

# 3M Electrical MRO Solutions

Power ON Money ON

Electrical Market Division

## Our Vision

3M Technology Advancing Every Company

3M Products Enhancing Every Home

3M Innovation Improving Every Life

# Why Insulation is Important - Takeaways



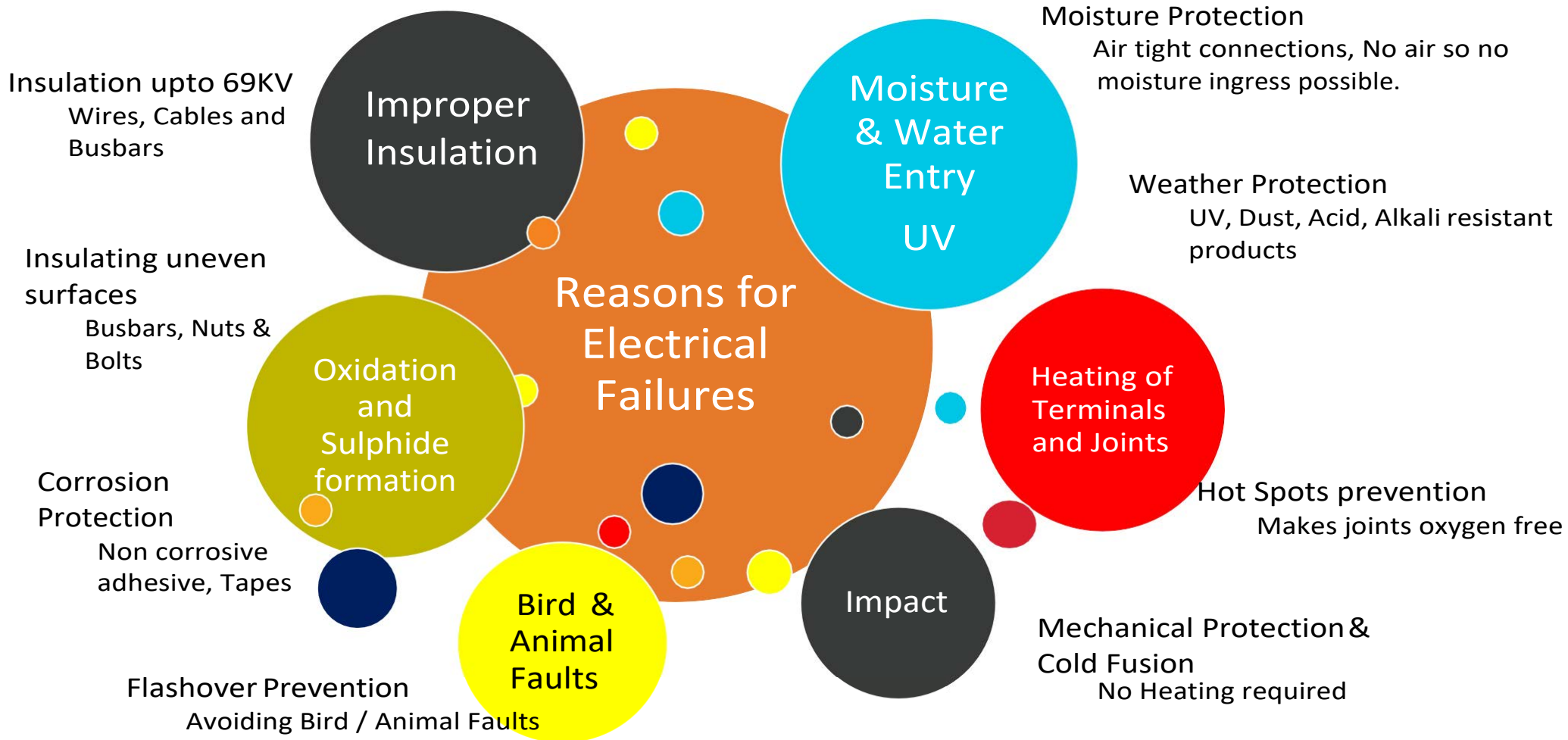
## **Tangible Loss due to improper insulation.**

- Excessive heating at Joints – prone to huge power loss and system failure.
- Sulphation and Oxidation on metal.
- Isolators developed moisture marks and have become weak.

## **Takeaways :**

- Insulation costs in total system is negligible but can cost huge loss.
- Fires may happen due to insulation failures which can bring huge losses
- Management focusing more on quality supplier of insulation rather than products.

# Identified reasons for electrical failures



# Applications





# Key Applications and Solutions

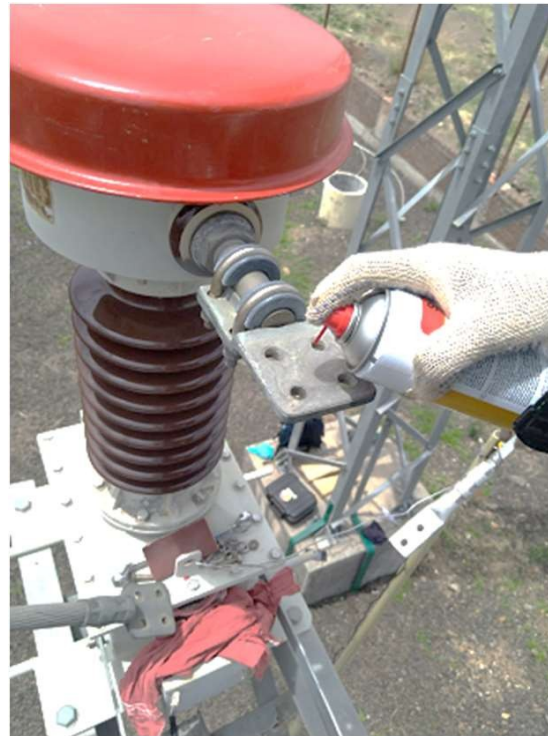
- Substation & Grid Maintenance
  - ✓ Hot Spot Elimination
  - ✓ Insulation in HT Systems
  - ✓ Anti-tracking Solution
  
- Cable system Maintenance
  - ✓ Cable Joints & Cable Jacket Repair
  - ✓ Hydraulic Hose & Cable Protection from Fire
  
- Township Maintenance & Workshop Repair
  - ✓ Insulation scheme for Low voltage
  - ✓ Connectors for street light
  - ✓ Moisture Protection & Sealing
  - ✓ Aerosol: Cleaning; Insulation



# Substation & Grid Maintenance

Reducing Power Losses at Feeder Substations

✓ Concern: Electrical joint heating; Power loss





# Substation & Grid Maintenance

## ~50% reduction in Electrical joint temperature

Thermography details of 33 kV Fdr No.1 bay check meter PT - Pre application of Alnox (3M)									
Date	Time	Load (MW)	Atmospheric Temp. (°c)	Check Meter - PT					
				R (°c)	Photo	Y (°c)	Photo	B (°c)	Photo
Pre 7/1/2019	18:00	22.2	30.0	89.2		92.2		33.5	
	19:00	11.4	28.0	73.4		66.1		31.1	
Post 7/3/2019	18:00	20.0	29.0	32.5		32.0		31.9	
	19:00	21.5	32.0	39.2		25.1		29.8	

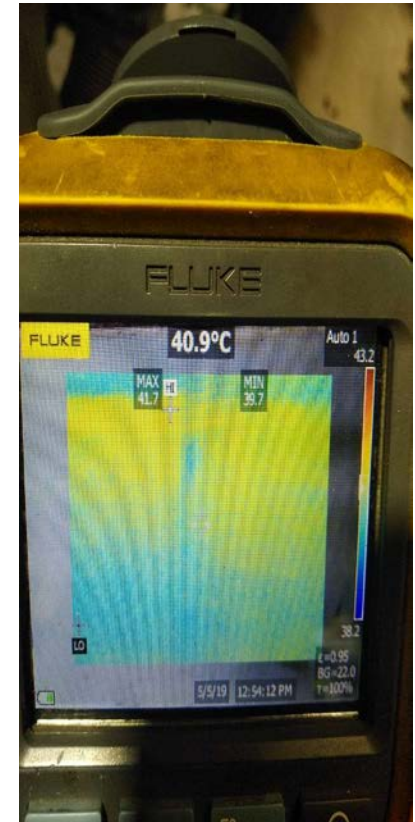
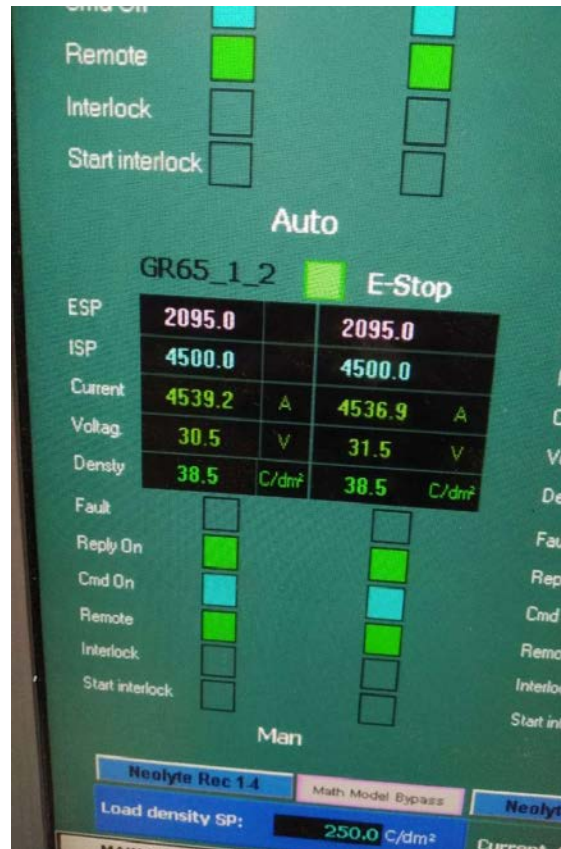


