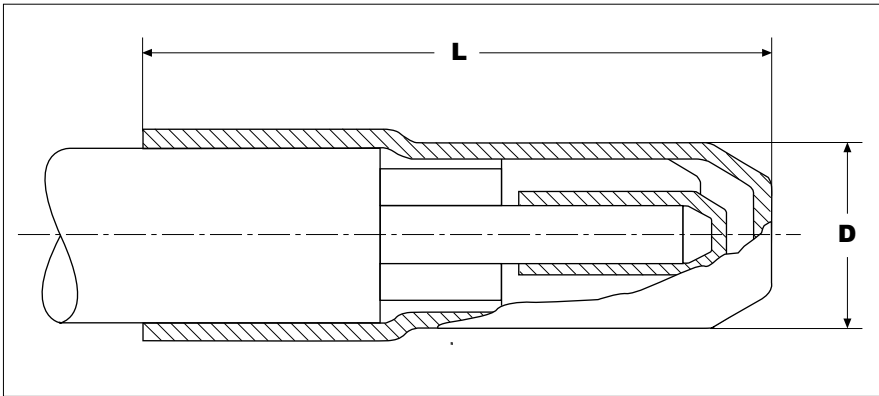
Nominal voltage Uo/U (kV)	Cross section polymeric (mm ²)	Ordering description		Dimensions (mm)		Joint L	D
		paper		Max. connector Length	Diameter		
0,6/1	25– 95	25– 95	SMOE 81404	90	25	850	70
	95–150	50–150	SMOE 81502	130	32	1050	80
	95–240	95–240	SMOE 81400	110	38	1150	90

Note: Dimensions of connectors must not exceed the dimensions given in the table. Mechanical connectors are not included in the joints.

4-core paper to 4-core polymeric insulated cable for use with crimp connectors

Nominal voltage Uo/U (kV)	Cross section (mm ²)	Ordering description for plastic cables		Dimensions (mm)	
		without armour	with armour	L	D
0,6/1	10– 16	EPKJ 0903	EPKJ 0828	700	45
	25– 50	EPKJ 0910	EPKJ 0835	900	60
	70–150	EPKJ 0917	EPKJ 0842	1100	75
	185–300	EPKJ 0924	EPKJ 0856	1300	100

Live end seal for polymeric and paper insulated cables



Dimensions L, D see table

Cable

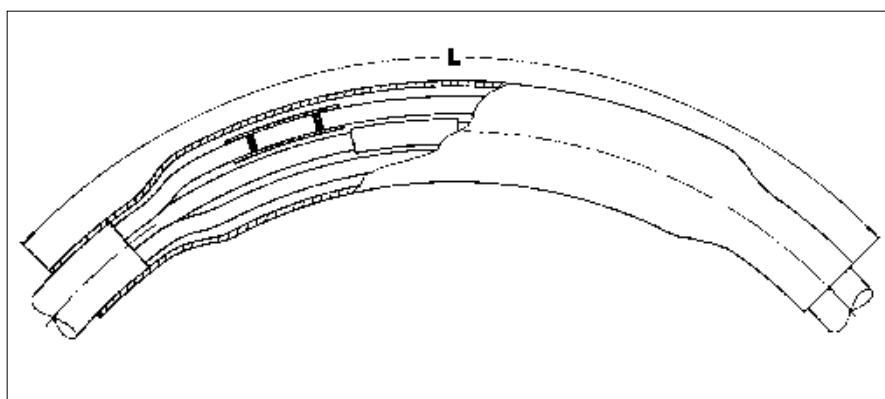
The live end seals are designed for polymeric or paper insulated cables. For example: SZAMtKAtM, N(A)YY, CYAbY, IPO 13, VVG, AVVG, AAbBY, ACbY, AYKY, CYKY, ANKOY, ANKOP, PP 00, XP 00, PP 41, N(A)YBY, IPO 14.

Design of live end seal

The ends of the cores are sealed and insulated with heat-shrinkable end caps. A larger end cap protects the cores and seals to the overshield. For cables with armour an additional metallic shielding is provided within the kit.

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
0,6/1	10– 16	EPKE 0024	90	32
	25– 50	EPKE 0044	90	42
	70–120	EPKE 0064	143	56
	150–300	EPKE 0084	163	67

Joins for flexible, rubber insulated cables



Dimensions L, D see table

Cable

The joints are designed for flexible, rubber insulated cables with or without shield. The maximum number of cores is five.

For example: GTB, GTBa, MCCG, H07RN-F, H07RN-FF, КГ, КГН, КПГ, OnG, Ogek, OnGbekz..., CGSG, CGTU, CGGU, CGDU, EpN 53, EpN 55, EpN 61, EpN 62, EpN (BN)76, GN 50.

Design of joints

The connectors are insulated and sealed by flexible tubings which are pre-coated with a hot-melt adhesive. The outer protection and sealing is also performed by a flexible, thick-wall, heat-shrinkable tubing. The voids between the cores and the outer tubing are filled by a flexible mastic. In case of shielded cables a copper mesh is wrapped around the mastic.

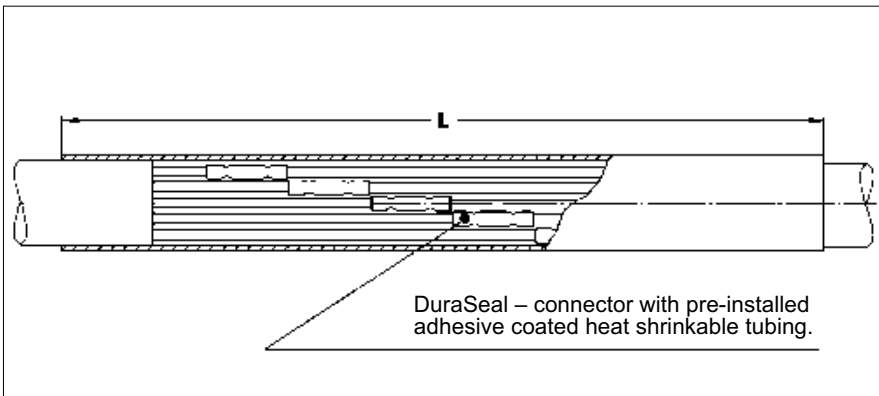
Unshielded flexible cables

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
0,6/1	1,5 – 6	EMKJ 0004	350	28
	10 – 16	EMKJ 0017	510	34
	25 – 50	EMKJ 0027	560	55
	70 – 120	EMKJ 0037	740	78

Shielded flexible cables

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
0,6/1	1,5 – 6	EMKJ 0104	350	25
	10 – 16	EMKJ 0117	510	36
	25 – 50	EMKJ 0127	560	60
	70 – 120	EMKJ 0137	740	84

Joins for control cables with DuraSeal connectors



Dimension L see table

Cable

The joints are designed for polymeric insulated control cables.
For example: NYY, KBBГ, КПсВГ, YKSY, YKSYy, YeKSY, CYKY, PP 00.

Design of joints

For cables without armour
The cores are connected and sealed with DuraSeal connectors. A cardboard liner ensures a round shape over which the outer protection and sealing is performed by a thick-wall heat-shrinkable tubing.

For cables with steel tape armour

The inner jointing is performed as for cables without armour. In addition, a tinned grid is wrapped around the jointing area and mechanically secured and electrically connected to the steel tape by roll springs. The outer protection and sealing is performed by a thick-wall heat-shrinkable tubing.

Joins for polymeric insulated cables without armour

Nominal voltage U _o /U (kV)	Number of conductors	Cross section (mm ²)	Cable diameter (mm)		Ordering description	Dimension L (mm)
			min.	max.		
0,6/1	4– 7	1,5–2,5	8	19	SMOE 81140	300
	8– 14	1,5–2,5	12	22	SMOE 81141	300
	15–21	1,5–2,5	15	27	SMOE 81142	350
	22–40	1,5–2,5	20	35	SMOE 81143	350
	41–75	1,5–2,5	28	44	SMOE 81144	400

Joins for polymeric insulated cables with steel tape armour

Nominal voltage U _o /U (kV)	Number of conductors	Cross section (mm ²)	Cable diameter (mm)		Ordering description	Dimension L (mm)
			min.	max.		
0,6/1	4– 7	1,5–2,5	14	21	SMOE 81140-T	450
	8– 14	1,5–2,5	15	26	SMOE 81141-T	450
	15–21	1,5–2,5	18	30	SMOE 81142-T	550
	22–40	1,5–2,5	21	39	SMOE 81143-T	550
	41–75	1,5–2,5	31	47	SMOE 81144-T	650

Joins for other cable types are available on request.

DuraSeal – pre-insulated connectors and terminals



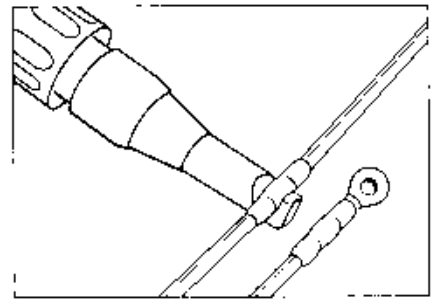
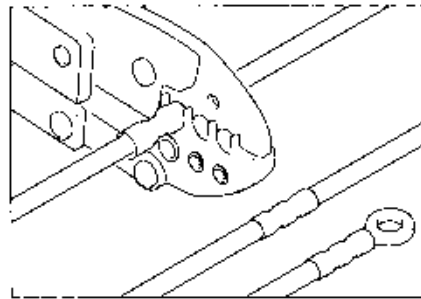
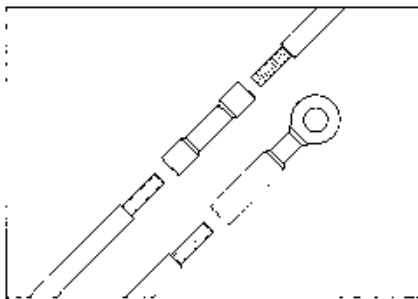
Application

Provides an environmentally sealed core connection for installation cables. To be used in joints or as a sealed terminal.

Construction

The connector consists of a crimp barrel and a pre-installed adhesive coated heat shrinkable tubing.

The terminal consists of a crimping lug and a pre-installed adhesive coated heat shrinkable tubing.



Installation

Select the correct connection element. Remove the core insulation on a length of 7,5 mm. With the adhesive not being sticky at room temperature, the cores can be easily inserted into the connector.

Crimp the connector with a suitable crimping tool, for example Raychem AD 1522-1.

Heat the crimped connection area with a hot air tool until the tubing recovers and the adhesive flows. The Raychem heating tool HL2005E-230V and the reflector HL1802E-070519 are recommended.

Insulated connectors

Cross section (mm ²) min.	Cross section (mm ²) max.	Ordering description	Colour	Length (mm)
1,5	2,5	DS-14-16	blue	32
4	6	DS-10-12	yellow	32

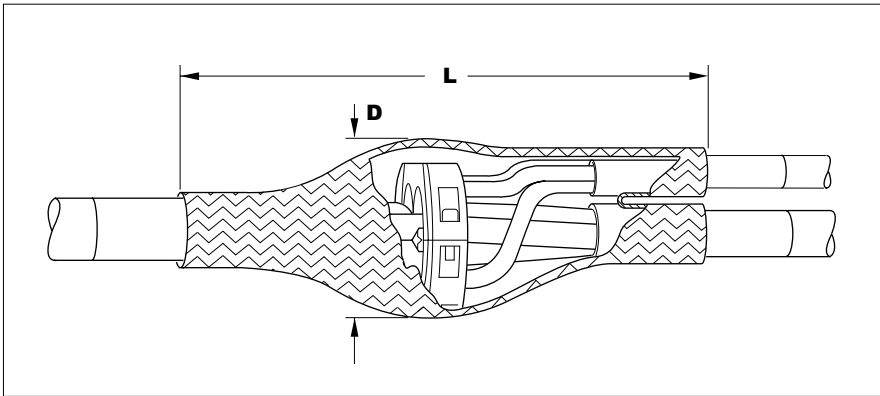
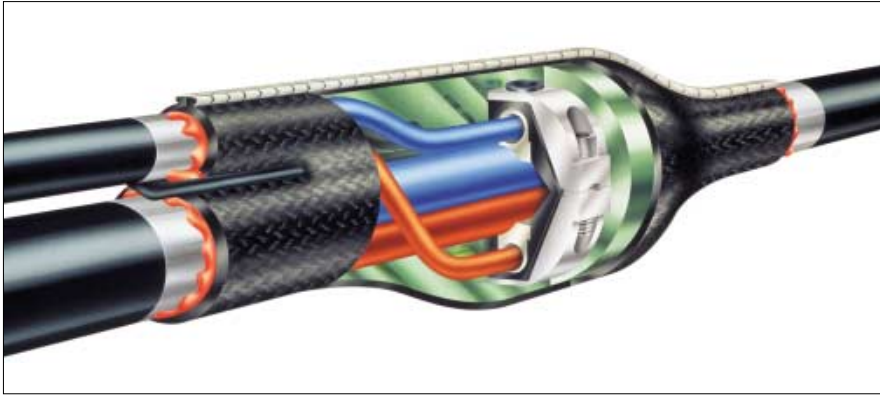
Note: To be ordered in boxes, a box contains 100 pcs or 50 pcs (only size 4–6 mm²)

Insulated terminals

Cross section (mm ²) min.	Cross section (mm ²) max.	Ordering description				Colour
		Fork d = 4 mm	Ring d = 4 mm	d = 6 mm	d = 8 mm	
0,5	1	DF-2-40	DR-2-40	DR-2-60	DR-2-80	red
1,5	2,5	DF-6-40	DR-6-40	DR-6-60	DR-6-80	blue
4	6	DF-4-40	DR-4-40	DR-4-60	DR-4-80	yellow

Note: To be ordered in boxes, a box contains 100 pcs or 50 pcs (only size 4–6 mm²)
d = hole diameter

Branch joints for polymeric and paper insulated cables



Dimensions L, D see table

Cable

The joints are designed for 4-core paper and polymeric insulated cables with or without armour. For example: N(A)YY, SZAPKOVБ, IPO 13, NPO 13, АСНРАbl, BBГ, АBBГ, YAKY, YKY, AKFtA, AYKY, CYKY, ANKOY, ANKOP, PP 00-(A), PP 41-(A), N(A)YBY, IPO 14.

Design of joints

The joint is designed to be installed live using compact ring connectors. Mastic around the cores and the connector seals and insulates. A fibre reinforced wraparound seals to the oversheath and provides mechanical protection. Joints for armoured cables include in addition solderless earth connections. Paper cables are sealed with additional oil-resistant mastic and a breakout for the branch cable.

Conductors types:

sm: Sector stranded
se: Sector solid
rm: Round stranded
re: Round solid

Branch joints for polymeric and paper insulated cables

Heat shrinkable branch joint for 4-core polymeric insulated cables including Hellstern compact ring connector

Nominal voltage U _o /U (kV)	Main conductor		Branch conductor		Ordering description	Dimensions		
	rm/sm (mm ²)	re/se (mm ²)	rm/sm (mm ²)	re/se (mm ²)		L (mm)	D (mm)	
0,6/1		5x 2,5–10		5x 2,5–10	SMOE 81601*	250	50	
		4– 16		4– 16	SMOE 81426*	380	55	
		35– 70	50– 95	6– 50	6– 70	BMHM 1001-4B1-4874	500	135
		70–120	95–150	6– 50	6– 70	BMHM 1001-4B1-6875	500	135
		150	185	6– 70	6– 70	BMHM 1001-4C1-6878	500	135
		185	240	6– 70	6– 70	BMHM 1001-4D1-6879	500	155
		240	–	6– 70	6– 70	BMHM 1001-4D1-6880	500	155
		95–120	120–150	10– 95/ 35–120	16–120/ 50–150	BMHM 1001-4D2-6877	560	155

* Insulated single core connectors are included

Additional sealing kits for double branches are available on request.

Heat shrinkable branch joint for 3½-core polymeric insulated cables including Hellstern compact ring connector

	Main cable phase conductor		neutral conductor		Branch conductor		Ordering description	Dimensions	
	rm/sm (mm ²)	re/se (mm ²)	rm/sm (mm ²)	re/se (mm ²)	rm/sm (mm ²)	re/se (mm ²)		L (mm)	D (mm)
0,6/1	70–120	95–150	35–70	50–95	6–50	6–70	BMHM 1001-4B1-4875.3	500	135
	150	185	70	70	6–50	6–50	BMHM 1001-4C1-6878.3	500	135
	185	240	95	95	6–50	6–50	BMHM 1001-4D1-6879.3	500	155
	240		120	120	6–50	6–50	BMHM 1001-4D1-6880.3	500	155

Additional sealing kits for double branches are available on request.

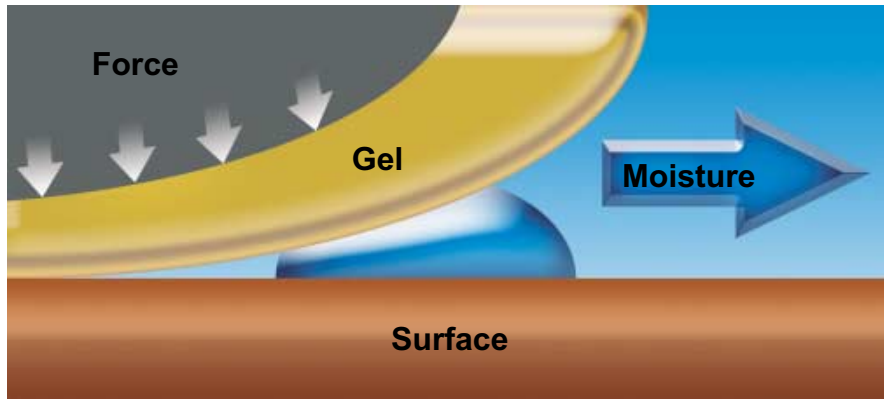
Heat shrinkable branch joint without connector

Nominal voltage U _o /U (kV)	Cross section		Ordering description	Connector diameter (mm)	Dimension	
	Main cable (mm ²)	Branch cable (mm ²)			L (mm)	D (mm)
Branch joints for polymeric insulated cables without armour						
0,6/1	16–185	6– 95	BMHM 1001-4B1	115	500	135
	95–185	6– 95	BMHM 1001-4C1	115	500	135
	95–240	6– 70	BMHM 1001-4D1	135	500	155
	95–240	6–150	BMHM 1001-4D2	135	560	155
Branch joints for polymeric insulated cables with steel tape armour or aluminium tape shield						
0,6/1	16–185	16– 95	BMHM 1031-4C1-CEE01	115	560	135
			+ EPPA 206-4-250*			
	95–185	16– 95	BMHM 1031-4C1-CEE01	115	560	135
	95–240	50–120	BMHM 1031-4D1-CEE01	135	560	155
Branch joints for paper insulated main cables and polymeric insulated branch cables						
0,6/1	35– 95	35–95	SMOE 81551	115	560	135
	120–185	35–95	SMOE 81503	115	560	135
	120–240	35–95	SMOE 81740	135	650	155

* EPPA 206-4-250 filler mastic must be used if the cross section is less than 95 mm²

Compact ring connectors of type Hellstern for cross sections up to 240 mm² are also available separately, see page 65.

Gel-filled inline and branch joints for polymeric insulated cables



Gel sealing technology

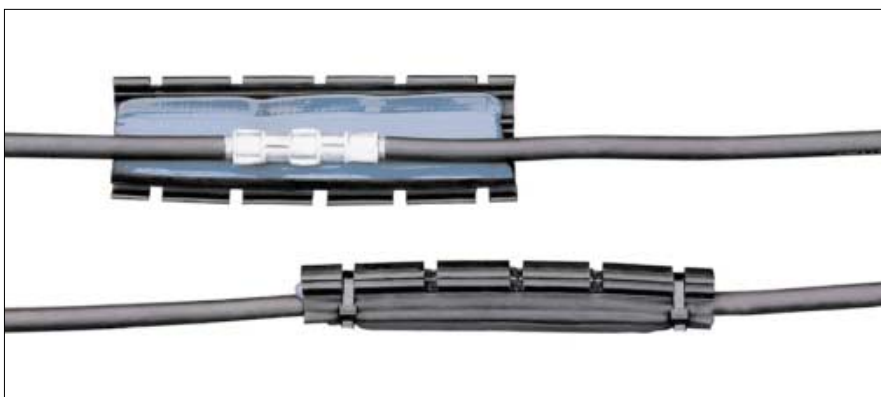
- Proprietary PowerGel technology for applications from -40°C to $+90^{\circ}\text{C}$ continuous temperature with an unlimited shelf life.
- PowerGel is silicone embedded in a cross-linked silicone matrix
- Combines the advantages of solid (elastic memory) and liquid (wetting, conforms to surfaces) sealing materials
- Extremely high elongation and elasticity, excellent ageing and dielectric properties
- Displacement of possible moisture
- PowerGel wets the surface applying a thin layer of silicone oil



RayGel: Inline and branch joints



GelBox: Inline joint



GelWrap: Inline joint and repair sleeve

Gel-filled inline, branch joints and repair sleeves for polymeric insulated cables

Cable

The joints are designed for 1-, 2-, 3-, 3½- and 4-core polymeric insulated cables without armour.

For example: SZAMtKAAtM, KAAtM, N(A)YY, N(A)YBY, VVG, AVVG, BBΓ, ABBΓ, YAKY, YKY, YKYFty, AYKY, CYKY, PP 00, XP 00, PP 41, N(A)YC(W)Y

Design of joints

RayGel – Inline and branch joints

The cables cores are joined by connectors supplied within the kit or selected according to the max. dimensions given in tables. The cores are spread apart and a separator horizontally inserted. The connection area is positioned in the middle of the opened gel-filled box. The joint is slightly pressed onto the gel with the separator in the bottom of the box placed between the lower cores. The box is closed until the locks snap in place. Accidentally re-opening is prevented by installing a cable tie as a lock.

For branch configurations, the branch cable and cores are positioned in parallel to the main cable and cores.

GelBox – Inline joints

The piercing connector block supplied within the kit joints the cable cores. Based on the piercing technology no stripping of the primary insulation is required. The connector block will be positioned in the centre of one gel-filled half shells. The second half shells will snap in to the previous one. Accidentally re-opening is prevented by the snap in mechanism.

GelWrap – Inline joint and repair sleeve

The Gelwrap is wrapped around the connection area or the area of oversheath repair. The rails are snapped into place and are self-locking. Installing cable ties as a lock prevents accidentally re-opening.

RayGel inline joints including mechanical connectors

Nominal voltage Uo/U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm) L x W x H
0,6/1	4 x 1,5– 6	RayGel-23-M	144 x 50 x 28
	4 x 6 –16	RayGel-24-M	180 x 70 x 40
	4 x 6 –25 (35*)	GelBox-25	270 x 100 x 45
	5 x 6 –16**	GelBox-25-5	270 x 100 x 45

L x W x H = Length x Width x Height

* 35 mm² with cable insulation removed

** includes a single mantle clamp for the earthing wire

RayGel inline and branch joints without connectors for cables with up to 4 cores

Nominal voltage Uo/U (kV)	Cross section Main (mm ²)	Branch max. (mm ²)	Ordering description	Dimensions (mm) Connectors, max.		Joint L x W x H
				round Dia/Length	rectangular L x W x H	
0,6/1	10 –50*	1 x 16	RayGel-12	∅10 x 25	21 x 24 x 15	86 x 46 x 26
	1,5– 6	4 x 1,5	RayGel-23	∅ 8 x 32	21,5 x 8 x 12,5	144 x 50 x 28
	6 –16	4 x 2,5	RayGel-24	∅14 x 40	20 x 12,5 x 20	180 x 70 x 40

L x W x H = Length x Width x Height

* only for 1-core cables

GelWrap inline joint for single-core cables and repair sleeve for cable cores and cable oversheaths

Nominal voltage Uo/U (kV)	Cable Cross section (mm ²)	Diameter (mm)	Ordering description	Max. dimensions (mm) connector or oversheath repair		Joint diameter Length x Diameter (mm)
				Length (mm)	Diameter	
0,6/1	2,5– 95	4–18	GELWRAP-18/4-150	75	25	200 x 35
	2,5– 95	4–18	GELWRAP-18/4-200	125	25	200 x 35
	35 –240	10–33	GELWRAP-33/10-250	150	40	250 x 50

Guroflex-filled joints up to 25 mm² for polymeric insulated cables



Cable

The joints are designed for 3-, 3½-, 4- and 5-core polymeric insulated cables without armour up to 25 mm².

For example: SZAMtKAtM, KAtM, N(A)YY, N(A)YBY, VVG, AVVG, BBΓ, ABBΓ, YAKY, YKY, YKYFty, AYKY, CYKY, PP 00, XP 00, PP 41, N(A)YC(W)Y.

