CTL
COMPONENTS
plc

Cable Accessories

Resin Joints
Heatshrink Joints
Heatshrink Terminations
Heatshrink Tubing
Heatshrink Components
Connectors
Constant Force Springs
Lugs
Ferrules
Clamps
Glands
Cleats
Tapes
Tools
Jointer Training

1kV
to
36 kV

Corporate

CTL COMPONENTS — group plc

CTL COMPONENTS plc

CTL METALWORK plc

Established since 1935, London-based CTL Components plc benefits from being part of CTL Components Group plc. As well as the manufacture of cable accessories, other Group activities include sub-contract precision sheet metalwork and finishing services and the distribution of electronic components. The entire Group is accredited to BS EN ISO 9001:2000 and has an impressive customer list of major international companies.

Cable accessories are a core CTL activity. Over half of production is exported and the CTL brand commands respect throughout the world.

As well as the given requirements of design, quality and price, it is the sheer breadth of CTL's range that provides customers with a reliable, authoritative and convenient one-stop-shop for all of their cable accessory needs. This catalogue alone lists nearly 100 variations of standard resin cable joints, almost all available immediately from stock. A "specials" service offers a further 400 variations to ensure that joints for almost any LV or MV cables can be supplied.

As a result, CTL holds approvals from many international oil, telecom, rail and utility companies and is the sole contracted supplier of cable accessories to the UK Government's Highways Agency.

Jointer Training

CTL cable joints are good, but only as good as the people who install them! Thousands of jointers throughout the world have grown to appreciate the ease of working with CTL joints and often comment on the clear instructions, sensible designs with plenty of space and high quality components.

For those less experienced, CTL offers a comprehensive jointer training programme run by highly-qualified trainers. Sessions are either held at CTL's London Head Office or at a client's location anywhere in the world. From Hong Kong to Azerbaijan, there are hundreds of jointers who proudly display their certificates of competence which have been issued to them following the successful completion of one of CTL's courses.

These courses vary in duration from one to five days and cover the theory and practical skills required to safely install cable joints and terminations up to 33kV, utilising both resin and heatshrink technologies.

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Contents

Low Voltage

MV

Contents

What goes into a good cable joint?

Injection Moulded Shells
Rigid and very strong, their snap-lock design forms an excellent seal and prevents egress of resin.

Mechanical Connectors
Our MC1/0 to MC1/3 connectors have been especially designed to accept the same range of cable sizes as the CM0 to CM3 LV cable joints they are supplied with. Machined from solid brass, they are suitable for either copper or aluminium conductors. Two Allen screws for each core ensure a sound electrical performance and an Allen key is also provided with each kit to ensure that everything needed to join a cable is included in the one box (CM and CB "+C" ranges). The connector range is complemented with larger aluminium alloy connectors (see page 11).

Earth Braid
Offers significant advantages over "single wire type" earth continuity systems, which can fail if poorly positioned within wire armour cores that have "spread". The flat, soft braid ensures good electrical contact and is insulated for extra protection.

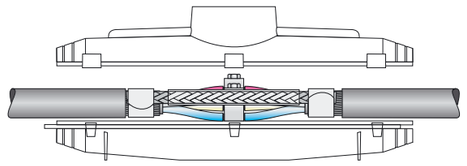
Constant Force Springs
Cable joints move and expand due to earth shift and heat from electrical current. Constant force springs react to this movement and maintain a sound electrical connection between the steel wire armouring and the earth continuity braid.

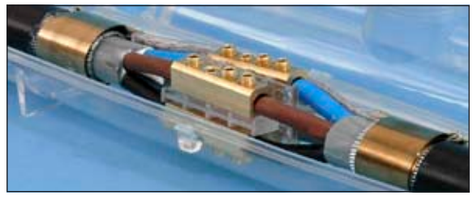
Core separators
Provide safe separation of cores and connectors.

Two-part resin
CTL's long-proven resin formula is of such quality that it is equally suitable for both LV and MV applications and provides excellent adhesion to PVC, XLPE, polythene and paper cables. It is supplied in two-part easy-mix packaging, ensuring both convenience and safety.

Packaging
CTL joints are supplied in especially robust and rigid boxes to withstand stacking both in warehouses and in pallets. These boxes are also popular with jointers since they can be used as "mini workbenches".

Instructions
Detailed, clear and concise instruction sheets, mostly printed in full colour, ensure there is no ambiguity about safe jointing procedures.





Breadth of range
There are few, if any, combinations of power cables that CTL cannot join. We offer over 400 variations of resin cable joints including special versions for mines & quarries; oil & petrochem; telecom & control; cathodic protection. These utilise both resin and heatshrink technologies and are supplied for both LV and MV applications.

Technical support
Call our technical help line on +44 (0) 20 8545 8700 to be instantly put through to someone who can answer your cable jointing question. CTL also offers specialist cable jointer training courses - see inside cover.

MV Joints

CTL Medium Voltage joints are tested in accordance with Cenelec HD629.1S1.

Test Description	Cable Type & System Voltages	
	Polymeric 12 kV (Um)	Paper & Transition 12 kV (Um)
DC Withstand 15 min (kV)	38	38
AC Withstand 5 min (kV)	28.5	28.5
Partial Discharge <10pc (kV)	11	-
Impulse Voltage (kVp)	95	95
Heat Cycling Air & Water (kV)	16	9.5

MV Terminations

CTL Medium Voltage Terminations are tested in accordance with VDE0278 (CENELEC HD629.1S1) and IEC502.

Test Description	Cable Type & System Voltages			
	Polymeric			Paper
	17.5 kV (Um)	24 kV (Um)	36 kV (Um)	12 kV (Um)
DC Withstand 15 min (kV)	52	76	114	38
AC Withstand Dry 5 min (kV)	39	57	85	28.5
AC Withstand Wet 1 min (kV)	35	51	76	25.5
Partial Discharge <10pc (kV)	15	22	33	-
Impulse Voltage (kVp)	95	125	194	95
Heat Cycling Air (kV)	23	32	47.5	9.5
Salt Fog 1000 hr (kV)	11	16	24	8

LV Heatshrink Products

All CTL C-Shrink moulded shapes and heatshrink tubing meet or exceed EA-1509-11.

Properties	Typical Results	Test Method
Cont. Operating Temp.	-55º to +110ºC	-
Tensile Strength	15 MPa	IEC 540
Ultimate Elongation	400%	IEC 540
Heat Shock	No Damage	ASTM D2671
Dielectric Strength	15 kV/mm	ASTM D2671
Water Absorption	<0.1%	ASTM D570
Flammability	Self Extinguishing	ASTM D635

LV Cable Joints

All CTL LV cable joints hold test certificate CENELEC HD 623.S1/DIN VDE 0278, now renamed EN50393:2006. (BS6910 and BS7888 standards are now obsolete.)

ISO 9001:2000

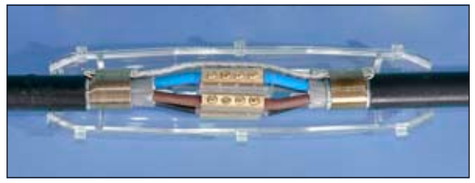
All companies within CTL Components Group plc are fully acredited to BS EN ISO 9001:2000. CTL is a member of the British Standards Institution.

LV Resin Cable Joints - Straight

suitable for PVC or XLPE cable, 1kV

Armoured Cables

CM range



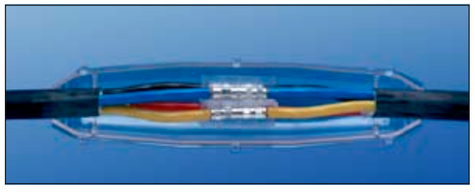
Max Cable Size 4 core (mm²)	Basic Joints		Basic Joints plus Mechanical Connectors	
	Part No	Earth Kit included	Part No	Connectors included
1.5 - 6	CM0	Braid & Constant Force Springs	CM0+C	4 x MC1/0 & Allen Key
10 - 16	CM1	Braid & Constant Force Springs	CM1+C	4 x MC1/1 & Allen Key
25	CM2	Braid & Constant Force Springs	CM2+C	4 x MC1/2 & Allen Key
35 - 95	CM3	Braid & Constant Force Springs	CM3+C	4 x MC1/3 & Allen Key
120	CM4	Braid & Constant Force Springs	CM4+C	4 x MC1/3 & Allen Key
150	CM5	Braid & Constant Force Springs	CM5+C	4 x MC1/5
185 - 240	CM6	Braid & Constant Force Springs	CM6+C	4 x MC1/6
300 - 400	CM7	Braid & Constant Force Springs	CM7+C	4 x MC1/7
Basic joints with compression ferrules instead of mechanical connectors are also available				

Quick Selection

No of cores	Cable size (mm²)																
	1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	400
2	CM0					CM1		CM2		CM3			CM4			CM5	
3	CM0				CM1		CM2	CM3				CM4		CM5		CM6	
4	CM0				CM1		CM2	CM3				CM4	CM5	CM6		CM7	

Unarmoured Cables

CM EX range



Max Cable Size 4 core (mm²)	Basic Joints	Basic Joints plus Mechanical Connectors	
	Part No	Part No	Connectors included
1.5 - 10	CM0EX	CM0EX+C	4 x MC1/0 & Allen Key
16	CM1EX	CM1EX+C	4 x MC1/1 & Allen Key
25 - 35	CM2EX	CM2EX+C	4 x MC1/2 & Allen Key
50 - 95	CM3EX	CM3EX+C	4 x MC1/3 & Allen Key
120	CM4EX	CM4EX+C	4 x MC1/3 & Allen Key
150 - 185	CM5EX	CM5EX+C	4 x MC1/5
240 - 300	CM6EX	CM6EX+C	4 x MC1/6
400	CM7EX	CM7EX+C	4 x MC1/7
Basic joints with compression ferrules instead of mechanical connectors are also available			

Quick Selection

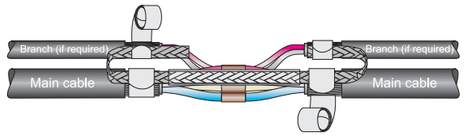
No of cores	Cable size (mm²)																
	1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	400
2	CM0EX					CM1EX		CM2EX		CM3EX			CM4EX			CM5EX	
3	CM0EX				CM1EX		CM2EX	CM3EX				CM4EX		CM5EX		CM6EX	
4	CM0EX				CM1EX		CM2EX	CM3EX				CM4EX	CM5EX		CM6EX		CM7EX