Reduced power losses,  
Asset protection,  
Reduced Power Failures

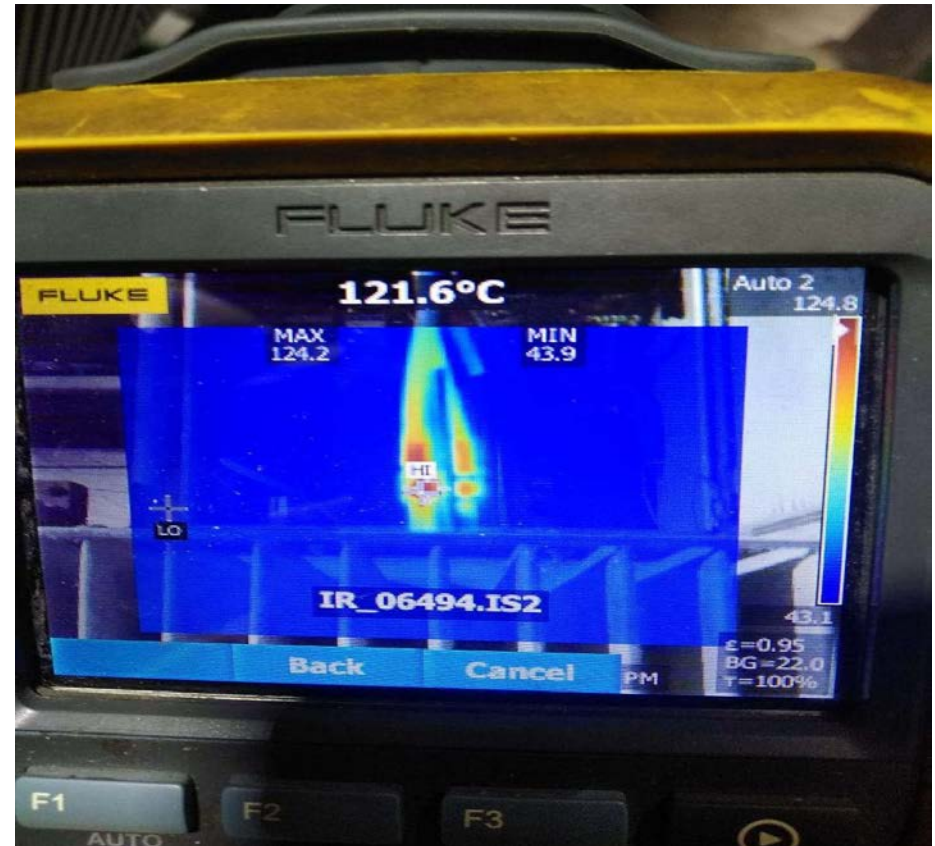
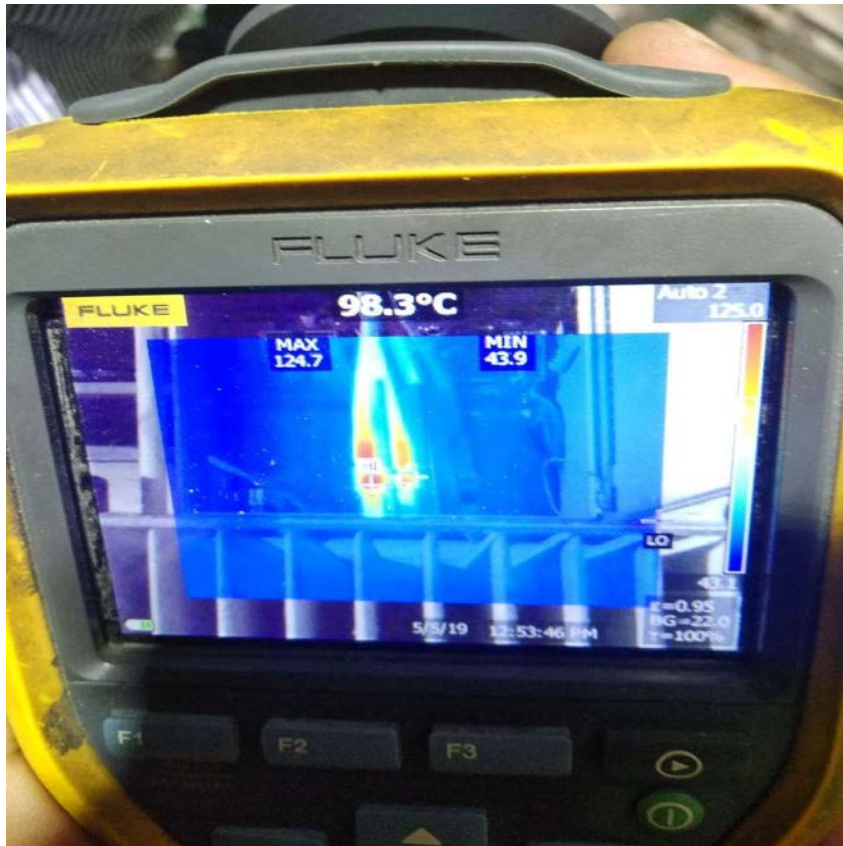


# Application result in Acidic environment : H2So4 pickling tank with acid fumes

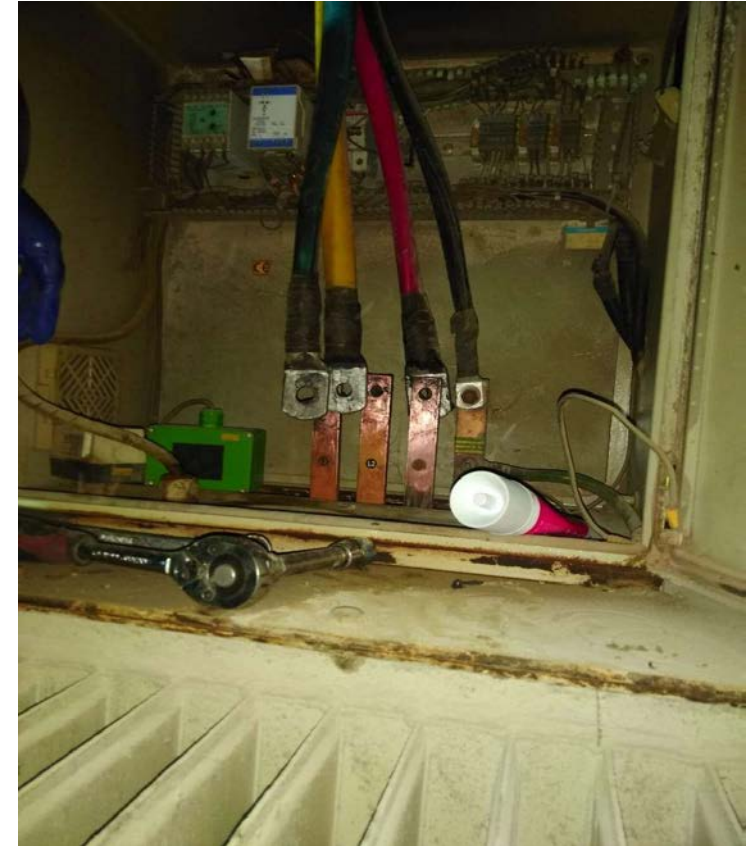
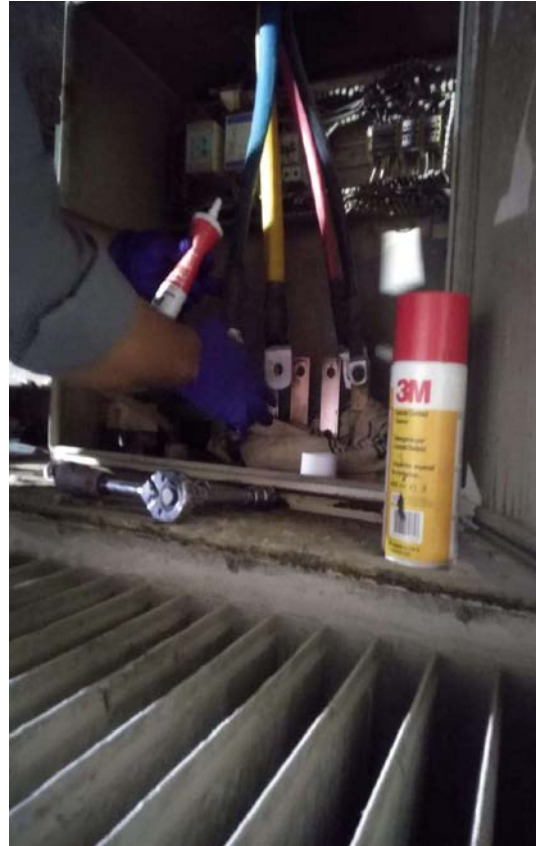
LOAD 4500 AMPS AMBIENT 40.9



