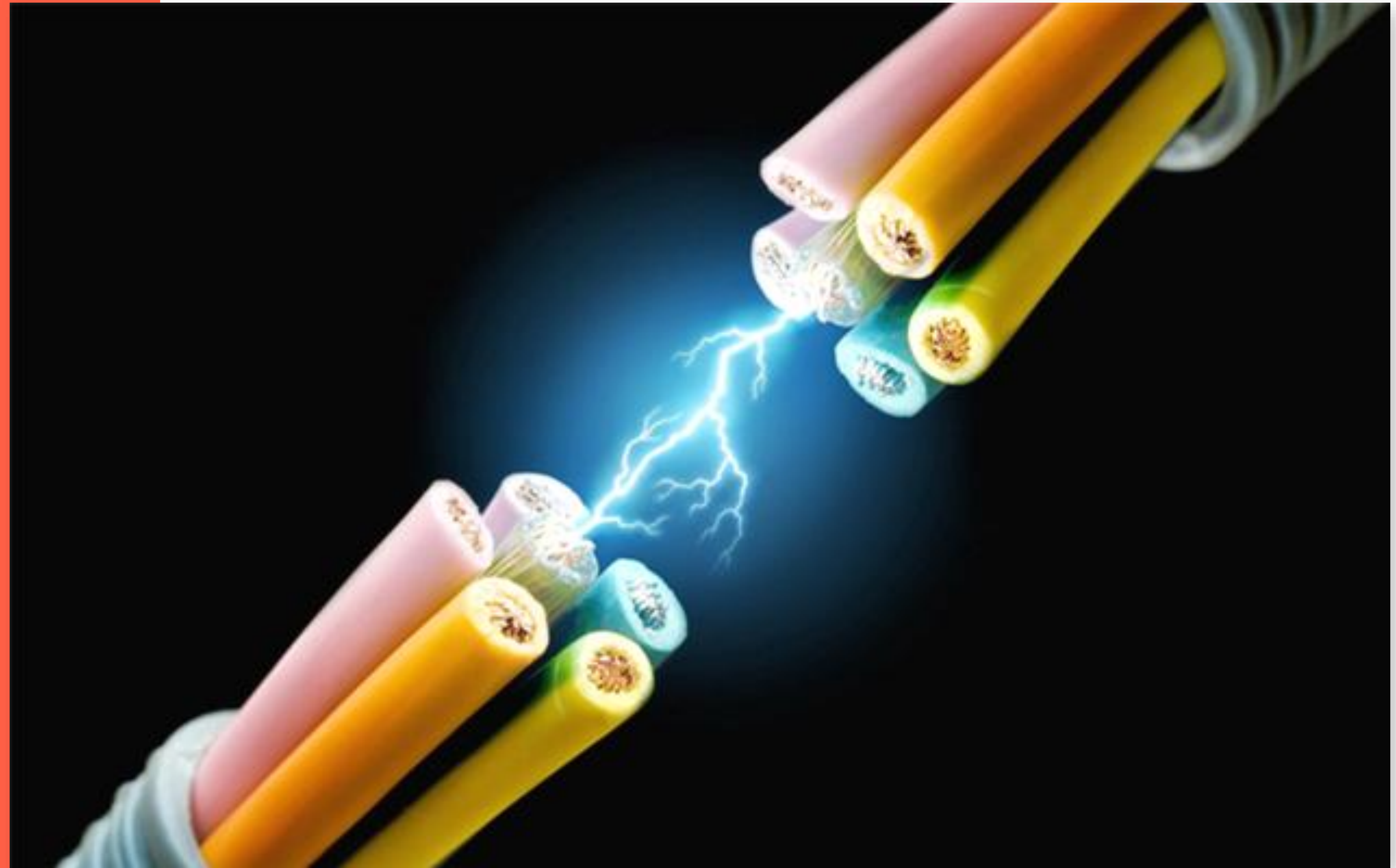


Role of Wires & Cables in Building

Amol Kalsekar
Director – Marketing

 ICA India

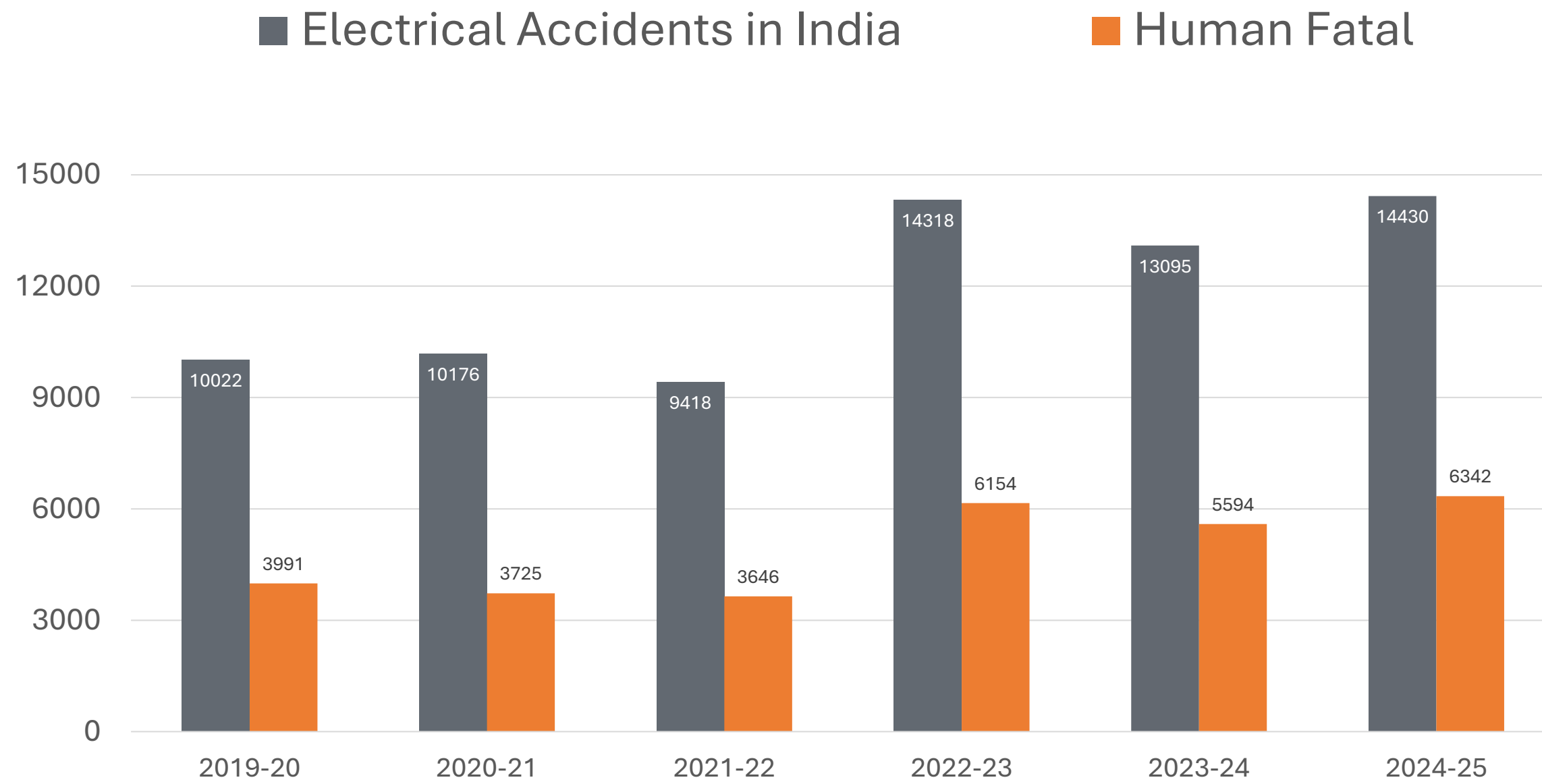


Who are we ?

- We are not for profit, non-commercial organization
- We represent the copper industry
- Role is to contribute to the UN Sustainable Development Goals
- We promote electrical safety, reliability, clean energy transition, circular economy
- Working with various ministries, BIS, BEE, MNRE, DPIIT, etc. and other industry stakeholders contributing to the national objectives.
- Under our Green and Healthy Building program, we train 10000+ electrical installers & Engineers annually, under its train the trainer's program.

India Public Safety

6300 people died in 2024-2025 due to electrocution and fire due to Electrical Short Circuits i.e. 17 people die every day



Source: CEA



Why
does
this
Happen?



Why electrical installation initiate fire?

