

# Electrical Markets Division

Low / Medium & High Voltage Cable Accessories

Products for Energy Segment



**Innovative**  
Electrical Solutions

**3M**

You're in a demanding industry. To be successful, you need a wide range of reliable products designed to effectively manage your daily processes. You need a supplier with a solid understanding of your industry and the technology that drives it. Quite simply, you need 3M. Our Electrical Markets Division designs and manufactures a comprehensive line of products that can address your diverse applications. Widely recognized for our innovation, reliability and global corporate strength, 3M has the products and services you need and the name you trust.

In your business; power, technology and reliability are essential. 3M delivers that and more. We have the power of a diversified, global manufacturer with more than 70,000 products in our line; a reputation for technical excellence and innovation; and employees committed to delivering quality products and service to you, our valued customer.

Our commitment and capability doesn't stop with electrical products, it starts there.

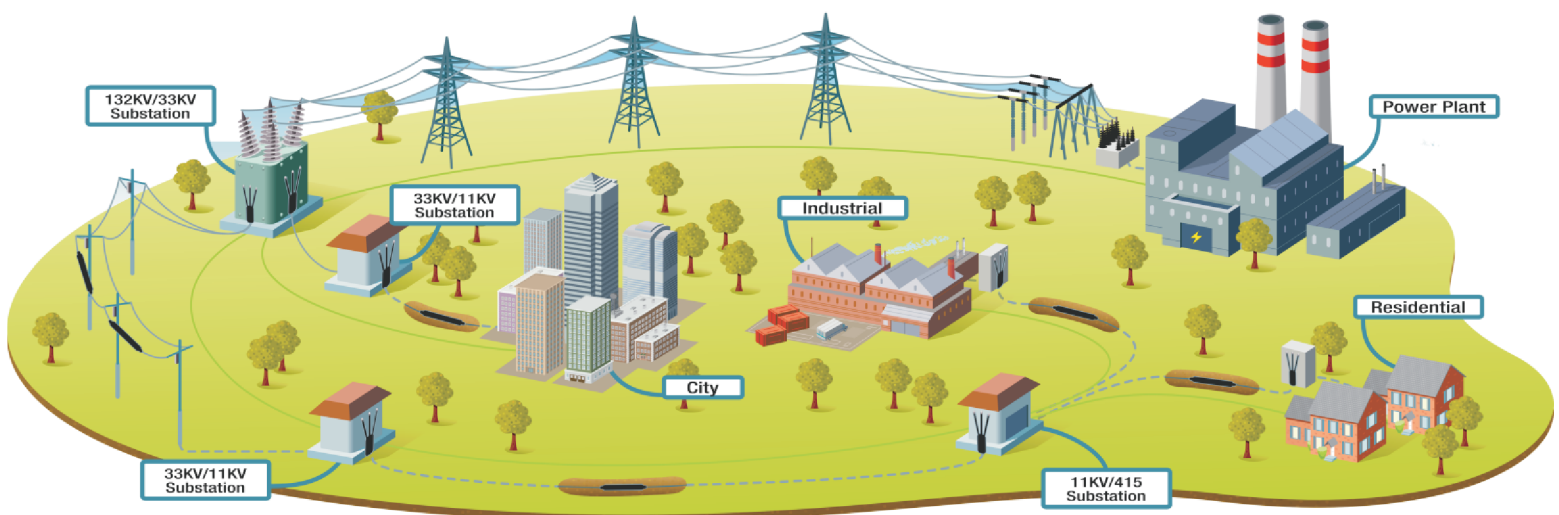
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## Electrical Markets Division

3M's Electrical Markets Division, headquartered in Austin, Texas, designs, manufactures and markets products for electrical construction, industrial maintenance, energy and industrial businesses, and electrical/electronic devices produced by original equipment manufacturers. Products include electrical and electronic specialty insulating tapes; power cable splices and terminations, including heat shrink and cold shrink technologies; cable arc and fire resistant tapes; heat shrinkable tubing and molded shapes for electrical insulation; electrical wire connectors; wire terminals, tools, lugs and connectors; wire marking products; cable ties; underground/underwater electrical system products; electrical diagnostic and detection products; and cushioning and protection products.

3M Electro & Communication India Pvt. Ltd. took over Mahindra Engineering & Chemical Products Ltd. on 01.12.06 which was established in 1968. It belonged to the well known 'Mahindra & Mahindra' group of companies.