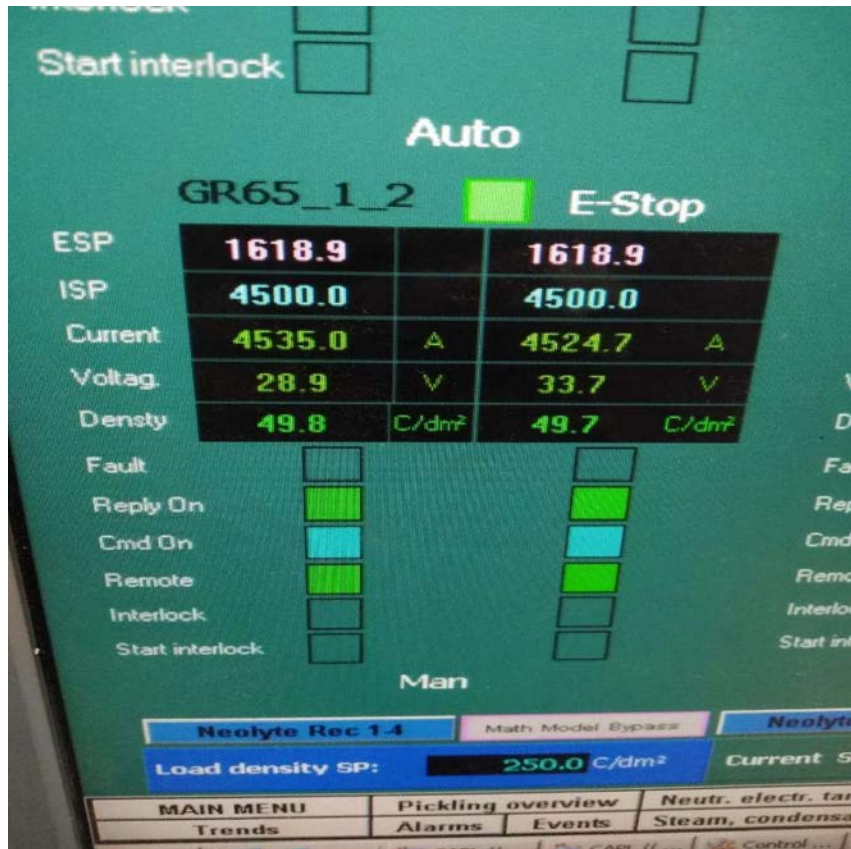
Before application , joint temperatures on 2 lugs was taken , these are 98 degree and 121degree



# 3M Contact improvement solutions was applied



Post trial the load again was at 4500 amps but ambient temperature became 44.4 degree – 3.5 degree rise from earlier ambient



Temperature at lugs were reduced from 98.3 degree to 58.4 degree and lug 2 from 121.6 degree to 64.2 degree



# AT 4500 amps in acidic environment

Summary : There was nearly a 50% drop observed at same load , summary as under :

Pre-Temperature	Ambient	Post 3M Solution	Ambient	Effective Net Drop
Lug 1 98.3	40.9	58.4	44.4	43.4 degree
Lug 2 121.6	40.9	64.2	44.4	60.9 degree

 Reduces contact resistance even when no hotspot

R



Y



B



R



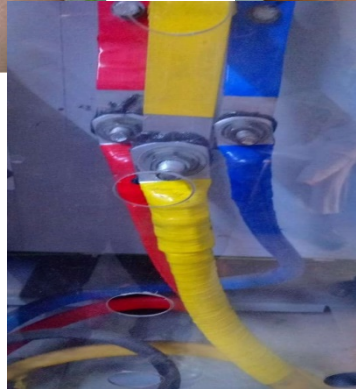
Y



B



Before application of 3M 1328

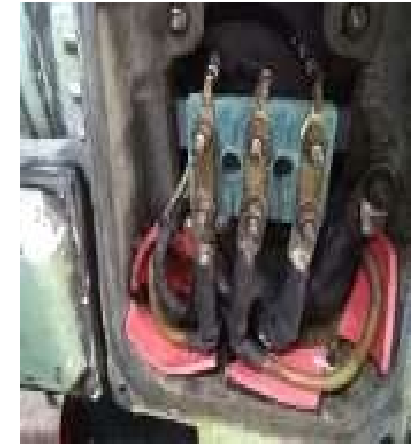


After application of **3M 1328** Electrical Conductive Compound





# Hotspot removal: All metal bolted joints/Bimetallic Joints



- ✓ Makes contact on irregular surfaces
- ✓ Fills Surface gaps
- ✓ Fills Undulation gaps
- ✓ Fills breathing gaps
- ✓ Prevents Oxidation/ Sulphation.



# Substation & Grid Maintenance PG Clamp heating losses



**3M Electrical Conductive Compound 1328(heating), 3M Scotch 23 (Insulation) and 3M Scotch 70 (Insulation, Arc resistance, anti tracking, weather resistance)**



**Benefits: Reduced heating, failures, IR losses and power failures, outdoor weather resistance**



# Substation & Grid Maintenance



Scotch 1328 / Alnox , Scotch 130C + Super 33+/35 RYB



Quick Maintenance  
Reduced regular checks

# Substation & Grid Maintenance

## Insulation of clamps , bushings, isolators



Cleaning to be done using Scotch 1625 special residue free contact cleaner before using insulating with 3M Scotch 23 EPR Rubber tape with an overwrap or 3M Super 33+



Insulations HT joints + PG Clamps + Isolator + Transformer bushings and any other exposed area where high voltage Insulation is required.



## Substation & Grid Maintenance

Scotch 70 on at terminations & crossarms of transformers

- ✓ **Concern:** Tracking; arcing; low clearance



- ✓ We suggested using Scotch 70 on end terminations to avoid their burning and failure and costly replacement.
- ✓ Transformer bushing to prevent flashover.
- ✓ On Crossarms of transformers. To reduce tracking issues / improve clearance



# Substation & Grid Maintenance

## Hotspot removal on busbars

- ✓ **Concern:** Hotspots at joint; Power losses; Faults



**3M Scotch Contact Cleaner 1625 (Cleaning) + 3M Electrical Conductive compound 1328 (Hotspot prevention)**



- ✓ **Reduced Power failures and power losses**
- ✓ **Reduced regular maintenance**
- ✓ **Reduced asset damages**

# 3M Overhead Retrofit Solutions



525W is a mastic, hand-applied material (curable silicone pad) for overhead line and joints insulation



525C provides insulation for (irregularly shaped) clamps on overhead lines with improved abrasion resistance and is easier to remove than 525W



Extruded silicone rubber products designed for field installation over bare (overhead) conductors (15-25kV) to insulate them from adjacent phases, grounded equipment, and animal contact



Electrostatic barrier that attaches to electrical insulators/bushings rated up to 35kV – consists of rugged plastic with metal spokes radiating outward



Indoor and outdoor bus bar application up to 52 kV for Round & Rectangular Bus bars. Prevent form Bird, Animal, flashovers in reduced clearance

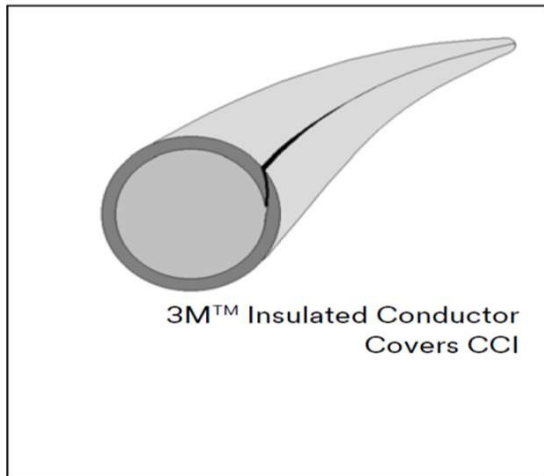
## 11 KV Conductors in India

Conductors Sizes	
Name	Dia (mm)
Ferret	9.50
Racoon	12.30
Dog	14.15
Caracal	18.00
Panther	21.00

## 33 KV Conductors in India

Conductors Sizes	
Name	Dia (mm)
Wolf	18.15
Panther	21.00
Goat	25.97
Zebra	28.62
Moose	31.77

# CCI – Conductor CoverInsulation – Monkey menace



Some of the suggested applications of the insulation system may be as follows:

- a. Minimizing flashovers due to conductor swings and wet tree branches during rains and thundershowers.
- b. Minimizing flashovers caused due to reptiles and animals.
- c. Minimizing of flashovers caused by birds nestings or large birds causing short circuits while spreading their wings when perching on the lines.
- d. Minimizing short circuits caused by kite threads (manzaa).
- e. Minimizing flashovers of busbars in substations.