FAULTY DESIGN

**DEFECTIVE
MATERIAL**

WORKMANSHIP

**LAPSES IN
VERIFICATION
and TESTING
PROCEDURES**

Right selection of Cables in Buildings

Defective Material

Right selection of cables

Various factors:

- Current carrying capacities - variation
- Derating
- Class of conductor
- Conductor cross section
- Right selection of insulation & conductor







Selection of Material

Types of Wires & Cables

- FR – IS 694
- FRLSH – IS 694
- HFFR (LSZH) – IS 17048
- FS – IS 17505
- Solar DC Cables – IS 17293

Know the Difference

Fire Safe Cables

Types of Fire Safe Cables	Facility Type / Systems					Cable Features
	Standard Installation conditions	Non – Hazardous Industry	Chemical or Refinery	Theatres, Hospitals, Shopping Malls, Airports etc.	Fire Alarms, Elevators, Fire Fighting Systems, Metros, Mines etc	
 Fire Survival (FS) Cables <small>950°C for 180 min</small>	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> • Designed to maintain circuit integrity and keep working for a specific amount of time under fire • As per newly released Standards IS 17505 fire survival cable should be able to withstand 950°C of heat for at least three hours
 Low Smoke Zero Halogen (LSZH) Cables	✓	✓	✓	✓	✗	<ul style="list-style-type: none"> • Made from polypropylene, which does not produce hazardous gasses during fire conditions • LSF cables will emit around 18% of smoke containing hydrogen chloride, offering 80% visibility
 Fire Retardant Low Smoke (FRLS) Cables	✓	✓	✓	✗	✗	<ul style="list-style-type: none"> • Reduce emission of smoke and toxic fumes during a fire • Offer upto 40% visibility in case of a fire incident • Smoke density of around 60%
 Fire Retardant (FR) Cables <small>800°C for 90 min</small>	✓	✓	✗	✗	✗	<ul style="list-style-type: none"> • Fire retardant prevents fire from spreading

✓ Suitable for use as per standards ✗ Not suitable for use as per standards

Source: International Copper Association India | www.copperindia.org

NBCS 2026 - 5.3.7 Cables

- **Cable Sizing Criteria Mandatory:** Sizing must account for current carrying capacity, voltage drop, short-circuit withstand, laying method, soil thermal resistivity, maximum temperature, and overload protection characteristics.
- **Fire Safety Recommendation:** Use Flame Retardant / Low Smoke / Halogen Free (FRLS / LSOH) cables and wires in electrical distribution systems.
- **Copper Conductor Mandatory:** All cables up to 25 mm² shall use copper conductors to prevent overheating and reduce fire risk in internal wiring.
- **Load Balancing Required:** Balance single-phase loads as far as possible to minimize neutral current in three-phase systems.
- **Installation Compliance:** Follow relevant good practice standards and cable manufacturer's recommendations for installation, jointing, and sealing.



Threshold Raised to 25 mm²

The copper-only mandate for conductor sizes has been raised from $\leq 16 \text{ mm}^2$ to $\leq 25 \text{ mm}^2$ a decisive expansion of copper's mandatory footprint.