## Cold Shrink (Pre Moulded / Extruded) Solutions

### Discover 3M Cold Shrink Solutions

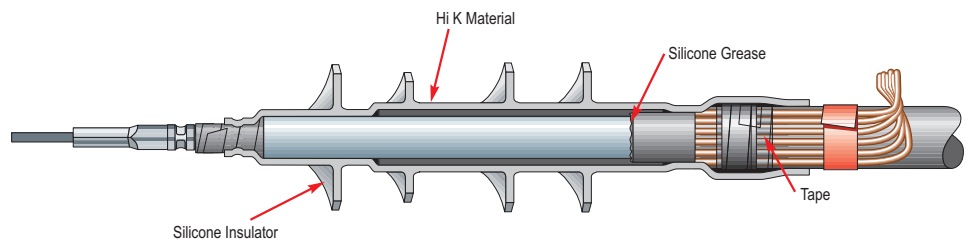
- 3M makes the products you need for that peace of mind.
- Over 40 years ago, 3M pioneered cold shrink technology
- Withstand extreme environmental conditions
- Lower installed cost
- Permanent, durable environmental seal and insulation

### 11/22/33 kV - Medium Voltage (MV) Termination

- 3M terminations are based on specially formulated, track-resistant, silicone rubber insulators with “built-in” Hi-K stress relief
- 3M “built-in” Hi-K provides a dielectric constant of approximately 25, distributing the electric field well beyond the shield cutoff. This greatly reduces the stress gradient at the end of the shield, thus helping to ensure long-lasting performance in medium-voltage applications
- Resistant to severe weathering, temperature extremes, heavy moisture and prolonged industrial contamination.

3M termination kits offer you:

- Fast, easy installation
- Reliable, long-lasting materials
- Solutions to fit your specs

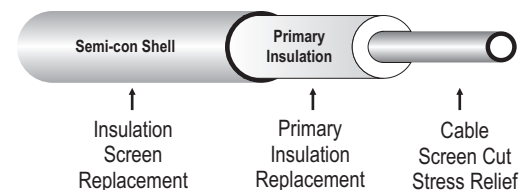


### 11/22/33 kV - Medium Voltage (MV) Splice

3M splice solutions can help you reduce the time, labor and cost involved in both above and below splice applications. What's more, every 3M splice has been 100% factory tested on power cable, so you can be assured of dependable performance, stability and long life with every splice you make.

#### Description:

- One-piece multilayer silicone splice body
- Integrated stress control device, insulation and outer semi-conductive layer
- Permanent radial pressure guarantees a reliable function over the entire lifetime
- The outer semi-conductive layer re-establishes the cable screen
- The insulation of the splice body replaces the cable insulation across the entire splice
- The integrated refractive stress control provides the proper electric field distribution
- 3M Scotch® Tape 13 is applied over the connector and forms the inner conductive electrode





## 66kV / 72.5kV Termination

Cold Shrink Termination Kit is designed for Cables up to 72.5kV (Umax) Voltage class, single core polymeric power cable systems.

### Features:

- Accommodates crimp or mechanical lugs
- Solderless earth connection
- Thick walled, silicone rubber
- Physical protection
- Moisture sealing
- Silicone outer rain sheds ideal for contaminated, industrial or coastal environments

### Applications:

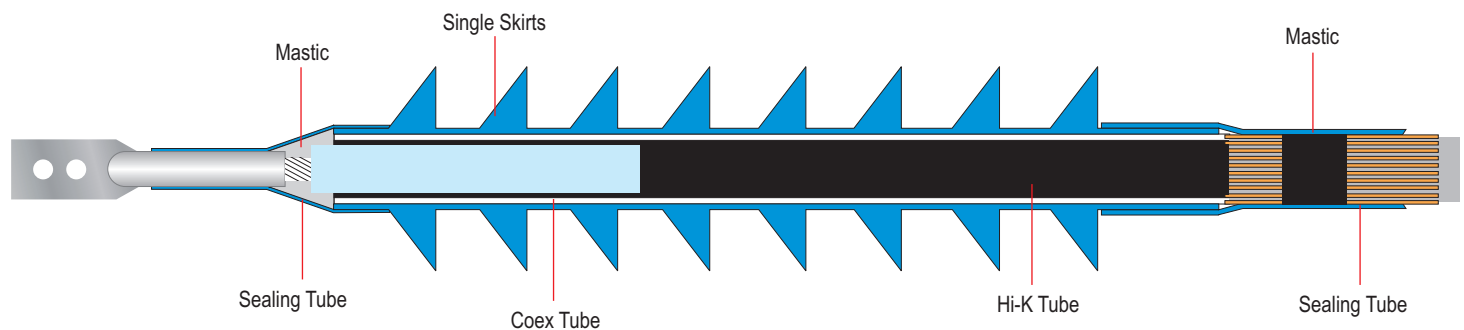
- Designed to terminate 72.5kV (IEC) power cables
- Covers conductor ranges up to 1200 mm<sup>2</sup>
- Designed for polymeric insulated cables

### Certifications:

The 3M QTEN termination meets AND exceeds the requirements of IEC Standard 60840.

### Advantages:

- Lightweight
- Proven Cold Shrink reliability
- Installs without heat, reducing worker safety risk
- Class I Termination



## 66kV / 72.5kV Splice

Cold Shrink Joint Kit is designed for cables upto 72.5kV Umax voltage class. The cold shrink joint body is a one-piece molded design made of specially formulated silicone rubbers.