Design of joints

The joints consist of a shock-resistant, transparent polycarbonate snap-to-close design housing and integrated polymer foams for sealing. The robust housing is easy and quickly to assemble, cutting to the cable diameter is not needed. The Guroflex filler material is delivered in a double chamber bag. For details on Guroflex filler see page 63. The inline Guro connector block with integrated spacing and insulation allows a quick and easy connection. A cable diameter range from 13–30 mm can be covered.

Inline filled joints without / with inline connector block

Nominal voltage U _o /U (kV)	Cable diameter (mm)	Cross section (mm ²)	Ordering description		Joint (mm)	
			Without connector	With connector	L	H
Inline joints with Guroflex filler						
0,6/1	13–20	5x 1,5 – 6	BV-0-GD	BV-0-GD-KS0	220	73
	16–25	5x 6 – 16	BV-1-GD	BV-1-GD-KS1	230	80
	21–30	4x16 – 25	BV-2-GD	BV-2-GD-KS2	270	90

Note: All cross sections are according to CENELEC HD 603;

L = Overall length of the housing; H = Overall height of the housing

Guroflex-filled joints for other cable types and cross sections are available on request.

Guroflex-filled branch joints up to 25 mm² for polymeric insulated cables



BAV-2U



with GURO connector block



with GURO mantle clamps

Cable

The joints are designed for 3½-, 4- and 5-core polymeric insulated cables without armour up to 25 mm².

For example: SZAMtKAtM, KAtM, N(A)YY, N(A)YBY, VVG, AVVG, BBF, ABBF, YAKY, YKY, YKYFty, AYKY, CYKY, PP 00, XP 00, PP 41, N(A)YC(W)Y

Design of joints

The joint consists of a shock-resistant, transparent polycarbonate snap-to-close design housing and integrated polymer foams for sealing. The robust housing is easy and quickly to assemble, cutting to the cable diameter is not needed. The Guroflex filler material is delivered in a double chamber bag. For details on Guroflex filler see page 63. The branch connectors allow a quick and easy connection. Different types of Guro branch connectors are available like single mantle clamps or connector blocks with integrated spacing and insulation. A cable diameter range from 10–30 mm can be covered.

Branch joint including Guro connector block or single mantle clamps

Nominal voltage Uo/U (kV)	Cross section		Ordering description	Joint (mm)	
	Main (mm ²)	Branch (mm ²)		Length	Height
with Guro connector blocks					
0,6/1	4x 6–25	4x 4–25	BAV-2U-GD-KK2/4	238	110
	5x 6–16 or 5x10–16	5x 6–16 5x2,5–6	BAV-2U-GD-KK2/5	238	110
with 5 single mantle clamps					
	5x1,5–25	5x1,5–25	BAV-2U-GD- MC25U	238	110
	5x 16–25	5x 16–25	BAV-2U-GD- MC25	238	110

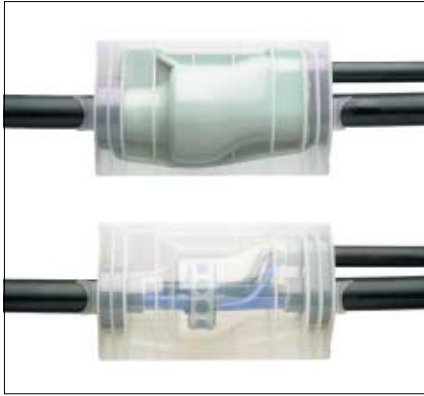
Note: All cross sections are according to CENELEC HD 603;
L Overall length of the housing; H-Overall height of the housing

Branch joint without connectors

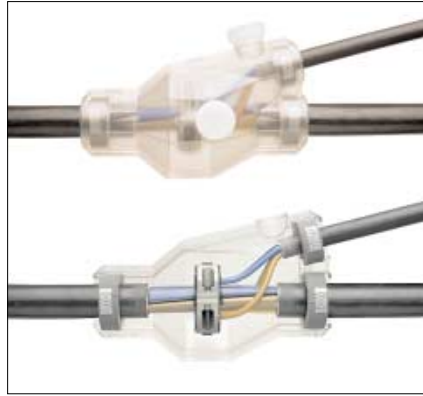
Nominal voltage Uo/U (kV)	Cable diameter (mm) Main / branch	Cross section		Ordering description	Joint (mm)	
		Main (mm ²)	Branch (mm ²)		Length	Height
0,6/1	10–30	5x1,5–25	5x1,5–25	BAV-2U-GD	238	110

Note: For Guro mantle clamps see page 64
L = Overall length of the housing; H = Overall height of the housing

Guroflex-filled branch joints 35 mm² to 240 mm² for polymeric insulated cables



MM 5



BAV 6, BAV 7



Hellstern compact ring connector

Cable

The joints are designed for 3½- and 4-core polymeric insulated cables without armour up to 240 mm².

For example: SZAMtKAtM, KAtM, N(A)YY, N(A)YBY, VVG, AVVG, BBΓ, ABBΓ, YAKY, YKY, YKYFty, AYKY, CYKY, PP 00, XP 00, PP 41, N(A)YC(W)Y.

Design of joints

The joints consist of impact-resistant, transparent polypropylene snap-to-close design (MM5) or impact-resistant, transparent polycarbonate snap-to-close design (BAV) housings and polymer foams for sealing. The housings are easy and quickly to assemble, no adjustment to the cable diameter needed. Joints are available with Hellstern compact ring connectors. The Guroflex filler material is delivered in double chamber bag (D) or in cans (C). The joints allow filling in different positions. A cable diameter range from 27–65 mm can be covered.

Conductors types:

sm: Sector stranded
se: Sector solid
rm: Round stranded
re: Round solid.

Branch joints including Hellstern compact ring connector

Nominal voltage U _o /U (kV)	Cross section (mm ²)		Branch rm, sm / re, se	Ordering description	Joint (mm)	
	Main rm, sm / re, se	Neutral rm, sm / re, se			Length	Height
Branch filled joints for 4-core cables						
0,6/1	35–70 / 50–95	–	6–50 / 6–70	MM-5-GD-4874	295	175
	70–120 / 95–150	–	6–50 / 6–70	MM-5-GD-6875	295	175
	150 / 185	–	6–70 / 6–70	BAV-6-GD-6878	348	203
	185 / 240	–	6–70 / 6–70	BAV-6-GD-6879	348	203
	240 / –	–	6–70 / 6–70	BAV-C7-GC-6880	484	212
	95–120 / 120–150	–	10–95 / 16–120	BAV-C7-GC-6877	484	212
Branch joints for 3½-core cables						
0,6/1	70–120 / 95–150	35–70 / 50–95	6–50 / 6–70	MM-5-GD-4875.3	295	175
	150 / 185	70 / 70	6–50 / 6–50	BAV-6-GD-6878.3	348	203
	185 / 240	95 / 95	6–50 / 6–50	BAV-C7-GC-6879.3	484	212
	240 / –	120 / 120	6–50 / 6–50	BAV-C7-GC-6880.3	484	212

Branch joints without connectors

Nominal voltage U _o /U (kV)	Cable diameter (mm) Main / branch	Connector diameter max (mm)	Cross section (mm ²)		Ordering description	Joint (mm)	
			Main	Branch		Length	Height
0,6/1	27–55 / 16–36	105	4x 35–150	4x6–70	MM5-GD	295	175
	30–58 / 16–40	115	4x 50–185	4x6–95	BAV6-GD	348	203
	45–65 / 16–50	140	4x120–240	4x6–150	BAVC7-GC	484	212

Note: Selecting criterias are cable diameters and connector sizes. Cross sections are selected for cables according to CENELEC HD 603 used with compact ring connectors. For Hellstern ring connectors see page 65.

Guroflex-filled joints for other cable types and cross sections are available on request.

GUROFLEX – 2-component environmental friendly filler material



2-component Guroflex in double chamber bag



2-component Guroflex in cans



Joint filled with “green” Guroflex

Properties

Guroflex is an environmental friendly, easy to handle, 2-component, cold casting material based on hydrocarbon resins. Guroflex can be used for all self-supporting underground cable joint systems up to 1 kV. Guroflex is suitable for XLPE, PE, PVC and paper insulated cables. Guroflex has excellent insulating properties, is hydrophobic and gives excellent corrosion protection. Guroflex filler can be handled without any special safety precautions and allows installation at low temperatures.

Handling

The resin is available either in double chamber bags or in cans. Immediately before filling the entire joint area, both components will be mixed in order to start the cross-linking process. The mixture has a pot life of about 3–4 minutes. The joint trench can be backfilled immediately after filling.

Technical data

- Dielectric strength: $U_d > 10$ kV/mm
- Spec. Dielectric Constant: $\epsilon_r \sim 4$
- Specific Vol. Resistance: $Q_D > 10^{13}$ *cm
- Relative Density: $\rho = 1,22$ g/cm³
- Min. Storage temperature: -20° C
- Min. Installation temperature: -10° C
- Hardness Shore A: ~ 20
- Shelf life: 2 years @ 23° C
- Color: Green

Ordering description for supply in		Volume	Weight	quantities suitable
Double chamber bags	Cans	(~ l)	(~ kg)	for Guro joints
GUROFLEX-D035	–	0,35	0,43	BV-0, BV-1
GUROFLEX-D055	–	0,55	0,67	BV-2
GUROFLEX-D080	–	0,8	0,98	BAV-2
GUROFLEX-D140	–	1,4	1,71	MM-5
GUROFLEX-D160	GUROFLEX-C160	1,6	1,95	VMY-405, MM-5
GUROFLEX-D170	GUROFLEX-C170	1,7	2,07	MM-5
GUROFLEX-D200	GUROFLEX-C200	2,0	2,44	BAV-5
GUROFLEX-D240	GUROFLEX-C240	2,4	2,93	BAV-6
–	GUROFLEX-C370	3,7	4,51	–
–	GUROFLEX-C480	4,8	5,86	VMP-600
–	GUROFLEX-C570	5,7	6,95	BAV-C7
–	GUROFLEX-C650	6,5	7,93	HMY-661-B, VMY-950

Note: Other quantities on request

Guro Mantle Clamps



Universal mantle clamp with insulation cap



Mantle clamp with insulation cap



Mantle clamp without insulation cap

Universal mantle clamp with individual branch connection and insulation cap

Ordering description	Cross section (mm ²)	
	Main	Branch
GURO-MC25U-I	2,5–25	1,5–25

Mantle clamps with common connection and with insulation cap

Ordering description	Combinations of cross sections	
	Main (mm ²)	Branch (mm ²)
GURO-MC06-I	4–6	1,5–6
	2,5–6	2,5–6
GURO-MC16-I	16	1,5–16
	10–16	2,5–10
	6–16	4 – 6
GURO-MC25-I	25	2,5–25
	16–25	6 – 16
	10–25	10

Mantle clamps with common connection without insulation cap

Ordering description	Combinations of cross sections	
	Main (mm ²)	Branch (mm ²)
GURO-MC25	25	2,5–25
	16–25	6 – 16
	10–25	10

Hellstern insulation piercing multi-core connectors

The Hellstern cable ring type connector is specially designed for simple and reliable installation while ensuring maximum safety during life line work. The connectors are suitable for aluminium or copper, for stranded or solid conductors and cables with PVC or XLPE insulation. The compact design allows installation in reduced size resin filled boxes and in Raychem heat-shrinkable Rayligator joints.



Installation

Cable oversheath is removed and the core separators placed between the cores. The two connector halves positioned over the cores and the bolts slightly tightened. Stripped ends of branch cores inserted in the branch channels and the bolts are tightened. The connector halves are closed by tightening the two outer bolts while the contact segments pierce the main cable cores. The outer metal ring is at all times insulated from the live conductors.

- For 4- and for 3½-core cables
- Contact segments with integrated depth limitation
- Branch channels with grooves
- No torque moment key required
- Exceeds requirements according to VDE 0220

Materials:

- Body: High strength aluminium alloy
- Contact segment: electro tinned brass
- Insulation parts: Glass fibre reinforced polymer
- Bolts: Tinned steel 12.9

Conductors types:

- sm: Sector stranded
- se: Sector solid
- rm: Round stranded
- re: Round solid

Cable ring type connector for 4-core cables

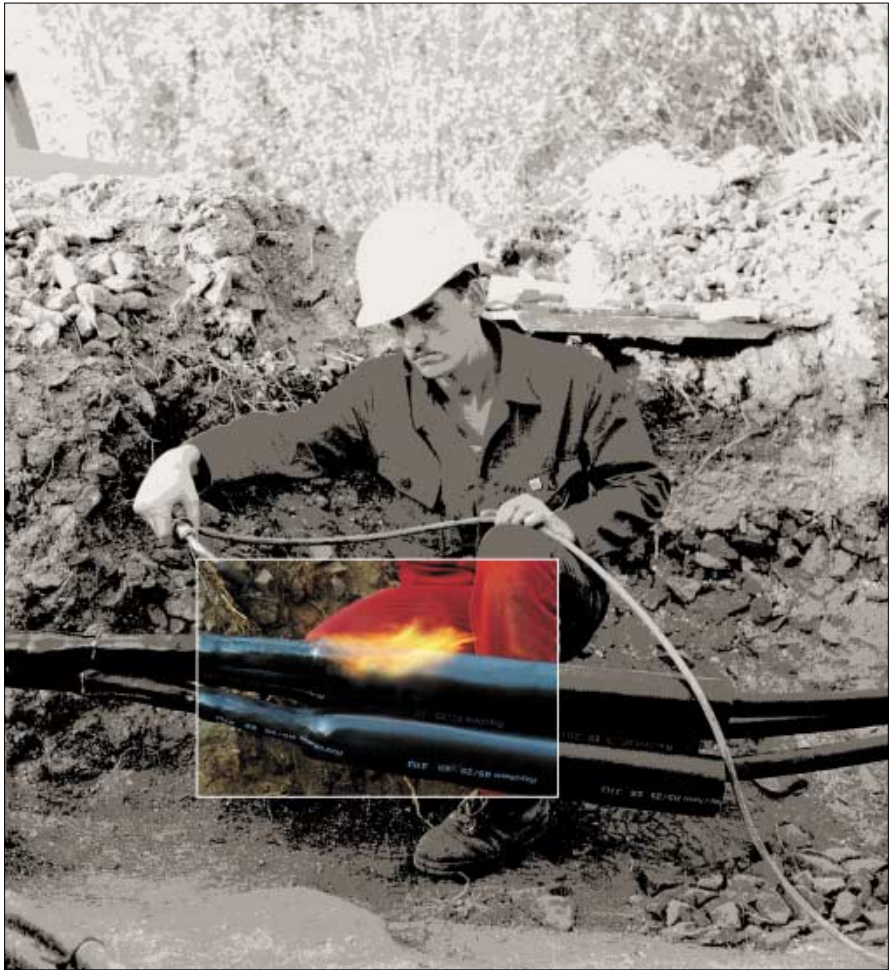
Ordering description standard version	branch with shear head	Main conductor		Branch conductor		Dimensions A / B / circle (mm)	Width across flats (mm)	Weight (kg/100pcs)
		rm/sm (mm ²)	re/se (mm ²)	rm/sm (mm ²)	re/se (mm ²)			
HEL-4874-35re		–	35	6– 35	6– 35	87/ 87/ 96	6 / 5	42,4
HEL-4874	HEL-4874-AK	35– 70	50– 95	6– 50	6– 70	87/ 87/ 96	6 / 5	42,4
HEL-6874	HEL-6874-AK	50– 70	70– 95	6– 50	6– 70	87/ 87/ 96	6 / 5	42,6
HEL-6875	HEL-6875-AK	70–120	95–150	6– 50	6– 70	87/ 87/ 96	6 / 5	42,2
HEL-6876	HEL-6876-AK	95–120	120–150	6– 50	6– 70	91/ 87/100	6 / 5	44,6
HEL-6877	HEL-6877-AK	95–120	120–150	10– 95/ 35–120	16–120/ 50–150	100/120/125	6 / 6	46,0
HEL-6878	–	150	185	6– 70	6– 70	103/ 93/115	6 / 5	60,0
HEL-6879	–	185	240	6– 70	6– 70	110/115/124	8 / 5	69,4
HEL-6880	–	240	–	6– 70	6– 70	110/115/124	8 / 5	69,4
HEL-5876	HEL-5876-AK	–	120–150	6– 50	6– 70	91/ 87/ 98	6 / 5	46,0
HEL-5877	HEL-5877-AK	–	120–150	10– 95/ 35–120	16–120/ 50–150	100/120/125	6 / 6	46,0

A-height, B-width

Cable ring type connector for 3½-core cables with reduced cross section of neutral conductor

Ordering description	Main phase conductor		neutral conductor		Branch conductor rm/sm (mm ²)	A / B / circle re/se (mm ²)	Dimensions (mm)	Width across flats (mm)	Weight (kg/100pcs)
	rm/sm (mm ²)	re/se (mm ²)	rm/sm (mm ²)	re/se (mm ²)					
HEL-4875.3	70–120	95–150	35–70	50–95	6–50	6–70	87/ 87/ 96	6 / 5	42,2
HEL-6878.3	150	185	70	70	6–50*	6–50	110/115/115	6 / 5	63,8
HEL-6879.3	185	240	95	95	6–50	6–50	110/115/124	8 / 5	73,2
HEL-6880.3	240		120	120	6–50	6–50	110/115/124	8 / 5	72,2

A-height, B-width



Joins – Medium Voltage

Joins for belted or screened, 3-core paper insulated cables with one common metal sheath 6 kV, 10 kV, 15 kV, 20 kV and 35 kV	68
Joins for screened, paper insulated cables with one metal sheath per phase 10 kV, 15 kV, 20 kV and 35 kV	70
Joins for unscreened, 3-core polymeric insulated cables 6 kV and 10 kV	72
Joins for flexible, rubber insulated cables and transition joints to unscreened 3-core polymeric insulated cables 6 kV	73
Joins and repair joints for screened, 3-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV	74
Joins and repair joints for screened, 1-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV	76
Branch joints for screened, 1-core polymeric insulated cables 10 kV, 15 kV and 20 kV	78
Live end seals for screened, 1-core polymeric insulated cables 10 kV, 15 kV and 20 kV	79
Transition joints for polymeric insulated cables to screened or belted, 3-core paper insulated cables with one common metal sheath 10 kV, 15 kV, 20 kV and 35 kV	80
Transition joints for screened polymeric insulated cables to screened, paper insulated cables with one metal sheath per phase 10 kV, 15 kV, 20 kV and 35 kV	82

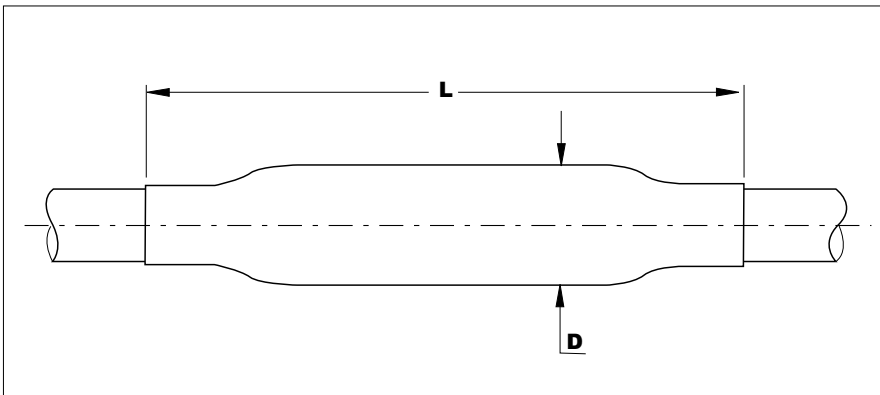
Joists for 3-core belted or screened, paper insulated cables with one common metal sheath 6 kV, 10 kV, 15 kV, 20 kV and 35 kV



Belted cable



Belted or screened cable



Dimensions L, D see table

Cable

The joints are designed for 3-core belted or screened paper insulated (MI, MIND) cables 6, 10, 15, 20 and 35 kV with a common metal sheath.

For example: ACHPAbl, N(A)KBA, SB, ASB, SAAB, AABY, ASBY, СБ, АСБУ, ААБУ, ААШБ, АСБ-В, КftA, Akny, HAKnFtA, HknFty, Hkny, CMKOPV, CMKOY, AMKOY, ANKOPY, IPO 13, NPO 13, IPHO 13, NPHO 13, N(A)HKBA.

Design of joints

For belted cables

The paper cores are covered with oil barrier tubing. The crutch is filled with a stress grading, oil resistive yellow mastic. The mechanical connectors, supplied with the joint, are covered with a stress control patch. The primary insulation over the connectors is provided with proven adhesive coated, heat-shrinkable tubing. The area between and around the cores

is filled with a cold applied mastic which is fully compatible with the materials used to impregnate paper cables. A heat-shrinkable tubing seals to the metal sheath and ensures during installation that the mastic flows and fills any void. Solderless earth connection and metal tape replace the metal sheath and armour in the joint. An outer heat-shrinkable tubing provides the outer sealing and protection.

Belted or screened cables

The paper cores are completely covered with oil barrier tubing and from the crutch area to the screen end with conductive tubing. The crutch area is filled with a stress grading, oil resistive yellow mastic and sealed with an adhesive lined, conductive breakout which is installed over the cores and the end of the metal sheath. Thus the paper cable is transformed to a quasi polymeric cable

construction and the cables jointed similarly. At the end of the conductive tubing and over the connectors stress grading mastic is applied. The jointing area of each cable core is covered with a heat-shrinkable stress control tubing. A heat-shrinkable dual-wall elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. The metal sheath and armour are jointed with solderless connections. The armour is replaced by a metal case or a metal tape. The outer sealing and protection is performed by an adhesive coated, thick-wall heat-shrinkable tubing. The joints are designed to allow crossing of cable cores. Joints type GUSJ are supplied with mechanical connectors, joints type EPKJ are supplied without connectors.

Joins for 3-core belted or screened paper insulated cables with one common metal sheath 6 kV, 10 kV, 15 kV, 20 kV and 35 kV

Joins including mechanical connectors

Joins for screened or belted paper insulated cables 6 kV, 10 kV, 15 kV and 20 kV

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
3,5/6	25– 50	GUSJ 12/ 35- 50	1050	90
	70–120	GUSJ 12/ 70-120	1250	120
	150–240	GUSJ 12/150-240	1250	140
6/10	25– 50	GUSJ 12/ 35- 50	1050	90
	70–120	GUSJ 12/ 70-120	1250	120
	150–240	GUSJ 12/150-240	1250	140
8,7/15	70–150	GUSJ 24/ 70-150-3SB	1800	130
	120–240	GUSJ 24/120-240-3SB	1800	150
12/20	70–150	GUSJ 24/ 70-150-3SB	1800	130
	120–240	GUSJ 24/120-240-3SB	1800	150

Joins without connectors

Joins for screened or belted paper insulated cables 10 kV, 15 kV, 20 kV and 35 kV

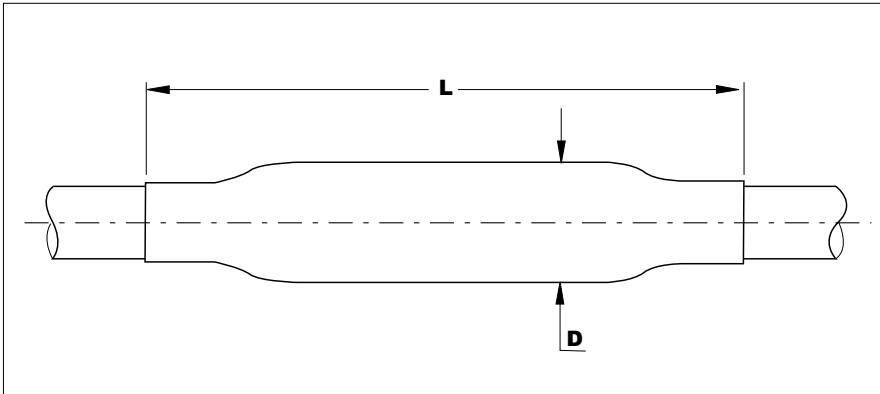
Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
6/10	35– 70	EPKJ-17A/3SB-3SB-T	2500	110
	95–185	EPKJ-17B/3SB-3SB-T	2500	130
	240–400	EPKJ-17C/3SB-3SB-T	2500	160
8,7/15	25– 50	EPKJ-17A/3SB-3SB-T	2500	110
	70–150	EPKJ-17B/3SB-3SB-T	2500	130
	185–300	EPKJ-17C/3SB-3SB-T	2500	160
12/20	35– 70	EPKJ-24B/3SB-3SB-T	2500	110
	95–240	EPKJ-24C/3SB-3SB-T	2500	130
	300–400	EPKJ-24D/3SB-3SB-T	2500	160
20/35	50– 70	EPKJ-36A/3SB-3SB-T	2500	110
	95–150	EPKJ-36B/3SB-3SB-T	2500	130
	185–400	EPKJ-36C/3SB-3SB-T	2500	160

Note: The joints are designed for crimp connectors. Connectors are not included in the joints.