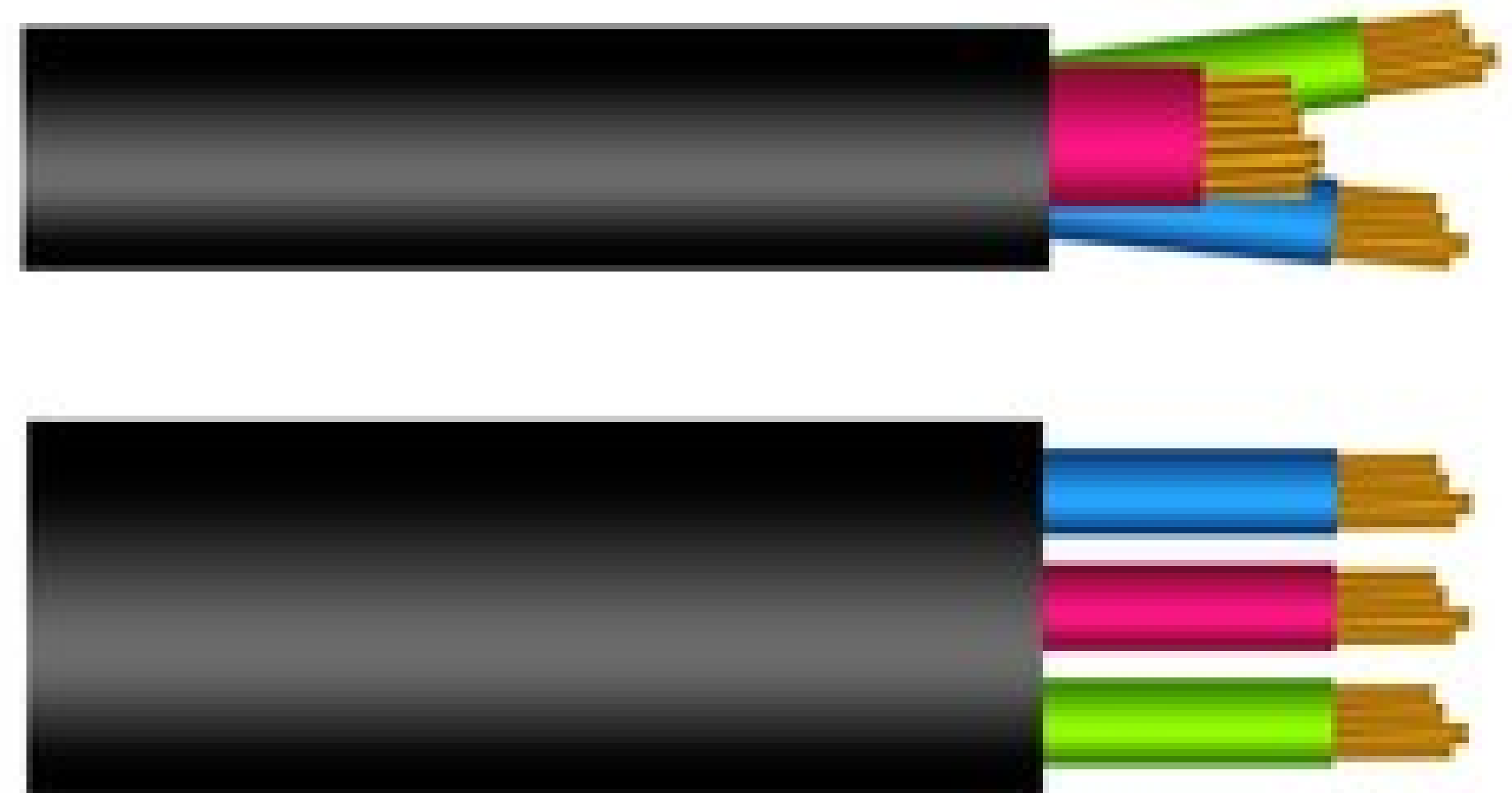


Critical Buildings

Very important public buildings and multi-storey towers now have specific copper mandates up to 50 mm² a named, enforceable provision.

5.8.5 Selecting and Installing Cables

- Recommended Cable Types:
 - ✓ Internal wiring: FRLSH Copper cables (Flame Retardant Low Smoke Halogen)
 - ✓ Fire alarm & critical services: HFFR / Fire Survival Copper cables
 - ✓ Mains: XLPE cables
 - ✓ Underground / Inter-building feeders: Armoured XLPE or PVC cables
- Underground Cable Protection Mandatory: Sand cushioning + bricks/concrete cover + marker strip + GI/PVC mechanical protection up to 2 m above ground.



Highlights - CEA Regulation and IS 732

Regulation 12 of CEA safety Regulations 2023, refer Indian Standards and mention to follow them in accordance hence becomes **mandatory**.

Heat / spark gets generated due to over-current or fault current which may occur due incorrectly designed **size of conductor** and its protection.

Electrical hazards can mainly be classified as Electrical Shock and Fire initiated due to electrical installation. if **selection of cables** is not proper, gases generated are toxic endangering human life

current carrying capacity as claimed by manufacturer under normal condition my **reduce to 50%** depending on **situation and method of installation**, which further requires increase in **size of conductor**

Adequate and correctly designed **protective equipment** is a gate way to prevent any mishap. Any possible cause of mishap, **over current, short-circuit, earth leakage, earth fault, voltage variation** can be prevented by following IS 732.