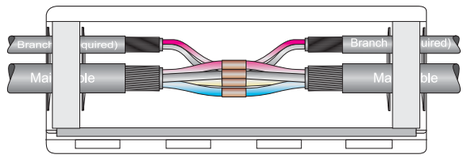
LV Resin Cable Joints - Branch

suitable for PVC or XLPE cable, 1kV

Service Branch Joints

CU range
"Universal" joints for branch & straight jointing





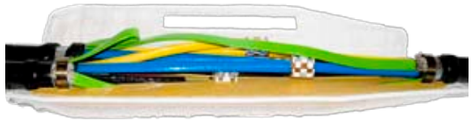
Main Cable Size 2,3 & 4 core (mm2)	Max Branch Cable 2,3 & 4 core (mm2)	Basic Joints	Basic Joints plus Mech. Connectors	
		Part No	Part No	Connectors included
Armoured & Unarmoured Cable - Uncut Main				
1.5 - 2.5	1 x 2.5	CU0	CU0+C	4 x MC3
4 - 6	2 x 6	CU1	CU1+C	4 x MC3
10 - 25	2 x 25	CU2	CU2+C	4 X MC2
35 - 50	2 x 35	CU3	CU3+C	4 x MC3/3
70 - 95	2 x 35	CU4	CU4+C	4 x MC4/1
120 - 185	2 x 35	CU5	CU5+C	4 x MC4/2

CB range

Main Cable Size 2,3 & 4 core (mm²)	Max Branch Cable 2,3 & 4 core (mm²)	Basic Joints	Basic Joints plus Mech. Connectors	
		Part No	Part No	Connectors included
Armoured & Unarmoured Cable - Uncut Main				
1.5 - 16	16	CB1	CB1+C	4 x MC3/1
25 - 35	35	CB2	CB2+C	4 x MC2
50 - 70	35	CB2.5	CB2.5+C	4 x MC4/1

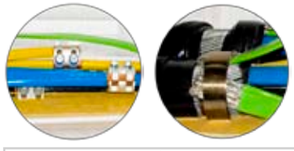
CB ring connector range

Main Cable Size 4 core (mm²)	Max Branch Cable 2,3 & 4 core (mm²)	Part No Inc ring connector
Armoured & Unarmoured Cable - Uncut Main		
25 - 70	50	CB1.5+MCRC1
70 - 150	70	CB2.5+MCRC2
95 - 185	70	CB2.5+MCRC3



Mains Branch Joints

CBM range



Uncut Main Cable 2, 3 & 4 core (mm²)	Max Branch Cable 2,3 & 4 core (mm²)	Part No Inc mechanical connectors
Armoured & Unarmoured Cable		
50 - 70	70	CBM0+C
95 - 120	120	CBM1+C
150 - 185	185	CBM2+C
240 - 300	300	CBM3+C

Cut Main Cable 2, 3 & 4 core (mm²)	Max Branch Cable 2,3 & 4 core (mm²)	Part No Inc mechanical connectors
Armoured & Unarmoured Cable		
1.5 - 35	35	CBM1.5+C
50 - 150	150	CBM2.5+C
185 - 300	300	CBM3.5+C

LV Specials

Cathodic Protection Joints

Approved by many oil and utility companies throughout the world, the main applications for these joints include:-

- Jointing of single core DC feeder to anode cable for cathodic protection of pipelines, jetties, tanks and buried structures.

Two variants of CP joints are offered:-

- **CPJ** - the classic cathodic protection joint for use when upright branch joints are required.
- **CB0** - a "Y"-shaped joint for horizontal branch jointing applications.

Max Cable Size single core (mm²)	Max Branch single core (mm²)	Basic Kit - no connector	Kit with Split-Bolt Line-Tap	
		Part No	Part No	Kit includes
120	95	CPJ120	CPJ120+C	Joint+ 1 x MC3/4
95	95	CB0	Please enquire	

Multicore Control & Pilot Cables CML Range

Especially designed for Control/Telemetry applications and for joining Pilot cables. Suitable for multi-core cables 600/1000V, PVC insulated, armoured or unarmoured. Nylon spacer tapes are included for easy bundling of cores and to ensure even penetration of resin.

No of cores	Core size 1.5 - 2.5 mm²		Core size 4 - 6 mm²	
	Armoured	Unarmoured	Armoured	Unarmoured
2 - 4	CM0L	CM0LEX	CM0L	CM0LEX
5	CM0L	CM0LEX	CM1L	CM1LEX
7 - 8	CM1L	CM1LEX	CM2L	CM2LEX
10 - 11	CM2L	CM2LEX	CM2L	CM2LEX
16 - 27	CM3L	CM3LEX	CM3L	CM3LEX
30 - 48	CM4L	CM4LEX		

Insulated ferrules for CML range should be ordered separately (one ferrule per core).
0.5 - 1.0 mm² - use Part No KX670; 1.5 - 2.5 mm² - use Part No KX680; 4.0 - 6.0 mm² - use Part No KX700.

Multipair Telecom Cables CML Range

For multipair cables, PVC insulated / PVC oversheathed, conductor Ø 0.9 mm, armoured or unarmoured.

No of pairs	Armoured	Unarmoured	No of pairs	Armoured	Unarmoured
2	CM0L	CM0LEX	25	CM2L	CM1LEX
5	CM1L	CM0LEX	40	CM3L	CM2LEX
10	CM1L	CM1LEX	50	CM4L	CM2LEX
15	CM2L	CM1LEX	100	CM4L	CM3LEX

Insulation-displacement connectors (Part No MCT) should be ordered separately (2 per pair).

LV Resin Cable Joints - Special Applications
suitable for PVC or XLPE cable, 1kV

LV Specials

Mines & Quarries CMMQ Range

Supplied with required accessories including:-

- Self-amalgamating tape to insulate ferrules.
- Special spiral spacers for core separation.
- Stainless steel mesh sleeve.

11 kV version also available.

Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No
1.5	2	CM1MQ	6	2	CM1MQ	25	2	CM2MQ	70	2	CM4MQ	150	2	CM5MQ
	3	CM1MQ		3	CM1MQ		3	CM3MQ		3	CM4MQ		3	CM5MQ
	4	CM1MQ		4	CM1MQ		4	CM3MQ		4	CM4MQ		4	CM6MQ
2.5	2	CM1MQ	10	2	CM1MQ	35	2	CM3MQ	95	2	CM4MQ	185	2,3,4	CM6MQ
	3	CM1MQ		3	CM2MQ		3	CM3MQ		3	CM4MQ	240	2,3,4	CM6MQ
	4	CM1MQ		4	CM2MQ		4	CM3MQ		4	CM5MQ	300	2,3,4	CM6MQ
4	2	CM1MQ	16	2	CM2MQ	50	2	CM3MQ	120	2	CM5MQ			
	3	CM1MQ		3	CM2MQ		3	CM4MQ		3	CM5MQ			
	4	CM1MQ		4	CM2MQ		4	CM4MQ		4	CM5MQ			

Oil & Petrochem CMOP Range

Supplied with required accessories inc:-

- Earth continuity components for lead covered (LV) cables.

Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No
1.5	2	CM1OP	6	2	CM2OP	25	2	CM2OP	70	2	CM4OP	150	2	CM5OP
	3	CM1OP		3	CM2OP		3	CM3OP		3	CM4OP		3	CM5OP
	4	CM1OP		4	CM2OP		4	CM3OP		4	CM4OP		4	CM6OP
2.5	2	CM1OP	10	2	CM2OP	35	2	CM3OP	95	2	CM4OP	185	2	CM5OP
	3	CM1OP		3	CM2OP		3	CM3OP		3	CM4OP		3	CM6OP
	4	CM1OP		4	CM2OP		4	CM3OP		4	CM5OP		4	CM6OP
4	2	CM1OP	16	2	CM2OP	50	2	CM3OP	120	2	CM5OP			
	3	CM2OP		3	CM2OP		3	CM4OP		3	CM5OP			
	4	CM2OP		4	CM2OP		4	CM4OP		4	CM5OP			

1.9/3.3 kV Joints

Suitable for PVC or XLPE/SWA/PVC oversheathed, 1900/3300V cables, with stranded copper or aluminium conductors, to BS5467 and 6346.

Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No	Cable (mm²)	No of cores	Part No
16	3	CM2M	70	1	CM2M	120	3	CM4M	240	1	CM3M	400	3	CM6M
25	3	CM3M	70	3	CM3M	150	1	CM3M	240	3	CM6M	500	1	CM4M
35	3	CM3M	95	1	CM2M	150	3	CM5M	300	1	CM3M	630	1	CM4M
50	1	CM2M	95	3	CM4M	185	1	CM3M	300	3	CM6M	800	1	CM4M
50	3	CM3M	120	1	CM2M	185	3	CM5M	400	1	CM4M	1000	1	CM4M

LV Resin Cable Joints - Low Smoke Zero Halogen

suitable for PVC or XLPE cable, 1kV

Distinguished by its yellow-tinted injection-moulded shells, CTL's range of Low Smoke Zero Halogen cable joints has been especially developed to meet the increasing demand for joints that match the characteristics of modern flame retardant, fire resistant and low smoke cables.

To reflect the specialist application, these joints can be installed without the need for dedicated tools or the application of heat.

All of the popular and well-established features of standard CTL joints have been retained. Internationally, there are several standards that regulate fire behaviour. CTL products conform to the following national standards:-

UK:- BS 476 Part 7,
Class 1Y rating.
Germany:- DIN 4102/part 1, B1 rating.
France:- NFP 92 501, 5 & 16, M2 rating.

A typical kit consists of an outer shell manufactured from UV stable , low smoke, zero halogen, flame retardant material that matches or exceeds the relevant properties of similarly specified cable.

For the majority of applications it is only the shell that requires specialist fire-sensitive properties. In these cases CTL's standard two-part polyurethane resin is supplied in easy-mix pouches.

When specifications call for the resin to also be flame retardant, halogen-free and low smoke, joints are shipped with CTL's CR171H resin which is flame retardent to V0 rating of UL94.