CCI , Scotch 2228 , Scotch 33+ , Alnox 1328 , 1625



## CCI on long sag



# CCI on Jumpers



# CT Breaker : Alnox / 1328, Scotch 2228+88, CCI tubing combination

- Cleaning using Scotch 1625 / 1605
- Contact improvement  
– No hotspot
- Insulation on conductor
- Breaker contact insulated using Scotch 2228 + Super 88



# Hybrid Insulator : Insulation scheme

Cleaning Using Scotch 1625 / 1605

Alnox / 1328 inside clamps of hybrid insulator

CCI : 3-4 foot

Scotch 2228 / 88 : Clamp insulation.

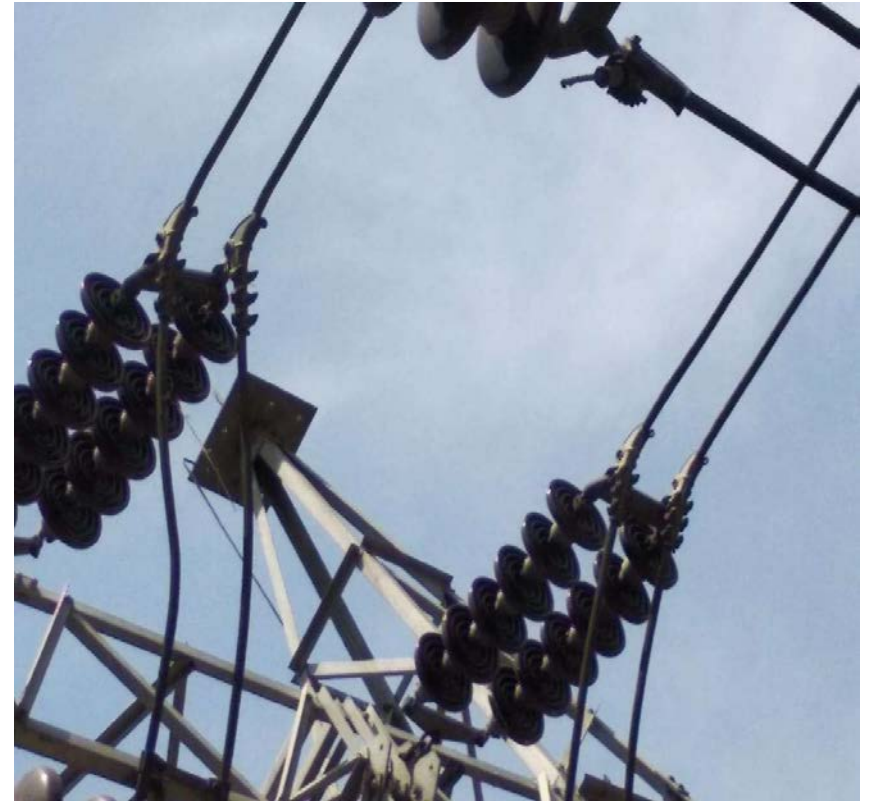


# Shoe Clamp – Insulation enhancement

Cleaning : 1626

Insulation on Shoe clamp Scotch 2228 + 88

Insulation on conductor : CCI



# Animal Guard

## 3M™ Electrostatic Animal Guard

This is a proprietary electrostatic barrier that attaches to energized electrical insulators/bushings rated up to 35 kV.

The 3M™ Electrostatic Animal Guard consists of rugged plastic with metal spokes radiating outward. When an animal touches the spokes, it receives an electric shock, similar to those generated by electrified livestock fences. The animal is not injured and power service is not interrupted.

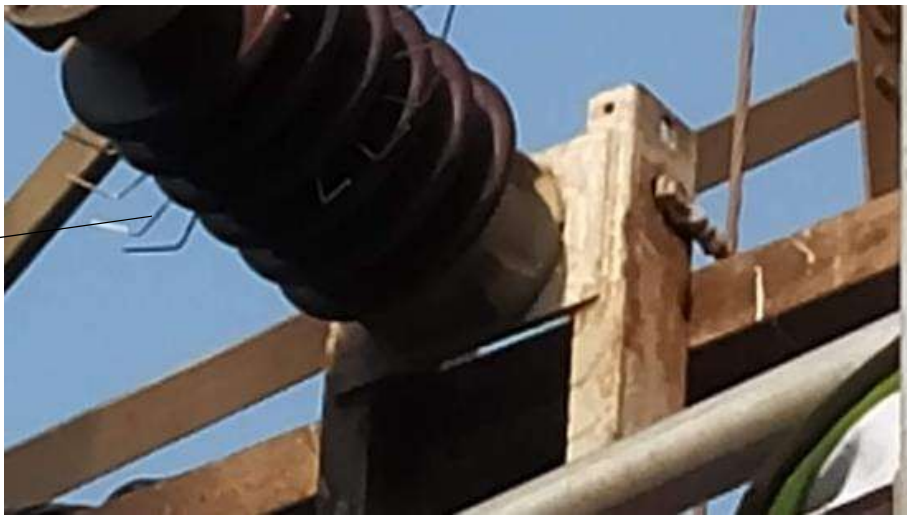
Note: Insulator neck diameter range is defined as the diameter of the insulator in between the skirts.



Voltage 35 kV and less

Order No.	UPC	Insulator Neck Diameter Range	Case Qty.
GG-7525	054007-43128	0.75"-2.50" (19,1-63,7 mm)	100
GG-1525	054007-43125	1.50"-2.50" (38,2-63,7 mm)	100
GG-2545	054007-43126	2.50"-4.50" (63,7-114,7 mm)	100
GG-4565	054007-43127	4.50"-6.50" (114,7-165,7 mm)	100

# Electrostatic Animal Guard and CCI application





# Insulation and Anti tracking + moisture proof – Scotch 70



- ✓ Excellent Weather resistance
- ✓ Hydrophobic
- ✓ Anti tracking properties



# Opening Rusted Joints - 3M 1633, Cleaning Joints drying using Scotch 1625





# Cleaning of clamps – copper using Scotch 1605 , 1625





# Application of 3M Products – Cleaning & Hotspot removal from Isolator bar & Jaw using 1605, 1633,1626 & Alnox- 1328



Before



After



# Isolator cleaning -1605 , earthing joints cleaning-





# Instant Bus Bar Cleaning Using 3M Scotch 1605 & 1625

**Before**



**Application**



**After**





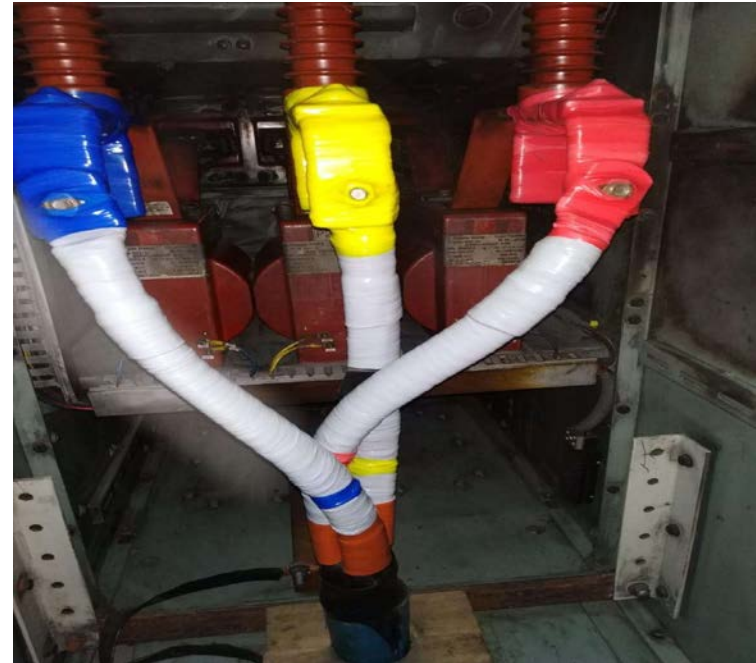
# Insulators protection and restoration of Insulation by using 3M Scotch 1602 -Red



**3M Scotch  
1602- Red**



# Moisture removal & cleaning, anti track insulation - 11KV Panel



Dehumidification & Cleaning, Anti Tracking insulation , Color Coding , Isolator insulation build up

# Bus Bar Insulation Scheme for transformers



# Termination Joint Sealing – Replacement of old corroded Earthing and Sealing



The old corroded Clip was replaced with new clamp, #25 Grounding braid followed by #2228 and #33+



- ✓ Moisture resistant
- ✓ Avoiding major failure by preventive maintenance



## Drop Down Fuse Unit Insulation – Scotch 2228

**Tangible Loss to utility – frequent faults and tripping.**

**Commercials :** 3M Scotch 2228 tape – 50 mm x 9 meter ( post stretch ) will Rs 115 per meter Consumption. Wrap Tartan 1710 over it will be provided FOC with Scotch 2228.