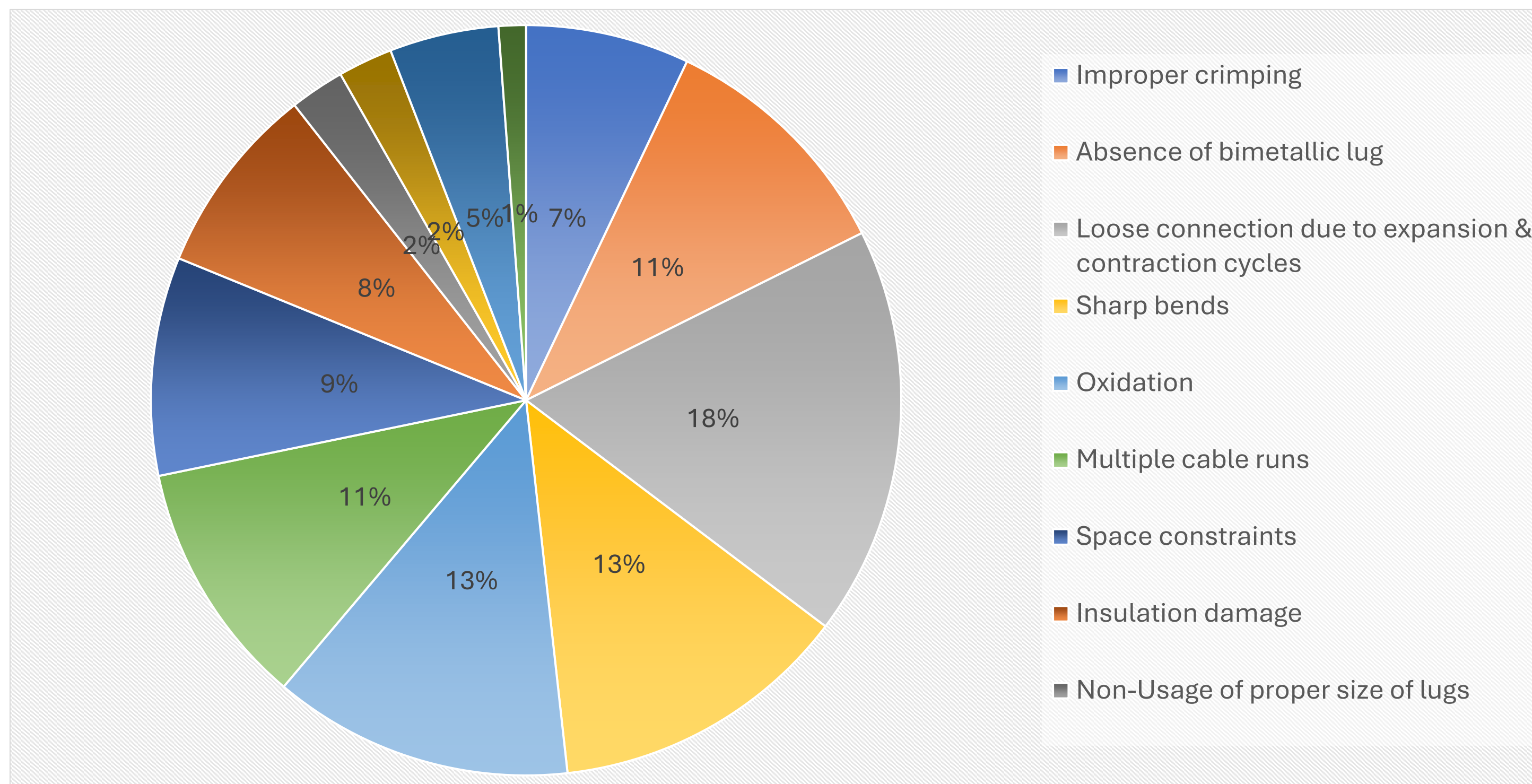
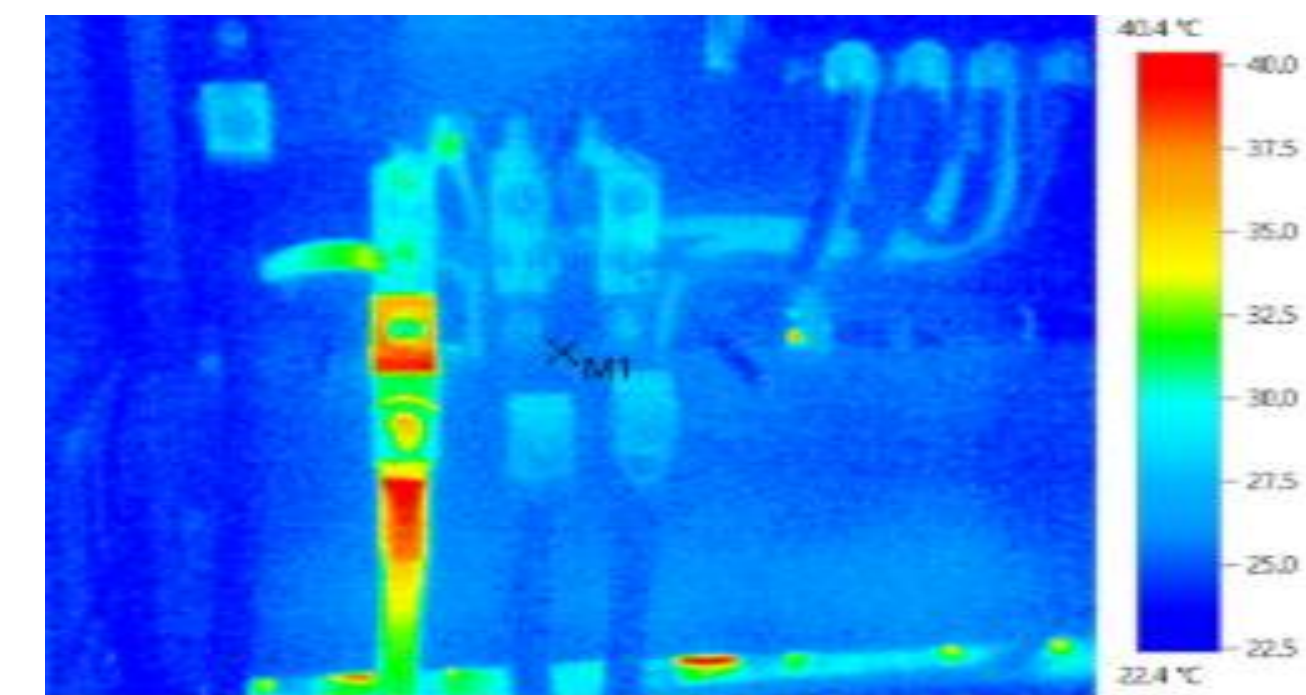
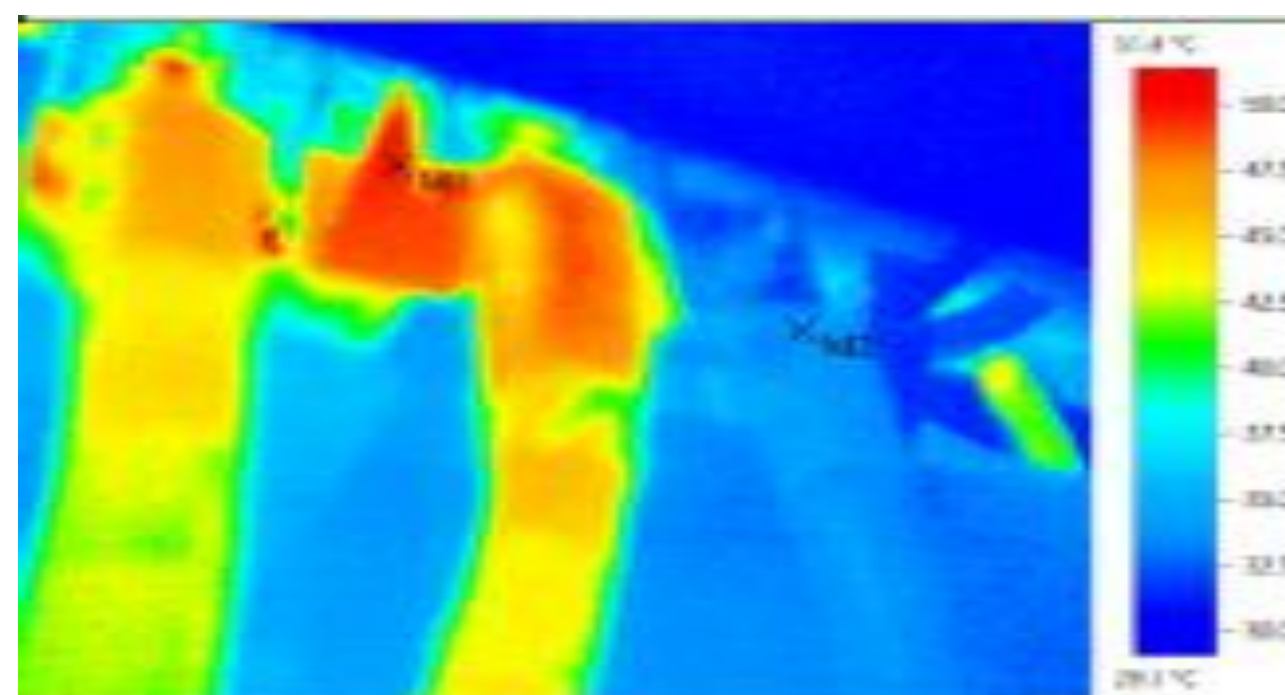
Electrical installation needs **verification**. This verification shall be done before connecting the installation to electric supply, after connecting to supply and then further periodically, **once in a year or at least once in five years**