LV Resin Cable Joints - Low Smoke Zero Halogen

suitable for PVC or XLPE cable, 1kV

Specifications - CTL Low Smoke Zero Halogen cable joints		
Properties of shell	Rating	Relevant standard
Flammability		
Flame retardant		
Flame class rating: 3mm	V-0	UL94
Flame class rating: 1mm	V-2	UL94
Glow wire test, 1 mm, 850 ºC	Pass	IEC 695-2-1
Low Smoke		
Smoke density 4 min	Dm < 200	AIRBUS Standard ABD 0031
Halogens	Free	DIN VDE 472 part 815
Mechanical		
Tensile strength at yield (speed 50mm/min)	63 Mpa	ISO 527, DIN 53455
Impact		
Charpy Impact, notched	30 kJ/m^2	ISO 179/2C
Thermal		
Thermal conductivity	0.20 W/m ºC	DIN 52612
Electrical		
Dielectric strength	17kV/mm	IEC 243, ASTMD 149
Volume resistivity	10^{15} Ohm.m	IEC 93, DIN53482
Surface resistivity	10^{15} Ohm	IEC 93, DIN53482
Properties of resin type CR171H		
Flammability - Flame class rating: 6mm	V-0	UL94
Physical properties		
Operating temperature	-40º C to +105º C	
Thermal conductivity	0.75 W/mK	
Shrinkage	Low	
Coefficient of linear expansion	Low	
Electrical properties		
Volume resistivity	11 - 13 log Ohm	
Surface resistivity	12 - 14 log Ohm	
Electric strength	> 16 MV/m	
Permittivity	3.2 @ 1 KHz	

Main Cable 2, 3 & 4 core (mm^2)	Branch Cable 2,3 & 4 core (mm^2)	Part No
Straight Joints		
1.5, 2.5, 4, 6		CM0LSHF
10, 16		CM1LSHF
25		CM2LSHF
35, 50, 70		CM3LSHF
95, 120		CM4LSHF
150, 185		CM6-07LSHF
240, 300		CM6-08LSHF
400		CM7-08LSHF
Branch Joints		
1.5, 2.5, 4, 6, 10	1.5, 2.5, 4, 6, 10	CB1LSHF
16, 25, 35	16, 25, 35	CB2LSHF

Accessories

a) Brass connectors with Allen head screws for Cu or Al conductors.
b) Aluminium alloy connectors with shear-head bolts & brass gauze for Cu or Al conductors
c) Copper or aluminium crimp ferrules

See page 15 for Hazardous Area Cable Glands.

See page 17 for cable clamps, troughs and "J" hooks especially designed for the rail industry.

Joint Shells

Joint Shell Dimensions

Straight-through Joints

Type	A	B	C	
			min	max
CM0 range	200	35	5	20
CM1 range	250	45	8	30
CM2 range	320	60	10	34
CM3 range	450	75	30	48
CM4 range	550	100	40	66
CM5 range	660	140	50	85
CM6 range	1290	140	45	95
CM7 range	1345	155	70	105

Branch Joints

Type	A	B	C1		C2	
			min	max	min	max
CB0 range	190	60	10	20	10	20
CB1 range	335	110	10	23	10	23
CB1.5 range	300	130	25	50	22	32
CB2 range	420	125	10	32	10	32
CB2.5 range	420	150	42	60	30	45
CB3.5 range	500	150	57	65	34	50
CBM0/1.5	710	120		45		45
CBM1	770	140		53		53
CBM2/2.5	910	170		60		60
CBM3/3.5	1010	200		73		73
CPJ120	160	92	10	25	10	20

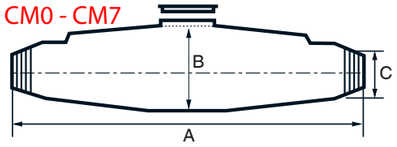
Universal Joints

Type	A	B	C1		C2	
			min	max	min	max
CU0 range	175	40	8	20	8	15
CU1 range	220	65	13	22	13	21
CU2 range	300	80	19	29	18	22
CU3 range	400	95	23	35	21	25
CU4 range	500	110	26	50	25	30
CU5 range	500	160	38	65	39	50

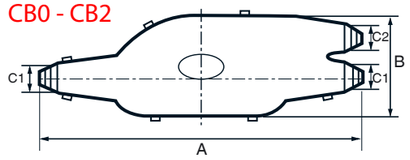
All shells apart from CM6, CM7 & CBM are injection-moulded from high-impact polycarbonate to form clear, rigid and strong pairs which clip together easily and provide a robust seal to prevent resin leakage. Many are also available in Low Smoke Zero Halogen variants which can be identified by their yellow tint (see pages 10 & 11).

CM6, CM7 & CBM shells share a similar design but are manufactured using a vacuum-forming process.

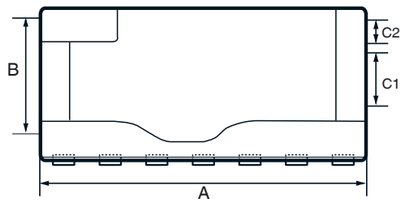
CM0 - CM7



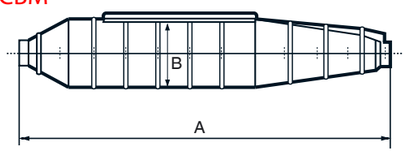
CB0 - CB2



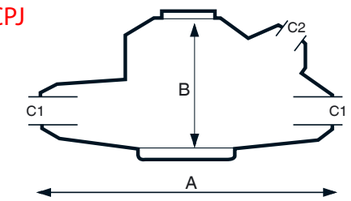
CB1.5 - CB3.5



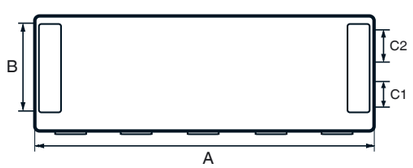
CBM



CPJ



CU0 - CU5



CTL Cold-Pour Two-Part Resins

Specifications

Resin Packs

Features

- Two-part Polyurethane resin in protective aluminium foil.
- Mixing is performed in sealed conditions - no need for skin contact but safety gloves are provided.
- Controlled curing temperature designed to be compatible with PVC, XLPE, EPR, Polythene and PILC cables.
- Clear mixing instructions on every pack.
- Full Health & Safety labelling.
- Batch number & use-by-date on every pack.
- Designed to meet the requirements of BS 6910, BS7888, CENELEC HD623 S1 and EN50393:2006.
- The same well-proven high quality resin formula is used as standard throughout both the LV & MV ranges.

Specification	
Mixed properties	Pack designed to contain factory dispensed quantities of resin & hardener
Specific gravity	1.40 Resin, 1.22 Hardener
Density (g/ml)	1.36 mixed system
Colour	Cream (standard)
Gel Time	20-30 minutes at 21º C for 200g mass
Peak Exotherm	54-75º C depending upon volume and ambient temperature.
Complete cure time	at 23º C - 24 hours at 80º C - 1 hour
Shelf life	24 months when stored at 5ºC - 15º C.
Operating temperature	-40º C to +100º C continuous, for cured product
Thermal Conductivity	>0.4w/mK
Tensile strength	45 MPa
Electrical strength	20kV/mm
Health & safety	Each pack contains mixing instructions and carries health and safety warnings. H&S (COSHH) Information Sheet available upon request
Transportation	No special labelling required for shipments by air, sea or road (UN No 2489, packaging group III)

Also available

- **Flame retardant, halogen-free resin** to VO rating of UL94.
- **Traffic systems resin** - Two-part, fast-curing toughened polyurethane resin designed for the encapsulation of speed sensors, junction boxes and the bases of control cabinets.
- **Re-enterable resin** - Two-part polyurethane resin that can be removed after curing. Ideal for encapsulating expensive components or multicore and multipair cables where subsequent repair may be required.

Part No	Useable volume of pack
CR0	180 ml
CR1	350 ml
CR2	825 ml
CR4	1850 ml
CR6	3000 ml

Straight-through Type - MC1 Range

Brass Connectors (set of 4) with Allen Key				
Core sizes mm²	To max 10mm²	To max 25mm²	To max 50mm²	To max 120mm²
1.5 - 10	MC1/0	MC1/1	MC1/2	MC1/3
16 - 25	MC1/1	MC1/2	MC1/2	MC1/3
35 - 50	MC1/2	MC1/2	MC1/2	MC1/3
70 - 120	MC1/3	MC1/3	MC1/3	MC1/3

Aluminium Connectors with shear-head screws				
Core sizes mm²	To max 95mm²	To max 185mm²	To max 300mm²	To max 500mm²
50 - 95	MC1/4	MC1/5	MC1/6	MC1/7
120 - 185	MC1/5	MC1/5	MC1/6	MC1/7
240 - 300	MC1/6	MC1/6	MC1/6	MC1/7
400 - 500	MC1/7	MC1/7	MC1/7	MC1/7

Service Branch Type, Uncut Main - MC2 Range

Aluminium Alloy

Main cable to max 35mm²	Branch cable to max 35mm²

Service Branch Type, Uncut Main - MC3 Range

Plain Brass or Tin Plated

Main cable mm²	Max Branch Cable:-					
	6mm²	10mm²	16mm²	35mm²	70mm²	120mm²
1.5 - 6	MC3	MC3/0	MC3/1	MC3/2	MC3/3	MC3/4
10	MC3/0	MC3/0	MC3/1	MC3/2	MC3/3	MC3/4
16	MC3/1	MC3/1	MC3/1	MC3/2	MC3/3	MC3/4
25 - 35	MC3/2	MC3/2	MC3/2	MC3/2	MC3/3	MC3/4
50 - 70	MC3/3	MC3/3	MC3/3	MC3/3	MC3/3	MC3/4
95 - 120	MC3/4	MC3/4	MC3/4	MC3/4	MC3/4	MC3/4

Service Branch Type, Uncut Main - MC4 Range

Aluminium Alloy

Main cable mm²	Branch to max 35mm²	Notes
50 - 95	MC4/ 1	Fitted with shear-head screws. Brass gauze is supplied for use on Cu conductors.
120 - 185	MC4/ 2	
240 - 300	MC4/ 3	

Mains Branch Type, Uncut Main - MCM Range

Aluminium Alloy

Main Cable mm²	Max Branch Cable:-		
	95mm²	185mm²	300mm²
50 - 95	MCM1	MCM2	MCM3
120 - 185	MCM2	MCM2	MCM3
240 - 300	MCM3	MCM3	MCM3

Mains Branch Type, Cut Main - MCM Range

Aluminium Alloy

Main Cable mm²	Branch to max 185mm²	Branch to max 300mm²
50 - 185	MCM6	MCM7
120 - 300	MCM7	MCM7

Insulation-Piercing Ring Connector - MCRC Range

Uncut Main

Main Cable mm²	Max Branch Cable:-		
	50mm²	70mm²	95mm²
25 - 50	MCRC1		
70 - 150	MCRC2	MCRC2	
95 - 185	MCRC3	MCRC3	MCRC3

Live Cable Connector - MC5 Range

Service Branch Type, Uncut Main

Insulated Main mm²	Uninsulated Branch to max 50mm²
16 - 150	MC5

Indoor & Outdoor Glands

Supplied complete with PVC Shrouds, galvanised locknut & brass earthtag.

Indoor & Outdoor Glands			
BW Indoor Gland Part No	CW Out-door Gland Part No	Size	Pack Qty
CG20SBW	CG20SCW	20s	2
CG20BW	CG20CW	20	2
CG25BW	CG25CW	25	2
CG32BW	CG32CW	32	2
CG40BW	CG40CW	40	1
CG50BW	CG50CW	50	1
CG63BW	CG63CW	63	1
CG75BW	CG75CW	75	1

Selection chart for 600/1000 V copper conductor PVC insulated SWA cable													
Conductor		No of Cores											
Area mm²	Neu-tral	1	2	3	3½	4	5	7	10	12	19	27	37	48
1.5			20s	20s		20s	20s	20s	20	20	25	25	32	32
2.5			20s	20s		20s	20s	20	25	25	25	32	32	40
4			20s	20s		20	20	25	25	25	32	40	40	50
6			20s	20s		20								
10			25	25		25								
16			25	25		25								
25	16		25	25	32	32								
35	16		25	32	32	32								
50	25	25	32	32	32	40								
70	35	25	32	40	40	40								
95	50	25	40	40	50	50								
120	70	25	40	50	50	50								
150	70	32	40	50	50	50								
185	95	32	50	50	63	63								
240	120	40	50	63	63	63								
300	150	40	63	63	75	75								
300	185				75									
400	185	50	63	75	75	75								

Hazardous Area Glands

See www.ctl-components.com for size selection tables.

