

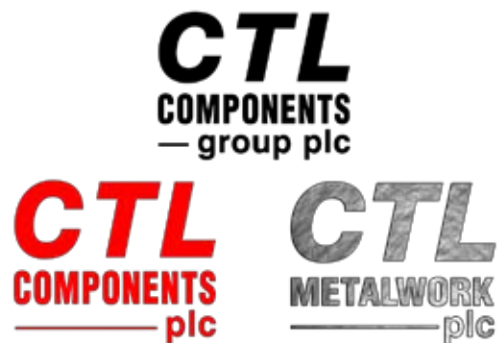
**CTL**  
COMPONENTS  
plc



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

**Cable Accessories**



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.

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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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.



Low Voltage  
MV

| Item   | Page No |
|--|---------|
| Jointer Training                                 | 2       |
| Contents   | 3       |
| Technical Information                            | 4       |
| Certification                                    | 5       |
| LV Resin Cable Joints - Straight                 | 6       |
| LV Resin Cable Joints - Branch                   | 7       |
| LV Resin Cable Joints - Special Applications     | 8       |
| Cathodic Protection Joints                       | 8       |
| Multicore Control & Pilot Cables                 | 8       |
| Multipair Telecom Cables                         | 8       |
| Mines & Quarries                                 | 9       |
| Oil & Petrochem                                  | 9       |
| 1.9/3.3 kV Joints                                | 9       |
| LV Resin Cable Joints - Low Smoke Zero Halogen   | 10      |
| Joint Shell Dimensions                           | 12      |
| CTL Cold-Pour Two-Part Resins                    | 13      |
| Mechanical Connectors                            | 14      |
| Cable Glands                                     | 15      |
| Cable Cleats                                     | 16      |
| Underground & Barrier Tapes                      | 16      |
| Cable Clamps                                     | 17      |
| LV Heatshrink tubing                             | 18      |
| LV Heatshrink Boxes                              | 19      |
| LV Wraparound repair sleeves                     | 19      |
| Anode Caps                                       | 19      |
| Cable End Caps                                   | 20      |
| Cable Breakouts                                  | 20      |
| LV Straight Joints                               | 21      |
| LV Terminations                                  | 21      |
| MV Terminations for Polymeric Cables up to 36 kV | 22      |
| MV Terminations for Paper Cables up to 12 kV     | 23      |
| MV (15kV) Heatshrink & Resin Cable Joints        | 24      |
| MV Heatshrink Cable Joints                       | 25      |
| MV Tubing  | 26      |
| Stress Control Tubing                            | 26      |
| Anti-tracking Tubing                             | 26      |
| Semi-conductive Tubing                           | 26      |
| Busbar Tubing                                    | 26      |
| MV Universal Boot Kits                           | 27      |
| MV Accessories                                   | 28      |
| Heatshrink Boot Kits                             | 28      |
| Stand-Off Insulators                             | 28      |
| Gland Kits                                       | 28      |
| Constant Force Springs                           | 29      |
| Self-amalgamating Tape                           | 29      |
| Torch Kit  | 29      |
| Metallic Screens                                 | 29      |
| Compression Lugs & Ferrules                      | 30      |
| Tools  | 31      |

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## 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<br>12 kV (Um)      | Paper & Transition<br>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<br>(Um)              | 24 kV<br>(Um) | 36 kV<br>(Um) | 12 kV<br>(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. | -55° to +110°C     | -           |
| 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 accredited 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



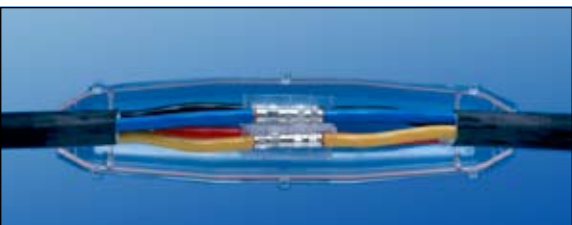
| Max Cable Size<br>4 core (mm²) | Basic Joints |                                | Basic Joints plus Mechanical Connectors |                       |
|--------------------------------|--------------|--------------------------------|---|-----------------------|
|                                | Part No      | 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<br>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 |     |