Case Studies highlighting the substandard selection of cables and its impact

Cables Performance Test - Thermal

Outcome:

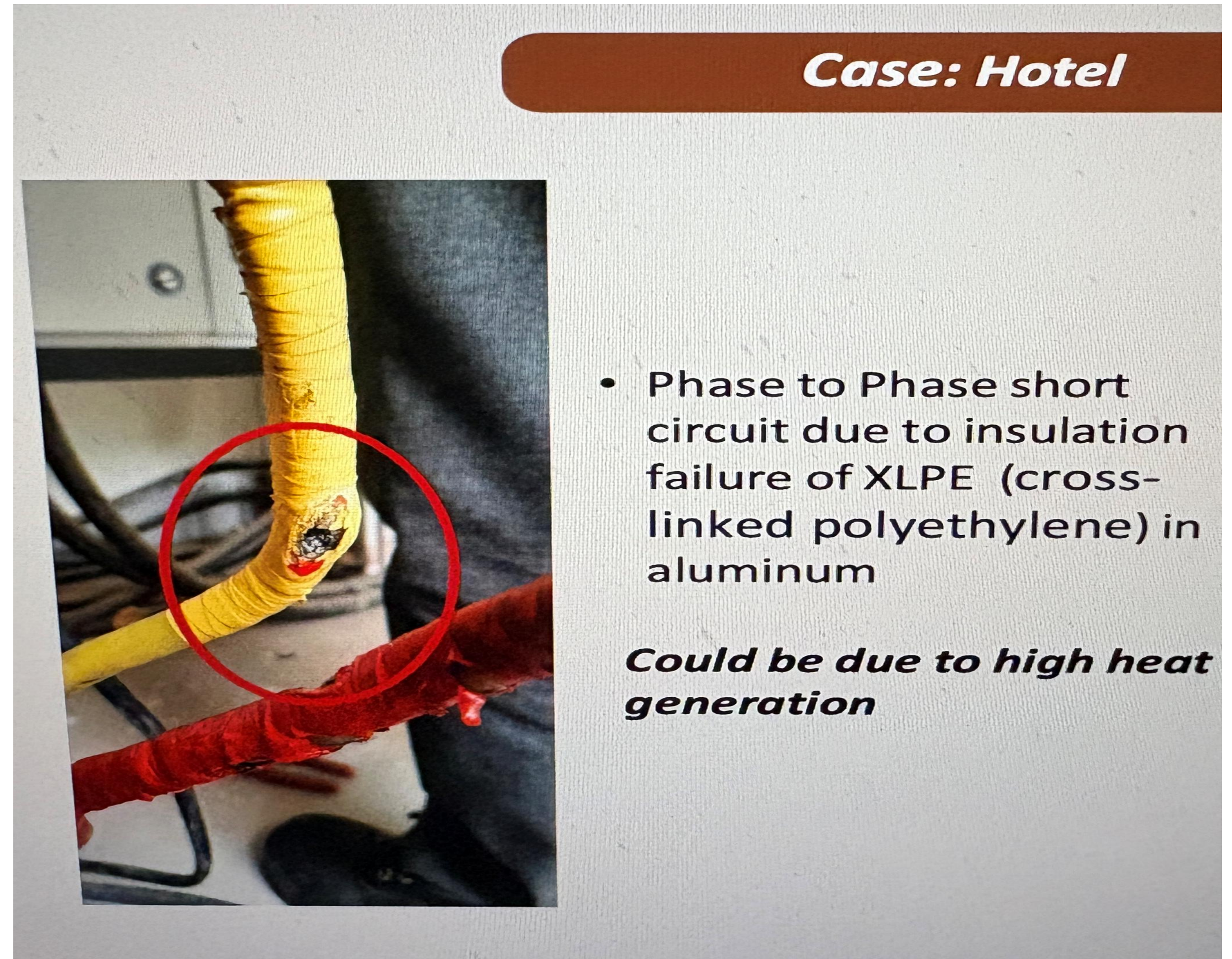
- Loose connection due to expansion & contraction cycle
- Faster aging due to higher loading
- Uneven distribution in cable run
- Overheating, oxidization, hot spots, termination clearance



Cables Performance Test - Mechanical

Outcome:

- Bending issues due to Space constraints
- Oxidation
- Galvanic effect
- Creep behavior of the Aluminium conductor vis a vis copper
- Thermal expansion and contraction