Manufactured from brass or nickel-plated brass.

Type A2F:- Compression gland for unarmoured cable, fitted with an elastomeric displacement seal, giving superior cable retention, explosion protection and IP rating. Supplied with a poly-propylene or neoprene sealing gasket. ***IP Ratings:-*** *IP66/67/68,* ***Standards:-*** *CENELEC/Atex Category 2, Category 3 EExde IIC 2 GD.*

Type A2EX:- Compression gland for unarmoured elastometric and plastic cables in areas requiring a flameproof EExde IIC seal on the outer sheath. Fitted with an inner seal on the cable sheath and a harder outer seal to grip the cable, giving superior cable retention and IP rating. Seals on the cable sheath to IP68 if fitted with a sealing gasket. ***IP Ratings:-*** *IP66/67/68,* ***Standards:-*** *CENELEC/Atex Zones 1, 2, 21 EExde IIC.*

Type E1EX:- Captive Cone gland for steel wire, braid and tape armoured cable. Patented disconnect system allows inspection of armour clamp and inner seal after assembly. Seals on the cable sheath to IP68 if fitted with a sealing gasket. ***IP Ratings:-*** *IP66/67/68,* ***Standards:-*** *CENELEC/Atex Zones 1, 2, 21 EExde IIC.*

Nylon Cable Glands

Manufactured from grey polyamid, these glands are rated IP67, supplied with lock nuts and are available in metric or imperial sizes. Different colours are available upon request.

Metric			Imperial		
Part No	Size	Pack Qty	Part No	Size	Pack Qty
CG12M	M12x1.5	100	CG7PG	PG7	100
CG16M	M16x1.5	100	CG9PG	PG9	100
CG20M	M20x1.5	100	CG11PG	PG11	100
CG25M	M25x1.5	50	CG13.5PG	PG13.5	100
CG32M	M32x1.5	24	CG16PG	PG16	100
CG40M	M40x1.5	12	CG21PG	PG21	50
CG50M	M50x1.5	6	CG29PG	PG29	24
CG63M	M63x1.5	4	CG36PG	PG36	12
			CG42PG	PG42	6
			CG48PG	PG48	6

Single & dual fixing cleats

A comprehensive range that provides a simple yet strong means of securing cables. The two hole version is designed to easily stack, thus saving space and time. Manufactured from highly UV resistant polypropylene - Low Smoke Zero Halogen variants are also available.

Single hole fixing for cables or pipes up to 50.8 mm Ø					Two hole fixing cables or pipes 50-135 mm Ø				
Part No	Size	Cable Ø (mm)		Stud Hole Size	Part No	Size	Cable Ø (mm)		Stud Hole Size
		Min	Max				Min	Max	
CC5	5	10.1	12.7	M6	CCT8	8	46	51	M10
CC6	6	12.6	15.2	M6	CCT9	9	50	57	M10
CC7	7	15.1	17.8	M6	CCT10	10	57	64	M10
CC8	8	17.7	20.3	M6	CCT11	11	64	70	M10
CC9	9	20.2	22.8	M6	CCT12	12	70	76	M10
CC10	10	22.7	25.4	M6	CCT14	14	76	85	M10
CC11	11	25.3	27.7	M10	CCT15	15	75	105	M10
CC12	12	27.6	30.5	M10	CCT16	16	105	112	M10
CC14	14	30.4	35.5	M10	CCT17	17	112	120	M10
CC16	16	35.4	40.6	M10	CCT18	18	120	128	M10
CC18	18	40.5	45.7	M10	CCT19	19	128	135	M10
CC20	20	45.6	50.8	M10					

Underground & Barrier Tapes

Barrier Tapes

For use around cable trenches and on building sites. Available in Red/White or Black/Yellow. 70mm wide supplied in 500m dispenser box or on a 100m reel.

Hazard Tapes

A statutory requirement for safety in the workplace, these ***self-adhesive*** tapes can be used to warn people of dangerous areas. Available in Black/Yellow or Red/White, the tapes are 50mm wide on 33m rolls.

Standard Warning Tapes

Specified by most utility companies, these are laid during the back-filling of trenches and act as a warning device for future excavations. Supplied 150mm wide on 365M rolls with a choice of nine messages and ten appropriate colours.

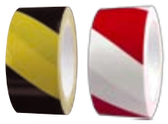
Detectable Warning Mesh

Conforming to BS EN 12613:2001, this warning plyage material is specified by the major utilities. It should be laid 0.3m above the cable/pipe and is designed to fragment when disturbed in such a way as to give the operator best chance of prior warning of an underground hazard. It has a stainless steel detection wire running along its length for easy detection using a metal detector. Choice of five messages in five appropriate colours, 200mm wide on 100m reels.

Cable Covers

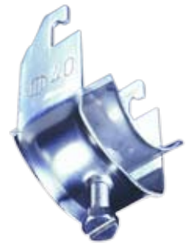
Available in a variety of formats/thicknesses, these help protect cables and pipes from penetration by stopping picks, spades and even digger shovels.

Barrier Tape

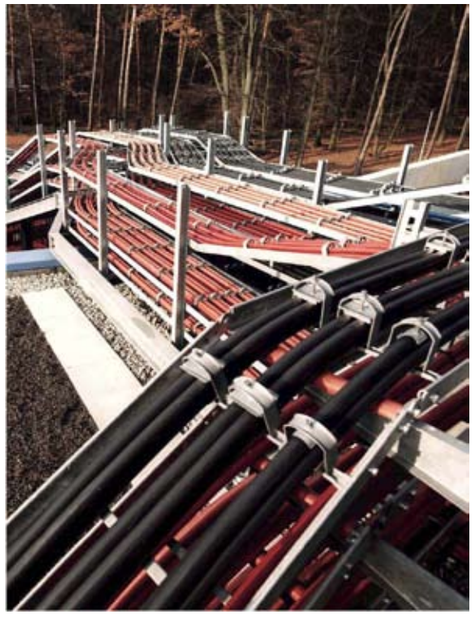


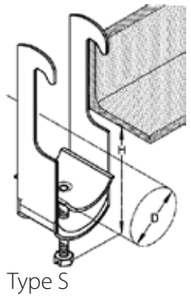
Self-adhesive Hazard Tape

Standard Warning Tape Wording/Colours			Detectable Warning Mesh Wording/Colours	
Electric Cable Below			Electric Cable Below	
Street Lighting Cable Below			Gas Pipe Below	
Gas Main Below			Water Pipe Below	
Sewer Pipe Below			Sewer Pipe Below	
Fibre Optic Cable Below			Fire Mains Below	
Water Pipe Below				
Sewer Pipe Below				
Telephone Cable Below				
Communications Cable Below				



CTL's ranges of single-bolt fixing cable clamps, counterbeds and fixing accessories are manufactured from either galvanised steel, non-magnetic aluminium or Grade 1 stainless steel. Special variants, including troughs and "J" hooks have been designed to address the specific needs of the rail industry. These extensive ranges are detailed in a separate CTL catalogue which is available upon request.





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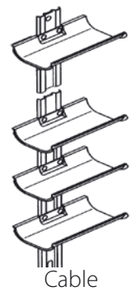
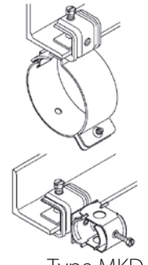
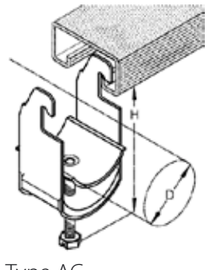


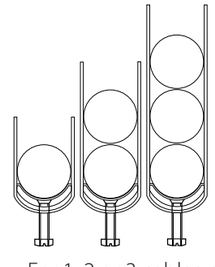
Cable Hangers



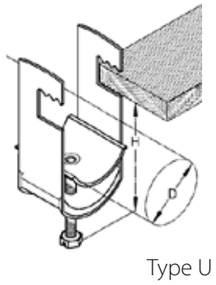
Type MKD



Type AC



For 1, 2 or 3 cables of Ø 6 - 175 mm, all types.



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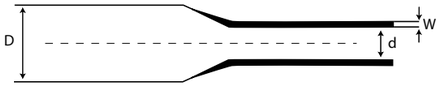


Thin Wall

CTL's H range of thin wall heatshrink tubes is made of cross-linked semi-flexible polyolefin which shrinks uniformly to form a permanent insulating covering. Upon recovery, thin wall tube will conform to the shape it is applied over. Ideal for low voltage electrical insulation up to 1000V.

Basic Properties - Thin Wall	
Operating Temp	-40º to +125ºC
Shrink Ratio	2:1
Standard Colours	Black; Blue; Red; Yellow; Transparent. (Others on request).
Options	Supplied on reel or cut to any length. Flame retardent. Self-extinguishing. Thin dual wall with adhesive lining. 3:1 shrink ratio. Special types to MIL STD 23053/5

See also CTL's LV heatshrink boxes on page 19.

Dimensions - Thin Wall			
Part No	Inner Ø as supplied D min (mm)	Inner Ø recovered d max (mm)	Wall thickness fully recovered W (mm)
H12	1.2	0.6	0.45
H16	1.6	0.8	0.45
H24	2.4	1.2	0.45
H32	3.2	1.6	0.45
H48	4.8	2.4	0.45
H64	6.4	3.2	0.55
H95	9.5	4.8	0.55
H127	12.7	6.4	0.55
H160	16.0	8.0	0.60
H190	19.0	9.5	0.70
H254	25.4	12.7	0.75
H320	32.0	16.0	0.90
H380	38.0	19.0	0.90
H510	51.0	25.4	1.00
H760	76.0	38.0	1.30
H1020	102.0	51.0	1.40

Medium Wall

CTL's HM range is a cross-linked medium wall heatshrink polyolefin tubing with a shrink ratio 3:1 to 4:1. The medium wall thickness provides a tough and semi-flexible insulation making the product ideal for the protection of underground cable joints, crimped terminal ends and cable terminations. The HMA range has a hot-melt adhesive lining which ensures an environmental seal that prevents the ingress of water.