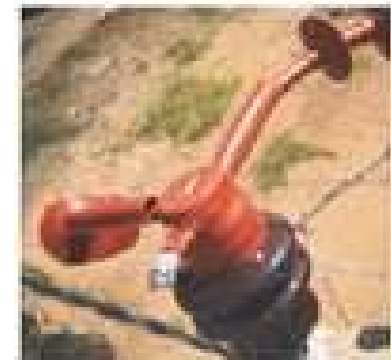
**Benefits:** Insulation, Padding, moisture sealing of irregular shapes UV resistance, Easy to use and re use.





## ABC T Tap connections insulation

- T Taps terminals: Issues of squirrel fault.
- When ABC is joined, T taps are used, there is heat shrink design or flap design.
- Heat shrink design edges are very difficult to insulate using HST at height – owing to air pressure , carrying torch and cylinder , moving at 360 degree angle.
- Flap design has issues of moisture entering from sides. Flaps opening





## Insulation on LT/ HT Poles

- Takes 5 minutes per pole , no drying time , coat on coat required, not dependent on environment.
- Patch repair / damage repair possible
- Tape has uniform layer which ensures constant dielectric strength.
- Thermosetting adhesive will prevent any unfurling or opening post application.
- In field trial since October last year.
- Flame retardant version also available.
- Dielectric strength 10 KV , thickness 0.25 mm.
- FR version – Super 88 and Anti corrosion version – Scotchwrap 50 tape.





# Pole wrapping





# Pre and post application of pole wrapping



# Transformer leakages repair

- Remove existing material used for leakages
- Clean and degrease – use 1626 spray
- Apply Scotchfill immediately – press
- Wrap Scotch 70 over it.



## Transformer oil leakages

- Clean using Scotch 1626
- Wrap Scotch 70
- If Taping is not possible , insert Scotch fill putty



The background of the slide is a complex, abstract geometric pattern composed of numerous overlapping triangles in various shades of yellow and orange. The triangles vary in size and orientation, creating a dynamic and textured visual effect. The colors range from bright, sunny yellow to a deeper, more saturated orange, with some areas appearing as lighter, almost white highlights where the triangles overlap.

# Cable System Maintenance



# Cable System Maintenance

## Underground Cable damaged Jacket repaired



Before



After



### On-site quick cable jacket repair Sealing Padding and Insulation



# Cable System Maintenance for flexible cable



Stacker Reclaimer



Damaged Cable



Repaired Cable

# Cable System Maintenance

## 3M Solution for Flexible Cable jacket repair & Jointing

### Cable Jacket Repair Mining Tape 31 & +130C



Scotch 130C should be also used if the cable damage is high

### Flexible Cable Joint - 3104 Kit – UG mines



3M™ Mining Cable Splice Kit 3104

Mining Cable Splice Kit 3104				
1	Scotch® Heavy Duty Mining Tape 31	2" x 8.5'	2kV	#6-500 kcmil
1	3M™ Temflex™ Vinyl Electrical Tape 1700P	1-1/2' x 44'	2kV	#6-500 kcmil
3	Scotch® Electrical Shielding Tape 24	2" x 10'	2kV	#6-500 kcmil
1	3M™ Cable Cleaning Preparation Kit CC-2-Dry		2kV	#6-500 kcmil
2	Scotch® Linerless Rubber Splicing Tape 130C	1-1/2' x 30'	2kV	#6-500 kcmil
1	Scotch® Linerless Rubber Splicing Tape 130C	3/4" x 30'	2kV	#6-500 kcmil

### Flexible Cable Joint - 3103 Kit



3M™ Mining Cable Splice Kit 3103

Mining Cable Splice Kit 3103				
2	Scotch® Heavy Duty Mining Tape 31	2" x 8.5'	5 - 15kV	#6-500 kcmil
1	3M™ Temflex™ Vinyl Electrical Tape 1700P	1-1/2' x 44'	5 - 15kV	#6-500 kcmil
3	Scotch® Electrical Shielding Tape 24	2" x 10'	5 - 15kV	#6-500 kcmil
2	Scotch® Rubber Mastic Tape 2228	1" x 10'	5 - 15kV	#6-500 kcmil
2	3M™ Cable Cleaning Preparation Kit CC-2-Dry		5 - 15kV	#6-500 kcmil
3	Scotch® Electrical Semi-conductive Tape 13	3/4" x 15'	5 - 15kV	#6-500 kcmil
3	Scotch® Linerless Rubber Splicing Tape 130C	1-1/2' x 30'	5 - 15kV	#6-500 kcmil
3	Scotch® Linerless Rubber Splicing Tape 130C	3/4" x 30'	5 - 15kV	#6-500 kcmil



# Shielded Cable Jacket repair





# Cable System Maintenance

## Cable Jacket repair with abrasion resistance

- ✓ Concern: Cable jacket failure leading to electrical losses in MV Cables
- ✓ Reasons Identified: Abrasion and Harsh Environment



3M Heavy Duty Mining Tape 31  
3M Super 33+ for edge sealing



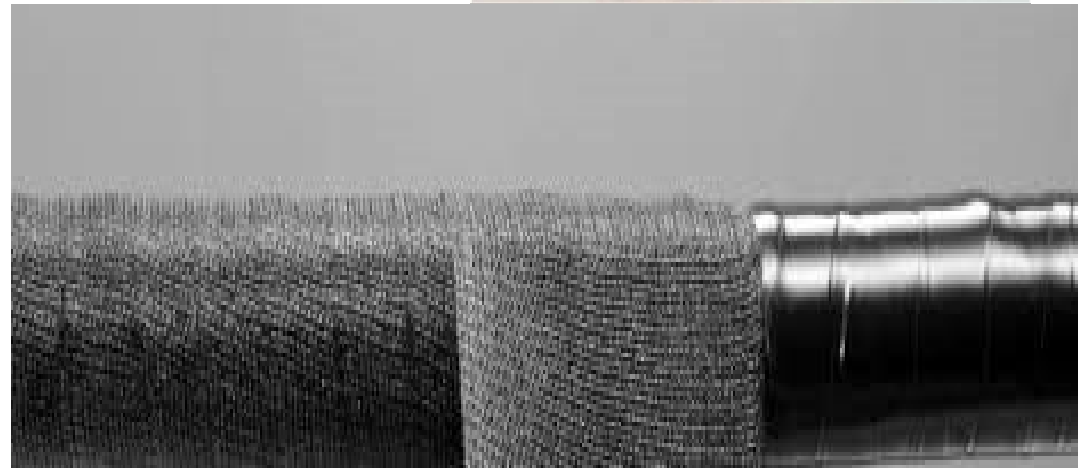
On-site quick cable jacket repair  
Abrasion Resistant  
Sealing and Insulation



# Cable outer sheath repair – Structural repair

Kit contains – Scotch fill , Scotch 23 , Armourcast

Flexible fiberglass knit fabric strip that has been saturated with a curable black urethane resin syrup that starts to cure when water is added. Once wet, the fiber strip becomes tacky and sticks to itself, so it wraps easily around almost any shape or size. Armorcast Structural Material is resistant to moisture, fungus, acid, alkali, ozone, sunlight, gasoline and high temperatures. It combines long life and very little maintenance. 3M™  
Armorcast Structural Material is RoHS compliant.\*





# Polycot tape to prevent roof leakage

Junction box, panels, roof sealing





# Polycot tape to prevent roof leakage

Sheds , roof tops





## 3M Scotch 1633 – Rust penetrant and remover

- Contains MOS2 – highest penetration properties and provides permanent lubrication.
- Releases corroded connections
- Very good creep properties and good capillary action
- Infiltrates and penetrates rust
- Protects against oxidation and corrosion
- Prevents the "seizure" of screw connections
- Eliminates squeaking and creaking noises





Conveyer belt repair in case it gets damaged, the below solution is flexible , impact resistant and flame retardant