Case: Hotel

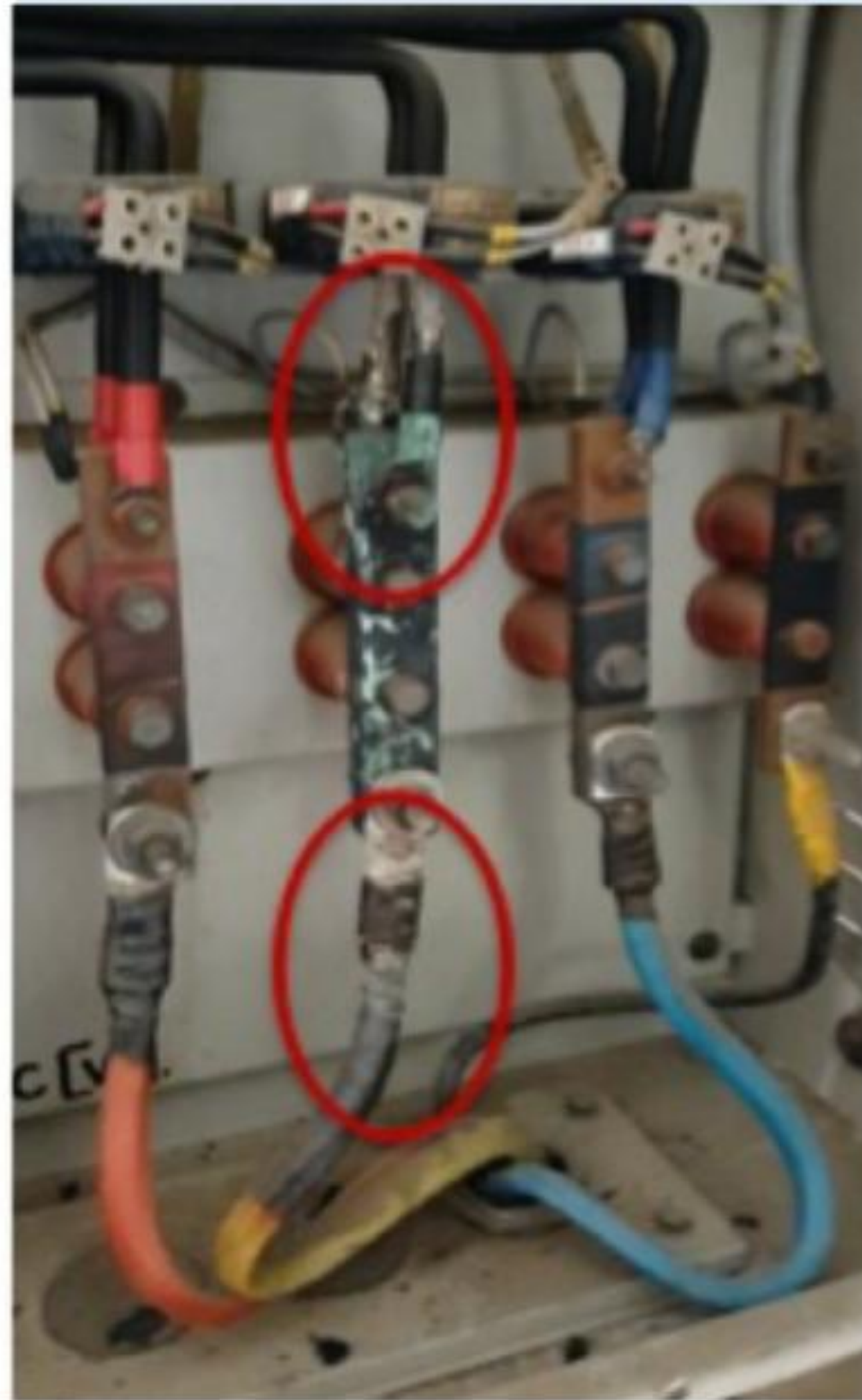
- Phase to Phase short circuit due to insulation failure of XLPE (cross-linked polyethylene) in aluminum

Could be due to high heat generation

Ageing of the cable

Outcome:

- Evidences depicting the effect of overloading, heating, atmospheric content, short circuit evidence, insulation failures, etc.
- Lugs were overheated and the melting point of aluminium was achieved



Wires & Cables Cost v/s Building Construction cost - Survey

Wire and Cable Cost in Buildings

Wires & Cables represents

- 1.0 to 1.5% for most commercial buildings
- 1.5 to 2.0% for most residential buildings



Thank You

Amol Kalsekar



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