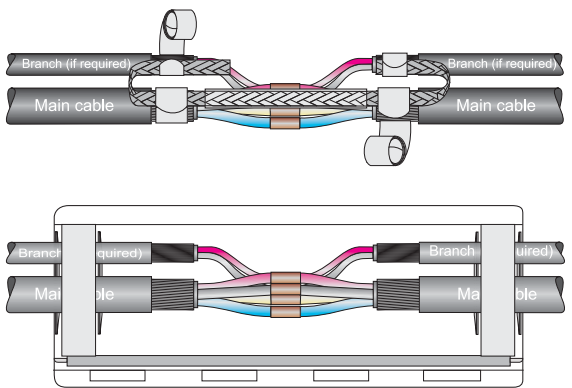
# LV Resin Cable Joints - Branch

suitable for PVC or XLPE cable, 1kV

## Service Branch Joints

### CU range

“Universal” joints for branch & straight jointing



| Main Cable Size<br>2,3 & 4 core<br>(mm2) | Max Branch Cable<br>2,3 & 4 core<br>(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

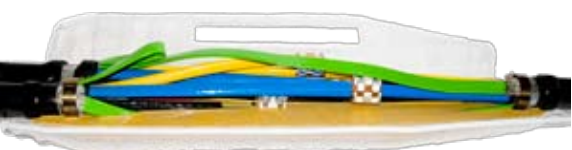


| Main Cable Size<br>2,3 & 4 core (mm²)    | Max Branch Cable<br>2,3 & 4 core (mm²) | Basic Joints | Basic Joints plus Mech. Connectors |                     |
|--|--|--------------|------------------------------------|---------------------|
|  |  | Part No      | Part No                            | 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<br>Cable Size<br>4 core (mm²)       | Max Branch<br>Cable<br>2,3 & 4 core<br>(mm²) | Part No<br>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<br>2, 3 & 4 core (mm <sup>2</sup> ) | Max Branch Cable<br>2,3 & 4 core (mm <sup>2</sup> ) | Part No<br>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<br>Cable<br>2, 3 & 4 core (mm <sup>2</sup> ) | Max Branch<br>Cable<br>2,3 & 4 core (mm <sup>2</sup> ) | Part No<br>Inc mechanical<br>connectors |
|---|--|---|
| Armoured & Unarmoured Cable                           |  |   |
| 1.5 - 35  | 35   | CBM1.5+C                                |
| 50 - 150  | 150  | CBM2.5+C                                |
| 185 - 300   | 300  | CBM3.5+C                                |



# LV Resin Cable Joints - Special Applications

suitable for PVC or XLPE cable, 1kV

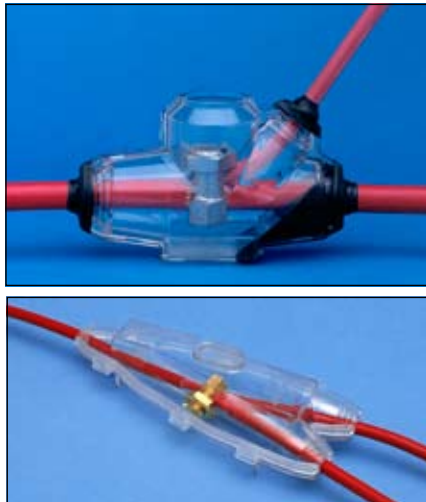
## Cathodic Protection Joints

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.
- CBO** - 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                           | CBO                      |  | 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