### Features:

- One-piece cold shrink joint body
- Each joint body is 100% factory tested, for greater reliability and longer service life
- No special tools or flame required for installation
- Kit covers wide range of cable sizes and types

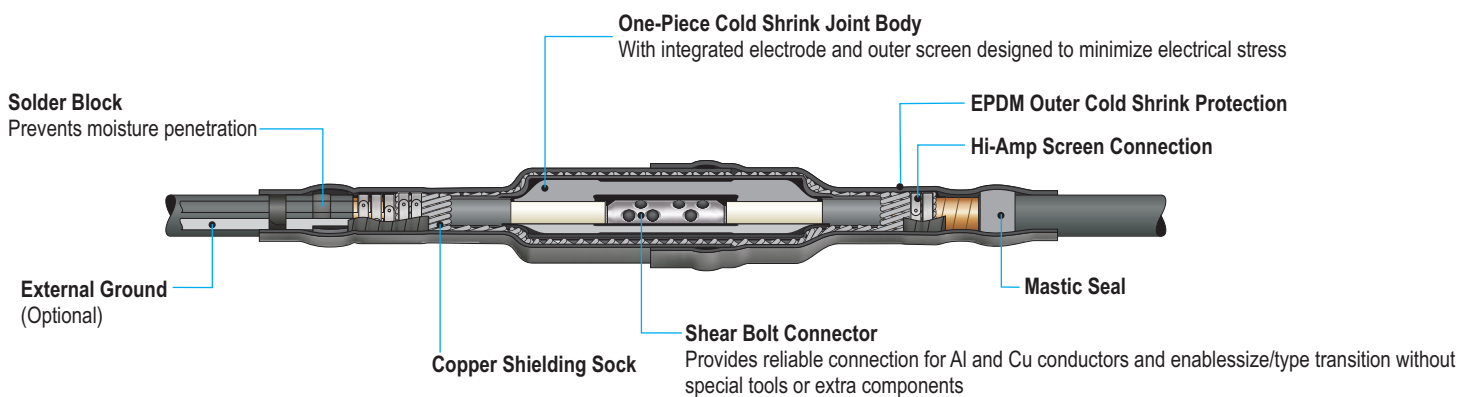
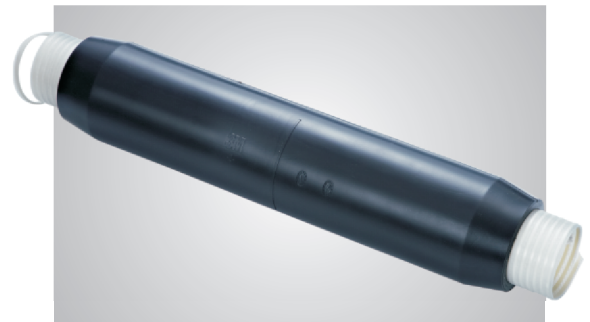
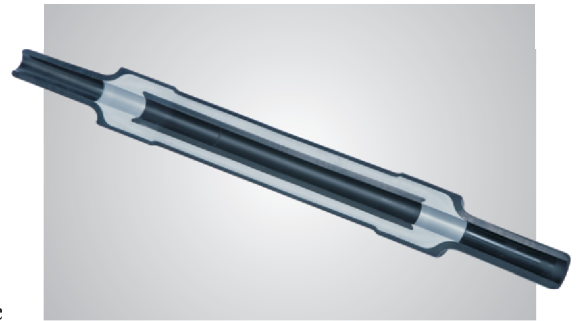
### Applications:

- Designed for polymeric insulated cables
- Covers inline and crossbond splicing applications
- Suitable for cable size and type transitions
- Covers conductor ranges up to 1200 mm<sup>2</sup>

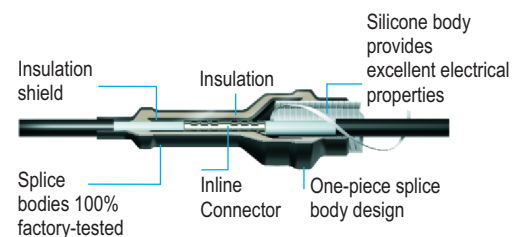
### Certifications

The Quick Splice joint for 69/72, 5kV meets or exceeds the requirements of:

- IEEE 404, for 69kV
- IEC 60840 for 72,5kV



Easy, consistent installations by eliminating the pushing, pulling or heating required by traditional splices silicone rubber body which provides excellent electrical properties and superior low temperature handling.



## 110kV (123kV) / 132kV (145kV) Termination

### Dry Termination TD-II Family for up to 123kV Applications

#### Description:

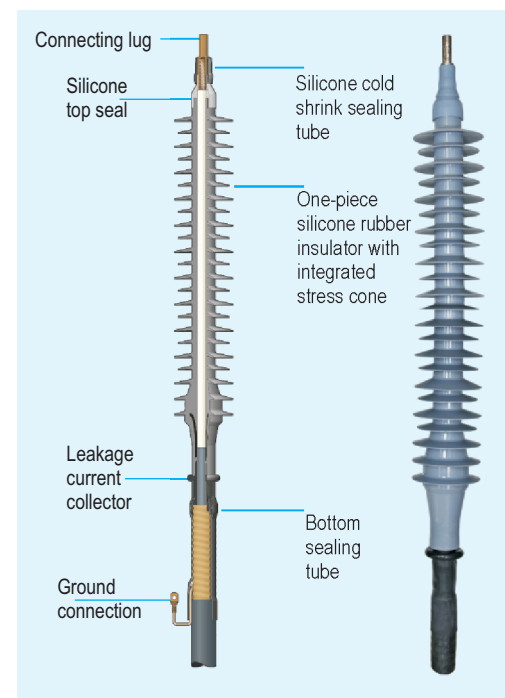
- One-piece dry termination, for indoor or outdoor installations