Joints for screened, paper insulated cables with one metal sheath per phase 10 kV, 15 kV, 20 kV and 35 kV



3-core paper insulated cable



Dimensions L, D see table

Cable

The joints are designed for single or 3-core, screened, paper insulated (MI, MIND) cables 10, 15, 20 and 35 kV with one metal sheath per phase.

For example: ACHPAbI, NAKKBA, AOSB, OSB-V, AOSB, OSB, AVVB, AVVG, APVG, OCБ-B, AOCБ, OCБ, Hkny, HAKny, CNKOY, ANKOY, ANKTOYPV, AMKTOYPV, IPZO 13, NPZO 13, N(A)EKBA, N(A)KLEY.

Design of joints

For three-core cables a solderless earth connection provides the connection between the armour and the metal sheaths. Heat-shrinkable breakouts and tubing seal and protect the metal sheaths. A stress grading, oil resistive yellow mastic is laid around the end of the metal sheath and the paper cores are completely covered with oil barrier tubing. A short conductive tubing rebuilds the screen from the metal sheath to the covered paper core. Thus the paper cable is transformed to a quasi polymeric cable construction and the cables are jointed similarly. At the end of the conductive tubing and over the connectors stress grading mastic is applied. The jointing area of each cable core is covered with a heat-shrinkable stress control tubing. A heat-shrinkable dual-wall elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. The metal sheaths are jointed with solderless connections. For three core cables the armour is replaced by a metal tape. The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing for single core cables and by a fibre-reinforced wraparound for 3-core cables. Joints type GUSJ are supplied with mechanical connectors, joints type RPKJ and EPKJ are supplied without connectors.

Joins for screened paper insulated cables with one metal sheath per phase 10 kV, 15 kV, 20 kV and 35 kV

Joins including mechanical connectors

Joins for three core cables with steel tape armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
6/10	35– 70	GUSJ 24/ 35- 70-3HL	1600	90
	70–150	GUSJ 24/ 70-150-3HL	1600	120
	120–240	GUSJ 24/120-240-3HL	1600	140
8,7/15	25– 70	GUSJ 24/ 25- 70-3HL	1600	90
	70–150	GUSJ 24/ 70-150-3HL	1600	120
	120–240	GUSJ 24/120-240-3HL	1600	140
12/20	25– 70	GUSJ 24/ 25- 70-3HL	1600	90
	70–150	GUSJ 24/ 70-150-3HL	1600	120
	120–240	GUSJ 24/120-240-3HL	1600	140
20/35	35– 50	GUSJ 42/ 35- 50-3HL	2000	120
	70–120	GUSJ 42/ 70-120-3HL	2000	130
	120–240	GUSJ 42/120-240-3HL	2000	150

Joins for single core cables without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
12/20	25– 70	GUSJ 24/ 25- 70-1HL	700	60
	70–150	GUSJ 24/ 70-150-1HL	700	70
	120–240	GUSJ 24/120-240-1HL	700	80
20/35	35– 50	GUSJ 42/ 35- 50-1HL	1000	70
	70–120	GUSJ 42/ 70-120-1HL	1000	80
	120–240	GUSJ 42/120-240-1HL	1000	90

Note: The joins are designed for crimp connectors. Connectors are not included in the joins.

Joins without connectors

Joins for three core cables with steel tape armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
6/10	35– 70	RPKJ-24A/3HL-3HL-T-CEE01	1900	90
	95–185	RPKJ-24B/3HL-3HL-T-CEE01	1900	130
	185–300	RPKJ-24C/3HL-3HL-T-CEE01	1900	160
8,7/15	25– 50	RPKJ-24A/3HL-3HL-T-CEE01	1900	90
	70–150	RPKJ-24B/3HL-3HL-T-CEE01	1900	130
	150–300	RPKJ-24C/3HL-3HL-T-CEE01	1900	160
12/20	25– 95	RPKJ-24B/3HL-3HL-T-CEE01	1900	90
	95–240	RPKJ-24C/3HL-3HL-T-CEE01	1900	130
	240–400	RPKJ-24D/3HL-3HL-T-CEE01	1900	160
20/35	50– 70	EPKJ-36A/3HL-3HL-T	2250	90
	95–150	EPKJ-36B/3HL-3HL-T	2250	130
	185–400	EPKJ-36C/3HL-3HL-T	2250	160

Note: The joins are designed for crimp connectors. Connectors are not included in the joins.

Joins for single core cables without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
12/20	35– 70	EPKJ-24B/1HL-1HL	850	70
	95–240	EPKJ-24C/1HL-1HL	950	80
	300–400	EPKJ-24D/1HL-1HL	950	90
20/35	50– 70	EPKJ-36A/1HL-1HL	1050	70
	95–150	EPKJ-36B/1HL-1HL	1050	80
	185–400	EPKJ-36C/1HL-1HL	1050	90

Note: The joins are designed for crimp connectors. Connectors are not included in the joins.

Joins for other cable types, cross sections and voltage classes are available on request.

Joins for unscreened 3-core, polymeric insulated cables 6 kV and 10 kV



Design of transition joints to 1-core screened polymeric insulated cables

The cores of the screened cable are covered with yellow, void filling mastic and heat-shrinkable stress control tubing. The conductors are jointed with a mechanical connector supplied with the joint. The connection area is covered with a stress control patch. A heat-shrinkable, dual-wall, elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. The shielding is rebuilt with copper mesh, and a solderless earth connection system provides the electrical connection. The outer sealing and protection is performed by an adhesive coated, thick-wall heat-shrinkable tubing.

Cable

The joints are designed for 3-core unscreened, polymeric insulated cables 6, 10 kV with armour or common copper tape shield.

For example: PP 41(A), PP 44(A), PP 45(A), NAYFGY, ABBБ, ABBГ, АПВГ, YKYFtly, YKYFoy, YAKY, YKYFtly, YKYFoy, YAKY, YKY..., AYKCYDY, AYKCY, N(A)YBY, N(A)YGY.

Design of joints

The connectors are insulated and sealed with thick-wall, heat-shrinkable tubings and mastic. The armour or copper tape shielding is rebuilt with a wraparound metal case or with copper mesh. A solderless earth connection provides the electrical connection to the armour or copper shielding. The outer protection and sealing is performed by an adhesive coated heat-shrinkable tubing. Joints type POLJ are supplied with mechanical connectors, joints type EPKJ and SMOE are supplied without connectors.

Joins including mechanical connectors

Joins for cables with steel tape armour or common copper tape or wire shield

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
3,5/6	25– 50	POLJ-06/3x 25- 50	800	70
	70–120	POLJ-06/3x 70-120	900	90
	150–240	POLJ-06/3x150-240	1000	100
6/10	25– 50	POLJ-06/3x 25- 50	800	70
	70–120	POLJ-06/3x 70-120	900	90
	150–240	POLJ-06/3x150-240	1000	100

Transition joints for 3-core unscreened cables to 1-core screened cables including mechanical connectors

Nominal voltage U _o /U (kV)	Cross section (mm ²) Cable type		Ordering description	Dimensions (mm)	
	3-core	1-core*		L	D
3,5/6	70–120	70–120	POLJ-12/1x 70-150-3U	1000	90
	150–240	150–240	POLJ-12/1x150-240-3U	1000	100
6/10	70–120	70–150	POLJ-12/1x 70-150-3U	1000	90
	120–240	150–240	POLJ-12/1x150-240-3U	1000	100

* Application ranges apply for 10 and 20 kV cables

Joins without connectors

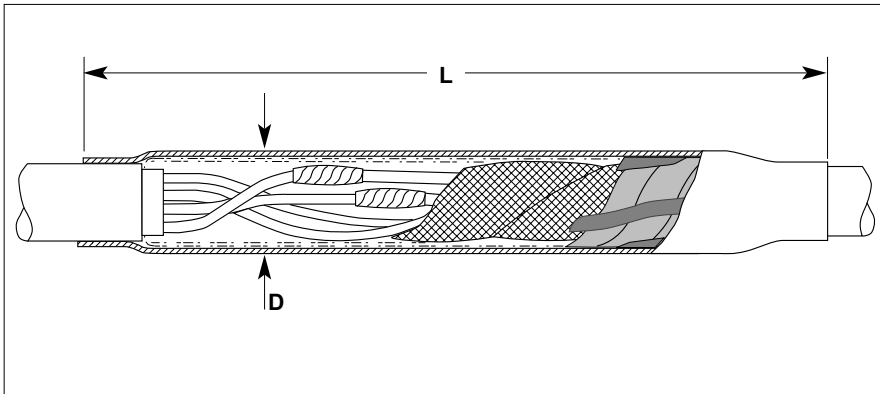
Cables with armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for cables		Dimensions (mm)	
		with tape armour	with wire armour	L	D
3,5/6 and 6/10	16– 70	EPKJ 2079-J41	EPKJ 2079	800	75
	95–150	EPKJ 2080-J42	EPKJ 2080	1000	105
	185–300	EPKJ 2081-J43	EPKJ 2081	1200	135

Cables with common copper tape shield and without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
3,5/6	25– 70	SMOE 62096	800	70
	95–185	SMOE 62095	1000	90
	240	SMOE 61302	1200	100

Joints for screened, flexible, rubber insulated cables and transition joints to 3-core unscreened polymeric insulated cables 6 kV



Dimensions L, D see table

Cable

The joints are designed for screened, flexible, rubber insulated cables 6 kV with one or three earth cores.
 For example: EpN 64 i 65, EPN (BN) 64 i 74, NTSCE, NTSCGEWÖU, КГЭ, КГЭТ, Ogb, Ogc z YKY, YKY..., CBVU, CHCU, EpN(BN) 76 i 78, EpN(BN) 78/53.

Design of joints for flexible cables

The connector areas are stress-graded, sealed and insulated with a void filler tape and thick-wall, heat-shrinkable tubings. A semiconductive tape rebuilds the screen over the insulating tubings. The outer sealing and protection is performed by a flexible, abrasive resistant, thick-wall tubing. The voids between the cores and the outer tubing are filled by a flexible mastic.

Design of transition joints for flexible cables to unscreened polymeric insulated cables

The cores of the flexible cable are stress graded at the end of the screen with a mastic tape. The connectors are insulated and sealed with thick-wall, adhesive coated, heat-shrinkable tubings. The shielding is rebuilt with copper mesh and a solderless earth connections provides the electrical connection to the shielding. The outer protection and sealing is performed by an adhesive coated, heat-shrinkable tubing.

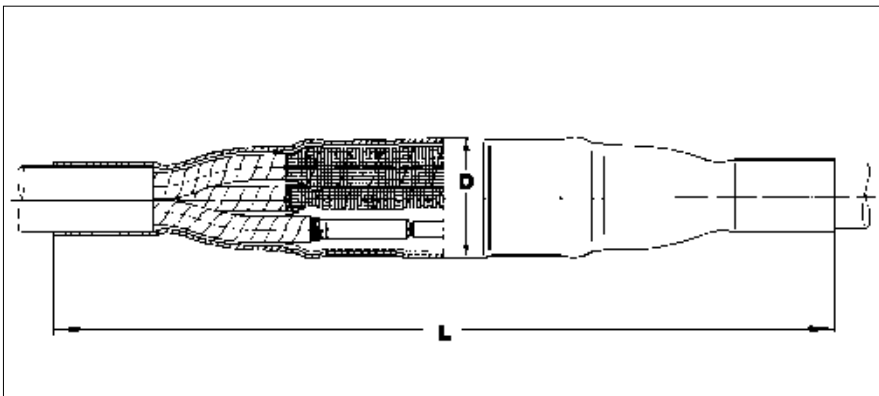
Joints for flexible, rubber insulated cables

Nominal voltage U _o /U (kV)	Cables with 3 earth cores		Cables with 1 earth core		Dimensions (mm)	
	Cross section (mm ²)	Ordering description	Cross section (mm ²)	Ordering description	L	D
3,5/6	25/10 – 95/16	EMKJ 2201-CEE01	10/ 10	EMKJ 2001	750	55
	120/16 – 185/35	EMKJ 2211-CEE01	16/ 16 – 95/ 95	EMKJ 2011	750	100
			120/120 – 185/185	EMKJ 2021	950	130

Transition joints for flexible rubber insulated cables to unscreened, polymeric insulated cables 6 kV

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimensions (mm)	
			L	D
3,5/6	70 – 185	SMOE 62453	1000	130

Joins and repair joints for screened, 3-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV



Dimensions L, D see table

Cable

The joints are designed 10, 15, 20 and 35 kV screened, three core polymeric insulated cables with or without armour. For example: SzaQkrKVM, XHP 81, CEYSEAbY, ACYSEAbY, CYSEY, ACYSEY, BBГ, ABБШШв, АBBГ, YHAKXS, XUHAKXS..., AXEKVCY, CXEKVCY, AXEKVCEY, CXEKVCY, N(A)2XSY, EpHP 81, PHP 48, PHP 84, XHP 48, N(A)YSEY.

Design of joints with mechanical connectors

For cables with wire or tape screen

At the screen end yellow void filling mastic is applied and the cable end is covered with a heat-shrinkable stress control tubing. The conductors are jointed with a mechanical connector supplied with the joint. The connection area is covered with a stress control patch. A heat-shrinkable dual-wall elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. For cables with wire screen a mechanical connector is supplied with the kit. For cables with tape screen the joint includes a solderless earth connection system. For cables with armour a metal case or a metal tape provide additional mechanical protection. The outer sealing and protection is performed by an adhesive coated, thick-wall heat-shrinkable tubing.

Additional sealing kit for transition joints of 3-core to 1-core cables

The transition joint is built the same way as an inline joint for 3-core cables. A heat-shrinkable breakout ensures the sealing of the outer tubing to the 1-core cables. A solderless earth connection system allows the connection of all typical combinations of shield constructions.

Design of joints without connectors

For cables with wire or tape screen

At the screen end and over the connectors yellow, void filling mastic is applied. The jointing area of each cable core is covered with a heat-shrinkable stress control tubing. A heat-shrinkable, elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. For cables with tape screen the joint includes a solderless earth connection. For cables with armour a metal case or a metal tape provide additional mechanical protection. The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing.

Design of repair joints

The design and components of the repair joint and the inline joint are similar. The longer length of the repair joint allows the damaged part of the cable to be cut out and be replaced by a piece of cable core and two connectors. This allows to repair the cable for a length of up to 520 mm (see also drawing page 76).

Design of transition joints for 3-core to 1-core cables

The transition joint is built the same way as an inline joint for 3-core cables. Special sealing clips ensure the sealing of the outer tubing to the 1-core cables.

Joins and repair joints for screened 3-core polymeric insulated cables 10 kV, 15 kV, 20 and 35 kV

Joins including mechanical connectors

For cables with wire or metal tape screen

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description			Dimensions (mm)	
		Cable without armour	Cable with steel tape armour	steel wire armour	L	D
6/10	25– 70	POLJ 12/3x 25- 70	POLJ 12/3x 25- 70-T	POLJ 12/3x 25- 70-W	1100	80
	70–150	POLJ 12/3x 70-150	POLJ 12/3x 70-150-T	POLJ 12/3x 70-150-W	1100	90
	120–240	POLJ 12/3x120-240	POLJ 12/3x120-240-T	POLJ 12/3x120-240-W	1100	100
8,7/15 and 12/20	25– 70	POLJ 24/3x 25- 70	POLJ 24/3x 25- 70-T		1250	90
	70–150	POLJ 24/3x 70-150	POLJ 24/3x 70-150-T		1250	100
	120–240	POLJ 24/3x120-240	POLJ 24/3x120-240-T		1250	110
20/35	70–120	POLJ 42/3x 70-120	POLJ 42/3x 70-120-T	POLJ 42/3x 70-120-W	2200	150
	120–240	POLJ 42/3x120-240	POLJ 42/3x120-240-T	POLJ 42/3x120-240-W	2200	180

Note: The application ranges are defined for cables with round, stranded conductors; for cables with sector shaped or solid conductors contact your Raychem products representative.

Additional sealing kit for transition joints of 3-core to 1-core cables

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description
6/10, 8,7/15, 12/20	25–240	SMOE 62800

Note: For joints to cables with aluminium laminate (e.g. type AHXAMK-W) the solderless ground wire connection kit SMOE 62600 must be ordered separately (details see page 81).

Joins without connectors

Joins for three core cables without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for cables		Dimensions (mm)	
		with wire shield	with metal tape shield	L	D
6/10	10– 25	SXSU 4302-CEE04		1450	90
	25– 35	SXSU 4302	SXSU 4302-CEE01	1450	90
	50– 70	SXSU 4312	SXSU 4312-CEE01	1450	90
	95–185	SXSU 4322	SXSU 4322-CEE01	1450	100
	240–300	SXSU 4332	SXSU 4332-CEE01	1500	110
8,7/15	35– 50	SXSU 4312	SXSU 4312-CEE01	1450	90
	70–150	SXSU 4322	SXSU 4322-CEE01	1450	100
	185–300	SXSU 4332	SXSU 4332-CEE01	1500	110
12/20	10– 25	SXSU 5302-CEE04		1450	90
	35– 95	SXSU 5322		1500	100
	120–240	SXSU 5332		1500	110
	300	SXSU 5342		1500	110

Repair joints for three core cables without armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for cables		Dimension (mm)	
		with wire shield	with metal tape shield	L	D
6/10	35– 95	REPJ-12A/3XU	REPJ-12A/3XU-CEE01	2000	90
	120–185	REPJ-12B/3XU	REPJ-12B/3XU-CEE01	2000	100
	240–400	REPJ-12C/3XU	REPJ-12C/3XU-CEE01	2100	110
12/20	25– 50	REPJ-24A/3XU		2000	90
	70–120	REPJ-24B/3XU		2000	100
	150–240	REPJ-24C/3XU		2100	110

Joins for three core cables with armour

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for cables		Dimension (mm)	
		with wire armour	with tape armour	L	D
6/10	25– 35	SXSW 4304	SXST 4303-CEE01	1450	100
	50– 70	SXSW 4314	SXST 4313-CEE01	1500	100
	95–185	SXSW 4324	SXST 4323-CEE01	1600	150
	240–300	SXSW 4334	SXST 4333-CEE01	1600	180

Transition joints for three core to one core polymeric insulated cable

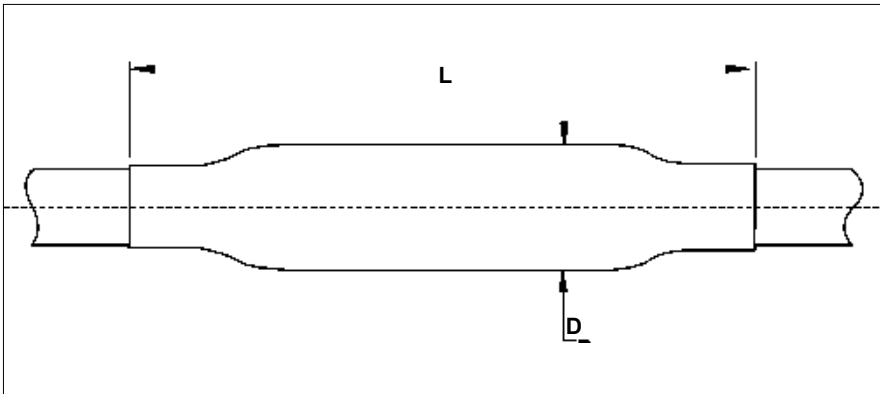
Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
6/10	35– 70	EPKJ-17A/1XU-3XU	1000	90
	95–185	EPKJ-17B/1XU-3XU	1100	130
	240–400	EPKJ-17C/1XU-3XU	1100	160
12/20	35– 70	EPKJ-24B/1XU-3XU	1100	90
	95–240	EPKJ-24C/1XU-3XU	1100	130
	300–400	EPKJ-24D/1XU-3XU	1100	160

Joins for other cable types, cross sections or voltage classes are available on request.

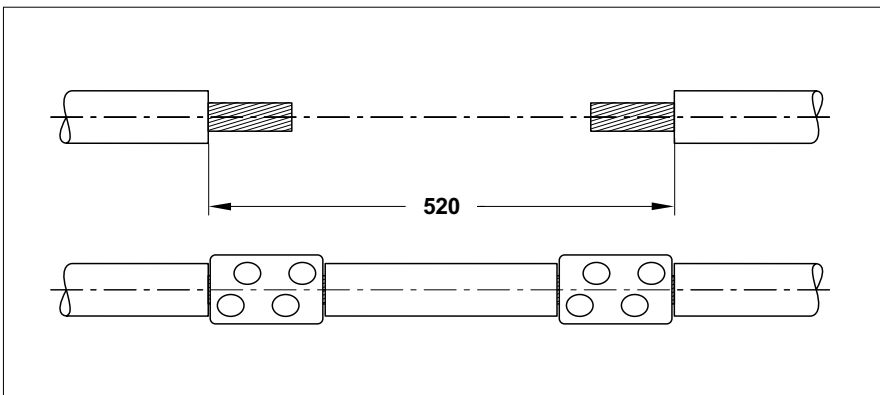
Joints and repair joints for screened, 1-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV



Joint



Dimensions L, D see table



Repair joint

Cable

The joints are designed 10, 15, 20 and 35 kV screened, one core polymeric insulated cables.

For example: A2YSb(r)Y, A2YSY, ПвП, АПвП, ВПвП, УНАКXS, ХУНАКXS, ХУНКС, АХЕКVCEY, СХЕКVCEY, N(A)2XS, SAXKA, DISTRI, XHE 49(A), XHP 48(A), EHP 48(A), N(A)2XS(F)2Y, АНХАМК-W, NFC 33-223

Design of joints with mechanical connectors

For cables with wire or tape screen

At the screen end yellow, void filling mastic is applied and the cable end is covered with a heat-shrinkable stress control tubing. The conductors are jointed with a mechanical connector supplied with the joint. The connection area is covered with a stress control patch. A heat-shrinkable, dual-wall, elastomeric

tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. For cables with wire screen an earth connection system is supplied with the kit. For cables with tape screen the joint includes a solderless earth connection system which is also suitable for cables with aluminium laminate (e.g. type АНХАМК-W). The outer sealing and protection is performed by an adhesive coated, thick-wall heat-shrinkable tubing. For cables with aluminium wire screen, the inner components of the cable up to the bedding are rebuilt as for cables with wire or tape screen. The aluminium wires are connected with mechanical connectors and covered with metal tape. The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing.

Design of joints without connectors

For cables with wire or tape screen

At the screen end and over the connector yellow, void filling mastic is applied. The entire joint area is covered with a heat-shrinkable, stress control tubing. A heat-shrinkable elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. For cables with tape screen the joint includes a solderless earth connection system which is also suitable for cables with aluminium laminate (e.g. type АНХАМК-W). The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing.

Design of repair joints

The design and components of the repair joint and the inline joint are similar. The longer length of the repair joint allows the damaged part of the cable to be cut out and to be replaced by a piece of cable core and two connectors. This allows to repair the cable for a length of up to 520 mm (10 and 20 kV) or 420 mm (35 kV).

Joins and repair joints for screened, 1-core polymeric insulated cables 10 kV, 15 kV, 20 kV and 35 kV

Joins including mechanical connectors

For cables with wire or metal tape screen

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description		Dimensions (mm)	
		Cable with wire shield	Cable with tape or wire shield *	L	D
6/10	25– 70	POLJ 12/1x 25- 70	POLJ 12/1x 25- 70-CEE01	450	45
	70–150	POLJ 12/1x 70-150	POLJ 12/1x 70-150-CEE01	450	55
	120–240	POLJ 12/1x120-240	POLJ 12/1x120-240-CEE01	450	65
	300–400	POLJ 12/1x300-400	–	500	75
	500–630	POLJ 12/1x500-630	–	500	85
	800	POLJ 12/1x800-Al-C**	–	550	90
8,7/15 and 12/20	25– 70	POLJ 24/1x 25- 70	POLJ 24/1x 25- 70-CEE01	500	55
	70–150	POLJ 24/1x 70-150	POLJ 24/1x 70-150-CEE01	500	65
	120–240	POLJ 24/1x120-240	POLJ 24/1x120-240-CEE01	500	70
	300–400	POLJ 24/1x300-400	–	550	80
	500–630	POLJ 24/1x500-630	–	550	90
20/35	35– 70	POLJ 42/1x 35- 70	POLJ 42/1x 35- 70-CEE01	800	65
	70–120	POLJ 42/1x 70-120	POLJ 42/1x 70-120-CEE01	850	70
	120–240	POLJ 42/1x120-240	POLJ 42/1x120-240-CEE01	850	75
	300–400	POLJ 42/1x300-400	–	900	85

* The joints are designed for cables with copper tape shield or with aluminium laminate (e.g. type AHXAMK-W) and can also be used for cables with wire shields. For transitions of cables with wire shield to cables with al-laminate use joints for cables with wire shield.