## 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   |
|             | 4           | CM1MQ   |             | 4           | CM2MQ   |             | 4           | CM3MQ   |             | 4           | CM5MQ   |             | 300         | 2,3,4   |
| 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 retardant 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        |
| <b>Flammability</b>                                      |                        |                          |
| Flame retardant  |                        |                          |
| Flame class rating: 3mm                                  | V-0                    | UL94                     |
| Flame class rating: 1mm                                  | V-2                    | UL94                     |
| Glow wire test, 1 mm, 850 °C                             | Pass                   | IEC 695-2-1              |
| <b>Low Smoke</b>   |                        |                          |
| Smoke density 4 min                                      | Dm < 200               | AIRBUS Standard ABD 0031 |
| Halogens   | Free                   | DIN VDE 472 part 815     |
| <b>Mechanical</b>  |                        |                          |
| Tensile strength at yield (speed 50mm/min)               | 63 Mpa                 | ISO 527, DIN 53455       |
| <b>Impact</b>  |                        |                          |
| Charpy Impact, notched                                   | 30 kJ/m²               | ISO 179/2C               |
| <b>Thermal</b>   |                        |                          |
| Thermal conductivity                                     | 0.20 W/m °C            | DIN 52612                |
| <b>Electrical</b>  |                        |                          |
| Dielectric strength                                      | 17kV/mm                | IEC 243, ASTM D 149      |
| Volume resistivity                                       | 10 <sup>15</sup> Ohm.m | IEC 93, DIN 53482        |
| Surface resistivity                                      | 10 <sup>15</sup> Ohm   | IEC 93, DIN 53482        |
| <b>Properties of resin type CR171H</b>                   |                        |                          |
| Flammability - Flame class rating: 6mm                   | V-0                    | UL94                     |
| <b>Physical properties</b>                               |                        |                          |
| Operating temperature                                    | -40° C to +105° C      |                          |
| Thermal conductivity                                     | 0.75 W/mK              |                          |
| Shrinkage  | Low                    |                          |
| Coefficient of linear expansion                          | Low                    |                          |
| <b>Electrical properties</b>                             |                        |                          |
| Volume resistivity                                       | 11 - 13 log Ohm        |                          |
| Surface resistivity                                      | 12 - 14 log Ohm        |                          |
| Electric strength  | > 16 MV/m              |                          |
| Permittivity   | 3.2 @ 1 KHz            |                          |

| Main Cable<br>2, 3 & 4 core (mm²)   | Branch Cable<br>2,3 & 4 core (mm²) | Part No    |
|---|------------------------------------|------------|
| <b>Straight Joints</b>  |                                    |            |
| 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 |
| <b>Branch Joints</b>  |                                    |            |
| 1.5, 2.5, 4, 6, 10  | 1.5, 2.5, 4, 6, 10                 | CB1LSHF    |
| 16, 25, 35  | 16, 25, 35                         | CB2LSHF    |
| <b>Accessories</b>  |                                    |            |
| 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.



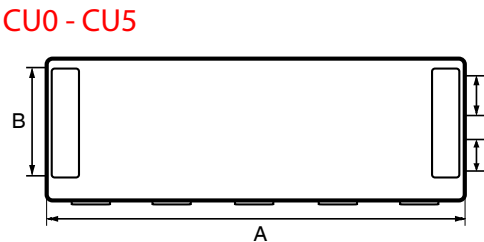
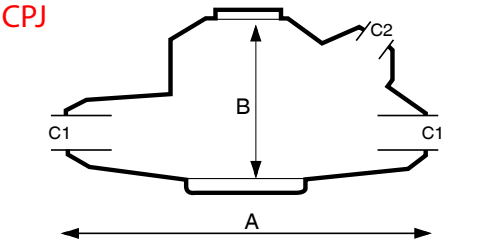
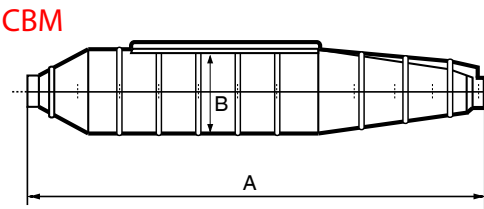
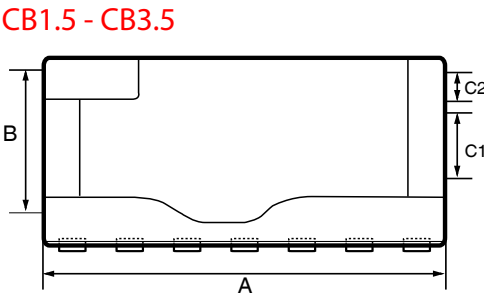
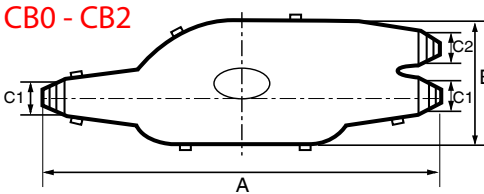
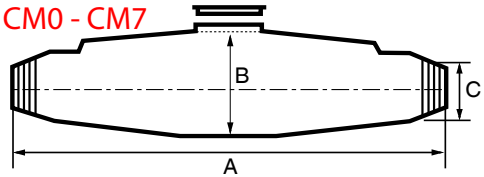
| Straight-through Joints |      |     |     |     |
|-------------------------|------|-----|-----|-----|
| Type                    | A    | B   | C   |     |
|                         |      |     | min | max |
| CM0 range               | 200  | 35  | 5   | 20  |
| CM1 range               | 250  | 45  | 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.