#### Applications:

- Conductor size up to 800 mm<sup>2</sup>
- Meets class 3 (heavy pollution) requirements
- Not self-supporting, requires holding structure

#### Features:

- Light weight
- Dry design - does not require liquid dielectric
- Can be installed at any angle or inverted
- No special maintenance required
- Top - and bottom - sealing system based on proven cold shrink technology
- Alternating sheds (skirts)
- One-piece factory-tested push-on termination body



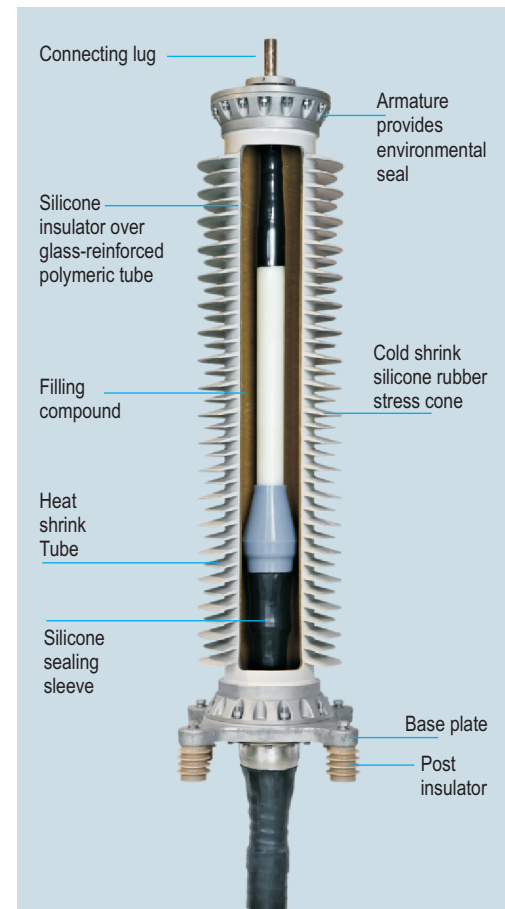
### Wet Silicone Termination TS-II Family with Cold Shrink Stress Cone for up to 145kV Applications

#### Description:

- Self-supporting, outdoor termination with composite insulator applications
- Conductor size up to 1,200 mm<sup>2</sup>
- Can accommodate a variety of pollution classes and lengths
- Maximum installation angle of 30°

#### Features:

- One-piece pre-molded cold shrink silicone stress cone
- Light-weight construction, approximately 1/3 the weight of most porcelain terminations
- Easier handling, transportation and installation than porcelain insulator
- Hydrophobic silicone materials provide excellent environmental performance
- Smooth surface enables self-cleaning properties
- Less sensitive to earthquakes, vibrations and thermal variations
- Internal shear bolt connection option eliminates need for crimp-type connections
- No special tools required
- One kit covers a wide range of cable sizes
- Alternating sheds (skirts)





## 110kV (123kV) / 132kV (145kV) Splice

### Cold Shrink Joint SC-II & SS-II Family for up to 145kV Applications

#### Description:

- One-piece, cold shrink silicone rubber joint for in-line and cross bond applications

#### Applications:

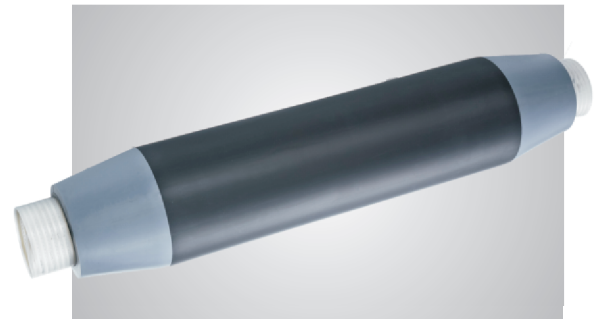
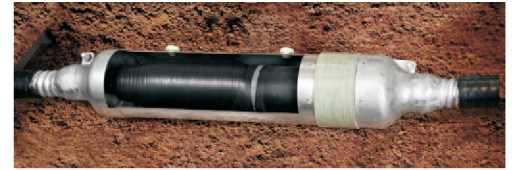
- Conductor size up to 1,600mm<sup>2</sup>
- In-line and cross bond design available