** Includes DIN-compression connector for Aluminium conductors to be crimped with hydraulic tool and with die code 58

For cables with aluminium wire armour and wire or tape screen

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description Cable with with tape or wire shield	Dimensions (mm)	
			L	D
6/10	25– 70	POLJ 12/1x 25- 70-AW	850	50
	70–150	POLJ 12/1x 70-150-AW	850	60
	120–240	POLJ 12/1x120-240-AW	850	70
8,7/15 and 12/20	25– 70	POLJ 24/1x 25- 70-AW	900	60
	70–150	POLJ 24/1x 70-150-AW	900	70
	120–240	POLJ 24/1x120-240-AW	900	75
20/35	70–120	POLJ 42/1x 70-120-AW	1250	75
	120–240	POLJ 42/1x120-240-AW	1250	80

Repair Joint for cables with wire or tape screen

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Repair length mm (max.)	Dimensions (mm)	
				L	D
6/10, 8,7/15 and 12/20	25– 70	REPJ-24/1x 25- 70	520	1200	50
	70–150*	REPJ-24/1x 70-150	520	1200	55
	120–240	REPJ-24/1x120-240	520	1200	70
20/35	70–120	REPJ-42/1x 70-150	420	1200	55
	120–240	REPJ-42/1x120-240	420	1200	70

* for 10 kV cables application range 95–150 mm²

Joins without connectors

Joins for cables with wire or tape screen

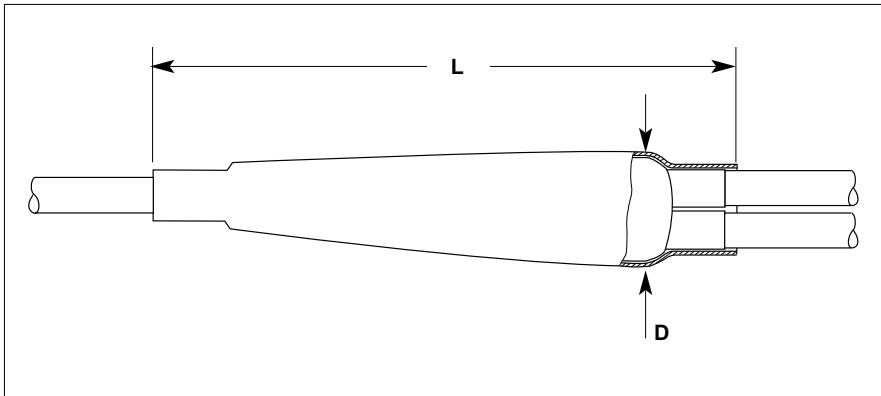
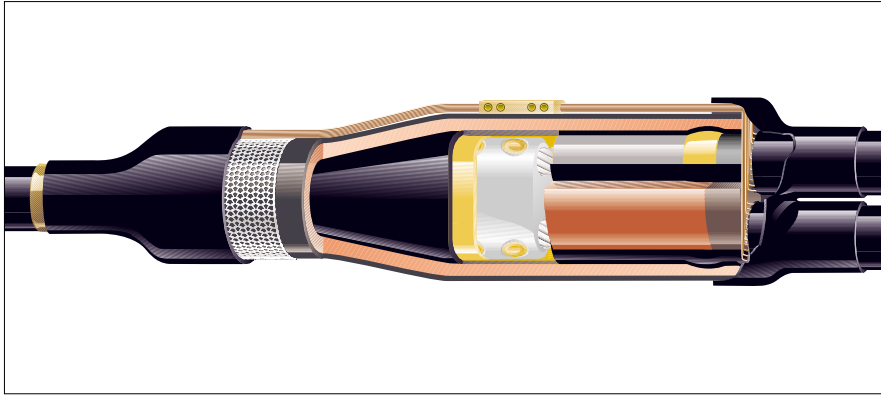
Nominal voltage U _o /U (kV)	Cross section (mm ²)		Ordering description for cables with		Dimensions (mm)	
	(mm ²)	(mm ²)	wire shield	metal tape shield *	L	D
6/10 and 8,7/15	6/10 kV	8,7/15 kV				
	50– 70	35– 50	SXSU 4111	SXSU 4111-CEE01	550	45
	95–150	70–120	SXSU 4121	SXSU 4121-CEE01	600	55
	185–300	150–240	SXSU 4131	SXSU 4131-CEE01	650	65
	400–630	300–500	SXSU 4141	SXSU 4141-CEE01	750	75
12/20	800	630–800	SXSU 5151		750	85
	35– 95		SXSU 5121	SXSU 5121-CEE01	600	60
	120–240		SXSU 5131	SXSU 5131-CEE01	650	70
	300–500		SXSU 5141		750	80
20/35	630–800		SXSU 5151		750	85
	50– 70		SXSU 6121		850	65
	95–150		SXSU 6131		850	70
	185–400		SXSU 6141		850	80

* The joints are designed for cables with copper tape shield or with aluminium laminate (e.g. type AHXAMK-W).

Joins for other cable types, cross sections or voltage classes are available on request.

Joins for 1-core cables include material for 1 phase.

Branch joints for screened, 1-core polymeric insulated cables 10 kV, 15 kV and 20 kV



Dimensions L, D see table

Based on the well proven technology of medium voltage joints, Raychem offers a technically and commercially interesting solution to realise branch joints for single core polymeric insulated cables. A newly developed, mechanical connector integrated in the joint design allows a quick, simple and reliable installation. The branch joint is fully qualified to the Raychem test norm PPS 3013.

Cable

The branch joint is designed for screened, single core polymeric insulated cables 10 kV and 20 kV.

For example: NAYSY, NA2XS2Y, ПвП, АПвП, УНКС, УНАКС, ХУНАКС, АХЕКВСУ, СХЕКВСЕУ, N(A)2XSU, XHE 49(A), XHP 48(A), EHP 48, N(A)2XS(F)2Y.

Design of branch joints

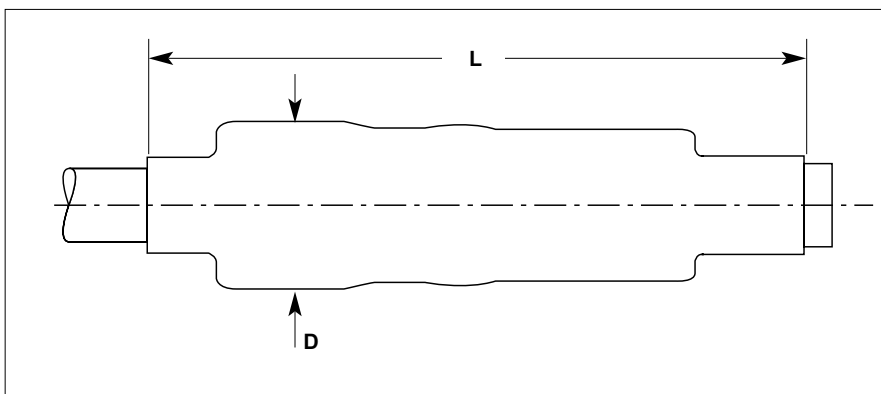
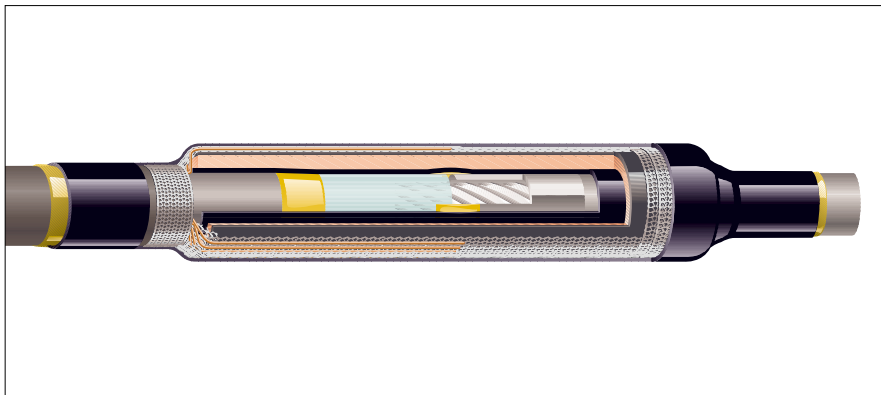
The cables are prepared as for inline joints. Before connecting the cables, the screen cut is covered with the yellow stress grading filler and a stress control tubing. The three cable ends are connected with a Raychem designed mechanical connector with shear-head bolts. Special moulded parts ensure the filling and sealing between the branch cables. Following, similar parts as for inline joints are used: Yellow void-filler over the connector, stress control tubing, dual-wall insulation and screen tubing. Copper mesh and a mechanical connector for the screen wires re-establish the metallic screen. The outer sealing is provided by a heat-shrinkable, thick-wall tubing and a 2-finger breakout. All connectors are supplied with the kit.

Branch joint for cables with wire screen, including mechanical connectors

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
6/10	35– 95	EPKB 12A/1XU-2XU	550	80
	95– 150	EPKB 12B/1XU-2XU	600	90
	185–300	EPKB 12C/1XU-2XU	650	95
8,7/15	35– 95	EPKB 24A/1XU-2XU	550	80
	95– 150	EPKB 24B/1XU-2XU	600	90
	185–300	EPKB 24C/1XU-2XU	650	95
12/20	35– 95	EPKB 24A/1XU-2XU	550	80
	95– 150	EPKB 24B/1XU-2XU	600	90
	120–240	EPKB 24C/1XU-2XU-BR02	650	95
	185–300	EPKB 24C/1XU-2XU	650	95

Branch joints for other cable types and cross sections are available on request. Joints for 1-core cables include material for 1 phase.

Live end seals for screened, 1-core polymeric insulated cables 10 kV, 15 kV and 20 kV



Dimensions L, D see table

Cable

The live end seals are designed for screened single core polymeric insulated cables 10 kV and 20 kV.

For example: NAYSY, NA2XS2Y, ПвП, АПвП, УНАКXS, ХУНАКXS, АХЕКVСУ, СХЕКVСЕУ, N(A)2XSU, XHE 49, XHP 48, EHP 48, N(A)2XS(F)2Y.

Design of end seals

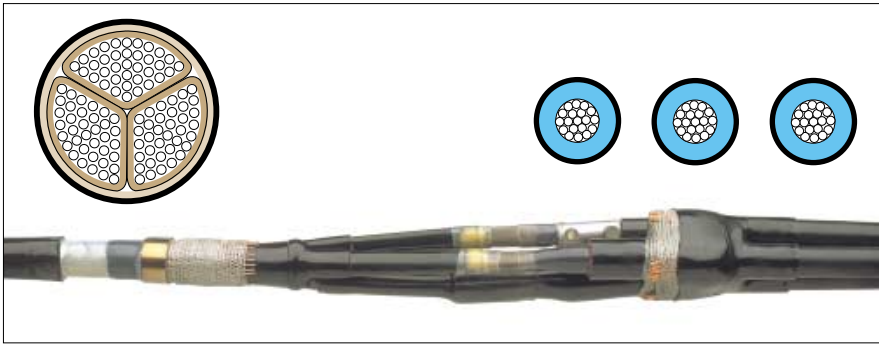
The cable is prepared the same way as for joints. An insulating rod is positioned over the conductor. The area between the end of the insulation and the rod are covered with yellow, stress grading filler. Similar to medium voltage joints, a stress control tubing and a dual-wall insulation and screen tubing are shrunk over the cable end and the insulating rod. Copper mesh is wrapped around the joint area to re-establish the metallic screen. The outer sealing and protection is provided by a heat-shrinkable, thick-wall tubing.

Live end seal for single core polymeric insulated cables with wire screen

Nominal voltage U ₀ /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
6/10, 8,7/15 and 12/20	70	EPKE 24B/1XU- 70	400	60
	95	EPKE 24B/1XU- 95	400	60
	120	EPKE 24C/1XU-120	400	70
	150	EPKE 24C/1XU-150	400	70
	185	EPKE 24C/1XU-185	400	70
	240	EPKE 24C/1XU-240	400	70
	300	EPKE 24D/1XU-300	400	80

Live end seals for other cable types, cross sections and voltages are available on request.
Joints for 1-core cables include material for 1 phase.

Transition joints for polymeric insulated cables to 3-core belted or screened, paper insulated cables with one common metal sheath 6 kV, 10 kV, 15 kV, 20 kV and 35 kV



Belted or screened, paper insulated cable to 1-core polymeric insulated cable



Belted or screened, paper insulated cable to 3-core polymeric insulated cable

Cable

The joints are designed for 3-core belted or screened, paper insulated (MI, MIND) cables with a common metal sheath to screened one or three core polymeric insulated cables 6, 10, 15, 20 and 35 kV. For example: ACHPAbI, N(A)KBA, SB, ASB, SAAB, ASBY, A2YSb(r)Y, A2YSY, ACБ, ААБУ, ПвПГ, АпвПГ, ANKOY-XEKVC(E)Y, ANKOPV-AYKCY, ANKOY-N(A)2XSy, IPO 13, NPO 13, IPHO 13, N(A)HKBA на XHE 49, XHP48, XHP 81, N(A)2XS(F)2Y, N(A)YSEY, EpHP 81.

Design of joints with mechanical connectors

For belted paper cables to one core polymeric cables

The paper cores are completely covered with oil barrier tubing and from the crutch area to the screen end with conductive tubing. The crutch area is filled with a stress grading, oil resistive, yellow mastic and sealed with an adhesive lined, conductive breakout and conductive tubing which are installed over the cores and the end of the metal sheath. Thus the paper cable is transformed to a quasi polymeric cable construction and the cables jointed similarly. Yellow, void filling mastic is laid around the screen end of the polymeric cables and the end of the conductive tubings of the paper cable cores. The cores of the polymeric cables are covered with stress control tubing.

The conductors are jointed with mechanical connectors supplied with the joint. The connection area is covered with a stress control patch. A heat-shrinkable, dual-wall elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. The metal sheath, armour and the metal screen of the polymeric cable are jointed with solderless connections. A metal tape is wrapped around the joint area to provide a metal screen and additional protection. The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing and a breakout. For cables with aluminium tape shield (e.g. type AHXAMK-W) a connection kit for the ground wire has to be ordered separately.

For belted paper cables to three core polymeric cables

The joint is designed for unscreened and screened polymeric cables. The installation and design is similar to joints for single core cables. The kit includes in addition solderless earth connections for different types of shielding and armouring.

Design of joints without connectors

For screened or belted paper cables to polymeric cables

The paper cores are completely covered with oil barrier tubing and from the crutch area to the screen end with conductive tubing. The crutch area is filled with a stress grading, oil resistive, yellow mastic and sealed with an adhesive lined, conductive breakout and conductive tubing which are installed over the cores and the end of the metal sheath. Thus the paper cable is transformed to a quasi polymeric cable construction and the cables jointed similarly. At the end of the conductive tubing, over the connectors and at the end of the screen of the polymeric cable yellow, void filling mastic is applied. The jointing area of each cable core is covered with a heat-shrinkable, stress control tubing. A heat-shrinkable dual-wall elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. The metal sheath, armour and the metal screen of the polymeric cable are jointed with solderless connections. The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing. Joints for single core polymeric cables include special sealing clips which ensure the sealing of the outer tubing to the 1-core cables. The joints are supplied without connectors.

Transition joints for polymeric insulated cables to 3-core belted or screened, paper insulated cables with one common metal sheath 6 kV, 10 kV, 15 kV, 20 kV and 35 kV

Transition Joints including mechanical connectors

For 1-core screened polymeric insulated cables to
3-core belted or screened paper insulated cables with common metal sheath 6 kV, 10 kV
and to 3-core screened paper insulated cables with common metal sheath 15 kV, 20 kV

Nominal voltage U _o /U (kV)	Cross section (mm ²) Cable Insulation		Ordering description		Dimension (mm)	
	Polymeric	Paper	wire shield	for polymeric cables with metal tape shield *	L	D
3,5/6 and 6/10	35– 50	35– 50	TRAJ 12/1x 35- 50	TRAJ 12/1x 35- 50-CEE01	950	90
	70–150	70–120	TRAJ 12/1x 70-120	TRAJ 12/1x 70-120-CEE01	950	120
	150–240	150–240	TRAJ 12/1x150-240	TRAJ 12/1x150-240-CEE01	950	140
8,7/15 and 12/20	25– 70	25– 70	TRAJ 24/1x 25- 70-3SB		1100	100
	70–150	70–150	TRAJ 24/1x 70-150-3SB		1200	120
	120–240	120–240	TRAJ 24/1x120-240-3SB		1200	140

* The joints are designed for cables with copper tape shield or with aluminium laminate (e.g. type AHXAMK-W).

For 3-core screened or unscreened polymeric insulated cables to
3-core belted paper insulated cables with common metal sheath 6 kV, 10 kV

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description for polymeric cable		Dimension (mm)	
		without armour	with wire armour	L	D
3,5/6 and 6/10	35– 50	TRAJ 12/3x 35- 50	TRAJ 12/3x 35- 50-W	1050	90
	70–120	TRAJ 12/3x 70-120	TRAJ 12/3x 70-120-W	1250	120
	150–240	TRAJ 12/3x150-240	TRAJ 12/3x150-240-W	1250	140

Transition Joints without connectors

For 1-core screened polymeric insulated cables to
3-core screened or belted paper insulated cables with common metal sheath 10 kV, 20 kV and 35 kV

Nominal voltage U _o /U (kV)	Cable cross section (mm ²)		Ordering description		Dimension (mm)	
	Polymeric	Paper	Polymeric	Paper	L	D
6/10 and 8,7/15	U _o /U (kV) = 6/10 kV		U _o /U (kV) = 8,7/15 kV			
	35– 70	35– 70	25– 50	25– 50	EPKJ-17A/1XU-3SB	1450 90
	95–185	95–185	70–150	70–150	EPKJ-17B/1XU-3SB	1450 130
	240–400	240–400	185–300	185–300	EPKJ-17C/1XU-3SB	1450 160
	95–185	35– 95	70–150	35– 70	SMOE 61200	1450 130
12/20	185–300	95–185	185–240	70–150	SMOE 61303	1450 140
	35– 70	35– 70			EPKJ-24B/1XU-3SB	1450 90
	95–240	95–240			EPKJ-24C/1XU-3SB	1450 130
20/35	300–400	300–400			EPKJ-24D/1XU-3SB	1450 160
	95–240	35– 95			SMOE 61733	1450 135
	50– 70	50– 70			EPKJ-36A/1XU-3SB	1450 100
	95–150	95–150			EPKJ-36B/1XU-3SB	1450 140
	185–400	185–400			EPKJ-36C/1XU-3SB	1450 160

For 3-core screened polymeric insulated cables to
3-core screened or belted paper insulated cables with common metal sheath 10 kV

Nominal voltage U _o /U (kV)	Cable cross section (mm ²)		Ordering description		Dimension (mm)	
	Polymeric	Paper	Polymeric	Paper	L	D
6/10 and 8,7/15	U _o /U (kV) = 6/10 kV		U _o /U (kV) = 8,7/15 kV			
	35– 70	35– 70	25– 50	25– 50	EPKJ-17A/3XU-3SB	1450 90
	95–185	95–185	70–150	70–150	EPKJ-17B/3XU-3SB	1450 130
	240–400	240–400	185–300	185–300	EPKJ-17C/3XU-3SB	1450 160
	95–185	35– 95	70–150	25– 70	SMOE 61600	1450 150

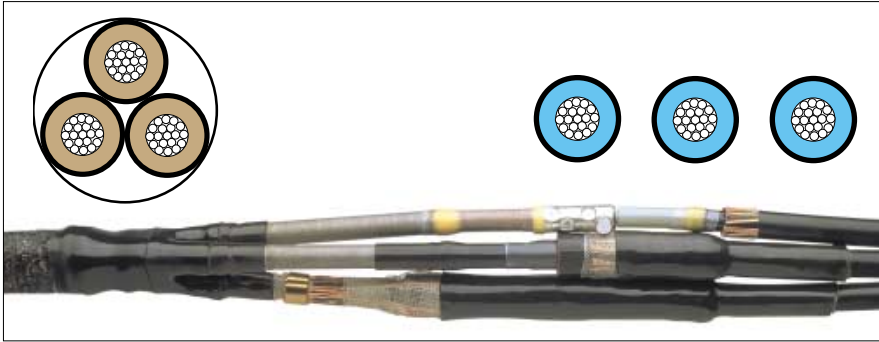
Connection kit for transition joints type TRAJ-CEE01 to the ground wire of 1-core polymeric cables with aluminium laminate (e.g. type AHXAMK-W)

Ordering description	Earth lead dimensions Length (mm)	Cross section (mm ²)
SMOE 62600	800	35

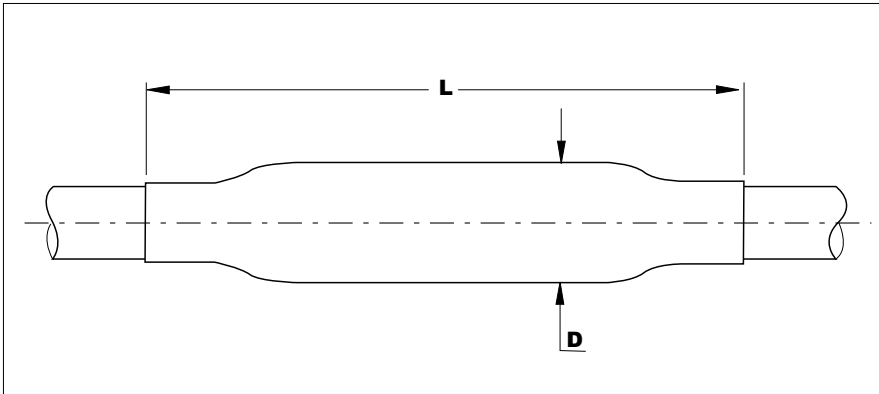
Note: The solderless ground wire connection kit must be ordered separately. It includes a screw connector, an insulated earth lead and insulation tubing.

Transition joints for other cross sections or cable types are available on request. Contact the local Raychem products representative for transitions of 6 kV or 10 kV paper insulated to 20 kV polymeric insulated cables.

Transition joints for screened, polymeric insulated cables to screened, paper insulated cables with one metal sheath per phase 10 kV, 15 kV, 20 kV and 35 kV



Screened 3-core paper insulated cable to one core polymeric insulated cable



Dimensions L, D see table

Cable

The joints are designed for single or 3-core, screened, paper insulated (MI, MIND) cables with one metal sheath per phase to screened single or three core polymeric insulated cables 10, 15, 20 and 35 kV.

For example: АСНРАbl, НАНКВА, АОСВ, А2YSb(r)Y, А2YSY, АОСБ-АПbП, ОСБ-ПпП, НАКнX-YHAKXS, ЗНК-XУHAKXS, ANKOY-AXEKVC(E)Y, ANKTOYPV-AXEKVC(E)Y, ANKTOYPV-N(A)2XSY, IZPO 13, NPZO 13, NPHO 13, NPZOP 13, N(A)HEKBA на XHE 49, XHP 48, N(A)2XS(F)2Y, XHP 81, N(A)YSEY.

Design of joints with mechanical connectors

For three-core paper cables a solderless earth connection provides the connection between the armour and the metal sheaths. A heat-shrinkable breakout and tubing seal and protect the metal sheaths. A stress grading, oil resistive, yellow mastic is laid around the end of the metal sheath and the paper cores are completely covered with oil barrier tubing. Thus the paper cable is transformed to a quasi polymeric cable construction and the cable jointed similarly.

Yellow, void filling mastic is laid around the screen end of the polymeric cables. The cores of the polymeric cables and of the paper cables are covered with heat-shrinkable stress control tubing. The conductors are jointed with mechanical connectors supplied with the joint. Yellow void filling mastic seals the end of the paper cores and the connection area is covered with a stress control patch. A heat-shrinkable, dual-wall elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen. The metal sheath and the metal screen of the plastic cable are jointed with solderless connections. The outer sealing and protection is performed by an adhesive coated, thick-wall heat-shrinkable tubing over each cable core.