- 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 21° C for 200g mass  |
| Peak Exotherm         | 54-75° C depending upon volume and ambient temperature.   |
| Complete cure time    | at 23° C - 24 hours<br>at 80° C - 1 hour  |
| Shelf life            | 24 months when stored at 5° C - 15° C.  |
| Operating temperature | -40° C to +100° 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 |
| 120 - 185      | MC4/ 2              | gauze is supplied for use on Cu      |
| 240 - 300      | MC4/ 3              | conductors.                          |

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 |                   |      |          |
|-------------------------|-------------------|------|----------|
| BW Indoor Gland         | CW Out-door Gland | Size | Pack Qty |
| Part No                 | Part No           |      |          |
| 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        |



**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.



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.

Indoor & Outdoor Glands

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

| Selection chart for 600/1000V copper conductor PVC insulated SWA cable |         |             |     |     |       |     |     |     |    |    |    |    |    |    |  |  |
|--|---------|-------------|-----|-----|-------|-----|-----|-----|----|----|----|----|----|----|--|--|
| Conductor Area mm²   | Neutral | No of Cores |     |     |       |     |     |     |    |    |    |    |    |    |  |  |
|  |         | 1           | 2   | 3   | 3 1/2 | 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

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 polypropylene 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 elastomeric 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.

Nylon Cable Glands

| 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

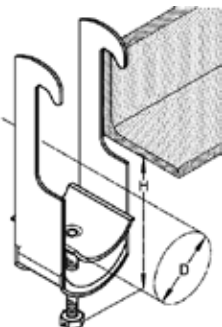
Available in a variety of formats/thicknesses, these help protect cables and pipes from penetration by stopping picks, spades and even digger shovels.



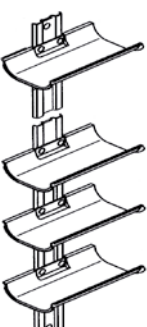
| Standard Warning Tape Wording/Colours | Detectable Warning Mesh Wording/Colours |
|---------------------------------------|---|
| Electric Cable Below                  | Electric Cable Below                    |
| Street Lighting Cable Below           | Gas Pipe Below                          |
| Gas 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.



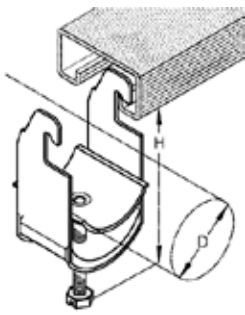
Type S



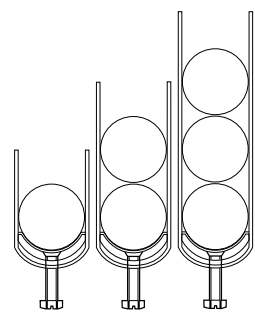
Cable Hangers



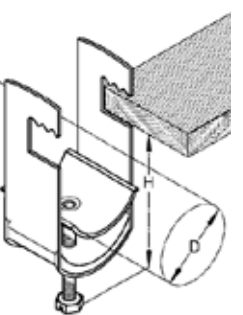
Type MKD



Type AC

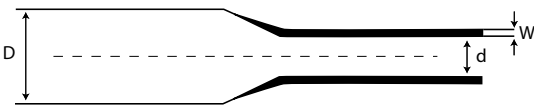


For 1, 2 or 3 cables of Ø 6 - 175 mm, all types.