#### Features:

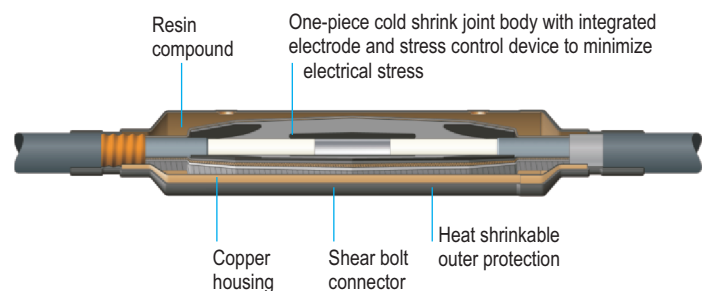
- One piece silicone rubber cold shrink joint body
- Shear bolt connector included (optional crimp connector)
- Connectors for round compacted or round segmented cable available
- Flexible design accommodates different shielding and cable re-jacketing systems
- No special tools required
- Short installation length
- No parking positioning required
- Kit covers a wide range of cable sizes

#### Optional:

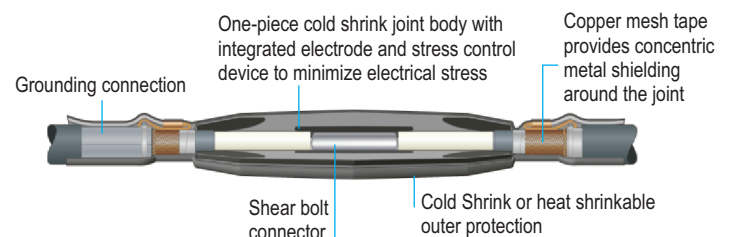
- Re-jacketing with cold shrink, heat shrink or resin-filled enclosure
- Metal housing (optional)
- Link boxes for a variety of grounding systems



Cold Shrink Joint SS-II with an in-line configuration, copper housing and cold shrink or heat shrink re jacketing



Cold Shrink Joint SC-II with a cross bond configuration and cold shrink or heat shrink re-jacketing



## GIS Solutions

### Termination TG Family for Gas Insulated Switchgear up to 145kV

#### Description:

- Pre-molded “dry-type” termination for gas-insulated switchgears and transformers

#### Applications:

- Conductor size up to 1,200 mm<sup>2</sup>
- Available for short (470 mm / 18.5 in) & long (757 mm / 29.8 in) installation lengths

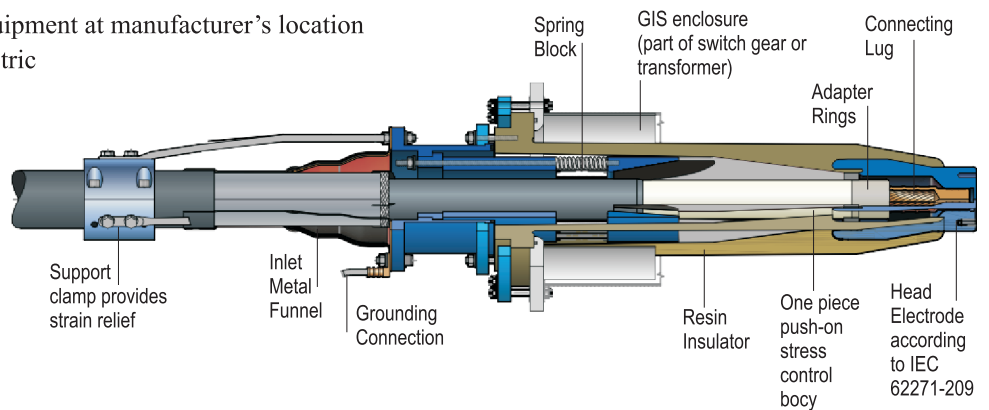
#### Features:

- One-piece silicone rubber stress cone
- Resin insulator can be mounted to GIS equipment at manufacturer’s location
- Dry design – does not require liquid dielectric

#### Optional:

- Corona shield for transformer connection
- Socket

Long Termination TG D/L for Gas Insulated Switchgear. Dimensions according to IEC 60859



### 26/35kV Cable Termination for GIS Equipment

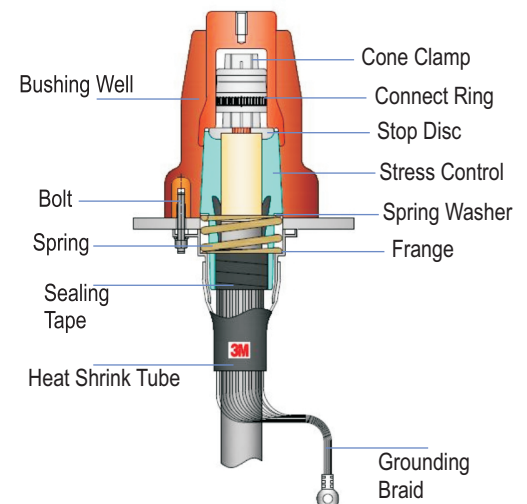
TG45 GIS cable termination, is used for cable connection to GIS switchgear, transformer, motor and generator at 33/36kV level. High quality silicone is applied for stress cone, and plug-in technology for connection with the bushing. The termination is not limited by environment and free for daily maintenance.