Dimensions - Medium Wall				
Part No With Adhesive	Part No Without Adhesive	Inner Ø as supplied D min (mm)	Inner Ø recovered d max (mm)	Wall thickness fully recovered W (mm)
HMA12-3	HM12-3	12.0	3.0	1.5
HMA19-6	HM19-6	19.0	6.0	2.0
HMA30-10	HM30-10	30.0	10.0	2.0
HMA40-12	HM40-12	40.0	12.0	2.0
HMA50-16	HM50-16	50.0	16.0	2.0
HMA63-19	HM63-19	63.0	19.0	2.5
HMA70-25	HM70-25	70.0	25.0	2.5
HMA90-30	HM90-30	90.0	30.0	2.5
HMA115-35	HM115-35	115.0	35.0	3.0
HMA140-12	HM140-12	140.0	42.0	3.0
HMA170-58	HM170-58	170.0	58.0	3.0

Thick Wall

CTL's HTH range is a cross-linked heavy-wall heatshrink polyolefin tubing with a shrink ratio 3:1 to 4:1. The toughness and weatherability of the tubes makes them well-suited for exposed applications for the protection of cable joints. The HTHA range contains hot-melt adhesive coating.

Basic Properties - Medium & Thick Wall	
Operating Temp	-55º to +125ºC
Dielectric strength	In excess of 15kV/mm
Shrink Ratio	3:1 to 4:1
Standard Colour	Black
Options	Standard lengths of 1m, 1.2m, 1.5 m or cut to any length. Flame retardent. Self-extinguishing.

Dimensions - Thick Wall				
Part No With Adhesive	Part No Without Adhesive	Inner Ø as supplied D min (mm)	Inner Ø recovered d max (mm)	Wall thickness fully recovered W (mm)
HTHA13-4	HTH13-4	13.0	4.0	2.5
HTHA19-6	HTH19-6	19.0	6.0	2.5
HTHA28-9	HTH28-9	28.0	9.0	3.0
HTHA38-12	HTH38-12	38.0	12.0	4.0
HTHA50-16	HTH50-16	50.0	16.0	4.0
HTHA68-22	HTH68-22	68.0	22.0	4.0
HTHA90-30	HTH90-30	90.0	30.0	4.1
HTHA120-40	HTH120-40	120.0	40.0	4.2
HTHA130-36	HTH130-36	130.0	36.0	4.2
HTHA160-50	HTH160-50	160.0	50.0	4.2
HTHA185-50	-	185.0	50.0	4.5
-	HTH240-54	240.0	54.0	5.0

Ten size and nine colour variations of thin-walled heatshrink tubing in easy to dispense display cartons - ideal for wholesalers' shelves.

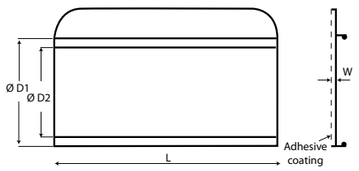
For colour:-	Part No Suffix:-	For colour:-	Part No Suffix:-
Red	R	Clear	C
Yellow	Y	Blue	BL
Black	BLK	Green/Yellow	GY
Brown	BR	Grey	GY
White	W		

Heatshrink boxes - Thin wall tubing dimensions				
Part No	Inner Ø as supplied (mm)	Inner Ø recovered (mm)	Wall thickness recovered (mm)	Length per box (m)
HSB1206	1.2	0.6	0.45	15
HSB1608	1.6	0.8	0.45	15
HSB2412	2.4	1.2	0.45	15
HSB3216	3.2	1.6	0.45	15
HSB4824	4.8	2.4	0.45	10
HSB7030	6.4	3.2	0.55	10
HSB10050	9.5	4.7	0.55	10
HSB13060	12.7	6.4	0.55	8
HSB190100	19.1	9.5	0.70	7
HSB260120	25.4	12.7	0.75	4

LV Wraparound repair sleeves

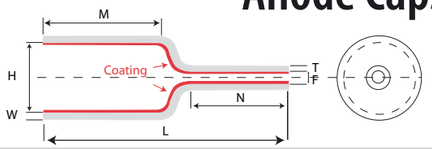
CTL's HWS range of heatshrinkable wraparound repair sleeves is manufactured from a highly cross-linked polyolefin compound. The sleeves are coated with hot-melt adhesive and are supplied with a metallic channel for closure.

Basic Properties - Wraparound repair sleeves	
Operating Temp	-40º to +90ºC
Dielectric strength	> 15kV/mm
Shrinking temperature	120ºC



Dimensions - Wraparound Repair Sleeve			
Part No	Inner Ø as supplied D1 min (mm)	Inner Ø recovered D2 max (mm)	Wall thickness fully recovered W (mm)
HWS36-10	36	10	3
HWS50-15	50	15	3
HWS60-18	60	18	3
HWS70-22	70	22	3
HWS80-25	80	25	3
HWS100-30	100	30	3
HWS135-38	135	38	3
HWS188-55	188	55	3
HWS200-60	200	60	3
Length L available from 0.25m to 1.5m.			

Anode Caps



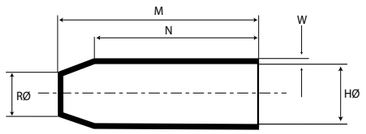
Dimensions (mm) - Anode caps									
Part No	Supplied		Recovered						
	H	F	H	F	L	M	N	W	T
HAN8240	82	13	40	5	170	115	60	4	4
HAN10840	108	13	40	5	170	115	60	4	4
Tolerances:- ± 2%, except W & T ± 10%									

Cable End Caps

CTL's HE range of heat-shrinkable End Caps offers an economical means of sealing power and control cable ends to ensure a water-tight seal. They are resistant to oxidation, ozone and UV radiation. Their internal surface has a layer of hot-melt adhesive, which retains its flexible properties after recovery.

Heat-shrinkable End Caps are recommended for use both in open air and on underground power distribution cables with PVC, lead or XLPE sheaths, aluminium or steel armoured. They can be combined to form a **live cable end kit** (as shown in the bottom left of the photo).

Basic Properties - Cable End Caps	
Shrink Temperature	*130ºC*
Shrink Ratio	*>2:1*
Colour	*Black*
Options	*Cable end caps with white flash ϟ for live cables; black mastic sealant for use on paper insulated cables; with built-in air valves for pressurised cables.*



Part No	Expanded (mm)				Recovered (mm)			Cable Diam (mm)
	H	M	N	R	H	R	W	
HE10-4	10.0				4.0	3	2.0	4-8
HE15-5	15.0	45	40	5	4.5	4	2.3	5-12
HE20-6	20.0	63	58	11	6.0	7.5	3.1	7-17
HE25-10	25.0	70	65	20	8.5	8	3.0	10-22
HE40-15	40.0	102	92	23	14.5	12	3.2	17-34
HE65-25	63.0	118	105	25	24.0	16	3.7	28-55
HE80-40	78.0	130	107	31	38.0	20	4	43-70
HE110-45	106.0	164	138	48	45.0	22	4.5	65-90
HE120-60	120.0	155	133	48	57.0	25	4	75-110
HE145-60	145.0	155	133	46	57.0	25	5	80-135

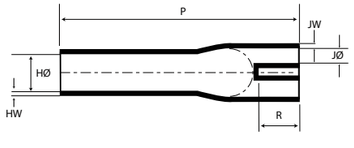
Tolerances:- M & N ± 2%, H & R ± 3%, W ± 10%

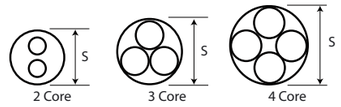
Cable Breakouts

CTL's HB range of heat-shrinkable breakouts is ideal for insulating and sealing cable crutches, providing resistance to abrasion and weathering. The standard range is lined with hot-melt adhesive. Black mastic sealant is also available if required.

No of Cores	Part No	Expanded (min)		Fully recovered dimensions (max)						Approx. Conductor Size (mm²)
		H	J	H	J	P	R	HW	JW	
2	HB2/21-9	21.0	9.0	9.4	2.8	76.5	20.0	1.6	1.6	2.5 - 10
	HB2/33-10	33.0	14.0	10.0	3.0	90.0	20.0	2.0	2.3	25 - 50
	HB2/60-22	60.0	24.0	22.0	6.7	120.0	35.0	3.2	3.0	4-50
	HB2/87-38	87.0	43.0	38.1	12.7	141.5	42.5	3.8	3.8	185 - 400
3	HB3/25-9	25.0	9.0	9.1	3.0	76.5	20.0	2.5	2.5	4 - 16
	HB3/38-14	38.0	15.0	14.0	4.0	110.0	20.0	2.3	1.5	16 - 35
	HB3/60-22	60.0	26.0	22.0	8.0	185.0	45.0	3.8	3.0	50 - 150
	HB3/80-33	80.0	36.0	33.0	16.0	210.0	50.0	4.0	3.2	150 - 240
	HB3/90-34	90.0	35.0	34.0	14.0	200.0	50.0	3.0	2.0	150 - 300
	HB3/110-47	110.0	48.0	47.0	20.0	225.0	75.0	3.8	3.0	150 - 400
	HB3/125-47	125.0	55.0	47.0	20.0	250.0	75.0	4.2	3.5	400
	HB3/140-54	140.0	62.0	54.0	27.0	240.0	65.0	4.0	2.5	400-500
4	HB4/28-9	28.0	9.0	9.0	1.8	78.0	17.0	2.7	2.0	2.5 - 10
	HB4/38-14	38.0	15.0	14.0	3.2	105.0	25.0	2.5	1.5	4 - 35
	HB4/45-25	45.0	20.0	24.9	7.1	99.0	34.0	4.5	4.5	35 - 70
	HB4/47-23	47.4	21.5	22.9	6.4	165.1	38.1	4.1	3.3	35 - 70
	HB4/50-14	50.0	15.0	14.0	3.2	90	25	2.5	1.5	35 - 70
	HB4/55-25	55.0	20.0	25.0	6.0	180.0	45.0	4.0	3.0	35 - 120
	HB4/65-25	60.0	25.0	25.0	6.0	160.0	45.0	4.0	3.0	70 - 120
	HB4/72-22	72.0	25.0	22.0	8.5	190.0	45.0	4.0	3.0	70 - 120
	HB4/100-33	100.0	35.0	33.0	14.0	215.0	50.0	4.0	3.0	120 - 400
	HB4/125-47	125.0	45.0	47.0	20.0	245.0	72.0	4.5	3.0	300 - 400
5	HB5/60-25	60.0	30.0	24.5	7.5	180.0	30.0	3.5	3.0	35 - 185
6	HB6/30-16	30.0	8.2	16.0	4.0	75.0	20.0	2.5	1.5	4 - 35
	HB6/40-16	40.0	12.0	16.0	4.0	75.0	20.0	2.5	1.5	4 - 70
	HB6/60-37	60.7	20.3	36.8	8.9	137.2	50.8	2.5	2.5	70 - 120

All Dimensions mm.