Type U





## 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               | -40° to +125°C  |
| 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                         | -55° to +125°C   |
| 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                                   |



| 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                |              |                  |

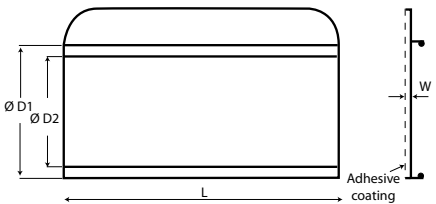
Ten size and nine colour variations of thin-walled heatshrink tubing in easy to dispense display cartons - ideal for wholesalers' shelves.

| 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



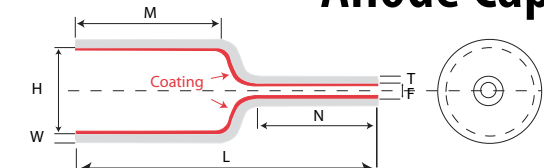
| Basic Properties - Wraparound repair sleeves |               |
|--|---------------|
| Operating Temp                               | -40° to +90°C |
| Dielectric strength                          | > 15kV/mm     |
| Shrinking temperature                        | 120°C         |



| 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%

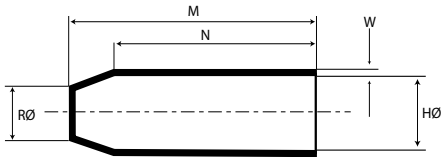


Cable End Caps

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                | 130°C   |
| Shrink Ratio                      | >2:1  |
| Colour                            | Black   |
| Options                           | Cable end caps with white flash  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          |

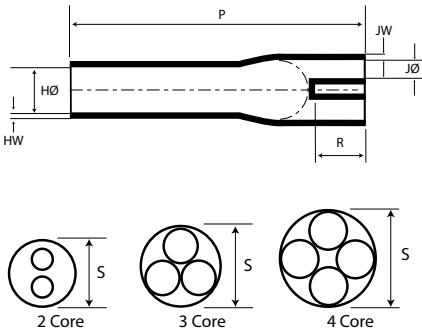
Tolerances:- M & N  $\pm$  2%, H & R  $\pm$  3%, W  $\pm$  10%

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. Conduc-<br>tor Size (mm <sup>2</sup> ) |
|-------------|------------|----------------|------|----------------------------------|------|-------|------|-----|-----|--|
|             |            | 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                                       |
| 5           | 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                                      |
|             | HB5/60-25  | 60.0           | 30.0 | 24.5                             | 7.5  | 180.0 | 30.0 | 3.5 | 3.0 | 35 - 185                                       |
|             | HB6/30-16  | 30.0           | 8.2  | 16.0                             | 4.0  | 75.0  | 20.0 | 2.5 | 1.5 | 4 - 35   |
| 6           | 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.



| Conductor Size 2 3 or 4 core (mm <sup>2</sup> ) | 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 |



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

LV Straight Joints

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 mm<sup>2</sup>, HJ3/3/120 for 3 x 120 mm<sup>2</sup> 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 mm <sup>2</sup>  | HALK1         | 200                    | 19 |
| Secondary 4mm <sup>2</sup> | 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 |

LV Terminations

| No of Cores | Cable range (mm <sup>2</sup> ) | 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.