## Clean -1625 , Pour and spread Scotchcast2131





Shore hardness is 50 Scale D and belt is repaired for operations





# Spray 1600 Application



Protective Sprays



Cleaning  
with 1633  
Rust  
Remover



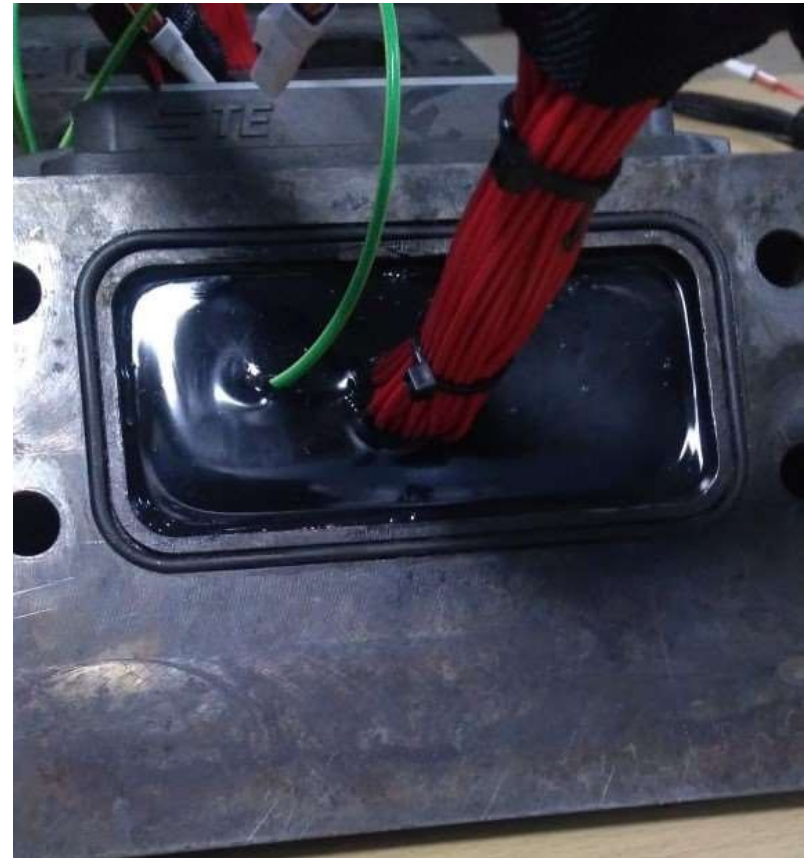
Anti Rust Rubberized Coating with 1600

Anti Rust  
Coating  
with 1600





# Connector potting – Scotch cast 2131 resin



# Cable System Maintenance

## Fire & Arc resistant Tape for Cables & hose pipe protection



**3M Fire and Arc resistant for Cables and hose pipes using Scotch 77 Tape**



### Applications

- Protect cables from electric arcs and fires
- Use on energy cables running in close proximity to other energy cables, such as:
  - Cables in substations, manholes, and vaults
  - Critical feeder cables and nearby branch circuits
  - Energy cables in buildings that cannot afford to lose power, (e.g. hospitals, military bases, server farms, etc.)
  - Energy cables in cable trays

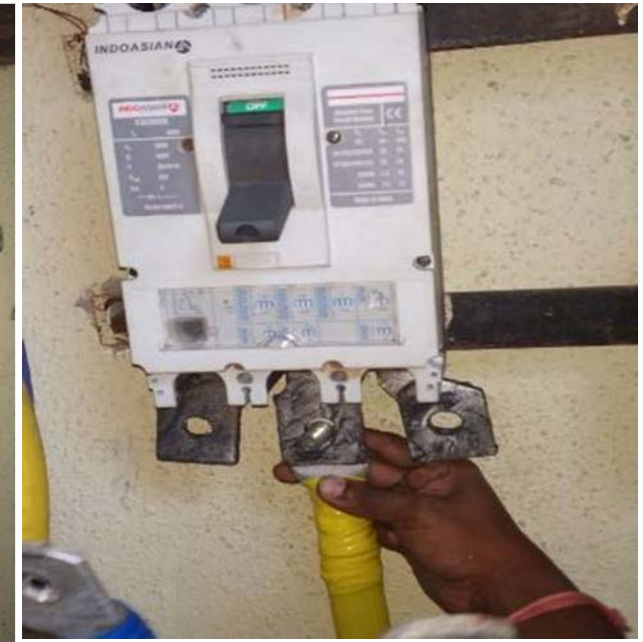
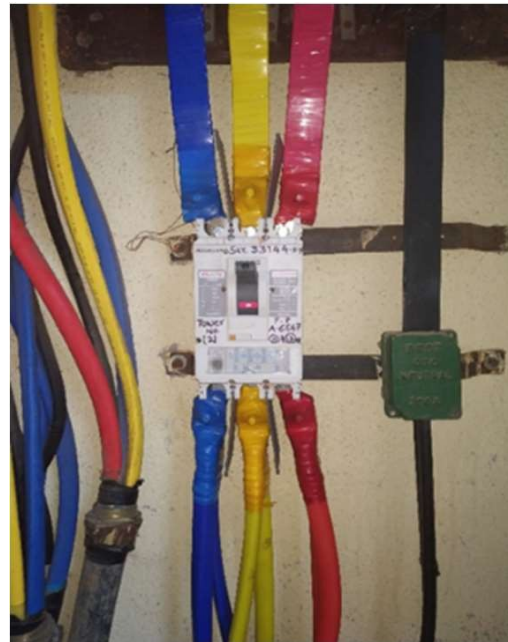


# Maintenance & Workshop Repair

# Plant/Township Maintenance & Workshop Repair

## 3M 1328 application between lug joints of switching unit

✓ **Concern:** Hotspots at joint; Flickering of floodlights



Switches for Flood lights



**Other Application: HVAC, Generator Panels, Control Panels, Main Control Room**

## Plant/Township Maintenance & Workshop Repair 3M Scheme for LT side of transformer

- ✓ **Concern:** Overheating at LT side of the transformer; animal fault



- Using electrical conductive compound 3M 1328 will eliminate hotspots as well as save electricity. This should be used as filler between bolted connections as well as lug area to remove air. The nano particles in this paste will increase the surface contact & conductivity.
- To cover uneven areas of nut bolts, and remove air, we suggest using 3M Scotchfil putty on the uneven part, this is non hardening and non corrosive putty from 3M.



- Wrap Scotch 33+(Black) or 35 tape(RYB) on all LT joints. The tape is flame retardant, can work at continuous temperature of 105 degrees and has non fading colors.

# Plant/Township Maintenance & Workshop Repair



Combination of 3M 1328+3M Scotchfill putty and 3M Scotch 35 tapes used to protect and Color code which last longer



# Plant/Township Maintenance & Workshop Repair

Revenue loss due to Transient faults / frequent tripping's

✓ **Concern:** Phase to Phase or Phase to Earth fault due to Animal / Bird



**3M Conductor Cover Insulation (CCI) Tubes**  
Class H, anti tracking, corona resistant, flexible, reusable, arc resistant



- **Protects / Insulates** bare conductors w/o dismantling the line
- **Versatile Usage** : Can be applied on bends/jumpers
- **Easy to install:** No Special Tools required for installation
- **Shorter period of Shutdown:** Faster installation
- **Maintenance friendly** - Reusable
- **Best for Outdoor** - Silicone rubber H Class Insulation

# Plant/Township Maintenance & Workshop Repair

## Preventing moisture ingress

- ✓ **Concern:** Moisture ingress; corrosion of connections & conductors; power failure



**3M Scotch fill putty and 3M Scotch Rubber Mastic Tape 2228 are excellent when it comes to sealing moisture entry.**



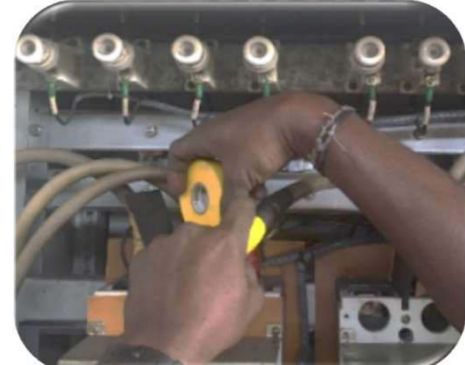
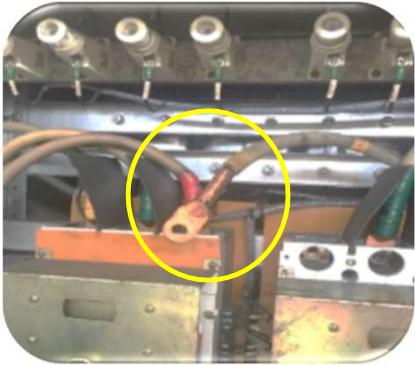
**Ideal for both indoor and weather-exposed outdoor applications, this tape is designed for all your moisture-sealing and electrical insulating applications**



# Plant/Township Maintenance & Workshop Repair

## Internal moisture sealing (Electrical Panel)

- ✓ **Concern** : Accumulation of moisture inside an panel with exposed lug ends may lead to short circuit or flash over between phase to earth and phase to ground.



Step 1 : Dehumidify using 3M Scotch 1605 Dehumidifier Spray and 1625 for cleaning.