Design of joints without connectors

For three-core paper cables a solderless earth connection provides the connection between the armour and the metal sheaths. A heat shrinkable breakout and tubing seal and protect the metal sheaths. A stress grading, oil resistive, yellow mastic is laid around the end of the metal sheath and the paper cores are completely covered with oil barrier tubing. A short conductive tubing rebuilds the screen from the metal sheath to the covered paper core. Thus the paper cable is transformed to a quasi polymeric cable construction and the cable jointed similarly.

At the end of the conductive tubing, the screen cut of the polymeric cable and over the connectors yellow, void filling mastic is applied. The jointing area of each cable core is covered with a heat-shrinkable stress control tubing. A heat-shrinkable, dual-wall, elastomeric tubing provides the correct thickness of insulation and the screening over the insulation. Copper mesh wrapped around the joint area rebuilds the metallic screen.

The metal sheath and the metal screen of the plastic cable are jointed with solderless connections. The outer sealing and protection is performed by an adhesive coated, thick-wall, heat-shrinkable tubing over each cable core. For three core polymeric insulated cables one tubing replaces the oversheath.

Transition joints for screened polymeric insulated cables to screened, paper insulated cables with one metal sheath per phase 10 kV, 15 kV, 20 kV and 35 kV

Transition Joints including mechanical connectors

For 1-core screened, polymeric insulated cables to
3-core screened, paper insulated cables with one metal sheath per phase 10, 15, 20 and 35 kV

Nominal voltage U _o /U (kV)	Cross sections (mm ²)			Ordering description	Dimension (mm)	
	(mm ²)	(mm ²)	(mm ²)		L	D
6/10, 8,7/15 and 12/20	6/10 kV	8,7/15 kV	12/20 kV			
	35– 70	35– 70	35– 70	TRAJ 24/1x 25- 70-3HL	1000	90
	70–150	70–150	70–150	TRAJ 24/1x 70-150-3HL	1000	120
20/35	120–240	120–240	120–240	TRAJ 24/1x120-240-3HL	1000	140
	35– 50			TRAJ 42/1x 35- 50-3HL	1250	100
	70–120			TRAJ 42/1x 70-120-3HL	1250	130
	120–240			TRAJ 42/1x120-240-3HL	1250	150

Note: The joints are designed for polymeric insulated cables with wire shield, copper tape shield or with aluminium laminate (e.g. type AHXAMK-W).

For 1-core screened, polymeric insulated cables to
1-core screened, paper insulated cables 20 and 35 kV

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
12/20	25– 70	TRAJ 24/1x 25- 70-1HL	850	60
	70–150	TRAJ 24/1x 70-150-1HL	850	65
	120–240	TRAJ 24/1x120-240-1HL	950	70
20/35	35– 50	TRAJ 42/1x 35- 50-1HL	1050	65
	70–120	TRAJ 42/1x 70-120-1HL	1050	70
	120–240	TRAJ 42/1x120-240-1HL	1050	80

Transition Joints without connectors

For 1-core screened, polymeric insulated cables to
3-core screened, paper insulated cables with one metal sheath per phase 10, 15, 20 and 35 kV

Nominal voltage U _o /U (kV)	Cross sections (mm ²)			Ordering description	Dimension (mm)	
	(mm ²)	(mm ²)	(mm ²)		L	D
6/10, 8,7/15 and 12/20	6/10 kV	8,7/15 kV	12/20 kV			
	35– 70	25– 50		RPKJ-24A/1XU-3HL-CEE01	1200	90
	95–185	70–150	25– 95	RPKJ-24B/1XU-3HL-CEE01	1200	130
	185–300	150–300	95–240	RPKJ-24C/1XU-3HL-CEE01	1200	150
			240–400	RPKJ-24C/1XU-3HL-CEE01	1200	160
20/35	50– 70			EPKJ-36A/1XU-3HL	1450	90
	95–150			EPKJ-36B/1XU-3HL	1450	130
	185–400			EPKJ-36C/1XU-3HL	1450	160

Note: The joints are designed for polymeric insulated cables with wire shield, copper tape shield or with aluminium laminate (e.g. type AHXAMK-W).

For 3-core screened, polymeric insulated cables to
3-core screened, paper insulated cables with one metal sheath per phase 20 kV

Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
12/20	35– 70	EPKJ-24B/3XU-3HL	1700	90
	95–240	EPKJ-24C/3XU-3HL	1700	130
	300–400	EPKJ-24D/3XU-3HL	1700	160

For 1-core screened, polymeric insulated cables to 1-core screened, paper insulated cables 20 and 35 kV

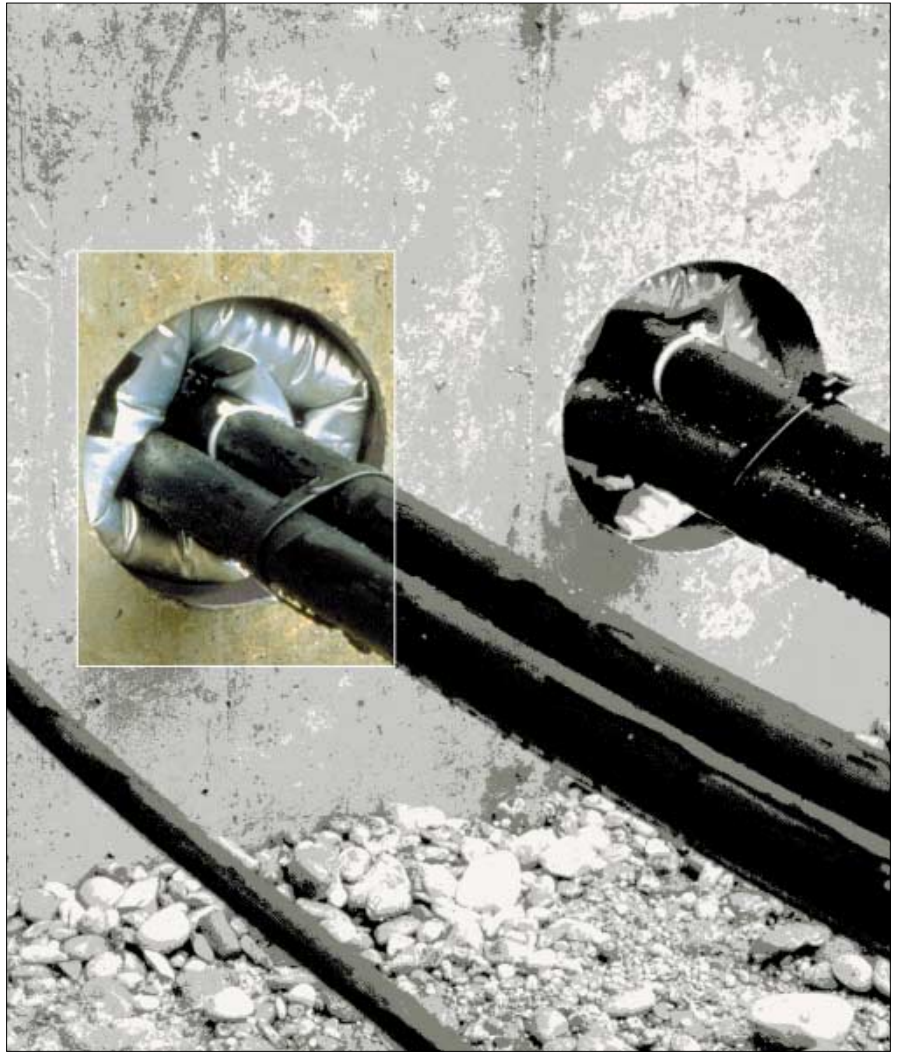
Nominal voltage U _o /U (kV)	Cross section (mm ²)	Ordering description	Dimension (mm)	
			L	D
12/20	35– 70	EPKJ-24B/1XU-1HL	850	50
	95–240	EPKJ-24C/1XU-1HL	950	65
20/35	95–150	EPKJ-36B/1XU-1HL	1050	70
	185–400	EPKJ-36C/1XU-1HL	1050	80

Connection kit for transition joints type TRAJ and RPKJ to the ground wire of 1-core polymeric cables with aluminium laminate (e.g. type AHXAMK-W)

Ordering description	Earth lead dimensions Length (mm)	Cross section (mm ²)
SMOE 62651	800	3 x 10

Note: The solderless ground wire connection kit must be ordered separately. It includes a screw connector, 3 insulated earth leads, a cable breakout and insulation tubing.

Transition joints for other cross sections or cable types are available on request

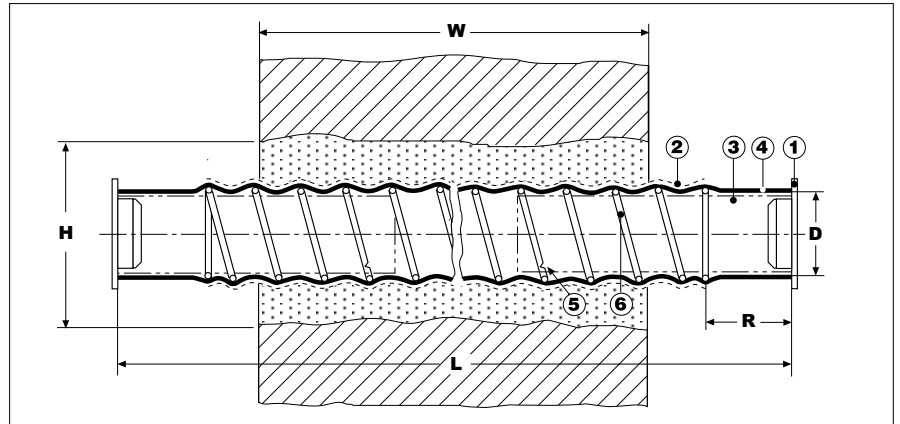


Sealing Systems

Sealing Systems

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Wall feed-through EPAF



Application

The wall feed-through EPAF provides a reliable seal against water and gas for cables brought into buildings underground. When properly installed, test reports prove a water and gas tightness at an external pressure of 0,1 MPa between the wall and the feed-through as well as between the feed-through and the cables. The design allows removal of cables and installation of new cables in the same feed-through. For exceptionally thick walls, the feed-through can be easily prolonged with another one.

Construction

The feed-through EPAF consists of a galvanised steel spiral over which a longer heat-shrinkable tubing with an adhesive coating inside is installed. An external coating of special primer improves the adhesion to various types of concrete and quick-drying cements. The ends of the tubing are protected with caps to allow cable installations at a later stage. When installing the cable, the end caps are removed and the adhesive coated tubing shrinks onto the cable. Cables are removed by cutting off the tubing at the end of the steel spiral. Upon pulling the steel spiral with a pair of pliers, it will break at a predetermined breaking point. The resulting new open end of the heat-shrinkable tubing can be shrunk onto the new cable.

1 Sealing cap

2 Outside sealing coating

3 Inside sealing coating

4 Heat-shrinkable tubing

5 Predetermined breaking point

6 Galvanised steel spiral

Da: Inside diameter as delivered

Db: Diameter after free recovery

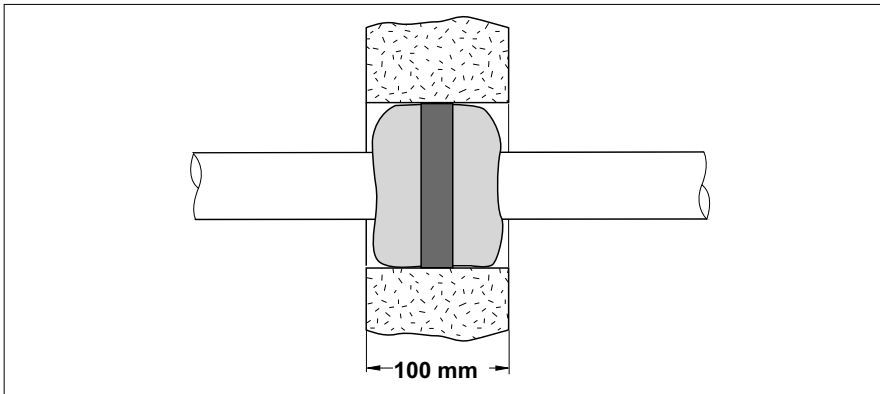
L: Length

W: Wall thickness

Recommended application ranges (mm)				Ordering description	Dimensions (mm)			
Cable diameter min.	Cable diameter max.	Wallthickness W max.*	Hole diameter H min.		D a (min.)	D b (max.)	L ± 20 mm	R ± 20 mm
8	14	320	40	EPAF 2004	16	8	700	90
12	25	320	55	EPAF 2008	28	10	700	90
18	36	420	70	EPAF 2010	41	16	800	90
29	56	320	90	EPAF 2020	59	26	700	90
55	98	370	140	EPAF 2030	106	54	760	115

* For bigger walls two wall feed-through can easily be connected.

Duct sealing system RDSS



Unsealed cable pipes and ducts need no longer cause dampness and flooding in substation basements, cable vaults and access manholes. In these environments rust, corrosion and a humid environment inevitably result in damage to support structures, metal work and electrical equipment. The most common route for water to enter into such installations can now be blocked simply and effectively by a new technique developed by Raychem. The Rayplate Duct Sealing System (RDSS) has been designed for use on power cables to provide a watertight seal when used with plastic, concrete or steel ducting systems.

Clean, fast, easy sealing method

The Rayplate seal consists of an inflatable bladder of flexible, metallic laminate, coated on both sides with a sealant strip. With the sealant strips lubricated, the product is simply wrapped around the cable and easily slides into the duct. The bladder is then inflated with a gas pressure tool which presses the sealant coating against the duct wall and the cable. Upon removal of the filling tube, an automatic gel valve system reliably retains the gas pressure in the Rayplate duct seal.

The entire installation is performed within a few minutes – even in congested enclosures.

Versatility and easy removal

The RDSS system adapts itself to any configuration and is independent of duct ovality. Each RDSS seal covers a large range of cable and duct diameters. The versatility of the wraparound concept enables use not only for new cable installations, but also for existing applications. Unlike other methods that require dry ducts, the Rayplate seals can be installed when water is still flowing out of the duct.

The duct seals can be quickly and easily removed from a duct or pipe by deflation. This allows cables to be replaced in an upgrade or repair. Since ducts are not damaged by the RDSS system, they can easily be sealed again.

Performance tested

Tests at room temperature showed water and air tightness at static pressures of more than 0.3 bar, even in conjunction with cable bending, vibration, torsion and axial pull.

Resistance to common chemicals has been proven by immersion tests. The Rayplate system was tested with cables load-cycled at conductor temperatures of 90 °C, similar to specifications required for cable accessories. The sealing tests showed water and air tightness with internal duct pressures of 0.3 bar. Measurements and calculations of the diffusion rate indicate that a typical Rayplate duct seal will withstand a 3 m waterhead for 30 years after installation. The sealing performance after 30 years of life was confirmed by sealing tests with reduced internal bladder pressures. The test methodologies and parameters are set out in a detailed test report available from your local Raychem products representative.

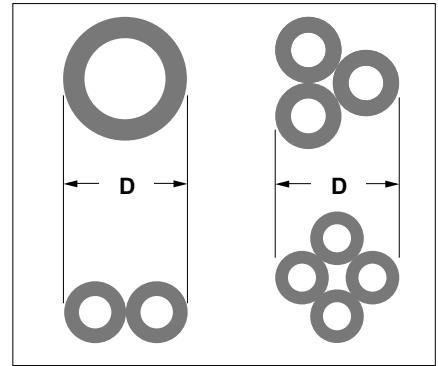
RDSS – Selection table for duct seals and sealing clips

Each RDSS seals empty ducts (except for size 150) and ducts containing up to 2 cables. The table below shows the minimum and maximum diameter of the cable or of the sum of 2 cables depending on the duct size. All dimensions in mm.

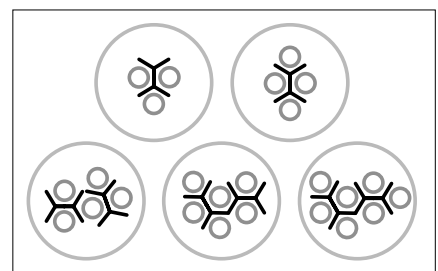
Duct inside Ø	Product description					
	RDSS-45 cable Ø	RDSS-60 cable Ø	RDSS-75 cable Ø	RDSS-100 cable Ø	RDSS-125 cable Ø	RDSS-150 cable Ø
32.5	0–14					
35	0–18					
40	0–27					
45	0–32	0–18				
50		0–30				
55		0–38	0–28			
60		0–45	0–30			
65			0–40			
70			0–46			
75			0–56	0–45		
80				0–52		
85				0–60		
90				0–66		
95				0–74		
100				0–80	0–65	
105				0–85	0–75	
110				0–90	0–83	
115				55–95*	0–91	
120				60–100*	0–95	
125					0–103	60–100
130					70–110*	60–107
135					75–115*	60–112
140					80–120*	60–118
145					85–125*	60–123
150					90–130*	60–129
155						60–134*
160						60–139*
165						105–145*
170						110–150*
175						115–155*
180						120–160*
clip selection	RDSS-Clip-45	RDSS-Clip-75	RDSS-Clip-75	RDSS-Clip-100	RDSS-Clip-125	RDSS-Clip-150

Suitable for empty ducts
 With cables only

* RDSS-clips must also be used for 2 or more cable configurations



Diameter of cable or cable bundles



If three or more cables have to be sealed, a RDSS-Clip is used in combination with the RDSS duct seal. The sealing clip has to be ordered separately. For each clip used, subtract 5 mm from the maximum cable diameter shown in the table to determine the maximum cable bundle diameter. One RDSS-clip seals up to 4 cables. If more cables are to be sealed, use one extra clip as shown above.

Tools for easy and quick inflation

Rayflate duct seals can be installed using a wide variety of inflation tools, which have the capability to inflate the bag to 3.0 ± 0.2 bar pressure.

For tools recommended by Raychem see page 106: RDSS-IT-16 inflation tool and gas cylinders E7512 0160.

RDSS – Adapter for large duct sizes

The RDSS-AD-210 adapter is designed to be installed together with RDSS-125 and RDSS-150 duct seals for ducts up to 210 mm in diameter.

After the sealant tape has been lubricated the RDSS-AD-210 adapter is coiled over the cable to fit the duct. The coiled adapter slides easily into the duct and when released snaps into position against the inner wall of the duct. Then the RDSS is inserted between the cable and the pre-positioned adapter and inflated in the usual way. Certain configurations may require two adapters, details are given in the selection table. The RDSS adapter was performance tested together with RDSS duct seals including watertightness even when the cables were subjected to load cycling, vibration or bending. A detailed test report is available on request.



The table below shows the minimum and maximum diameter of the cable or cable bundle that can be accommodated in a cable duct for a specific combination of RDSS seals and RDSS-AD-210 adapter. All dimensions in mm.

Duct inside Ø	Product description			
	1xRDSS-AD-210 + RDSS-125 cable Ø	2xRDSS-AD-210 + RDSS-125 cable Ø	1xRDSS-AD-210 + RDSS-150 cable Ø	2xRDSS-AD-210 + RDSS-150 cable Ø
130	0*			
135	0*			
140	0– 40			
145	0– 50			
150	0– 65			
155	0– 83			
160	0– 91			
165	0– 103			
170	70– 110	0*	60– 107	
175	75– 115	0– 40	60– 112	
180	80– 120	0– 50	60– 118	
185	90– 130	0– 65	60– 129	
190		0– 83	60– 135	
195		0– 95	60– 139	
200		0– 103	105– 145	60– 100
205		75– 115	115– 155	60– 112
210		80– 120	120– 160	60– 118

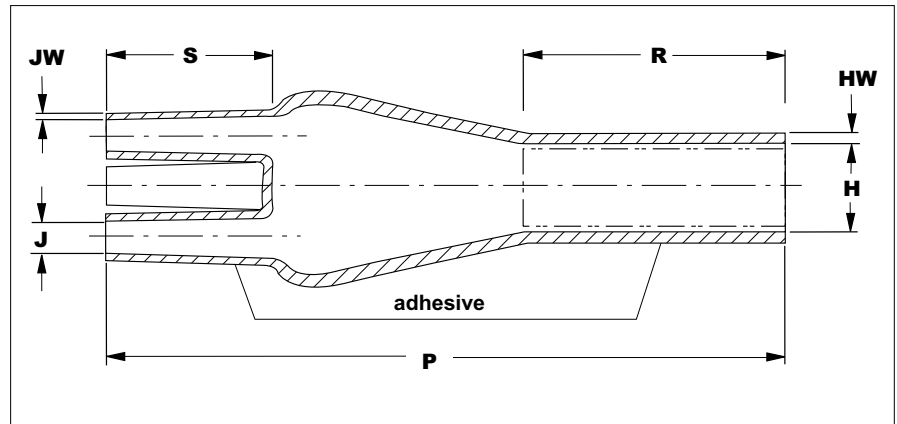
For sealing of cable bundles select the appropriate RDSS-clip according to the selection table on the previous page

Suitable for empty ducts

With cables only

* Empty ducts only

Sealing Breakouts for 2 to 5 core cables and ducts



Application

For sealing crutches of multi-core cables and cable entries into ducts. To seal onto all common plastics and metals, all outlets are coated with hot-melt adhesive.

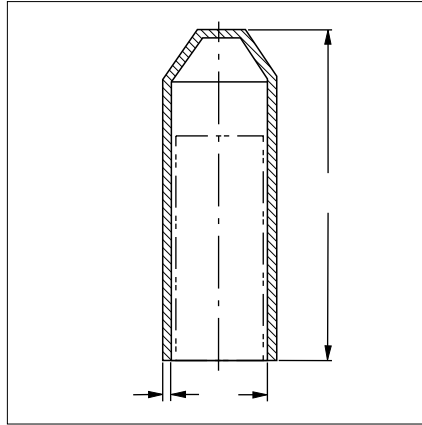
Breakouts are available for 2-, 3-, 4- and 5-core cables, in a variety of sizes. Dimensional details see table below.

- H:** Diameter of large outlet
- J:** Diameter of small outlets
- P:** Length of breakout
- R:** Length of large outlet
- S:** Length of small outlets
- HW:** Wall thickness of large outlet
- JW:** Wall thickness of small outlets
- a:** as delivered
- b:** after free recovery

Recommended cross section of plastic cables (mm ²)	Ordering description	Dimensions (mm)								
		H		J		P	R	S	HW	JW
		a min.	b max.	a min.	b max.	b +/-10%	b +/-10%	b +/-10%	b +/-20%	b +/-20%
for 2-core cables										
4– 25	302K333-S	28	9	15	4.1	90	40	25	2.0	2.0
35–150	302K224-S	48	32	22	7	172	–	70	2.0	2.0
150–400	302K466-S	86	42	40	16	200	–	75	2.5	2.5
for 3-core cables										
4– 35	402W533-S	38	13	16	4.2	103	45	28	2.7	1.5
50–150	402W516-S	63	22	26	9	180	85	40	3.5	1.5
95–500	402W526-S	95	28	44	13	205	90	45	3.5	2.5
–	402W248-S	115	45	52	22	240	100	60	4.0	2.5
–	402W439-S	170	60	60	30	252	90	63	4.2	2.6
for 4-core cables										
1,5– 10	502S012-S	23	9	8	1.5	68	–	21	2.1	1.5
4– 35	502K033-S	36	16.5	14	3.4	96	71	25	2.5	1.9
25– 95	502K046-S	45	19	20	7	165	75	40	3.5	2.0
50–150	502K016-S	60	25	25	9	217	100	44	3.5	2.0
120–400	502K026-S	100	31	40	13.5	223	103	51	3.5	2.5
–	502R810-S	170	60	46	21	255	90	65	4.0	3.5
for 5-core cables										
25–120	603W035-S	68	26	20	7	182	75	40	3.2	2.5

for smaller cross sections use 502K033 with 2 cores inside an outlet.

Sealing end caps 102L



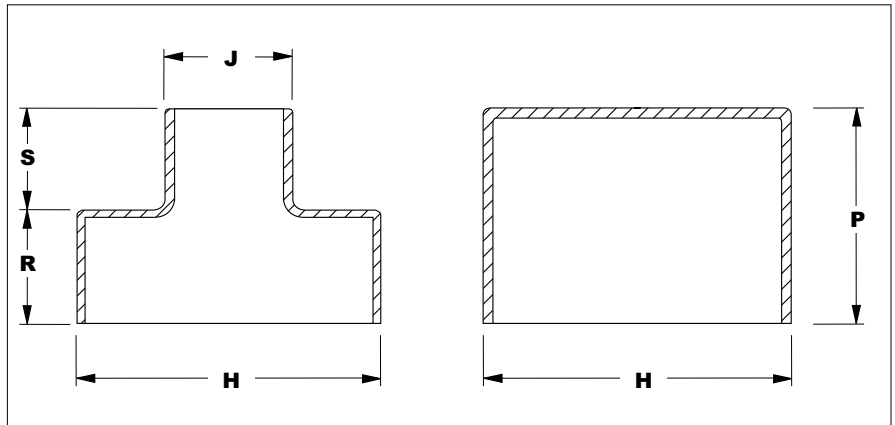
Application

On the inside coated with hot-melt adhesive, the heat-shrinkable end caps are used to seal and protect the ends of plastic, paper and rubber insulated cables during storage, transport and cable laying.