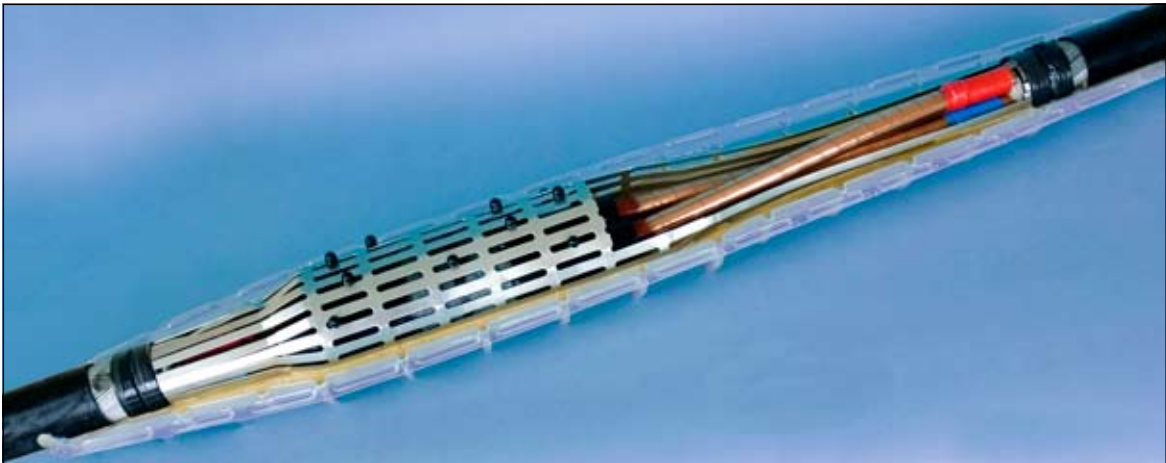
Generous tail lengths - 1200mm for outdoor and 300mm for indoor terminations (special tail lengths are also available).





# MV (15kV) Heatshrink & Resin Cable Joints

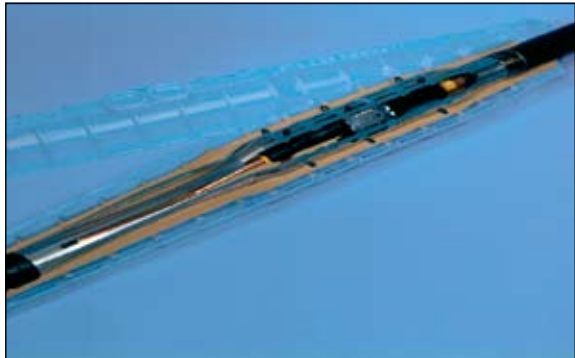
Heatshrink joint, resin protected to prevent water ingress



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:-

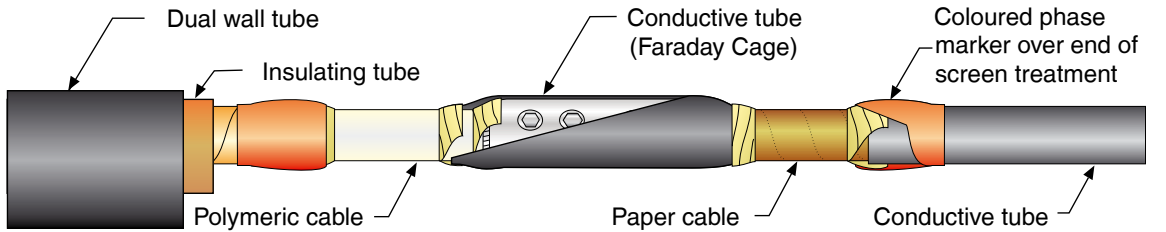
- Resin encapsulation provides mechanical protection and prevents water ingress.
- Simple design – easy to install.
- Suitable cable types include:-
  - XLPE.
  - Paper.
  - XLPE/Paper transition.
  - Trifurcating joints 3-core to 3 single cores.
- Optional core connectors - choice of:-
  - mechanical 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 mm <sup>2</sup>  |
| CM7HX3N  | XLPE                    | 3 core 185 - 300 mm <sup>2</sup> |
| CM6HXP3N | XLPE/Paper (Transition) | 3 core 35 - 150 mm <sup>2</sup>  |
| CM7HXP3N | XLPE/Paper (Transition) | 3 core 185 - 300 mm <sup>2</sup> |
| CM6HP3N  | Paper/Paper             | 3 core 35 - 150 mm <sup>2</sup>  |
| CM7HP3N  | Paper/Paper             | 3 core 185 - 300 mm <sup>2</sup> |

