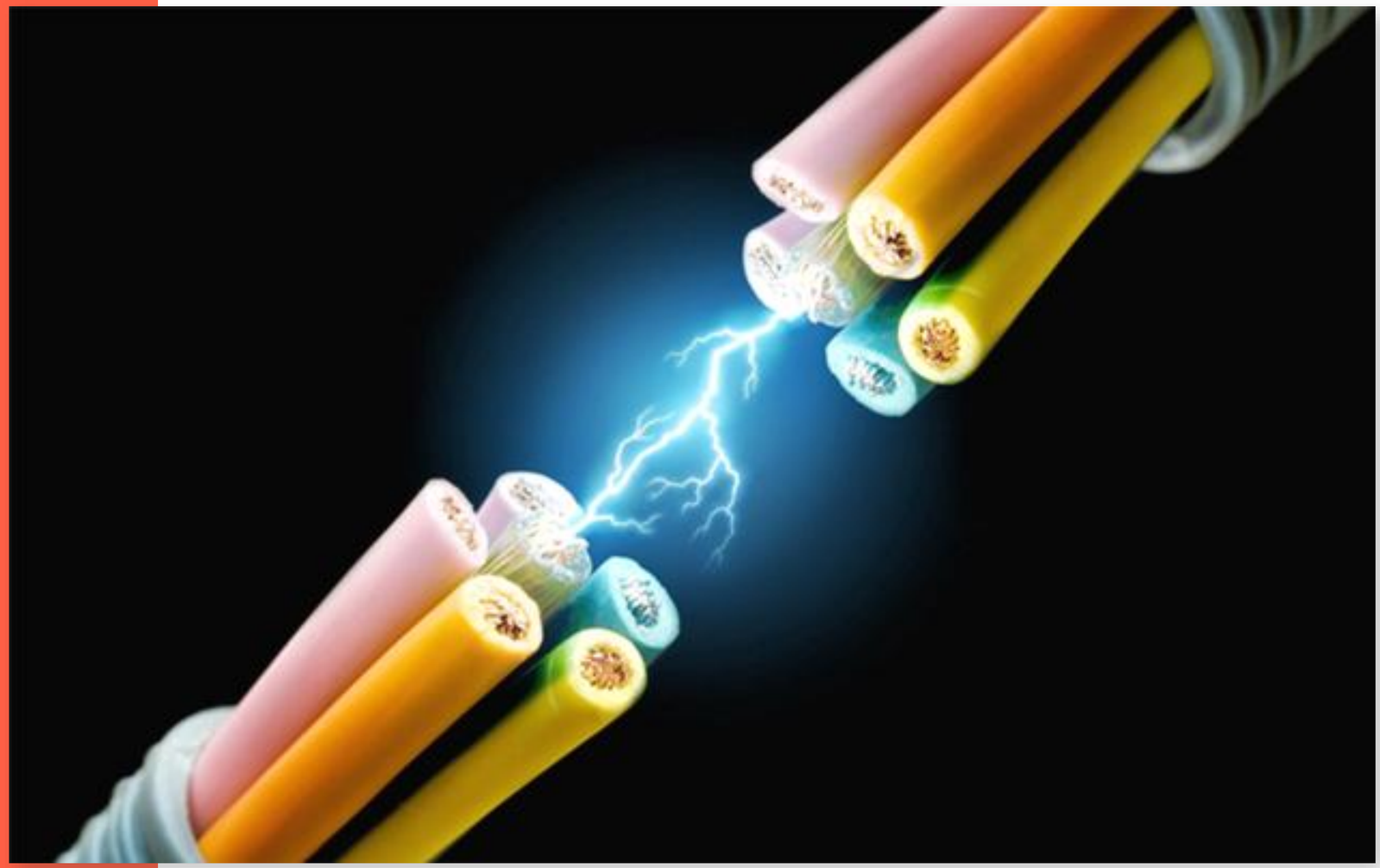
Role of Wires & Cables in Building



Amol Kalsekar
Director – Marketing

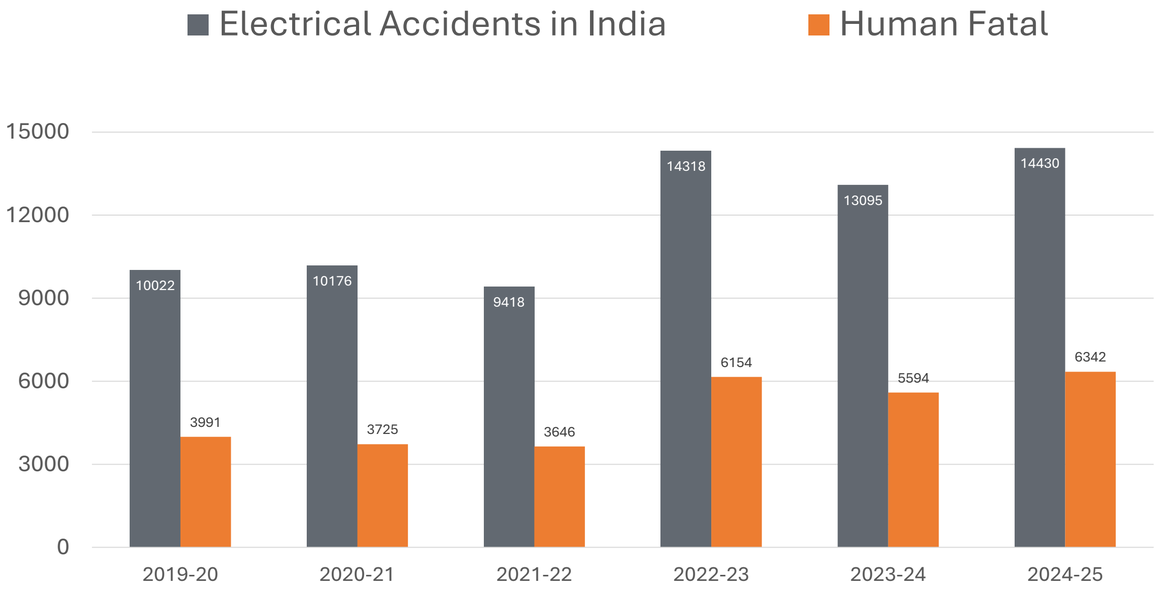
ICA India