Da: Diameter as delivered
Db: Diameter after free recovery
Lb: Length after free recovery
Wb: Wall thickness after free recovery

Recommended cable diameter (mm)		Ordering description	Dimension (mm)			
min.	max.		D		L	W
			a (min.)	b (max.)	b (+/- 10%)	b (+/- 20%)
4	8	102L011-R05/S	10	4	38	2.0
8	17	102L022-R05/S	20	7.5	55	2.8
17	30	102L033-R05/S	35	15	90	3.2
30	45	102L044-R05/S	55	25	143	3.9
45	65	102L048-R05/S	75	32	150	3.3
65	95	102L055-R05/S	100	45	162	3.8
95	115	102L066-R05/S	120	70	145	3.8

Duct Sealing System LTEC/LTCP



Application

These low-temperature heat-shrinkable end caps and cable feed-throughs are designed to reliably seal empty and with cables occupied ducts. The polymer material is specially developed for applications on PVC ducts and cable jackets where a low shrink temperatures is required. All part are coated on the inside with hot-melt adhesive.

H: Diameter of duct side
J: Diameter of cable side
P: Length of duct side
R: Length of duct side
S: Length of cable side
W: Wall thickness of large outlet
a: as delivered
b: after free recovery

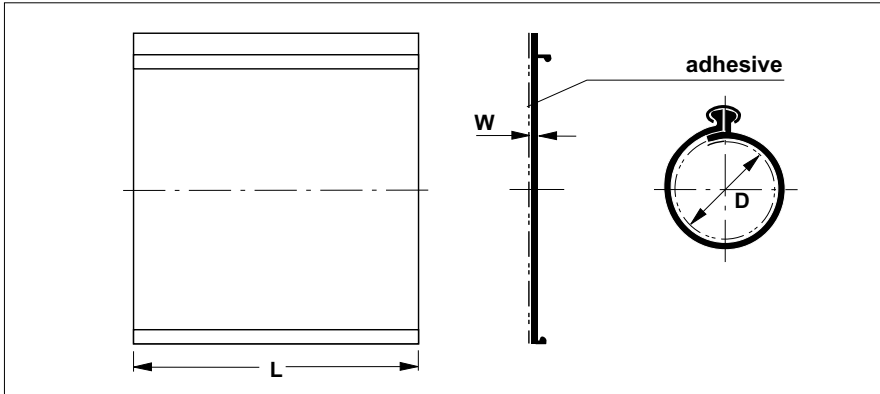
Application ranges		Ordering description	Dimensions (mm)							
Cable diameter (mm)	Duct outside diameter (mm)		H		J		P	R	S	W
			a min.	b max.	a min.	b max.	b +/-10%	b +/-10%	b +/-10%	b min.
end cap	105–125	LTCP-600	130	90	–	–	110			2.0
cable feed-through										
15–25	105–125	LTEC-200	135	100	30	13	–	49	87	2.0
26–48	105–125	LTEC-300	135	100	57	23	–	48	87	2.0
47–90	105–125	LTEC-400	135	100	100	41	–	52	87	2.0



Repair Sleeves and Tubings

Repair sleeve for plastic and paper insulated cables – CRSM	94
Repair sleeve for flexible cables – MRSM	95
Fibre-reinforced repair sleeve RFSM	95
Thick-wall, heat-shrinkable tubing WCSM	96
Thick-wall, halogen-free and flame retardant heat-shrinkable tubing ZCSM	96
Thick-wall, flexible and flame retardant heat-shrinkable tubing FCSM	97
Medium-wall, heat-shrinkable tubing MWTM	98
Thin-wall, dual-colour (green-yellow), heat-shrinkable tubing DCPT	99
Thin-wall, flexible, heat-shrinkable tubing CGPT	99
Thin-wall, adhesive coated, heat-shrinkable tubing CGAT	99

Repair sleeve for plastic and paper insulated cables CRSM



The general purpose wraparound CRSM is used for a fast and reliable repair of polymeric or lead cable sheaths to re-establish the electrical and mechanical integrity of the cable. The wraparound is supplied with an adhesive coating.

Dimensions:

D: Diameter

Da: Diameter as delivered

Db: Diameter after free recovery

L: Length

W: Wallthickness

Wa: Wall thickness as delivered

Wb: Wall thickness after free recovery

Recommended application			Dimensions (mm)		W		L
min.	max.	Ordering description	D		a (min.)	b (min.)	a (± 15 mm)
11	21	CRSM 34/10- 250/239	35	9	0.3	2.4	250
		CRSM 34/10- 500/239					500
		CRSM 34/10-1000/239					1000
		CRSM 34/10-1500/239					1500
17	32	CRSM 53/13- 250/239	54	15	0.3	2.0	250
		CRSM 53/13- 500/239					500
		CRSM 53/13- 750/239					750
		CRSM 53/13-1000/239					1000
		CRSM 53/13-1500/239					1500
24	50	CRSM 84/20- 250/239	86	21	0.3	2.0	250
		CRSM 84/20- 500/239					500
		CRSM 84/20- 750/239					750
		CRSM 84/20-1000/239					1000
		CRSM 84/20-1500/239					1500
31	65	CRSM 107/29- 500/239	108	27	0.3	2.0	500
		CRSM 107/29-1000/239					1000
		CRSM 107/29-1500/239					1500
33	86	CRSM 143/36- 500/239	144	28	0.3	1.8	500
		CRSM 143/36-1000/239					1000
		CRSM 143/36-1500/239					1500
56	120	CRSM 198/55-1000/239	203	50	0.3	2.1	1000
		CRSM 198/55-1500/239					1500
103	150	CRSM 250/98-1000/239	257	91	0.4	1.7	1000
		CRSM 250/98-1500/239					1500

Note: The repair sleeve and the channel can be cut to the length as required at the place of installation. Other lengths are available on request.

Repair sleeve for flexible cables MRSM



The flame retardant wraparound MRSM is used for fast and reliable cable repairs in the mining, construction and transportation industries and for similar applications where flame retardancy and flexibility are required. The wraparound is supplied with an adhesive coating. The closing channel can be removed when cooled down.

Recommended application diameter (mm)		Ordering description	Dimensions (mm)		W		L
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)	a (+/-15 mm)
25	40	MRSM 50/23-250/239	50	23	0.7	2.3	250
		MRSM 50/23-600/239					600
40	58	MRSM 73/38-300/239	73	38	0.9	2.3	300
		MRSM 73/38-600/239					600
		MRSM 73/38-750/239					750
58	89	MRSM 100/51-600/239	100	51	0.9	2.3	600
		MRSM 100/51-750/239					750

Fibre-reinforced repair sleeve RFSM



The fibre-reinforced wraparound RFSM is used for fast and reliable cable repairs in applications where high mechanical resistance is required. The wraparound is supplied with an adhesive coating. The RFSM wraparounds can also be used as an outer sheath for low and medium voltage joints.

Recommended application diameter (mm)		Ordering description	Dimensions (mm)		W		L
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)	a (+/-15 mm)
15	45	RFSM 45/15- 500/123	50	13	1.5	2.5	500
		RFSM 45/15- 750/123					750
20	65	RFSM 65/20- 500/123	71	18	1.5	2.5	500
		RFSM 65/20-1000/123					1000
30	95	RFSM 95/30- 750/123	103	27	1.5	2.5	750
		RFSM 95/30-1000/123					1000
		RFSM 95/30-1500/123					1500
40	125	RFSM 125/40- 750/123	135	36	1.5	2.5	750
		RFSM 125/40-1000/123					1000
		RFSM 125/40-1500/123					1500
55	165	RFSM 165/55- 750/123	178	50	1.5	2.5	750
		RFSM 165/55-1500/123					1500
65	205	RFSM 205/65- 750/123	222	59	1.5	2.5	750
		RFSM 205/65-1500/123					1500

Thick-wall, heat-shrinkable polyolefin tubings

WCSM

Thick-wall, heat-shrinkable tubing for general electrical insulation and sealing purposes. The tubing is weathering and UV-resistant and adhesive coated

Temperature range: – 40°C to +90°C
 Dielectric strength: 14 kV/mm
 Colour: black
 Delivery form: adhesive coated, 1 m cut lengths



Recommended application diameter (mm)		Ordering description	Dimension (mm)		W	
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)
3.5	8	WCSM 9/ 3-1000/S	9	3	0.6	2.0
4.5	11	WCSM 13/ 4-1000/S	13	4	0.6	2.4
6.5	17.5	WCSM 20/ 6-1000/S	20	6	0.7	2.5
9	30	WCSM 33/ 8-1000/S	33	8	0.7	3.2
13	39	WCSM 43/12-1000/S	43	12	0.8	4.3
17.5	44	WCSM 51/16-1000/S	51	16	1.0	4.5
23	62	WCSM 70/21-1000/S	70	21	1.0	4.4
27	76	WCSM 85/25-1000/S	85	25	1.0	4.3
33	94	WCSM 105/30-1000/S	105	30	1.0	4.3
40	117	WCSM 130/36-1000/S	130	36	1.0	4.3
55	145	WCSM 160/50-1000/S	160	50	1.0	4.3
55	155	WCSM 180/50-1000/S	180	50	1.0	4.3

ZCSM

Thick-wall, flame retarded and halogen-free heat-shrinkable tubing for general electrical insulation purposes. The tubing is weathering and UV-resistant.

Temperature range: – 40°C to +140°C
 Dielectric strength: 12 kV/mm
 Colour: black
 Delivery form: uncoated, 1 m cut lengths



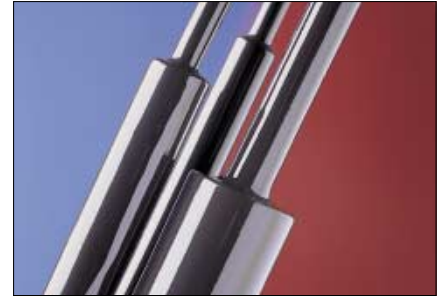
Recommended application diameter (mm)		Ordering description	Dimension (mm)		W	
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)
3.5	7	ZCSM 8/ 3-1000/U	8	3	0.6	2.0
5.5	14.5	ZCSM 16/ 5-1000/U	16	5	0.7	2.4
9	21.5	ZCSM 24/ 8-1000/U	24	8	0.9	2.9
13	29	ZCSM 32/12-1000/U	32	12	1.0	4.0
17.5	40.5	ZCSM 45/16-1000/U	45	16	1.0	4.0
24	54	ZCSM 60/22-1000/U	60	22	1.0	4.0
27.5	63	ZCSM 70/25-1000/U	70	25	1.0	4.0
39.5	76.5	ZCSM 85/36-1000/U	85	36	1.0	4.0
55	108	ZCSM 120/50-1000/U	120	50	1.0	4.2
82.5	162	ZCSM 180/75-1000/U	180	75	1.0	5.6

Thick-wall, heat-shrinkable polyolefin tubing

FCSM

Thick-wall, flexible and flame-retarded, heat-shrinkable tubing for general electrical insulation and sealing purposes. The tubing is weathering and UV-resistant.

Temperature range: – 40°C to +140°C (uncoated)
 – 40°C to + 90°C (coated)
 Dielectric strength: 13 kV/mm
 Colour: black
 Delivery form: A/U = uncoated on spools
 1000/U = uncoated, 1 m cut lengths
 1000/S = adhesive coated, 1 m cut lengths

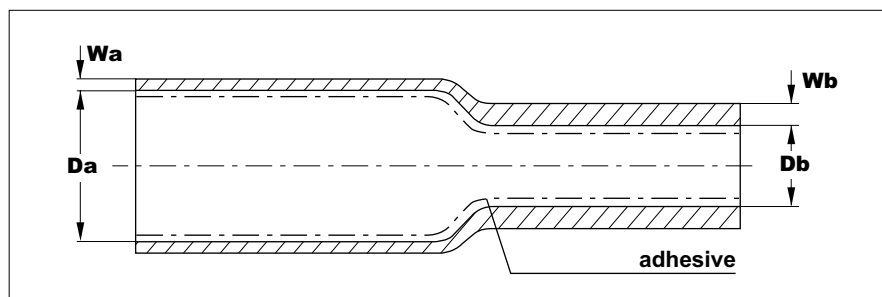


Uncoated tubings

Recommended application diameter (mm)		Ordering description	Dimension (mm)		W	
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)
3.5	8	FCSM 9/ 3-1000/U	9	3	0.6	2.0
6.5	17	FCSM 19/ 6-A/U	19	6	0.7	2.4
10	25	FCSM 28/ 9-A/U	28	9	0.8	3.2
13	34	FCSM 38/12-A/U	38	12	1.0	4.1
17.5	46	FCSM 51/16-A/U	51	16	1.0	4.1
24	61	FCSM 68/22-1000/U	68	22	1.0	4.1
33	81	FCSM 90/30-1000/U	90	30	1.0	4.1
44	108	FCSM 120/40-1000/U	120	40	1.0	4.1
69	159	FCSM 177/63-1000/U	177	63	1.0	4.1

Adhesive coated tubings

Recommended application diameter (mm)		Ordering description	Dimension (mm)		W	
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)
3.5	8	FCSM 9/ 3-1000/S	9	3	0.6	2.0
6.5	17	FCSM 19/ 6-1000/S	19	6	0.7	2.4
10	25	FCSM 28/ 9-1000/S	28	9	0.8	3.2
13	34	FCSM 38/12-1000/S	38	12	1.0	4.1
17.5	46	FCSM 51/16-1000/S	51	16	1.0	4.1
24	61	FCSM 68/22-1000/S	68	22	1.0	4.1
33	81	FCSM 90/30-1000/S	90	30	1.0	4.1
44	108	FCSM 120/40-1000/S	120	40	1.0	4.1
69	159	FCSM 177/63-1000/S	177	63	1.0	4.1



Dimensions:

D: Diameter
Da: Diameter as delivered
Db: Diameter after free recovery
L: Length
W: Wallthickness
Wa: Wallthickness as delivered
Wb: Wallthickness after free recovery

Medium-wall, heat-shrinkable polyolefin tubing

MWTM

Medium-wall, heat-shrinkable tubing for general electrical insulation, sealing and corrosion protection purposes. The tubing is weathering and UV-resistant.

Temperature range:	– 40°C to +120°C (uncoated) – 40°C to + 90°C (coated)
Dielectric strength:	14 kV/mm
Colour:	black
Delivery form:	A/U = uncoated on spools 1000/U = uncoated, 1 m cut lengths 1000/S = adhesive coated, 1 m cut lengths

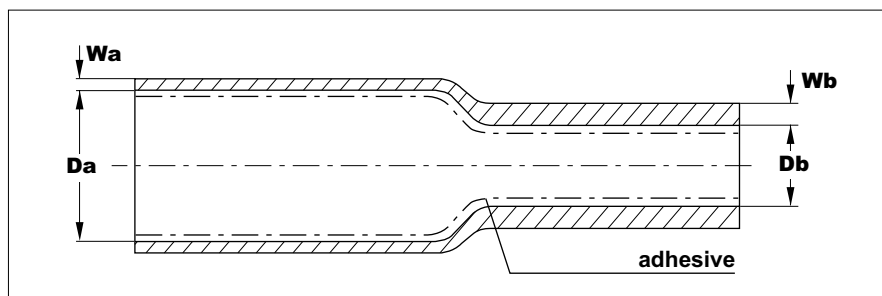


Uncoated tubings

Recommended application diameter (mm)		Ordering description	Dimension (mm)		W	
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)
3.5	9	MWTM 10/ 3-A/U	10	3	0.3	1.0
5.5	14.5	MWTM 16/ 5-A/U	16	5	0.3	1.4
9	22.5	MWTM 25/ 8-A/U	25	8	0.4	2.0
13	31.5	MWTM 35/12-A/U	35	12	0.4	2.0
17.5	45	MWTM 50/16-A/U	50	16	0.5	2.0
21	57	MWTM 63/19-1000/U	63	19	0.6	2.4
24	68	MWTM 75/22-1000/U	75	22	0.6	2.7
27.5	77	MWTM 85/25-1000/U	95	25	0.6	2.8
32	86	MWTM 95/29-1000/U	95	29	0.7	3.1
37	104	MWTM 115/34-1000/U	115	34	0.7	3.1
46	126	MWTM 140/42-1000/U	140	42	0.7	3.1
55	144	MWTM 160/50-1000/U	160	50	0.7	3.2
66	162	MWTM 180/60-1000/U	180	60	0.7	3.2

Adhesive coated tubings

Recommended application diameter (mm)		Ordering description	Dimension (mm)		W	
min.	max.		a (min.)	b (max.)	a (min.)	b (min.)
3.5	9	MWTM 10/ 3-1000/S	10	3	0.3	1.0
5.5	14.5	MWTM 16/ 5-1000/S	16	5	0.3	1.4
9	22.5	MWTM 25/ 8-1000/S	25	8	0.4	2.0
13	31.5	MWTM 35/12-1000/S	35	12	0.4	2.0
17.5	45	MWTM 50/16-1000/S	50	16	0.5	2.0
21	57	MWTM 63/19-1000/S	63	19	0.6	2.4
24	68	MWTM 75/22-1000/S	75	22	0.6	2.7
27.5	77	MWTM 85/25-1000/S	95	25	0.6	2.8
32	86	MWTM 95/29-1000/S	95	29	0.7	3.1
37	104	MWTM 115/34-1000/S	115	34	0.7	3.1
46	126	MWTM 140/42-1000/S	140	42	0.7	3.1
55	144	MWTM 160/50-1000/S	160	50	0.7	3.2
66	162	MWTM 180/60-1000/S	180	60	0.7	3.2



Dimensions:

- D:** Diameter
- Da:** Diameter as delivered
- Db:** Diameter after free recovery
- L:** Length
- W:** Wallthickness
- Wa:** Wallthickness as delivered
- Wb:** Wallthickness after free recovery

Thin-wall, heat-shrinkable polyolefin tubings

DCPT

Dual colour (yellow, green), thin-wall, heat-shrinkable tubing for marking and protection of grounding wires, cables and busbars. The tubing is weathering and UV-resistant.



Temperature range: – 40°C to +135°C
 Colour: green/yellow
 Delivery form: uncoated on spools

Recommended application diameter (mm)		Ordering description	Dimension (mm)		
min.	max.		D	W	
			a (min.)	b (max.)	b (min.)
1.7	2.8	DCPT 3/ 1,5-45	3	1.5	0.51
3.2	5.6	DCPT 6/ 3-45	6	3	0.58
4.5	7.6	DCPT 8/ 4-45	8	4	0.64
5.5	9.5	DCPT 10/ 5-45	10	5	0.64
6.5	11.5	DCPT 12/ 6-45	12	6	0.64
10.0	18.0	DCPT 19/ 9-45	19	9	0.76
14.0	25.0	DCPT 26/13-45	26	13	0.89
23.0	35.0	DCPT 38/19-45	38	19	1.00

CGPT

Thin-wall, flexible heat-shrinkable tubing for universal electrical insulation and protection purposes. The tubing is weathering and UV-resistant.



Temperature range: – 40°C to +125°C
 Colour: black
 Delivery form: uncoated on spools

Recommended application diameter (mm)		Ordering description	Dimension (mm)		
min.	max.		D	W	
			a (min.)	b (max.)	b (min.)
0.6	1.3	CGPT 1,5/0,5-0	1.5	0.5	0.45
1.1	2.5	CGPT 3/ 1-0	3	1	0.55
2.2	5.0	CGPT 6/ 2-0	6	2	0.65
3.3	8.0	CGPT 9/ 3-0	9	3	0.75
4.5	10.5	CGPT 12/ 4-0	12	4	0.75
7.0	16.0	CGPT 18/ 6-0	18	6	0.85
9.0	21.5	CGPT 24/ 8-0	24	8	1.00
14.5	35.0	CGPT 39/13-0	39	13	1.15

CGAT

Thin-wall, heat-shrinkable tubing for general electrical insulation, sealing and corrosion protection purposes. The tubing is weathering and UV-resistant and adhesive coated.



Temperature range: – 40°C to + 80°C
 Colour: black
 Delivery form: adhesive coated, cut length of 1.2 m

Recommended application diameter (mm)		Ordering description	Dimension (mm)		
min.	max.		D	W	
			a (min.)	b (max.)	b (min.)
1,1	2,0	CGAT 3/ 1-0	3	1	1,00
2,2	4,0	CGAT 6/ 2-0	6	2	1,00
3,3	7,0	CGAT 9/ 3-0	9	3	1,35
4,5	9,0	CGAT 12/ 4-0	12	4	1,50
7,0	16,0	CGAT 18/ 6-0	18	6	1,70
9,0	21,0	CGAT 24/ 8-0	24	8	1,95
14,5	36,0	CGAT 39/13-0	39	13	2,10



Tools and Accessories

Tools and Accessories

Gas torch assembly	102
Tool sets and screen removal tool	104
Miscellaneous tools	105
Miscellaneous tools and accessories	106
Sealant and filler tapes	107

Gas torch assembly FH 1630

The FH 1630 torch assembly for rapid installation of heat-shrinkable materials offers maximum burning efficiency and the best available balance of surface preheat.

All system components are fully compatible.

Torch box with contents FH 1630-S-MC10

Torch box with nozzles BN28, BN38 and PN17, torch handle HSZ, constant pressure regulator R1, automatic cut-off valve CV, 4 m high pressure hose SW4.
Weight: 4.8 kg
Dimensions: 470 x 210 x 74 mm



Torch handle FH 1630-S-HNZ, FH 1630-S-HSZ

Torch handle with holder and shut-off valve for use on all FH 1630-S nozzles. Handle HSZ has in addition a pilot/full flame lever.
Nozzle connection thread: R 3/8", right
Hose connection thread: R 3/8", left



Nozzles for FH 1630-S

	Flame Diameter (mm)	Gas consumption (kg/h)	Stern length (mm)
FH 1630-S-BN 28	28	0.46	195
FH 1630-S-BN 38	38	0.90	195
FH 1630-S-BN 50	50	2.00	195
For Plumbing FH 1630-S-PN 17	17	0.24	195



Torch box with contents FH 1630-PIE-MC10

Torch box with nozzles BN28, BN38, BN50 and PN18, torch handle FH 1630-PIE with piezo ignition, safety regulator LGS, 4 m high pressure hose SW4.
Weight: 4.8 kg
Dimensions: 450 x 210 x 74 mm



Torch handle with piezo ignition FH 1630-PIE

Torch handle with piezo ignition, gas supply only while handle is pressed.
Nozzle connection: bayonet socking.
Hose connection thread: R 3/8", left



Nozzles for FH 1630-PIE

	Flame Diameter (mm)	Gas consumption (kg/h)	Stern length (mm)
FH 1630-PIE-BN 28	28	0.46	195
FH 1630-PIE-BN 38	38	0.90	195
FH 1630-PIE-BN 50	50	2.00	195
For Plumbing FH 1630-PIE-PN 18	18	0.24	210



Accessories for gas torch assembly FH 1630

Constant pressure regulator FH 1630-PIE-R1

Applicable on propane gas tanks with a capacity of 5 kg or 11 kg. Thread connection fits to all FH 1630 high pressure hoses.
Gas flow: max. 6 kg/h

Constant pressure: 2 bar
Hose connection thread: R 3/8" LH
Gas bottle connection thread:
W 21.8 x 1/14" LH (DIN-Kombi)



Automatic cut-off valve FH 1630-PIE-CV

The automatic cut-off valve is fitted between the hoses SW4, SW5 or SW10 and the constant pressure regulator and cuts off the gas supply in the event of damage to the hose or torch handle.

Connection threads: R 3/8" LH



Safety regulator FH 1630-PIE-LGS

The safety regulator with integrated constant pressure regulator (2 bar, 2 kg/h) and automatic cut-off valve is fitted between the hose and the gas bottle.

Hose connection thread: R 3/8" LH
Gas bottle connection thread:
W 21.8 x 1/14" LH (DIN-Kombi)



High pressure hoses

Fitted with screw connections for FH 1630 constant pressure regulator and torch handle.

Connection threads: R 3/8" LH
Internal diameter: 4 mm
Colour: orange

FH 1630-PIE-SW 4 4 m length
FH 1630-PIE-SW 5 5 m length
FH 1630-PIE-SW 10 10 m length



Torch assembly FH 1630-S-TS1

Torch assembly of nozzle BN38, torch handle FH 1630-S-HNZ and 5 m long pressure hose SW5.