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)<br>&<br>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  |           |           |
|  | PL   | Polymeric to Polymeric   |            |            |           |           |
| Insulation Type  | 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:-   |      |  |            |            |           |           |
| HJMV12BPL33 = 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              | -40° to +100°C |  |  |
| Shrinking Temperature              | 110°C          |  |  |
| Dielectric constant (permittivity) | 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      | -40° to +100°C                   |  |  |
| Shrinking Temperature      | 120°C                            |  |  |
| 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 | -40° to +90°C |  |  |
| Shrinking Temperature | 120°C         |  |  |
| 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

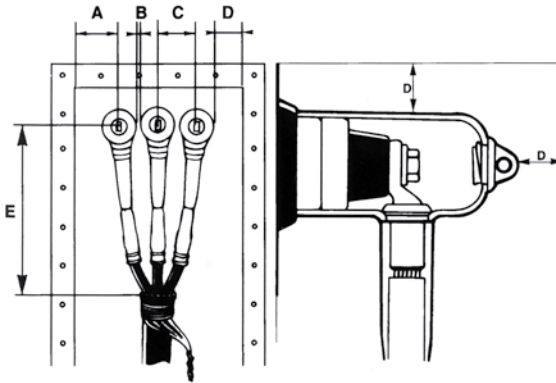
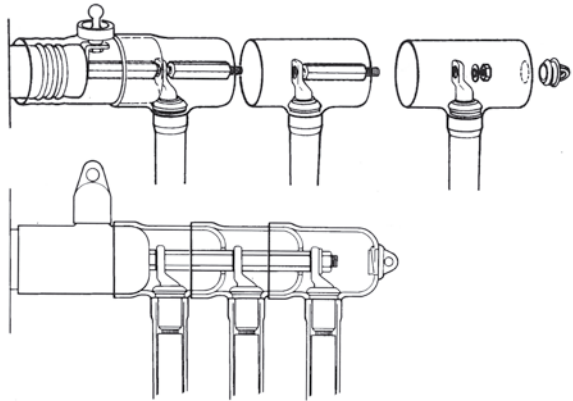
The HBM range of heat shrinkable tubing is particularly suited for insulating medium voltage busbars up to 36kV. It is available in Medium Wall (reduces distance between bus bars to half) and Thick Wall (reduces distance to one third the distance between two phases in medium voltage switchboards).

| Basic Properties             |                |  |  |
|------------------------------|----------------|--|--|
| Continuous temperature range | -40° to +100°C |  |  |
| Shrinking Temperature        | 120°C          |  |  |
| 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 (mm²) | 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.

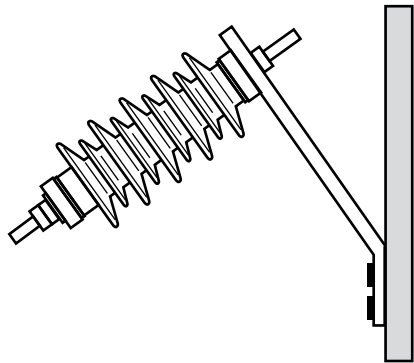
| Cable size (mm²) | Part No | Description                |
|------------------|---------|----------------------------|
| 50 - 400         | HKS     | Set of 3 straight boots    |
|                  | HKR     | Set of 3 right-angle boots |



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 (mm²) | 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 (mm²)          | 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 (mm²) | 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 <sup>15</sup> ohms/cm | Tensile strength     | 3.5 Mpa |
| Dielectric strength | 28 kV/mm                 | Elongation at break  | 700%    |
| Dielectric constant | 2.8                      | Peak operating temp. | 130°C   |

| 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 crimping 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 mm<sup>2</sup> to 400 mm<sup>2</sup>. Insulated, 45° and 90° 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 mm<sup>2</sup> to 500 mm<sup>2</sup> with solid palm (suitable for outdoor terminations). DIN Standard 46329.