#### Features:

- Integrated structure, easy for installation, and fit for the cable section from 50mm<sup>2</sup> to 630mm<sup>2</sup>
- Compact design with high quality insulation material for reliable creep distance
- Ampere capability reach to 1600A
- No special tools needed to fix the frange with long bolt

#### Applications:

- TG45 GIS termination with plug-in technology connect the cable to the electrical equipment with sealing insulation system, and can match the bushing following DIN EN 50180 or DIN EN 50181 with No.3 interface type.
- Can be installed on 26/35kV cable with the rated temperature at 90°C, and emergency temperature at 250°C
- Be used for the cable with solid insulation, such as Polyethylene, XLPE, and EPR
- Application for both indoor and outdoor environment



## Heat Shrink Solutions (1.1kV to 36kV)

### Heat Shrink Splice / Cable Jointing Kit

#### Description:

3M Heat Shrink medium voltage joints are available for tape/wire shielded, armoured/unarmoured medium voltage single core and three core polymeric cables. 3M Heat Shrinkable joint utilizes a unique high dielectric constant (High K) stress control tube and mastic for effective grading of electrical stresses. The stress control tube together with the insulating and dual walled (inside insulating & outside semiconducting) tubes forms the splice body.

All the heat shrinkable components are supplied in an expanded state and would shrink effectively on application of heat.

All the grounding connections are solder-less.

#### Features:

- Available for 1-Core and 3-Core polymeric cables.
- Provides excellent environmental protection and moisture sealing.
- Wide conductor size ranges upto 1000 mm<sup>2</sup>



### Heat Shrink Termination Kit

#### Description:

3M Heat Shrink medium voltage terminations are available for tape/wire shielded, armoured/unarmoured medium voltage single core and three core polymeric cables. 3M Heat Shrinkable terminations utilize a unique high dielectric constant (High K) stress control tube and mastic for effective grading of electrical stresses. The non tracking heat shrinkable insulating outer tube is optimally designed for reliable environmental protection. The modular heat shrinkable skirts allow installation of the termination in inverted condition if required. For three core cable terminations, a heat shrinkable breakout is provided for environment sealing of the trifurcating crotch area.

All the heat shrinkable components are supplied in an expanded state and would shrink effectively on application of heat.

All the grounding connections are solder-less.

#### Features:

- Available for 1-core and 3-core polymeric cables.
- Provides excellent environmental protection and moisture sealing.
- Wide conductor size ranges upto 1000 mm<sup>2</sup>





## Heat Shrink Technology

Heat Shrink Technology offers complete range of cable jointing & termination kits for XLPE, PILC, PVC & EPR Cables from 1.1kV to 36kV voltage grades. The kits consist of heat shrinkable tubes, mastics, moulded parts, mastics & other accessories for making a complete termination / splice:

### Stress Control Tube

3M Heat Shrink high K Stress Control tubes have been designed for providing electrical stress grading & relief on screen interruptions, which avoids localized stress accumulation leading to failures. 3M SCT tubes are made from specially formulated Polyolefin and provide good balance between electrical and mechanical properties.

#### Features:

- Good chemical resistance & thermal aging properties
- Split resistant
- Higher shrink ratios ensure versatility/ low inventories

### Stress Control Mastic

3M Stress Control Mastics are integral part of Stress grading system used in 3M Heat Shrink cable splicing and termination kits along with 3M heat shrink Stress Control Tubes for providing stress relief on screen interruptions. The self amalgamating, high K & low permittivity mastics provide excellent void filling and stress control.

#### Features:

- Suitable for both XLPE and PILC cables
- High resistance to humidity and moisture ingress

### Dual Wall Tube

3M Heat Shrink Dual Wall Tubes are two layered, co extruded with inner insulating and outer semi-conducting layers. These tubes provide excellent insulation, outer screen continuity and exhibit excellent mechanical and electrical properties.

#### Features:

- Co-extruded to avoid any air pockets between insulation and screen
- Reduces no. of tubes for heat shrinking in a splice
- Split resistant

### Anti-Tracking Tube

3M Heat Shrink Anti-Tracking Tubes have been specially designed to meet the outdoor conditions & performance requirements of medium voltage power cable end terminations. The material resists to splitting and has excellent arc resistance.

#### Features:

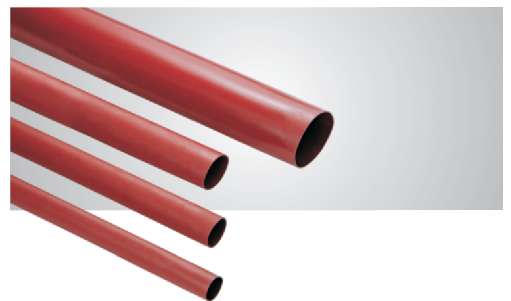
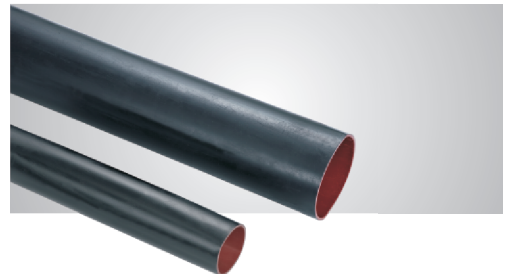
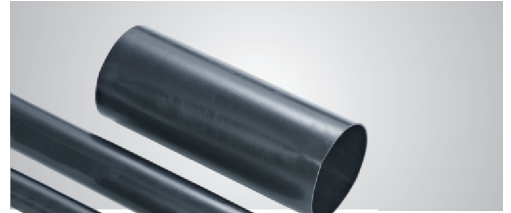
- Suitable for outdoor and indoor applications
- Flexible, conforms to shapes/ core bends
- Halogen free, Self extinguishing

### Insulating Tube

3M Heat Shrink Insulating tubes have been designed for providing electrical insulation, protection from mechanical impact and provide atmospheric sealing. These are made from specially formulated Polyolefin and offer outstanding physical, electrical & chemical resistant properties.