Step 2 : Moisture Seal & insulate using Scotch using Scotch 23/130C on the conductor. If uneven surface is there use 3M Scotch Mastic Tapes 2228/2229/Scotchfil putty Tape



Step 3: For Outer Protection, Jacketing and color coding wrap 3M Scotch Vinyl Tape for outer protection and color coding. 3M Scotch 35 is available in 9 colours

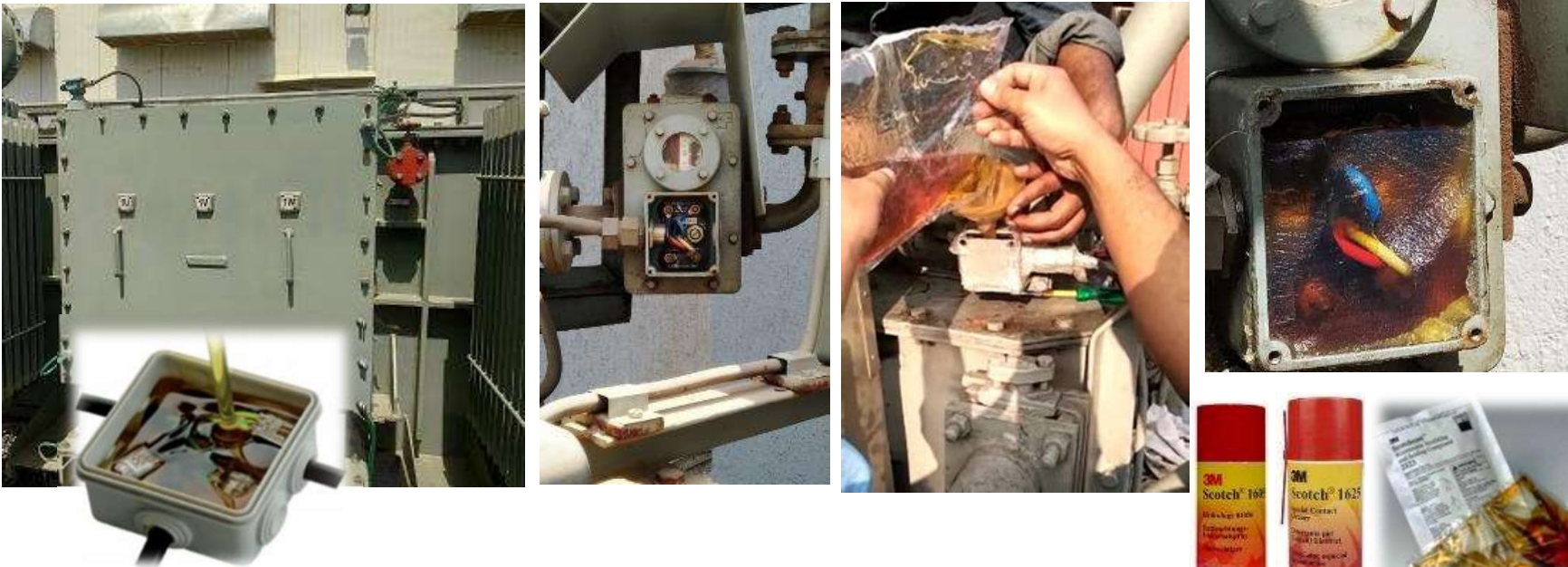




# Plant/Township Maintenance & Workshop Repair

## Moisture Protection of Buchholz Relay on 500 KVA Transformer

✓ **Concern:** Damage to the transformer due to malfunction of relay



3M Scotchcast Re-enterable Electrical Insulating Resin 2123 is formulated for electrical applications requiring a soft and re-enterable encapsulant with good handling and performance characteristics.



**Avoids failure of relay and hence transformer**  
Resin 2123 is excellent for applications with constant exposure to water & critical application.

# Plant/Township Maintenance & Workshop Repair

## Sealing of Junction Boxes - roomcuring

✓ **Concern:** Moisture ingress; Corrosion; MalfunctioningC



3M™ Scotchcast Resin 2131 is a two component, flame retardant, flexible polyurethane resin for room temperature curing. The resin has been designed for electrical insulation and mechanical protection of flexible electrical cable joints.



3M Scotchcast Re-entable Electrical Insulating Resin 2123 is two component , formulated for electrical applications requiring a soft and re-entable encapsulant with good handling and performance characteristics.

# Plant/Township Maintenance & Workshop Repair

## Corrosion Protection of structures

✓ **Concern:** Localized corrosion of structure due to moisture water, chemicals



3M 1625 Cleaning Spray  
3M 1617/16-501 Zinc Spray (Primer layer)  
3M 1604 Grey Sealer Spray (Top Coat)



- ✓ Onsite Corrosion Protection.
- ✓ Easy to carry and faster to do
- ✓ Asset protection
- ✓ Avoids long term losses
- ✓ 800 hours of salt spray test

# Scotch® Zinc Spray 16-501



Dispersion of fine powdered 97% pure zinc

- Halogen-free and leaves a barrier coating similar to hot-dipped galvanized surfaces
- Instant drying capability
- this non-corrosive spray preserves base metal, even when scratched or chafed.
- RoHS 2011/65/EU Compliant.



- ✓ **Lasting protection against rust and corrosion of bare iron and steel fabrications.**
- ✓ **Restoration and protection on galvanized metals following damage.**



*Prior cleaning is recommended with Scotch®1626 or Scotch®1625.*



Zinc Spray Applications



Zinc Spray Applications





# Plant/Township Maintenance & Workshop Repair

Sealing of unused opening to prevent entry of rodents, moisture,

✓ **Concern:** Rodent menace; Electrical faults



Unwanted hole is plugged



3M Scotch 1639 Foam Spray is a quick-drying one-component foam spray, for installation and filler applications which swells and cures when exposed to air and moisture.



For sealing and filling joints, cracks, cavities and installation channels.



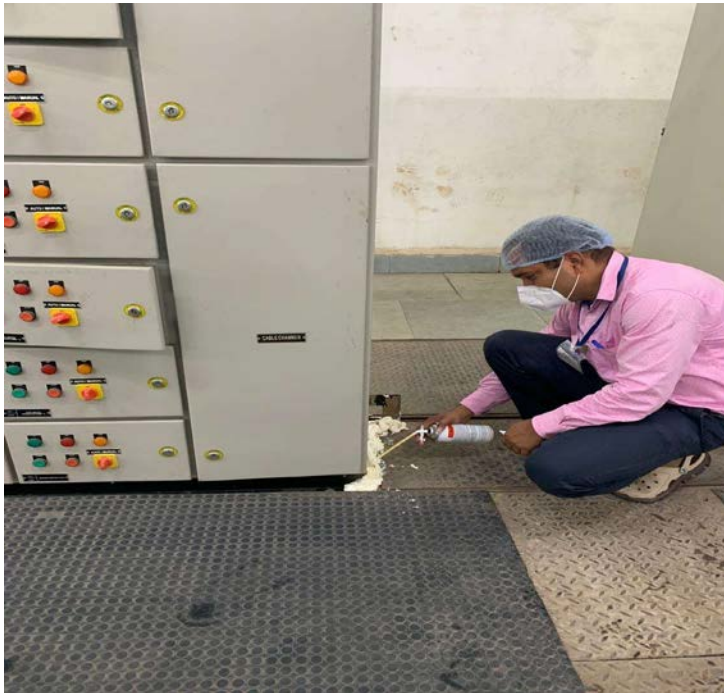
# Plant/Township Maintenance & Workshop Repair

Sealing of unused opening to prevent entry of rodents, moisture





# Scotch 1639 seals gaps easily





# Plant/Township Maintenance & Workshop Repair

Protect your Electrical Network from rodents

✓ **Concern:** Rodent menace; Electrical faults

**3M Rodent Repellant Coating Spray** is a specially developed coating to prevent wires and cable damage from the menace of Rodents.

The coating contains bitter ingredients to repel rodents thereby preventing cable and asset replacement which would get damaged due to network failures.

## Areas of Applications:

Electrical & Telecom Wires and Cables, Electrical Panels, Rubber and plastic parts



3M Rodent Repellant is tested by a NABL Accredited Laboratory for its potency against rodents.



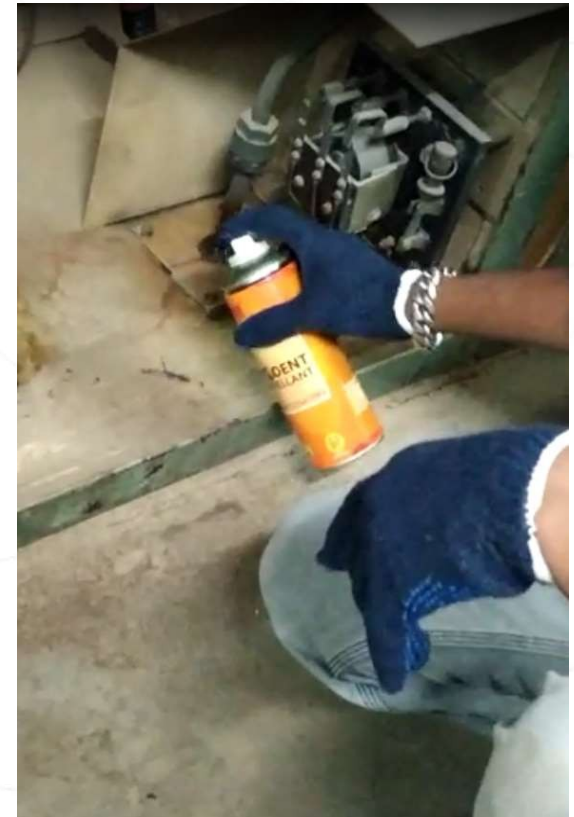
# Rodent Repellant Application



Panel Entries



Panel Cable Entries



PVC Wires, Rubber & Plastic Parts

***Important: Switch off the Electrical power before application***

# Reducing Circuit Breaker (CB) Flashover using 3M 1602-R Red Insulating Sealer



## Benefits

- Excellent adhesion to metals, windings and coils
- Excellent Flexibility
- Dielectric Strength 104KV/mm

**Problem Statement:** With continuous operation and exposure to dust, moisture and heat the chances of a failure of Circuit breaker increases which results in drop in Insulation resistance leading to a major failure.