LV Straight Joints

Conductor Size 2 3 or 4 core (mm²)	CTL Joint Kit	Approx Joint Size (mm)	
		Length	Ø
Polymeric Insulated Armoured Cable			
1.5 - 6	HJ1	400	40
10 - 50	HJ2	800	60
70 - 150	HJ3	1000	100
185 - 300	HJ4	1200	120
Polymeric Insulated Unarmoured Cable			
1.5 - 10	HJ1EX	300	30
16 - 70	HJ2EX	600	50
95 - 185	HJ3EX	800	80
240 - 400	HJ4EX	1000	100
Paper Insulated Armoured Cable			
16 - 25	HJP1	400	40
35 - 50	HJP2	800	60
70 - 150	HJP3	1000	100
185 - 300	HJP4	1200	120
Transition Joints (Paper/Polymeric)			
16 - 25	HJT1	400	40
35 - 50	HJT2	800	60
70 - 150	HJT3	1000	100
185 - 300	HJT4	1200	120
Underwater Joint Kits for Flexible Cable			
1.5 - 2.5	HUJK1	400	40
4 - 6	HUJK2	800	60
10	HUJK3	1000	100
16	HUJK4	1200	120
25	HUJK5	1200	120

A comprehensive range of heatshrink joints offering the following features:-

- Simple, fast installation allowing immediate backfill of the trench.
- Excellent electrical insulation
- Outstanding environmental resistance.
- Proven mechanical strength.
- Slim profile.
- Mechanical or crimp connectors available upon request.
- Joints to customer specification also available (eg HJ1/3/6 for 3 x 6 mm², HJ3/3/120 for 3 x 120 mm² etc).
- Special kits for lead covered (LC) cables.

Typical kit content:-

- Adhesive-lined medium wall tubing for connector insulation, outer sealing and protection tube. For armoured cable we include a special aluminium cage and constant force springs for mechanical protection and earth continuity.

Cable or Joint Type	CTL Joint Kit	Approx Joint Size (mm)	
		Length	Ø
Airfield Lighting Kits			
Primary 6 mm²	HALK1	200	19
Secondary 4mm²	HALK2	200	19
Braided Primary	HALK3	200	19
Traffic Light Kits			
Loop - Armour	HTLK1	300	30
Loop - Loop	HTLK5	50	12
Feeder - Feeder	HTLK7	300	30

Typical kit content:-

- Adhesive-lined medium wall tubing for core sealing; cable breakout; non-adhesive-lined tubes for lug sealing; phase colour-coded thin wall tubes; constant force springs for earth connection.
- Cable lugs are also available if required.

LV Terminations

No of Cores	Cable range (mm²)	Part No	
		Indoor	Outdoor
2	4 - 16	HT16-2	HTO16-2
	25 - 50	HT50-2	HTO50-2
	70 - 150	HT150-2	HTO150-2
	185 - 400	HT400-2	HTO400-2
3	4 - 16	HT16-3	HTO16-3
	25 - 35	HT35-3	HTO35-3
	50 - 150	HT150-3	HTO150-3
	185 - 400	HT400-3	HTO400-3
4	4 - 35	HT35-4	HTO35-4
	50 - 70	HT70-4	HTO70-4
	95 - 120	HT120-4	HTO120-4
	150 - 400	HT400-4	HTO400-4

The same kit may be used for armoured or unarmoured cable.

Generous tail lengths - 1200mm for outdoor and 300mm for indoor terminations (special tail lengths are also available).

MV Terminations for Polymeric Cables up to 36 kV

3.3 kV to 36kV Terminations certified to:-

- DIN VDE 0278 up to 24 kV
- IEC 502 1994 for 36 kV.

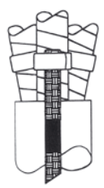
- Terminations and tail lengths can be designed for individual needs.
- Optional crimping lugs for both indoor and outdoor terminations are available - see page 30.
- A range of bushing kits for indoor terminations is also available (see page 28 for heatshrink types and page 27 for cold push-on types).
- Stand-off insulators with pole mounting brackets for outdoor terminations are also available (see page 28).

For Single Core Polymeric Cable					
Each kit contains one set of three single-core terminations					
Max kV	Part No		Cable Size (mm^2)	Std. tail Lengths (mm)	
	Indoor	Outdoor		Indoor	Outdoor
3.6	HSK3001	HSK1014	16 - 35	450	450
	HSK3002	HSK1016	50 - 95	450	450
	HSK3003	HSK1018	120 - 300	450	450
	HSK3004	HSK1020	400 - 500	450	450
7.2	HSK3005	HSK1022	16 - 35	650	650
	HSK3006	HSK1024	50 - 120	650	650
	HSK3007	HSK1026	150 - 185	650	650
	HSK3008	HSK1028	240 - 400	650	650
	HSK3009	HSK1030	500 - 630	650	650
17.5	HSK3010	HSK1032	25 - 70	650	650
	HSK3011	HSK1034	95 - 185	650	650
	HSK3012	HSK1036	240 - 300	650	650
	HSK3014	HSK1038	400 - 630	650	650
	HSK3016	HSK1040	800 - 1000	650	650
24	HSK3018	HSK1042	35 - 70	750	900
	HSK3020	HSK1044	95 - 185	750	900
	HSK3022	HSK1046	240 - 400	750	900
	HSK3024	HSK1048	500 - 1000	750	900
36	HSK3026	HSK1050	50 - 95	750	900
	HSK3028	HSK1052	120 - 300	750	900
	HSK3030	HSK1054	400 - 630	750	900
	HSK3032	HSK1056	800 - 1000	750	900

For Three Core Polymeric Cable					
Each kit contains one three-core termination					
Max kV	Part No		Cable Size (mm^2)	Std. tail Lengths (mm)	
	Indoor	Outdoor		Indoor	Outdoor
3.6	HSK3/3001	HSK3/1014	16 - 35	550	550
	HSK3/3002	HSK3/1016	50 - 95	550	550
	HSK3/3003	HSK3/1018	120 - 300	550	550
7.2	HSK3/3005	HSK3/1022	16 - 35	650	650
	HSK3/3006	HSK3/1024	50 - 120	650	650
	HSK3/3007	HSK3/1026	150 - 185	650	650
	HSK3/3008	HSK3/1028	240 - 400	650	650
	HSK3/3009	HSK3/1030	500 - 630	650	650
17.5	HSK3/3010	HSK3/1032	25 - 70	650	650
	HSK3/3011	HSK3/1034	95 - 185	650	650
	HSK3/3012	HSK3/1036	240 - 300	650	650
	HSK3/3014	HSK3/1038	400 - 630	650	650
	HSK3/3016	HSK3/1040	800-1000	650	650
24	HSK3/3018	HSK3/1042	35 - 70	850	1200
	HSK3/3020	HSK3/1044	95 - 185	850	1200
	HSK3/3022	HSK3/1046	240 - 400	850	1200
	HSK3/3024	HSK3/1048	500- 000	850	1200
	HSK3/3026	HSK3/1050	50 - 95	850	1200
36	HSK3/3028	HSK3/1052	120 - 300	850	1200
	HSK3/3030	HSK3/1054	400 - 630	850	1200
	HSK3/3032	HSK3/1056	800-1000	850	1200

Screen Earthing Kits - Polymeric Cables

Solderless Screen Earthing Kits are used for earthing the copper screen layer within polymeric insulated cables. The kit consists of three constant force springs and three solder blocked earth braids.



Part No		Cable Size (mm^2)			
1 core system	3 core system	7.2 kV	17.5 kV	24 kV	36 kV
MVAA1CSE	MVAA3CSE	16 - 70	16 - 25		
MVAB1CSE	MVAB3CSE	95 - 150	35 - 95	25 - 70	
MVAC1CSE	MVAC3CSE	185 - 300	120 - 240	95 - 185	25 - 70
MVAD1CSE	MVAD3CSE	400 - 630	300 - 500	240 - 500	95 - 300
MVAE1CSE	MVAE3CSE	800 - 1000	630 - 1000	630 - 1000	400 - 1000

MV Terminations for Paper Cables up to 12 kV

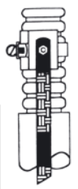
- For single or three core paper insulated, belted or screened cables.

- Terminations and tail lengths can be designed for individual needs.
- Optional crimping lugs for both indoor and outdoor terminations are available - see page 30.
- A range of bushing kits for indoor terminations is also available (see page 28 for heatshrink types and page 2 for cold push-on types).
- Stand off insulators with pole mounting brackets for outdoor terminations are also available (see page 28).

For Single Core Paper Insulated, Belted or Screened Cable					
Each kit contains one set of three single-core terminations					
Max kV	Part No		Cable Size (mm^2)	Std. tail Lengths (mm)	
	Indoor	Outdoor		Indoor	Outdoor
3.6	HSP3001	HSP1014	16-50	450	550
	HSP3002	HSP1016	70-185	450	550
	HSP3003	HSP1018	240-300	450	550
7.2	HSP3005	HSP1022	16-50	650	650
	HSP3007	HSP1026	70-150	650	650
	HSP3008	HSP1028	185-400	650	650
12	HSP3010	HSP1032	16-35	650	650
	HSP3011	HSP1034	50-95	650	650
	HSP3012	HSP1036	120-300	650	650
	HSP3014	HSP1038	400	650	650

For Three Core Paper Insulated, Belted or Screened Cable					
Each kit contains all components required for a 3-core termination					
Max kV	Part No		Cable Size (mm^2)	Std. tail Lengths (mm)	
	Indoor	Outdoor		Indoor	Outdoor
3.6	HSP3/3001	HSP3/1014	16-50	450	550
	HSP3/3002	HSP3/1016	70-185	450	550
	HSP3/3003	HSP3/1018	240-300	450	550
7.2	HSP3/3005	HSP3/1022	16-50	650	650
	HSP3/3007	HSP3/1026	70-150	650	650
	HSP3/3008	HSP3/1028	185-300	650	650
12	HSP3/3010	HSP3/1032	16-35	650	650
	HSP3/3011	HSP3/1034	50-95	650	650
	HSP3/3012	HSP3/1036	120-300	650	650
	HSP3/3014	HSP3/1038	400	650	650

Screen Earthing Kits - PILC & PICAS Cables



Sheath Earth Connectors provide a simple and effective method of earthing lead or aluminium sheaths of PILC and PICAS 12 kV cables. They are fully tested and compliant to C93.
Short circuit rating:-

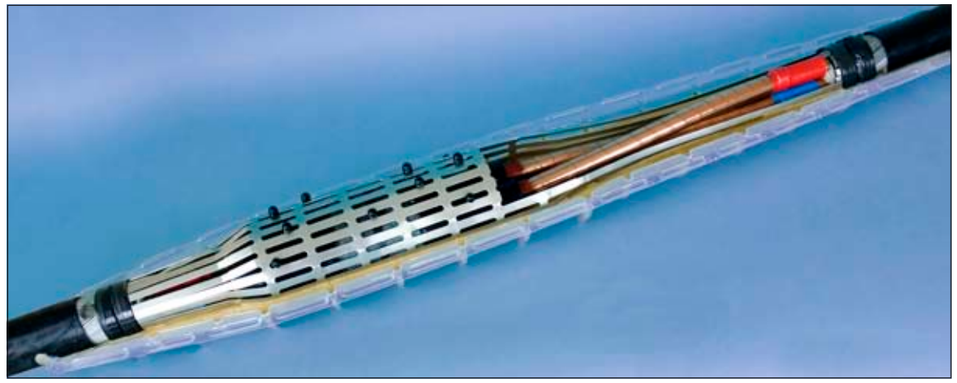
- PILCAS 13.1 kA for 3 seconds
- PILC6 kA for 3 seconds

Part No	Cable Size (mm^2)
MVA12ASEC	up to 185
MVA12BSEC	240 - 300

See page 31 for ranges of crimping, cable cutting and cable preparation tools.