#### Features:

- Excellent thermal aging properties & Best-in-class weather/chemical resistance



## Resin Solutions

### Scotchcast 450

Kastex now Scotchcast 450 Cable Accessories for Low Voltage PVC / PILC / XLPE Cables have been designed for simplicity in installation and a prolonged service life. Kastex joints and terminations for LV Cables are based on a cast resin system. The casting resin is polyurethane based which has complete compatibility with the cable components.

#### Features:

- Simple & easy to install
- Provides good mechanical/moisture ingress protection
- Option of crimping ferrules or mechanical connectors
- Tee Joints also available



### Taped Joints

Tapex/Taped System of cable jointing follows the time tested technique of rebuilding the cable construction. The system is simple and is based on three components:

- Self Amalgamating Insulating Tapes
- Self Amalgamating Semi-Conducting Tapes
- Non Linear Stress Grading Pads

#### Features:

- Few Components and no mastics
- Easy to install as it requires no heating
- No tapering of XLPE Insulation
- Cold Flow property
- Thermally compatible with XLPE Insulation
- Provides complete mechanical & moisture protection



## RMU Solutions

### Screened Tee Separable Connectors

3M Range of Dead Break Screened Separable Connectors are designed for compact SF6 insulated Ring Main Units with Outer Cone bushing Type 'C' & bolted interface according to CENELEC 50180 & 50181.

These kits are available for a XLPE insulated cables of 6.35/11 kV and 12.7/22 kV grades – 400A/630 A applications.

#### Features:

- Compact in design with inbuilt cable termination.
- Made from Superior Silicone Rubber
- Screened outer surface – No influence of surrounding environment
- Tee Connectors available for multiple cable application
- No heating or taping required
- Maintenance free, simple disconnection & reconnection
- Safe in case of accidental touch
- Watertight Design - Resistant to moisture ingress even under submerged condition
- Provision for cable testing
- Meets IEC 60502-4:1997



## Terminal Protector

The Terminal Protector is an insulating barrier system, which can be used in conjunction with any indoor termination. The Terminal Protector is an unique insulating system for providing Phase to Phase and Phase to Earth insulation to power cable terminals where these terminations need to be installed in very compact areas like motor terminal boxes, ring main units, distribution transformers etc. The Terminal Protector comprises of an insulating bellow and grommets. All these components are injection moulded from EPDM / Si rubber.

### Features:

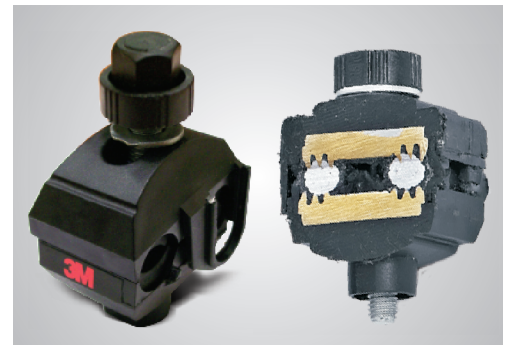
- Accommodates a large cable cross section - 25 to 300 sq mm and 400 to 630 sq mm
- Also fits sector shaped cables
- Facilitates direct voltage testing
- Easy to fit, Re-openable, Re-usable
- Can be installed on any termination i.e. Premoulded Heat Shrink etc.
- Can be installed on XLPE, PVC or PILC cable



## Aerial Bunched Cable Accessories

The Insulation Piercing Connector (IPC) is used for connecting an insulated conductor with a branch conductor without removing the insulation of the conductor. The application is mainly for insulated Aerial bunched cables. Each connector is in two halves, interconnected with a bolt having a shear head top. The shear head of the bolt shears off at predetermined torque. IPC of this design is when both the main & tap conductors are tightened simultaneous whereby the teeth of the contact plates penetrate the insulation and establish a contact.