**Solution:** 3M 1602-R – Ensures Uniform coat & a substantial increase in IR value



**From**

**To**

Insulation Resistance

< 2000 Ohm



> Giga ( $10^9$ ) Ohm

Failures Reduction

<40%



<10%

Potential Saving /CB breakdown

Nil



~Rs. 5 Lacs



**3M**

# Protection of electric motor winding using 3M 1602-R Red Insulating Sealer



## Benefits

- Excellent adhesion to metals, windings and coils
- Excellent Flexibility
- Dielectric Strength 104KV/mm

**Problem Statement:** Winding failure of industrial motor due to exposure to cement dust, moisture and heat. The failure starts with progressive drop in IR value & finally resulting in complete burn-out of winding & motor seizure.

**Solution:** 3M 1602-R Spray provides a glossy coating, increases the IR value substantially



90Kw, Class F, Continuous operation motor in cement plant

Insulation Resistance	< 100 Ohm		> Giga (10 <sup>9</sup> ) Ohm
Failure Rate	Once in 3 years		Once in 5 years
Potential Saving breakdown	Nil		~Rs. 0.3Lacs

**Important:** Above values are as per internal analysis and we recommend to do application trials at your site. Please refer to 3M Technical Datasheet before usage and application of the products. 3M Electrical | 84

# 3M Motor Lead Connections for Electrical Construction and Maintenance – LT motors / HT Motors / High Temperature



# HT Motor Terminal Lead insulation and protection



Improper Insulation leading to Dust and moisture



Ensuring Insulation with EPR Linerless 130C rubber tape and and mechanical protection with Super 33+; 1328 on metal parts



Properly insulated and mechanically protected motor lead wires / cables

# High Temperature Tape for Cable protection



Hi-Temp Tape wrapped on a cable

- Continuous 600°C



Kept on Coke Oven battery area on Top at Temperature greater than 300 deg C



Tape is intact with blackening but keeping cable safe

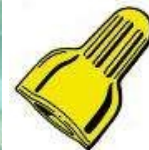


# Wire Connectors (Spring Connector)

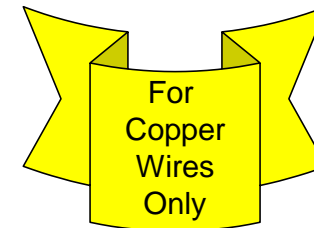


- Application:  
Electrically connect two or more conductors ends in pigtail application and insulate the connection, or insulate a single conductor end.

- Type:                      Wire Range (SQ MM):
- Y (yellow)                      0.75 thru 2.5 sol/str
- R (red)                            1.0 thru 6.0 sol/str
- G(gray)                            2.5 thru 8.0 sol/str
- B (blue) 4.0 thru 16.0 sol/str



- Construction:
- Spring : Spring steel, Corrosion res. coating
- Shell : Steel, Corrosion res. Coating
- Insulator : Flame Retardant, flexible PVC



# 3M Wire Connectors

Electrically connects two or three wire ends, insulate the connection

## Spring Connectors



Connect and insulate copper wires in a variety of industry applications

Flexible spring accommodates a **range of wire sizes and combinations**

## Direct Bury Connectors



Reduce exposure to the elements in outdoor boxes and underground connections

Moisture resistant grease acts as barrier for damp environments

## Insulation Displacement Connectors (IDCs)

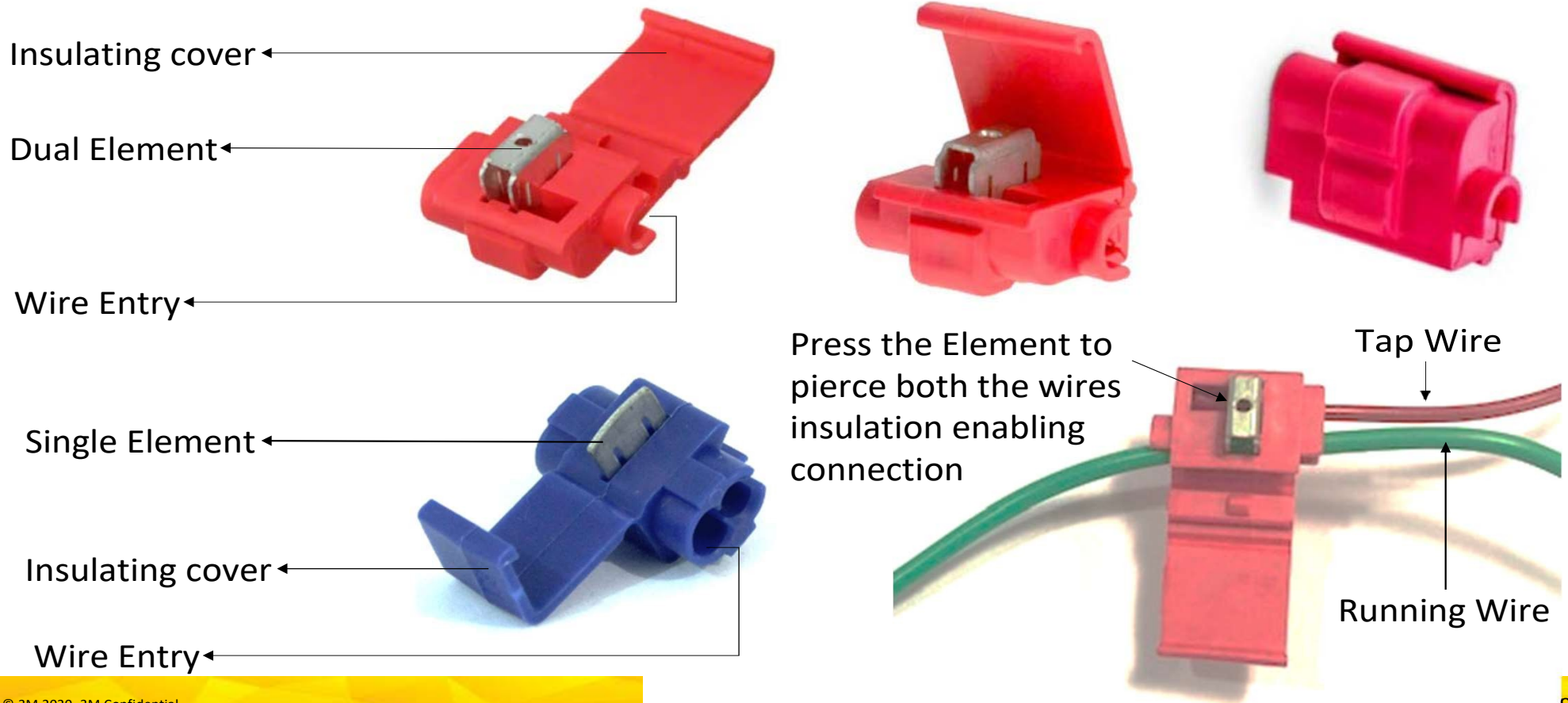


Quick and easy connections **without the need to strip wire**

Select products are **moisture resistant** and **removable** to allow for easy disconnections

# Key components of Insulation Displacement Connector(IDC)

Function: Electrically connects two or three wire ends, insulate the connection



# 3M Scotchlok Irrigation Connector – 316IR



The product is recommended for use with low energy underground circuit wires, sprinkler systems, landscape lighting or other moisture-resistant applications less than 30 volts.



# Summary - Insulation need to be Top priority



➤ Insulation costs is single digit of electrical budget but more than half of budget amount is spend due to failure in insulation only.



➤ Major fires happen due to electrical insulation failures which can bring huge losses



➤ Management focusing more on quality insulation are able to enhance safety, reduce failures and increase revenue



## **PARKER ELECTRONICS PVT. LTD**

59/1/1, Industrial Area, Site - 4 Sahibabad,  
Ghaziabad - 201010, Uttar Pradesh, India

**Phone** - +91 120 4793777, 8383851089, 9717111038

**Email** - [info.pepl@parkergroup.in](mailto:info.pepl@parkergroup.in), [sales.cord@parkergroup.in](mailto:sales.cord@parkergroup.in)