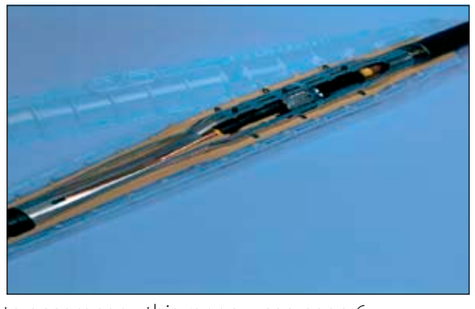
MV (15kV) Heatshrink & Resin Cable Joints

Heatshrink joint, resin protected to prevent water ingress



An innovative, highly effective and fully-tested design of joint that combines CTL's two core competencies in resin and heatshrink joint technologies. Features include:-

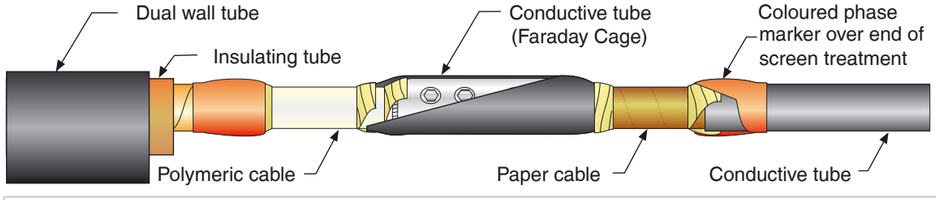
- Resin encapsulation provides mechanical protection and prevents water ingress.
- Simple design – easy to install.
- Suitable cable types include:-
  - XLPE.
  - Paper.
  - XLPE/Paper transition.
  - Trifurcating joints 3-core to 3 single cores.
- Optional core connectors - choice of:-
  - mechanical connectors with shear-head bolts.
  - compression ferrules with conical ends.
- High quality two-part polyurethane resin in easy-mix bag system.
- Unique mould design.
  - Clear shell for easy inspection.
  - Interlocking, non-reversible halves.
  - Superior resin-seal system.
- No taping of core conductors.
- Earth continuity kit with constant force spring system.
- Strong aluminium wrap-around cage - rubber spacers ensure correct positioning .
- All components and resin packed together in one sturdy box.
- Tested to:-
  - CENELEC HD 629.1S1:1996.
  - DIN VDE 0278 Pt 629-1.
- Short circuit and current test (armour continuity & complete joint):-
  - 18.5 kA for 1 second.
  - 22kA for 0.5 second.



A range of Pilot cable joints is available to accompany this range – see page 6

Unique Full Faraday Cage Solution

(Transition joint shown.)



Part No	Cable type	Cable Size
CM6HX3N	XLPE	3 core 35 - 150 mm²
CM7HX3N	XLPE	3 core 185 - 300 mm²
CM6HXP3N	XLPE/Paper (Transition)	3 core 35 - 150 mm²
CM7HXP3N	XLPE/Paper (Transition)	3 core 185 - 300 mm²
CM6HP3N	Paper/Paper	3 core 35 - 150 mm²
CM7HP3N	Paper/Paper	3 core 185 - 300 mm²

To ensure correct selection of the joints, full cable specifications should be provided at time of order.

MV Heatshrink Cable Joints

6.6 - 36 kV

CTL's C-Shrink Medium Voltage Heatshrink Jointing System for single and three core cables up to 36 kV features:-

- Simple design – easy to install.
- Suitable cable types include:-
  - XLPE, Paper & XLPE/Paper transition.
- Optional core connectors (see below).
- Outer protection either:-
  - Thick wall heatshrink tubing.
  - or Reinforced wrap-around sealing sleeve for maximum mechanical strength and minimum installation space.
- 3.3kV non-shielded Joints also available.
- Tested to CENELEC HD629.1S1:1996 (DIN VDE 0278 Pt 629-1).

Ordering Codes						
Specification	Code	Description				
Basic Part No	HJMV	Heatshrink Joint Medium Voltage				
Armouring	A	Armoured Cable				
	U	Unarmoured Cable				
Voltage	7	6.6 kV				
	12	12 kV				
	17	15 kV - 17 kV				
	24	24 kV				
	36	36 kV				
Cable Size (mm²) & Voltage		6.6 kV	11 - 12 kV	15 - 17 kV	24 kV	36 kV
	A	35 - 150	35 - 120	25 - 95	25 - 50	25 - 95
	B	185 - 240	150 - 185	120 - 150	70 - 240	120 - 240
	C	300 - 400	240 - 400	185 - 300	300 - 630	300 - 630
	D	500 - 630	500 - 630	400 - 500		
Insulation Type	PL	Polymeric to Polymeric				
	PB	Paper to Paper				
	TR	Polymeric to Paper - Transition				
	TT	Three core Paper to three single core Polymeric - Trifurcating				
Core Configuration	11	Single to Single Core				
	31	Three Core to Three single Cores				
	33	Three to Three Core				
Ordering example:- **HJMVA12BPL33** = Heatshrink joint, armoured cable,12kV, 185 mm² polymeric insulation, 3 core to 3 core.						

MV Connectors

To complement its range of MV joints, CTL can supply either shear-head mechanical connectors or compression ferrules. All are available with barrier for use with transition XLPE/paper cable joints.

Stress Control Tubing

Heat-shrinkable tubing used exclusively as stress control relief in medium voltage cable joints and terminations, up to 36kV. The product features a very high dielectric constant.

Basic Properties	
Operating Temperature	-40º to +100ºC
Shrinking Temperature	110ºC
Dielectric constant (permitivity)	20 - 35
Standard Colour	Black

Part No	Inner Ø as supplied (mm)	Inner Ø recovered (mm)	Wall thickness nominal (mm)
HSC26-12	26	12	2.5
HSC30-15	30	15	2.7
HSC45-20	45	20	2.8
HSC50-25	50	25	2.9
HSC65-30	65	30	3.1
HSC95-45	95	45	3.2

Anti-tracking Tubing

Anti-tracking red heat-shrinkable tubing for use in MV joints and terminations up to 36kV.

Basic Properties	
Operating Temperature	-40º to +100ºC
Shrinking Temperature	120ºC
Dielectric strength	> 15 kV/mm
Comparative tracking index	KA1 (IEC 112)
Flammability	Self extinguishing/ halogen free
Standard Colour	Black

Part No	Inner Ø as supplied (mm)	Inner Ø recovered (mm)	Wall thickness nominal (mm)
HAT30-10	30	10	2.4
HAT35-12	35	12	2.6
HAT49-16	49	16	2.9
HAT56-21	56	21	3.0
HAT70-26	70	26	3.1
HAT100-40	100	40	3.8

MV Breakouts

CTL's range extends to both anti-tracking and semi-conductive breakouts for use in 3-core terminations and 3-core cable joints up to 36kV. See web for specifications and sizes.

Semi-conductive Tubing

Semi-conductive heat-shrinkable tubing used to rebuild the shield in medium voltage cable joint applications.

Basic Properties	
Operating Temperature	-40º to +90ºC
Shrinking Temperature	120ºC
Standard Colour	Black

Part No	Inner Ø as supplied (mm)	Inner Ø recovered (mm)	Wall thickness nominal (mm)
HCON44-16	44	16	2.8
HCON70-25	70	25	3.0
HCON95-35	95	35	3.0
HCON110-40	110	40	3.0

Busbar Tubing

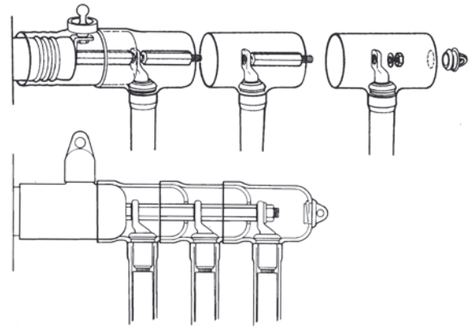
The HBM range of heat shrinkable tubing is particularly suited for insulating medium voltage busbars up to 36kV.
It is available in Medium Wall (reduces distance between bus bars to half) and Thick Wall (reduces distance to one third the distance between two phases in medium voltage switchboards).

Basic Properties	
Continuous temperature range	-40º to +100ºC
Shrinking Temperature	120ºC
Dielectric strength	> 15 kV/mm

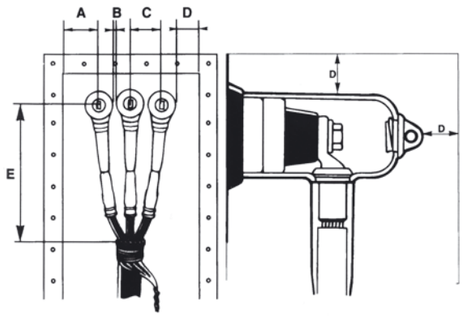
Part No	Inner Ø as supplied (mm)	Inner Ø recovered (mm)	Wall thickness nominal (mm)
Medium Wall			
HBM30-12	30	12	2.3
HBM50-12	50	20	2.5
HBM75-30	75	30	2.5
HBM100-40	100	40	2.5
HBM120-50	120	50	3.0
Thick Wall			
HBT36-10	36	10	4.0
HBT46-14	46	14	4.5
HBT54-16	54	16	5.0
HBT66-20	66	20	5.0
HBT95-30	95	30	7.0

These Universal Boot Kits are designed for indoor use with Polymeric or Paper cables at voltages between 6.6kV and 24kV. Providing screw-on connection using standard bushing, they are equally suitable for round or sector-shaped cable. Features include:-

- Manufactured from heavy-duty EPDM rubber.
- Re-usable.
- Suitable for use in oil-filled transformer boxes when Paper cables are upgraded to XLPE.
- Universal design - same kit can be used for straight, right-angled, or parallel ("piggy-back") installation.
- Easy to install - no heat or tools required. Easily removable cover for voltage testing.
- An ideal complement to indoor terminations.
- Sold in sets of 3.



Above:- Illustration of a parallel installation. (extension bolts can be provided.)
Below:- Illustration of universal straight or right-angle installation.