Tool Sets and Screen Removal Tools

Complete tool kit IT 1000-001-CEE01



The tool kits contain all basic tools usually required for the cable preparation and the installation of accessories. Different tool sets are assembled in a leather case.

The tool kit IT 1000-001-CEE01 includes the following tool sets assembled in a leather case:

Ordering description	Contents
IT-1000-005	1 x Hammer, 300 g 1 x Screwdriver, 3,5 mm 1 x Screwdriver, 6,5 mm 1 x Hacksaw 1 x Hacksaw junior
IT-1000-006	1 x Pipe wrench, 250 mm 1 x Side cutter, 160 mm 1 x Pincers, 180 mm 1 x Blunt nose pliers, 180 mm 1 x Scissors, 200 mm
IT-1000-007	1 x Folding ruler, 2 m 1 x Wire brush 1 x Hook knife 1 x Cable knife 1 x Sharpening stone, 125x100 mm 1 x File set, medium size
IT-1000-008	1 x Control mirror, 100x100 mm 1 x Spreader 3 way 2 x Core separator 6 x Cleaning tissues 1 x Refillable solvent bottle (empty), 0.4 litre
IT-1000-010	1 x Diameter tape, 2 m
IT-1000-011	1 x Scoring tool for easy-strip screens
IT-1000-012	1 x Leather tool case, 400x125x280 mm

The individual tool sets can also be ordered separately.

Complete tool kit IT 1000-001-CEE02



The tool kit IT 1000-001-CEE02 includes in addition to the tool kit IT-1000-001-CEE01 the following tool sets:

Ordering description	Contents
IT-1000-003	1 x Wedge positioner for spreading cable cores
IT -1000-015	1 x Tee-handles spinner wrench, 300 mm 1 x hexagon insert socket for wrenches, 13 mm 1 x hexagon insert socket for wrenches, 17 mm 1 x hexagon insert socket for wrenches, 19 mm 1 x hexagon insert socket for wrenches, 22 mm

The individual tool sets can also be ordered separately.

Screen removal tool IT-1000-017



Screen removal tool for round plastic insulated conductors with a bonded semi-conductive screen. Continuously adjustable core diameters within given range. Cutting depth easily changed with a knurled head screw. Delivered completely with operating manual, hexagonal allen key and a spare blade in a tool box.

Application ranges	Ordering description		
	IT-1000-17-1	IT-1000-17-2	IT-1000-17-3
Over semi-conductive layer	Ø 14-34 mm	Ø 18-45 mm	Ø 21-48 mm
Rated Voltages U ₀ /U (U _m) (kV)	Cable Cross Section (mm ²) according to IEC 502		
6/10 (12)	25–300	70–630	120–800
8.7/15 (17.5)	25–240	50–630	70–800
12/20 (24)	25–185	25–500	50–630
18/30 (36)	35–120	35–400	35–500
20/35 (42)	35–95	35–300	35–400

Miscellaneous Tools

Cable knife
EXRM 607

Cable knife with fixed blade
Length: 175 mm



Insulation stripping tool
EXRM 1004

Insulation stripping tool for paper insulated cables.
Length: 190 mm
Application range: \varnothing 15–50 mm



Insulation stripping string
EXRM 0764

Insulation stripping string for plastic insulated cables.
Length: 2000 mm



Hexagon insert socket
EXRM 1228

Extra long hexagon insert socket wrench is used for the installation of RICS-adapters (page 38).
Insert socket size: 24 mm
Length: 90 mm



Installation tool
IT 1000-019

Tool for holding mechanical connectors in position while tightening the bolts.
Length of handle: 190 mm
Application range: \varnothing 15–50 mm



T-socket wrench
IT-1000-22

Fully insulated hexagon head T-socket wrench for allen screws

Ordering description

IT-1000-22-4
IT-1000-22-5
IT-1000-22-6
IT-1000-22-8

Width across flats

for 4 mm allen screw
for 5 mm allen screw
for 6 mm allen screw
for 8 mm allen screw



Miscellaneous Tools and Accessories

Cleaning tissues EPPA 001

Tissues impregnated with isopropyl alcohol. For cleaning and degreasing metal and plastic surfaces.
Size: 195 x 135 mm folded to 50 x 35 mm
Packaging: 50 pieces in a box



Inflation tool RDSS-IT-16

Inflation tool for RDSS duct seals complete with an ON/OFF switch and an automatic pressure monitoring system. The required CO₂ gas cylinders (E7512-0160) must be ordered separately. The standard package includes 1 tool per box plus operating manual and a 3 year warranty.



CO₂ gas cylinders E7512-0160

16 gr. CO₂ gas cylinders for RDSS-IT-16 tool. Each gas cylinder inflates approx. 5 pcs of RDSS-100 duct seals. Each box contains 10 gas cylinders.



Funnel EPPA 017

Funnel to fill draining oil (MI) cable terminations with insulating oils, i.e. EPPA 016-1-10.



Insulating oil EPPA 016-1-10

Insulating oil is used to fill the crutch of draining oil cable terminations, e.g. type IDST (page 22).

Description	Content
EPPA-016-1-08	0.8 liter
EPPA-016-1-10	1.0 liter
EPPA-016-1-13	1.3 liter

Accessories for solderless earth connections

Roll Springs

Constant force roll springs used for solderless shield and armour connections.

Ordering Description	Application Diameter (mm)		Width (mm)
	min.	max.	
EPPA-034-E	17	29	25
EPPA-034-F	30	39	25
EPPA-034-G	40	60	25
EPPA-034-H	50	75	30



Ligarex pliers IT 1000-004

These special pliers are used for tightening the Ligarex straps. The Ligarex straps are used in earth connections of paper cables with metal sheaths.



Ligarex bands

Description	Length
EXRM 0302-500	500 mm
EXRM 0302-800	800 mm

Sealing and filling tapes

Filler tape EPPA 206

EPPA 206 is a black mastic and mainly used as filling and shimming tape.

Ordering description	Width (mm)	Thickness (mm)	Length (mm)
EPPA-206-2-1500	50	2.0	1500
EPPA-206-4- 250	50	4.0	250



Sealing tape S 1052

S 1052 is a black, heat activated high flow sealant used for sealing, corrosion protection and large void filling.

Ordering description	Width (mm)	Thickness (mm)	Length (mm)
S1052-1-500	25	1.0	500



Connection Boxes for Lighting Applications

Product overview and selection table 110

For fuses size D 01 (E14):

EKM 2045	– very small poles and cables	112
EKM 2020	– small poles, small cables	113
EKM 2050SK	– medium poles, medium cables	114
EKM 2050SKFH	– outdoor, medium cables	114
EKM 2051	– special applications with controls	115

For fuses size D II (E27):

EKM 1271, 1272	– small poles, small, medium cables	116
EKM 1261	– outdoor, small cables	117
EKM 2072	– medium poles, medium cables	118
EKM 1281	– outdoor, medium cables	119
EKM 2035	– large poles, large cables	120

Accessories and spare parts

Fuses, adapter screws, screw caps and fused connector B 6770	121
Cable protection frames, adapter hook and spare connection box covers	122

Connection Boxes for Lighting Applications

For fuses size D 01 (E14)



EKM 2020



EKM 2050SK



EKM 2051

For fuses size D II (E27)



EKM 1271



EKM 1272



EKM 2072



EKM 2035

For applications outdoor and in lamp poles



EKM 2045



EKM 2050SKFH



EKM 1261



EKM 1281

Connection Boxes for Lighting Applications

Concept

Connection boxes are intended to be used inside lighting poles and outdoor as a connection between earth cables and the lighting equipment and therefore have to have a high degree of reliability. Additional attributes of ingress protection (IP) and insulation protection (class II) provide important operation and maintenance safety features.

Connection boxes can be split into 3 functional areas:

1. Earth cable break-out and connection area
2. Fuse area or DIN-rails
3. Lamp cable connection area

With respect to the size and sturdiness of the earth cable cores, all terminals allow radial assembly. They are designed either as mantle terminals or as sliding terminals.

The fuse area allows to place 1 to 3 fuses for protection of luminaire components and selective protection without influencing other parts of the lighting system. As alternative to fuses, boxes with DIN-rails allow the installation of additional components like timers, MCBs or other electronic devices.

The lamp cable area consists of the terminals, either pillar or lug type, and the cable sealing, rubber grommet or compression glands.

Technology

The closures are made from impact resistant, flame retardant thermoplastic materials. All metal parts are either stainless steel or galvanised copper alloys. Fuse sockets are either from ceramics or integrated in high strength glasfiber reinforced thermoplastics. Depending on the type, the connection boxes have a ingress protection degree of IP 43 to IP 54. Types rated IP 54 are also suitable to be mounted on walls outside. All connection boxes fulfill protection class II.

The connection boxes fit easily in lighting columns with door openings acc. to EN 40-2 (lighting columns – dimensions and tolerances) and with brackets acc. to DIN 49778 (lighting columns; brackets with sliding nuts for mounting of devices). For different designed mounting means, hooks are available as accessories.

Tests

The connection boxes are designed and manufactured in accordance with applicable IEC- and DIN-VDE-standards as:

- IEC-60439 (Low-voltage switchgear and controlgear assemblies – Part 1: Type tested assemblies),
 - VDE 0660-505 (Switchgear and control gear; Low-voltage switchgear and controlgear assemblies; Specification for house fuseboxes and connection boxes),
 - DIN 43628 (Fuseboxes for cable protection fuses).
- Test certificates are available upon request.

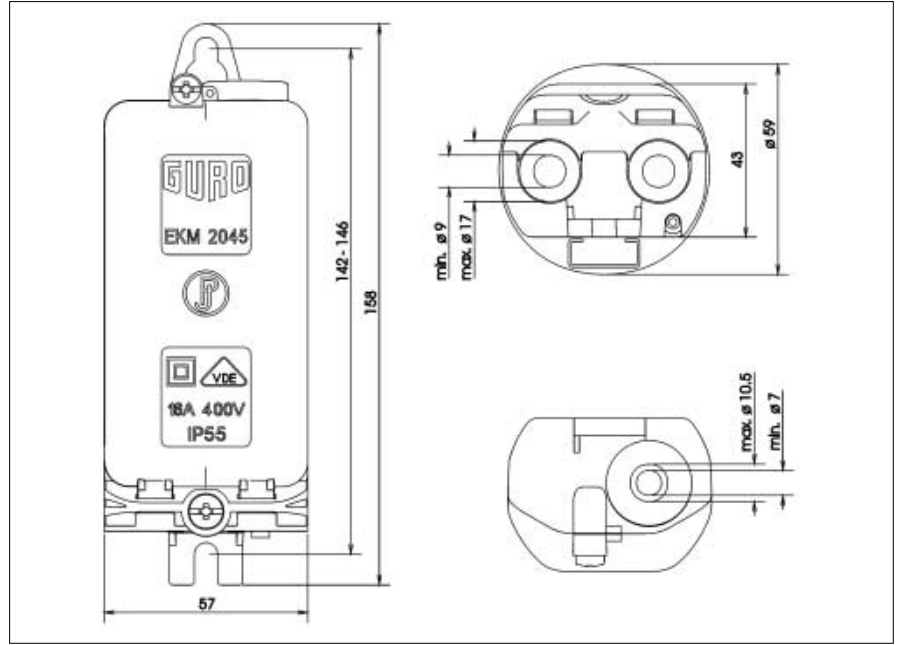
Selection overview

Product Name	Selection Criteria	Application Range of Cables (cross section mm²)			Fuse Carrier	Terminals	Ingress Protection	Dimens. of Pole (mm)	
		one	two	three				Door	Inside Diameter
EKM 2045	very small poles and cables / outdoor	5x1,5-4	5x1,5-4	–	1xE14 pre-wired, with fuse	box terminal	IP 55	58x150	59
EKM 2020	small poles and cables	5x2,5-16	5x2,5-16	5x2,5-10	2xE14 pre-wired, with fuse caps	mantle terminals	IP 44	70x240	84
EKM 2050	medium poles and cables / outdoor / 2 and 3 x E14	5x2,5-25	5x2,5-25	5x2,5-16	2/3xE14 pre-wired, with caps / DIN-rail	sliding-terminals	IP 54	85x270	90
EKM 2051	medium poles and cables / outdoor / special applications	5x2,5-25	5x2,5-25	5x2,5-16	2/3/4xE14 / DIN-rails	sliding-terminals	IP 54	85x350	100
EKM 1271	medium poles / small cables / 1xE27	4/5x6-16	4/5x6-16	–	1xE27	mantle terminals	IP 43	80x210	90
EKM 1272	medium poles and cables / 2xE27	4x6-25	4x6-25	–	2xE27	mantle terminals	IP 43	80x260	90
EKM 1261	outdoor / small cables	4x6-16	4x6-16 5x10	– 5x10	1/2xE27 / DIN-rail	mantle terminals	IP 54	80x250	100
EKM 2072	medium poles / large cables	5x4-16, 5x25-35	5x4-16, 5x16-35	–	1/2xE27	mantle terminals	IP 43	80x280	90
EKM 1281	outdoor / large cables	5x25 4x35 5x25	5x16-25, 4x16-35 5x16	– 5x16	1/2xE27 / DIN rail	mantle terminals	IP 54	100x300	120
EKM 2035	large poles and cables	4x4-50	4x4-50	4x4-35	1/2xE27 / DIN-rail	sliding-terminals	IP 43	90x300	110

A wide range of additional connection boxes for other cable dimensions, fuses or accessories is available on request.

EKM 2045 – Connection Box for Lighting Application

Pole Diameter ≥ 59 mm, Fuses: D01, Earth Cables ≤ 4 mm²



Application

This connection box is intended to be installed in lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Selection Criteria

- For application inside of Lighting columns
Pole diameter: ≥ 59 mm
Door size: $\geq 58 \times 150$ mm
- 5 box terminals for 2 cables 1,5–4 mm²
- With 1 fuse D01 - 4 A

Technical Data

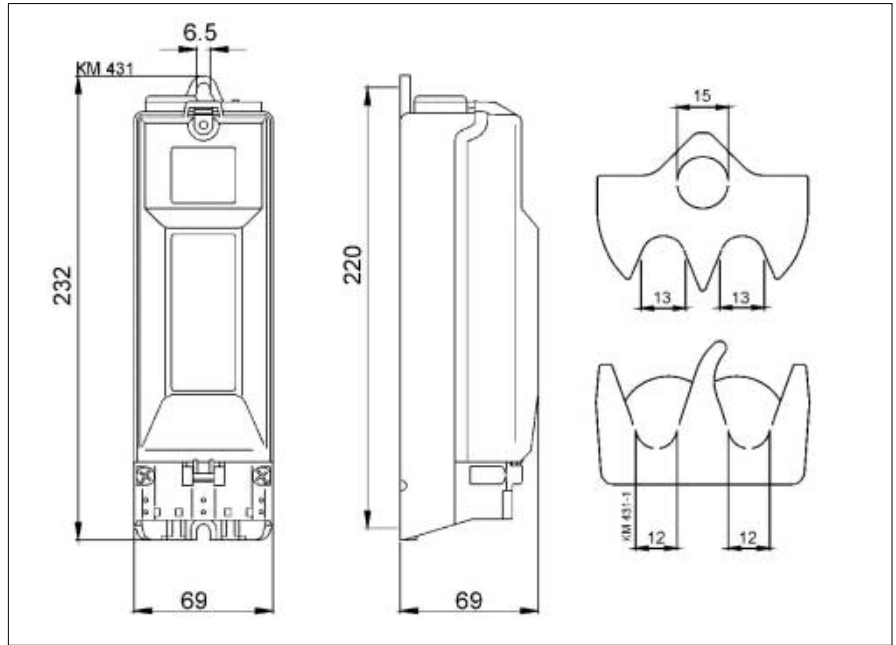
- Acc. IEC 60439-1 and DIN VDE 0660-505
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Grey cover
- With special fuse holder
- Prewired with L1
- Ingress Protection: IP 55
- Class of Protection II
- Range taking self adapting cable sealings
 $\varnothing 9$ –17 mm earth cable (2x)
 $\varnothing 7$ –10,5 mm luminaire cable (for 1 luminaire cables)
3 x 1,5 mm²–3 x 2,5 mm²

Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
1 x D 01 - 4A	5 x 1,5–4	–	EKM 2045-1D1

Note: Fuse for 4A included. Accessories and spare parts see page 121 and 122

EKM 2020 – Connection Box for Lighting Application

Pole Diameter ≥ 84 mm, Fuses: D01 (E14), Earth Cables ≤ 16 mm²



Application

This connection box is intended to be installed in lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Selection Criteria

- For application inside of Lighting columns
Pole diameter: ≥ 84 mm
Door size: $\geq 70 \times 240$ mm
- 5 mantle terminals for
2 cables 2,5–16 mm² or
3 cables 2,5–10 mm²
- For 2 fuses D01 (E14) up to 16 A

Technical Data

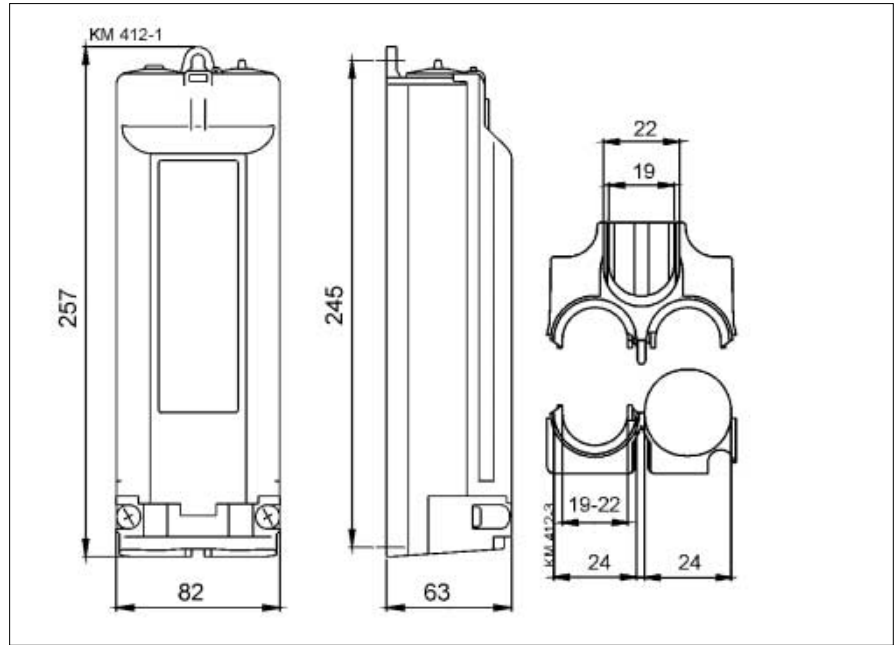
- Acc. IEC 60439-1
DIN VDE 0660-505 and
DIN 43628
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent cover
- With fuse caps
- Prewired with bars (N, 1,3,2,PE(N))
- Ingress Protection: IP 44
- Class of Protection II
- Range taking self adapting cable sealings
 - Ø 10–25 mm earth cable (2x)
 - Ø 10–23 mm earth cable (3x)
 - Ø 8–14 mm luminaire cable
(2 sealings for 2 luminaire cables
3 x 1,5 mm²–5 x 2,5 mm²)
- Luminaire cables alternatively installable downward in parallel to earth cables max. Ø 11,5 mm (2x)

Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
2 x D 01 (E14)	5 x 2,5–16	5 x 2,5–10	EKM 2020-2D1

Note: Fuses not included. Accessories and spare parts see page 121 and 122

EKM 2050 – Connection Box for Lighting Application

Pole Diameter ≥ 90 mm and for Outdoor Application, Fuses: D01 (E14), Earth Cables ≤ 25 mm²



Application

This connection box is intended to be installed inside of lighting columns (SK type) and for outdoor applications (SKFH type) at the connection between looped-through earth cables and the luminaire components protected by fuses.

Additional connection boxes for other cable dimensions, fuses or accessories are available on request.

Selection Criteria

- SK for application inside of lighting columns
Pole diameter: ≥ 90 mm
Door size: $\geq 85 \times 270$ mm
- SKF and SKFH for outdoor application and inside of lighting columns
- 5 sliding terminals for
2 cables 2,5–25 mm² or
3 cables 2,5–16 mm²
- Type SK, SKF, SKFH:
Fuses D01 (E14) up to 16 A
or 1 DIN-rail
- Types with DIN-rail: For standard installation devices attachable up to 3 TE width (3 x 18 mm), max. height of devices 64 mm. Height of connection box 82 mm.

Technical Data

- Acc. IEC 60439-1
DIN VDE 0660-505 and
DIN 43628
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent (SK) or grey (SKF, SKFH) cover
- Fuse sockets with fuse caps
- Prewired with bars (N, L1, L3, L2, PE(N))
- Ingress Protection: IP 54
- Class of Protection II
- Range taking cable sealings for earth cables
 $\varnothing 19$ –24 mm (2x),
 $\varnothing 19$ –22 mm (cable 3)
- SK, SKF type with range taking sealing grommets for luminaire cables:
 $\varnothing 8$ –14 mm luminaire cable
(2 sealings for 2 luminaire cables
3 x 1,5 mm²–5 x 2,5 mm²)
- SKFH type with compression sealing glands for luminaire cables:
 $\varnothing 8$ –14 mm luminaire cable
(2 sealings for 2 luminaire cables
3 x 1,5 mm²–5 x 2,5 mm²)
- Luminaire cables alternatively installable downward in parallel to earth cables
max. $\varnothing 11,5$ mm (2x)

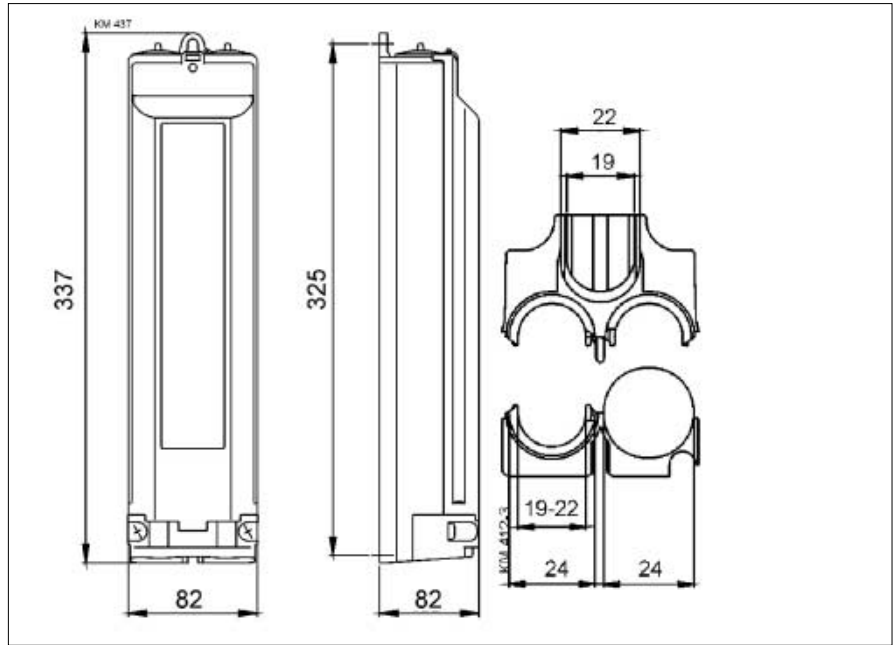
Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
SK for application in columns			
2 x D01 (E 14)	5 x 2,5–25	5 x 2,5–16	EKM 2050SK-2D1U
3 x D01 (E 14)	5 x 2,5–25	5 x 2,5–16	EKM 2050SK-3D1U
SKF for outdoor application and in columns			
none, DIN-rail *	5 x 2,5–25	5 x 2,5–16	EKM 2050SKF-0D0-1R
SKFH for outdoor application and in columns			
2 x D01 (E 14)	5 x 2,5–25	5 x 2,5–16	EKM 2050SKFH-2D1U
3 x D01 (E 14)	5 x 2,5–25	5 x 2,5–16	EKM 2050SKFH-3D1U
none, DIN-rail*	5 x 2,5–25	5 x 2,5–16	EKM 2050SKFH-0D0-1R

Note: Fuses not included. Accessories and spare parts see page 121 and 122

* Connector block only and 1 DIN-rail

EKM 2051 – Connection Box for Lighting Application

Pole Diameter ≥ 100 mm, For special equipment, Earth Cables ≤ 25 mm²



Application

This connection box is intended to be installed in lighting columns at the connection between looped-through earth cables and the luminaire components. Special equipment as MCBs, timers, residual current devices or the like can be integrated on DIN rails.

Connection boxes only equipped with connector block fuse holders or DIN-rails. Timers or MCBs are not part of offered product

Additional connection boxes for other cable dimensions, fuses or accessories are available on request.