Aluminium lugs 10 mm<sup>2</sup> to 400 mm<sup>2</sup> suitable for indoor terminations. DIN Standard 48201.

Aluminium ferrules 10mm<sup>2</sup> to 500 mm<sup>2</sup>. DIN Standard 48201.

## Bi-metallic cable lugs and ferrules

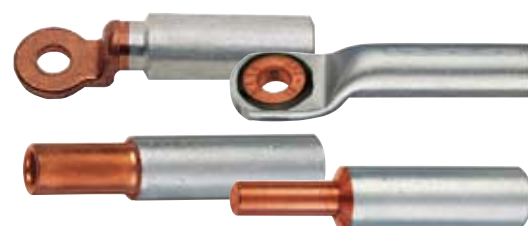
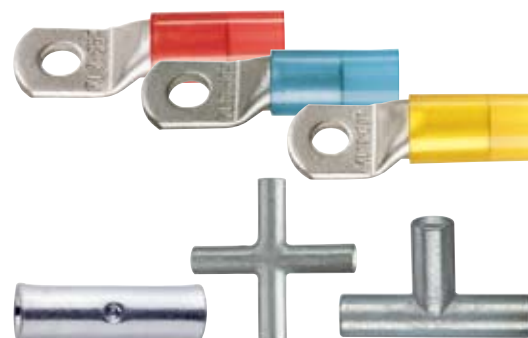
Bi-metallic lugs 16 mm<sup>2</sup> to 300 mm<sup>2</sup> with solid copper palm. DIN Standard 48201.

Bi-metallic lugs 10 mm<sup>2</sup> to 400 mm<sup>2</sup> with copper insert. DIN Standard 48201.

Bi-metallic ferrules 10mm<sup>2</sup> to 300 mm<sup>2</sup> 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



K05 & 6 & 9



K22



HK60/22



HK120/42



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



EK22PLUS



K1031 K1041



ESG45PLUS



GB-PM20-SET



GB-M20



GB-P20



GB-KG05-3

## Mechanical crimping tools

K2:- Indent ratchet crimping tool covering sizes 0.75 - 16 mm<sup>2</sup>.

K507:- Hand ratchet crimping tool with 3 quick-change die sets stored in the handle. For pre-insulated terminals 0.75 - 6mm<sup>2</sup>, endsleeves and copper tube terminals up to 10mm<sup>2</sup>.

K05/06/09:- Hexagonal crimping tool with integral revolving dies. Size range K05 6 - 50 mm<sup>2</sup>, K06 10 - 120 mm<sup>2</sup>, K09 25 - 150 mm<sup>2</sup>.

K22:- Crimping tool for interchangeable dies 6 - 300 mm<sup>2</sup>. Flip-top style crimping head rotates 360°. Telescopic handles.

## Hydraulic crimping tools

HK60/22:- For interchangeable dies 6 - 300 mm<sup>2</sup>. Two-stage hydraulics with auto-retraction. Flip-top style crimping head rotates 360°.

HK120/42:- For interchangeable dies 16 - 400 mm<sup>2</sup>. Two-stage hydraulics with auto-retraction. C-shape crimping head rotates 360°.

## 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 360°.

## 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 360°. A 230 V mains-powered version is also available (part no KNSG45).

## Cable preparation tools for polymeric cables

GB-PM20-SET:- The ultimate cable preparation kit for the professional cable joiner. Consists of:-

GB-M20:- Removes outer insulation and XLPE inner insulation. For cables 35-500 mm<sup>2</sup>, 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 mm<sup>2</sup> (70 mm Ø) are also available.





1kV  
to  
36 kV



**CTL Components plc**

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