Recommended Minimum Air Gaps (mm)						
U (kV)	Insulation Level (kV)	A	B	C	D	E
12	75	50	10	90	20	470
24	125	110	50	130	50	570

The recommended minimum distances quoted apply in general. However, in cases where type testing has been carried out, other minimum distances may apply. The distances shown above are for gas-insulated Ring Main Units (RMU).

Cable size (mm^2)	Part No	Rating (A)
25 - 300	IBK300	600

Heatshrink Boot Kits

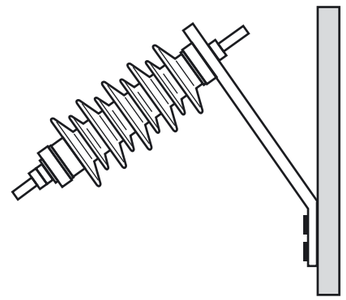
Each kit consists of three boots and sufficient mastic tape to cover the bushing nuts.

Cable size (mm^2)	Part No	Description
50 - 400	HKS	Set of 3 straight boots
	HKR	Set of 3 right-angle boots

Stand-Off Insulators

Designed for outdoor terminations, each kit consists of a pole mounting bracket with three polymeric insulators.

Voltage kV	Creepage Path (mm)	Part No
12	465	SO12
24	615	SO24
33	845	SO33
36	1160	SO36



Gland Kits

"Top Hat" style, for ***three-core*** paper or polymeric cable. Manufactured from zinc-plated steel. Suitable for Indoor Terminations up to 36kV.

Cable size (mm^2)	Part No
16 - 95	HSGA/3
120 - 300	HSGB/3

"Top Hat" style, for ***single-core*** aluminium wire armoured cable. Manufactured from aluminium. Suitable for Indoor Terminations up to 36kV.

Cable size (mm^2)	Part No
16 - 630	HSGB/1
Supplied in sets of three	

Brass cone style, for paper or polymeric cable. Suitable for earthing of cable entry for Indoor Terminations up to 36kV.

Cable size (mm^2)	Part No	Description
16 - 300	CG16-300	Kit for 3 x single-core cable

Constant Force Springs

CTL's range of Constant Force Springs is manufactured from BS5770 302S25 Stainless Steel which has been heat-treated and coiled. The springs feature chamfered and raised leading edges for easy use. Principal applications are:-

- Earth continuity systems for LV joints.
- Screen attachment in MV joints and terminations.

Constant Force Springs (Dimensions in mm - special sizes available upon request.)									
Part No	Inner Ø	Width	Thickness	Application range	Part No	Inner Ø	Width	Thickness	Application range
RF059	3.6	6.35	0.05	4 - 10	RF3	23	19	0.24	25 - 37
RF060	7.5	9.5	0.10	9 - 15	RF4	23	19	0.35	31 - 50
RF0	11	16	0.15	12 - 19	RF5	32	19	0.45	44 - 70
RF1	15	19	0.20	17 - 22	RF6	42	19	0.45	58 - 94
RF2	17	19	0.20	19 - 29	RF7	45	19	0.60	60 - 130

Self-amalgamating Tape

This self-amalgamating tape is manufactured from a tough EPR based elastic material that completely self-fuses to form a water, ozone and corona resistant mass at cable terminations or splices. It has a high dielectric strength and forms stable, long-lasting joints.

Basic Properties			
Volume resistivity	10^{15} ohms/cm	*Tensile strength*	3.5 Mpa
Dielectric strength	28 kV/mm	*Elongation at break*	700%
Dielectric constant	2.8	*Peak operating temp.*	130ºC

Standard Sizes (mm)			
Part No	Width	Thickness	Length
CT691975	19	0.75	10 m
CT692575	25	0.75	10 m
Special sizes available upon request			

Torch Kit

Propane torch burner with piezo ignition, regulator and soft flame nozzle.

Part No	Nozzle Ø (mm)	Hose length (m)
HA076	50	2

Metallic Screens

CTL's specialist sheet metalwork plant can manufacture any sizes of earthing and protective cages in either aluminium or galvanised steel.

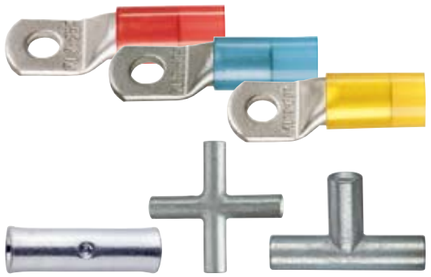
An especially comprehensive range of lugs and ferrules that is manufactured to the very highest standards. Matching mechanical, battery and hydraulic compression tools complement the range. Range highlights are shown below and a detailed 300 page catalogue is available upon request.

"R" range

Tin plated copper cable lugs, available with or without inspection holes in size range 6 mm² to 400 mm². Insulated, 45º and 90º angled variants also available.
Ferrules include "Butt", "T" and "Cross" connector types.

DIN range

As above, with the added benefit of meeting DIN Standard 46235.

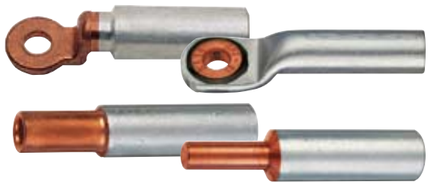


Aluminium cable lugs and ferrules

Aluminium lugs 16 mm² to 500 mm² with solid palm (suitable for outdoor terminations). DIN Standard 46329.
Aluminium lugs 10 mm² to 400 mm² suitable for indoor terminations. DIN Standard 48201.
Aluminium ferrules 10mm² to 500 mm². DIN Standard 48201.

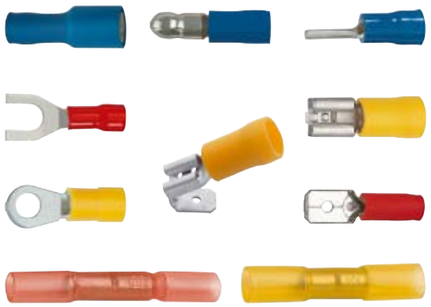
Bi-metallic cable lugs and ferrules

Bi-metallic lugs 16 mm² to 300 mm² with solid copper palm. DIN Standard 48201.
Bi-metallic lugs10 mm² to 400 mm² with copper insert. DIN Standard 48201.
Bi-metallic ferrules 10mm² to 300 mm² including copper connecting bolt option.



Insulated and uninsulated solderless terminals and cable end sleeves

Ring, fork, tab and pin types with matching receptacles and butt connectors. Available both in packs and assortment boxes.



K2

K507

Mechanical crimping tools

K2:- Indent ratchet crimping tool covering sizes 0.75 - 16 mm².
K507:- Hand ratchet crimping tool with 3 quick-change die sets stored in the handle. For pre-insulated terminals 0.75 - 6mm², endsleeves and copper tube terminals up to 10mm².
K05/06/09:- Hexagonal crimping tool with integral revolving dies. Size range K05 6 - 50 mm², K06 10 - 120 mm², K09 25 - 150 mm².
K22:- Crimping tool for interchangeable dies 6 - 300 mm². Flip-top style crimping head rotates 360º. Telescopic handles.

K05 & 6 & 9

K22

HK60/22

HK120/42

Hydraulic crimping tools

HK60/22:- For interchangeable dies 6 - 300 mm². Two-stage hydraulics with auto-retraction. Flip-top style crimping head rotates 360º.
HK120/42:- For interchangeable dies 16 - 400 mm². Two-stage hydraulics with auto-retraction. C-shape crimping head rotates 360º.

EK15/50,15/50G, 35/4UK

EK22PLUS

Battery crimping tools

EK15 range:- Battery-powered mini tools designed for one-handed crimping of lugs, connectors, terminals, end sleeves etc. Auto-retract and interchangeable dies.
EK22PLUS:- Battery-powered crimping tool for interchangeable dies. Two-stage hydraulics, auto-retract. Flip-top style closed crimping head rotates 360º.

K1031 K1041

ESG45PLUS

Cable cutting tools

K1031:- Ratchet design - cuts cable in steps. For cable up to 60 mm Ø.
K1041:- Ratchet design - cuts cable in steps. For cable up to 100 mm Ø.
ESG45PLUS:- Battery-powered cutting tool for steel armoured, copper or aluminium cable up to 45 mm Ø. Cutting head (with flip-open jaws) rotates 360º. A 230 V mains-powered version is also available (part no KNSG45).

GB-PM20-SET

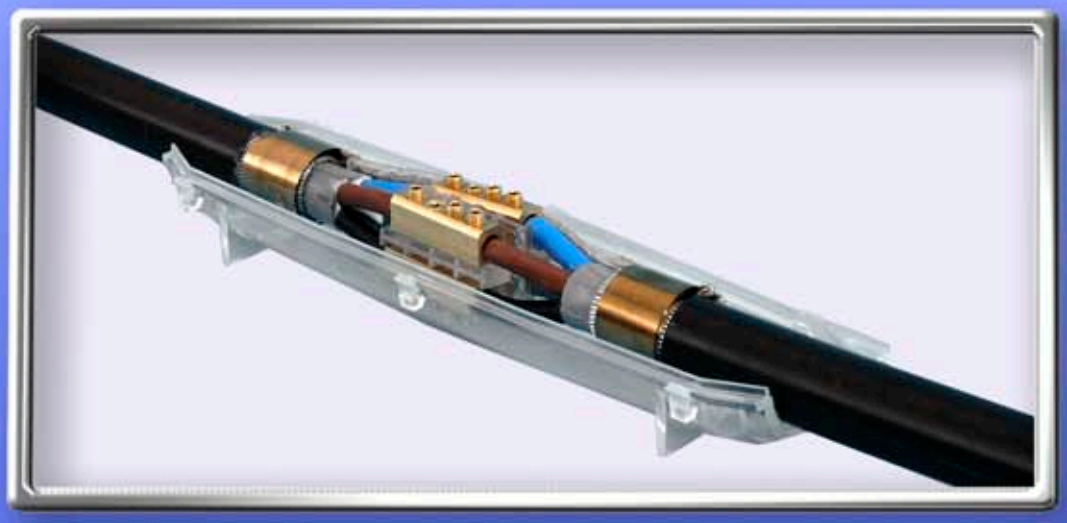
GB-M20

GB-P20

GB-KG05-3

Cable preparation tools for polymeric cables

GB-PM20-SET:- The ultimate cable preparation kit for the professional cable jointer. Consists of:-
GB-M20:- Removes outer insulation and XLPE inner insulation. For cables 35-500 mm², 15-50 mm Ø.
GB-P20:- Peeling/shaving tool removes the cable's bonded semi-conducting layer. For cables 10-50 mm Ø.
GB-KG05-3:- Chamfers edges of XLPE insulation.
Tools for larger cables up to 630 mm² (70 mm Ø) are also available.



1kV
to
36 kV

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