Selection Criteria

- For application inside of lighting columns
Pole diameter: ≥ 100 mm
Door size: $\geq 85 \times 350$ mm
- 5 sliding terminals for
2 cables 2,5–25 mm² or
3 cables 2,5–16 mm²
- Optional Fuses D01 (E14) up to 16 A
- Optional for standard installation devices on DIN-rail attachable up to 3 TE width (3 x 18 mm), max. height of devices 69,5 mm.

Technical Data

- Acc. IEC 60439-1
DIN VDE 0660-505 and
DIN 43628
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent (SK) or grey (SKF, SKFH) cover
- Ingress Protection: IP 54
- Class of Protection II
- Range taking cable sealings for earth cables
 \varnothing 19–24 mm (2x),
 \varnothing 19–22 mm (cable 3)
- SK, SKF type with range taking sealing grommets for luminaire cables:
 \varnothing 8–14 mm luminaire cable
(2 sealings for 2 luminaire cables
3 x 1,5 mm²–5 x 2,5 mm²)
- SKFH type with compression sealing glands for luminaire cables:
 \varnothing 8–14 mm luminaire cable
(2 sealings for 2 luminaire cables
3 x 1,5 mm²–5 x 2,5 mm²)
- Luminaire cables alternatively installable downward in parallel to earth cables max. \varnothing 11,5 mm (2x)

Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
SK for application in columns			
2 x D01 (E14), DIN-rail*	5 x 2,5–25	5 x 2,5–16	EKM 2051SK-2D1S-1R
none, DIN-rail**	5 x 2,5–25	5 x 2,5–16	EKM 2051SK-0D0-2R
SKFH for outdoor application and in columns			
3 x D01 (E14)*	5 x 2,5–25	5 x 2,5–16	EKM 2051SKFH-3D1-1R
4 x D01 (E14)	5 x 2,5–25	5 x 2,5–16	EKM 2051SKFH-4D1
none, DIN-rail**	5 x 2,5–25	5 x 2,5–16	EKM 2051SKFH-0D0-2R

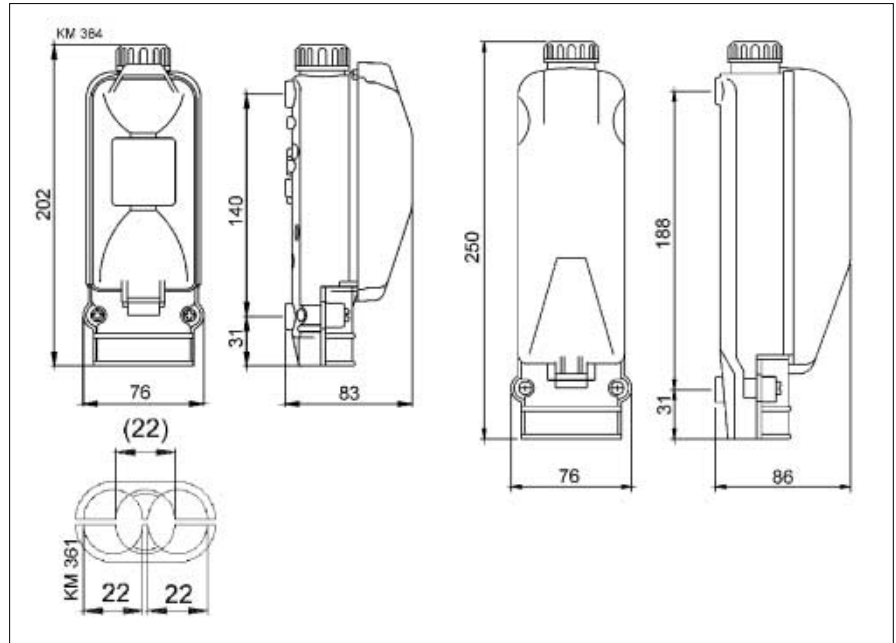
Note: Fuses not included. Accessories and spare parts see page 121 and 122

* Connector block, with 2 fuse holders and 1 adjustable DIN-rail

** Connector block only and 2 adjustable DIN-rails

EKM 1271, EKM 1272 – Connection Box for Lighting Application

Pole Diameter ≥ 90 mm, Fuses: DII (E27), Earth Cables ≤ 25 mm²



Application

This connection box is intended to be installed in lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Selection Criteria

- For application inside of lighting columns
Pole diameter: ≥ 90 mm
Door size:
EKM 1271 $\geq 80 \times 210$ mm
EKM 1272 $\geq 80 \times 260$ mm
- 4 or 5 mantle terminals for 2 cables
EKM 1271/1272 6–16 mm² or
EKM 1272 10–25 mm²
- Fuses D II (E27) up to 25 A

Technical Data

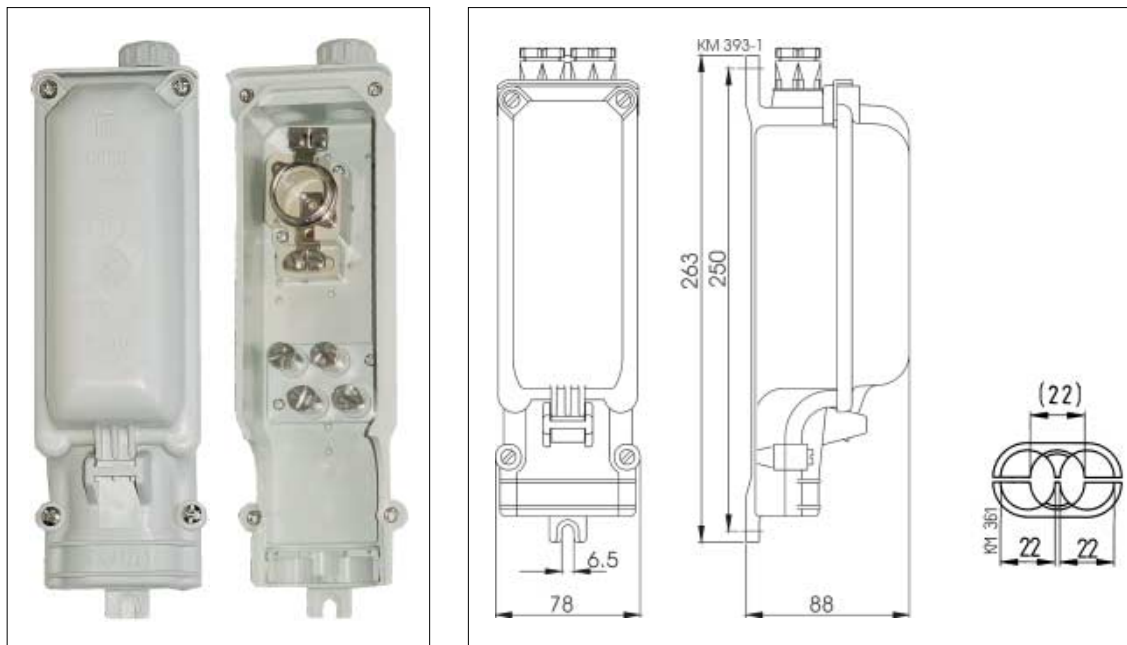
- Acc. IEC 60439-1
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent fuse cover
- Degree of Protection: IP 43
- Class of Protection II
- Entry for earth cables max. $\varnothing 22$ mm (2x)
- Compression sealing glands for luminaire cables:
 $\varnothing 8$ –14 mm luminaire cable (for 1 luminaire cable
3 x 1,5 mm²–5 x 2,5 mm²)

Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
1 x DII (E 27)	4 x 6–16	–	EKM 1271-1D2-4-16
1 x DII (E 27)	5 x 6–16	–	EKM 1271-1D2-5-16
2 x DII (E 27)	4 x 6–16	–	EKM 1272-2D2-4-16
2 x DII (E 27)	4 x 10–25	–	EKM 1272-2D2-4-25

Note: Fuses, adapter screws and screw caps not included. Accessories and spare parts see page 121 and 122

EKM 1261 – Connection Box for Lighting Application

Pole Diameter ≥ 100 mm and Outdoor Application, Fuses: DII (E27), Earth Cables ≤ 16 mm²



Application

This connection box is intended to be installed for outdoor application and inside of lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Selection Criteria

- For application inside of lighting columns
Pole diameter: ≥ 100 mm
Door size: $\geq 80 \times 250$ mm
- 4 or 5 mantle terminals for 2 cables $6-16$ mm²
- Fuses D II (E27) up to 25 A

Technical Data

- Acc. IEC 60439-1
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent fuse cover
- Ingress Protection: IP 54
- Class of Protection II
- Entry for earth cables max. $\varnothing 22$ mm (2x) without insert max. $\varnothing 25$ mm (2x)
- Compression sealing glands for luminaire cables:
 $\varnothing 8-14$ mm luminaire cable (2 glands for 2 luminaire cables
 $3 \times 1,5$ mm²– $5 \times 2,5$ mm²)

Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
1 x DII (E27)	4 x 6–16	–	EKM 1261-1D2-4-16
1 x DII (E27)	5 x 6–16	–	EKM 1261-1D2-5-16
2 x DII (E27)	4 x 6–16	–	EKM 1261-2D2-4-16
2 x DII (E27)	5 x 6–16	–	EKM 1261-2D2-5-16
2 x DII (E27)	5 x 10**	5 x 10	EKM 1261-2D2-5-10
none, DIN-rail *	5 x 6–16	–	EKM 1261-0D0-5-16-1R

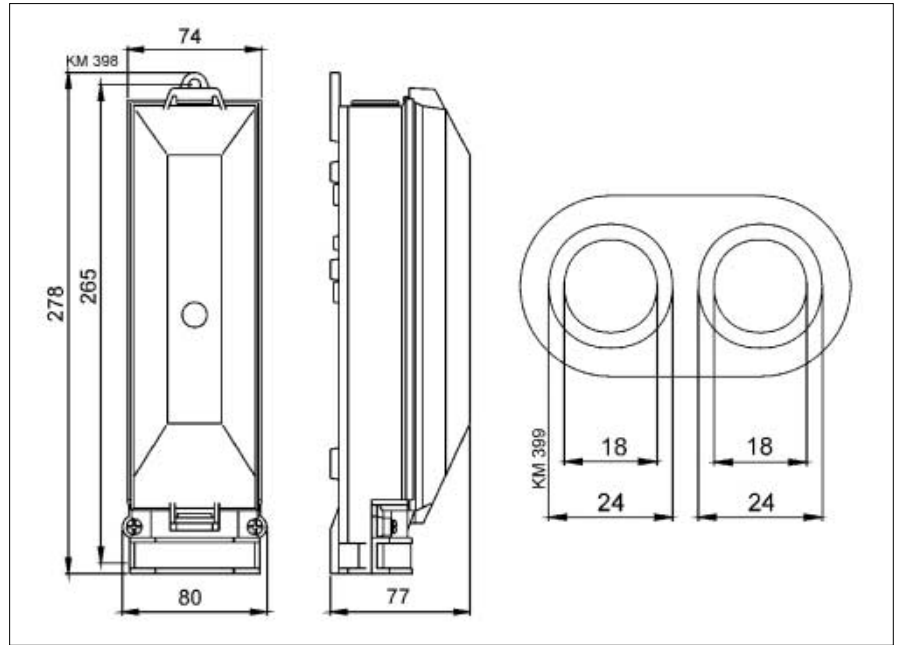
* Connector block only and DIN-rail for up to 3 MCB

** only for 2 cables

Note: Fuses, adapter screws and screw caps not included. Accessories and spare parts see page 121 and 122
Boxes without fuse sockets are available on request.

EKM 2072 – Connection Box for Lighting Application

Pole Diameter ≥ 90 mm, Fuses: DII (E27), Earth Cables ≤ 35 mm²



Application

This connection box is intended to be installed in lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Selection Criteria

- For application inside of lighting columns
Pole diameter: ≥ 90 mm
Door size: $\geq 80 \times 280$ mm
- 4 or 5 mantle terminals for
2 cables 4–16 mm² or
2 cables 16–35 mm²
- Fuses D II (E27) up to 25 A

Technical Data

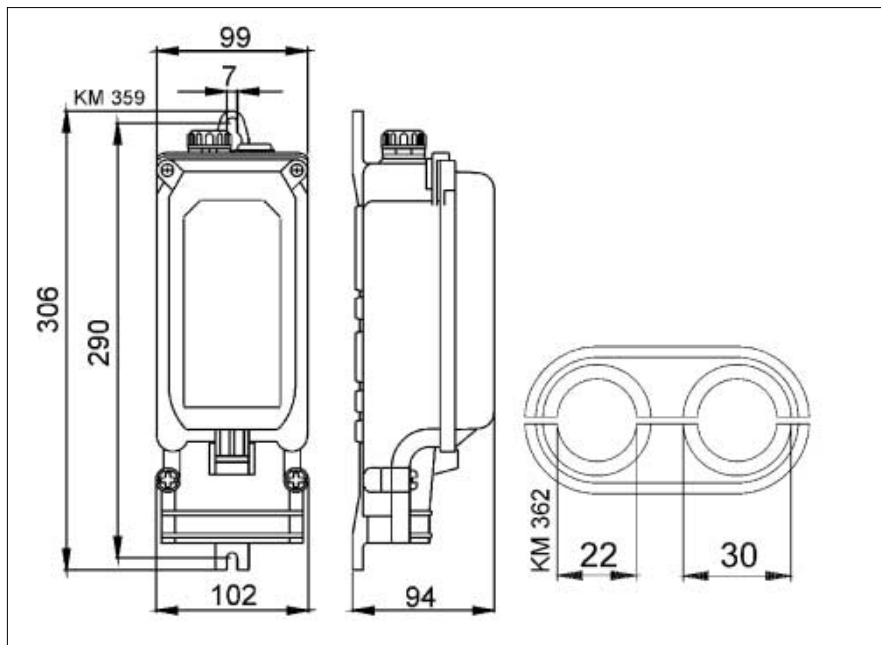
- Acc. IEC 60439-1
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent fuse cover
- Degree of Protection: IP 43
- Class of Protection II
- Range taking self adapting cable sealings
 \varnothing 19–29 mm earth cable
 \varnothing 8–14 mm luminaire cable
 (2 sealings for 2 luminaire cables
 3 x 1,5 mm²–5 x 2,5 mm²)

Fuse sockets	Cross section (mm ²)			Ordering description
	for 1 cables	for 2 cables	for 3 cables	
1 x D II (E 27)	5 x 4–16	5 x 4–16	–	EKM 2072-1D2-5-16
2 x D II (E 27)	5 x 4–16	5 x 4–16	–	EKM 2072-2D2-5-16
1 x D II (E 27)	4 x 25–35	4 x 16–35	–	EKM 2072-1D2-4-35
2 x D II (E 27)	4 x 25–35	4 x 16–35	–	EKM 2072-2D2-4-35
1 x D II (E 27)	5 x 25–35	5 x 16–35	–	EKM 2072-1D2-5-35
2 x D II (E 27)	5 x 25–35	5 x 16–35	–	EKM 2072-2D2-5-35

Note: Fuses, adapter screws and screw caps not included. Accessories and spare parts see page 121 and 122

EKM 1281 – Connection Box for Lighting Application

Pole Diameter ≥ 120 mm and Outdoor Application, Fuses: DII (E27), Earth Cables ≤ 35 mm²



Application

This connection box is intended to be installed for outdoor application and inside of lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Additional connection boxes for other cable dimensions, fuses or accessories are available on request.

Selection Criteria

- For application inside of lighting columns
Pole diameter: ≥ 120 mm
Door size: $\geq 100 \times 300$ mm
- 4 or 5 mantle terminals for
2 cables 16–25 mm² or
2 cables 16–35 mm²
- Fuses D II (E27) up to 25 A

Technical Data

- Acc. IEC 60439-1
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Ingress Protection: IP 54
- Class of Protection II
- Entry for earth cables
 $\varnothing 22$ –30 mm (2x)
- Crompression sealing glands for luminaire cables:
 $\varnothing 8$ –14 mm luminaire cable
(2 glands for 2 luminaire cables
3 x 1,5 mm²–5 x 2,5 mm²)

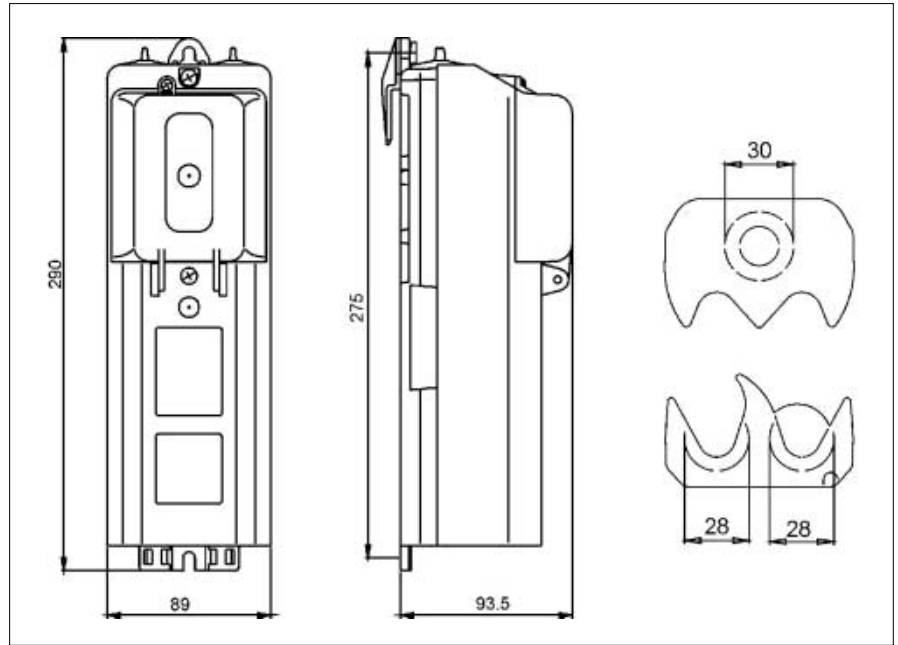
Fuse sockets	Cross section (mm ²)			Ordering description
	for 1 cables	for 2 cables	for 3 cables	
1 x DII (E 27)	5 x 25	5 x 16–25	–	EKM 1281-1D2-5-25
2 x DII (E 27)	4 x 25	4 x 16–25	–	EKM 1281-2D2-4-25
2 x DII (E 27)	4 x 35	4 x 16–35	–	EKM 1281-2D2-4-35
2 x DII (E 27)	5 x 25	5 x 16	5 x 16	EKM 1281-2D2-5-16
2 x DII (E 27)	5 x 25	5 x 16–25	–	EKM 1281-2D2-5-25
none, DIN-rail*	4 x 35	4 x 16–25	–	EKM 1281-0D0-4-25-1R

* Connector block only and DIN-rail for up to 3 MCB

Note: Fuses, adapter screws and screw caps not included. Accessories and spare parts see page 121 and 122
Boxes without fuse sockets are available on request.

EKM 2035 – Connection Box for Lighting Application

Pole Diameter ≥ 110 mm, Fuses: DII (E27), Earth Cables ≤ 50 mm²



Application

This connection box is intended to be installed in lighting columns at the connection between looped-through earth cables and the luminaire components protected by fuses.

Special equipment as MCBs, timers, residual current devices or the like can be integrated on DIN rails.

Selection Criteria

- For application inside of lighting columns
Pole diameter: ≥ 110 mm
Door size: $\geq 90 \times 300$ mm
- 4 sliding terminals for
2 cables 4–50 mm² or
3 cables 4–35 mm²
- Optional Fuses D II (E27) up to 25 A
- Optional for standard installation devices on DIN-rail attachable up to 3 TE width (3 x 18 mm), max. height of devices 75 mm.

Technical Data

- Acc. IEC 60439-1
- Impact resistant thermoplastic
- All metal parts corrosion protected
- Transparent fuse cover
- Ingress Protection: IP 43
- Class of Protection II
- Range taking self adapting cable sealings
 \varnothing 16–35 mm earth cable
 \varnothing 8–14 mm luminaire cable
 (2 sealings for 2 luminaire cables
 3 x 1,5 mm²–5 x 2,5 mm²)
 or 2 x 4 wires \varnothing 1,5–3 mm

Fuse sockets	Cross section (mm ²)		Ordering description
	for 1 and 2 cables	for 3 cables	
1 x D II (E 27)	4 x 4–50	4 x 4–35	EKM 2035-1D2
2 x D II (E 27)	4 x 4–50	4 x 4–35	EKM 2035-2D2
none*	4 x 4–50	4 x 4–35	EKM 2035-0D0
none, DIN-rail**	4 x 4–50	4 x 4–35	EKM 2035-0D0-1R

Note: Fuses, adapter screws and screw caps not included. Accessories and spare parts see page 121 and 122

* Connector block only and screws for fuse sockets

** Connector block only and DIN-rail for up to 3 MCB

Fused connectors, fuses, screw caps and adapter screws



Fused connector B 6770



Fuse D01, Screw cap



Fuse D II, Screw cap, Adapter screw

Fused connector B 6770, complete with fuse type D01 (E14)

For mounting in narrow poles or to fuse directly at the luminaire component.
For connecting cables on both sides up to 4 mm².

Nominal current	Ordering description
2 A	GURO-B 6770- 2A
4 A	GURO-B 6770- 4A
6 A	GURO-B 6770- 6A
10 A	GURO-B 6770-10A

Fuse accessories type D01 (E14)

Nominal current	Ordering description Fuses D01 (E14)	Adapter screws	Screw cap
–			GURO-F-D1-SC
2 A	GURO-F-D1-02	GURO-F-D1-AS02	
4 A	GURO-F-D1-04	GURO-F-D1-AS04	
6 A	GURO-F-D1-06	GURO-F-D1-AS06	
10 A	GURO-F-D1-10	GURO-F-D1-AS10	
16 A	GURO-F-D1-16	–	

Fuseholders for size D01 can also be used without adapter screws

Fuse accessories type DII – E27

Nominal current	Ordering description Fuses DII (E27)	Adapter screws	Screw cap
–			GURO-F-D2-SC
2 A	GURO-F-D2-02	GURO-F-D2-AS06	
4 A	GURO-F-D2-04	GURO-F-D2-AS06	
6 A	GURO-F-D2-06	GURO-F-D2-AS06	
10 A	GURO-F-D2-10	GURO-F-D2-AS10	
16 A	GURO-F-D2-16	GURO-F-D2-AS16	
20 A	GURO-F-D2-20	GURO-F-D2-AS20	
25 A	GURO-F-D2-25	GURO-F-D2-AS25	

Fuseholders for size D01 can also be used without adapter screws

Cable protecting frames for lighting poles, spare covers for connection boxes, adapter hook



Cable protection frames for poles



Adapter hook for transversal rails in poles



Spare covers for connection boxes

Cable protection frames for poles according to EN40

The frames are inserted in the standardized (EN 40) underground cable openings and protect the cable insulation against damage from sharp edges. Stays in position even when cables will be pulled back.

For cable entry opening 50 x 150 mm acc. to EN 40.

Material: Polyethylen

Snap-in-design, fit all diameters > 90 mm

Ordering description	cable entry opening	min. pole diameter
GURO-B 6924	50 x 150 mm	90 mm

Adapter hook for transversal rails in poles

The adapter hook has a self-fastening feature when inserted into the hanging eye of the connection box. The adapter hook, fixed to the connection box, is slid behind the transversal rail and thus providing a hook for hanging the connection box on.

Dimensions: Width 30 mm, depth 19 mm, height 58 mm, hook diameter 10,5 mm; material: PP

Ordering description	Dimensions (mm)	Hook diameter (mm)
GURO-B 7324	30 x 58 x 19 mm	10.5 / 6.2

Spare covers for Guro connection boxes

Ordering description	cover for connection box type
GURO-B 7224	EKM 2020
GURO-B 7182-01	EKM 2050SK
GURO-B 7182-03	EKM 2020SKFH
GURO-B 7217-11	EKM 2051
GURO-B 6692	EKM 1271
GURO-B 6602	EKM 1272
GURO-B 6622	EKM 1261
GURO-B 7142	EKM 2072
GURO-B 6705	EKM 1281



G4
G5

III

S5-L4

L4

L2

S1-L2

S2-L4

S2-L2

All of the above information, including drawings, illustrations and graphic designs, reflects our present understanding and is to the best of our knowledge and belief correct and reliable. Users, however, should independently evaluate the suitability of each product for the desired application. Under no circumstances does this constitute an assurance of any particular quality or performance. Such an assurance is only provided in the context of our product specifications or explicit contractual arrangements. Our liability for these products is set forth in our standard terms and conditions of sale. GURO, Hellstern, Raychem, SIMEL are trademarks.

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