3M Description	Main to tap Conductor size mm2
ABCC 01	95 - 70 to 25 - 16
ABCC 02	95 - 70 to 95 - 70
ABCC 03	185 - 120 to 25 - 16
ABCC 04	185 - 120 to 185 - 70
ABCC 05	95 - 16 to 95 - 16
ABCC 06	185 - 70 (35) to 35 - 6 (50 - 6)
ABCC 07	120 - 16 to 16 - 1.5
ABCC 08	95 - 16 to 50 - 10 (6)
ABCC 09	120 - 6 to 6 - 1.5



## Dead End Clamps

Wedge Type 25-35 mm <sup>2</sup> /	16-25 mm <sup>2</sup>
2 Bolted Type 25-70 mm <sup>2</sup> /	25-70 mm <sup>2</sup>
3 Bolted Type 70-150 mm <sup>2</sup>	70-120 mm <sup>2</sup>

## Suspension Clamps

SCB 25-70 mm<sup>2</sup>  
SCB 70-210 mm<sup>2</sup>  
16-120 mm<sup>2</sup>

Suspension clamps for Bare Messenger and for Insulated Messenger



## Preinsulated Bimetal Lugs & Aluminium Sleeve

Model No		Conductor (mm <sup>2</sup> )	
PBCL 101	16		
PBCL 102	25		
PBCL 103	35		
PBCL 104	50		
PBCL 105	54.6		
PBCL 106	70		
PBCL 107	95		
PBCL 108	120		
PBCL 109	150		
PBCL 110	185		

### RANGE - Type 1

Model No	Conductor (mm <sup>2</sup> )
PIAS 101	16 - 16
PIAS 102	25 - 25
PIAS 103	35 - 35
PIAS 104	50 - 50
PIAS 105	70 - 70
PIAS 106	95 - 95
PIAS 107	120 - 120
PIAS 108	150 - 150
PIAS 109	185 - 185
PIAS 110	16 - 25
PIAS 111	25 - 35

### RANGE - Type 2

Model No	Conductor (mm <sup>2</sup> )
PIAS 101 T	16 - 16
PIAS 102 T	25 - 25
PIAS 103 T	35 - 35
PIAS 104 T	50 - 50
PIAS 105 T	54.6 - 54.6
PIAS 106 T	70 - 70
PIAS 107 T	95 - 95
PIAS 108 T	120 - 120

## End Caps

Model No	Conductor Range (mm <sup>2</sup> )
CEC 101	6 - 95
CEC 102	70 - 185

## Eye Hooks





## HVDS Insulation Enhancement System

The High Voltage Distribution System (HVDS) in an utility consists of a step- down transformer, a lightening arrestor (LA), Jumper(s) and a drop out (DO) fuse assembly installed very close to the consumer premises. The DO fuse assembly provides protection to the transformer from over load and short circuit.

3M HVDS Insulation System provide electrical insulation to the live and exposed parts of a 11 kV Drop Out Fuse Assembly on a high voltage distribution system. The molded covers are made of arc resistant, flame retardant insulating material having excellent weathering and UV resistance properties similar to our Heat shrink cable jointing products.

- Fast, efficient & easy to use product
- The product is re-usable
- Excellent Di-electric and wet electrical properties
- Flame retardant and good thermal stability.
- Excellent weathering, ozone and ultraviolet light resistance
- Resists fungus, acids and alkalis
- Does not require heat or any specific tools- requires only workman's hands for error free installation
- Built in buttons provide unique latching mechanism which ensures lasting stability of the products on HVDS fittings

3M can customize the insulation system to meet the customers HVDS network requirements.



## Electrical Tapes For Maintenance And Repair Applications

- Vinyl Electrical Tapes
- Insulating and Splicing Tapes
- Sealing and Insulating Tapes
- Special use Tapes



## Sprays

- Protective Sprays
- Preventative Maintenance Sprays
- Silicone Sprays
- Cleaning Sprays
- Degreasing and Cleaning Spray
- Rust Remover



# Aluminum Conductor Composite Reinforced (ACCR)

## The next generation of reliable and affordable transmission solutions

Higher capacity, lower costs, less installation time and fewer environmental impacts compared to conventional upgrade options

### Technology:

Advanced aluminum and ceramic fiber composite core wrapped in high-temperature, hardened aluminum outer strands results in:

- Core strength comparable to steel and eight times that of aluminum
- Core weight less than half that of steel
- Thermal expansion of the core approximately one-fourth that of aluminum and half that of steel
- Rated for 210°C/240°C emergency
- No degradation through corrosion and other environmental factors

### Benefits:

- Two to three times the ampacity, using existing towers and clearances
- Proven performance in numerous field installations, 5 years field experience and thorough testing
- Avoid the environmental impact of new towers and ROW
- Shorter permitting and installation times
- Fully-documented installation procedures, design and implementation support, and a complete range of accessories optimized for 3M ACCR
- Peace of mind from using a technology backed by the technical, financial and manufacturing resources of 3M

### Applications:

- Thermal upgrades, such as transmission bottlenecks or high load growth areas
- Difficult or environmentally sensitive areas, such as mountains, wetlands, parks and wildlife refuges, or densely populated areas
- Long span, high strength applications, such as river, canyon or lake crossings
- Corrosive or challenging environments, such as coastal, desert or cold regions



To explore the many ways we can serve you or to arrange for sales assistance

Contact:

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#### **Important Notice**

Before using these products, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

#### **Warranty; Limited Remedy; Limited Liability.**

This product will be free from defects in material and manufacture at the time of purchase. **3M MAKES NO OTHER WARRANTIES**

#### **INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any indirect, special, incidental or consequential loss or damage arising from this 3M product, regardless of the legal theory asserted.**



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