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

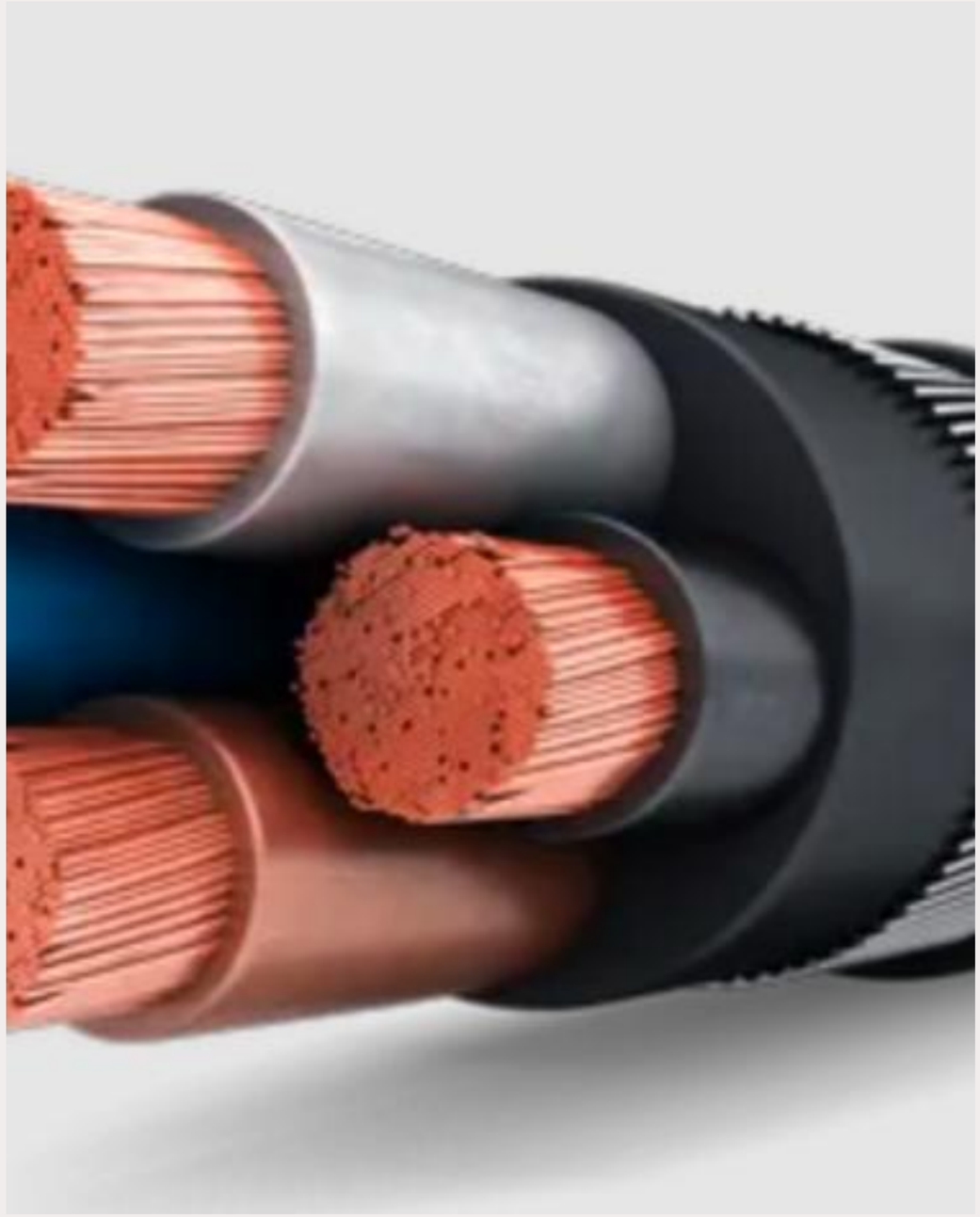
Right selection of Cables in Buildings

Defective Material

Right selection of cables

Various factors:

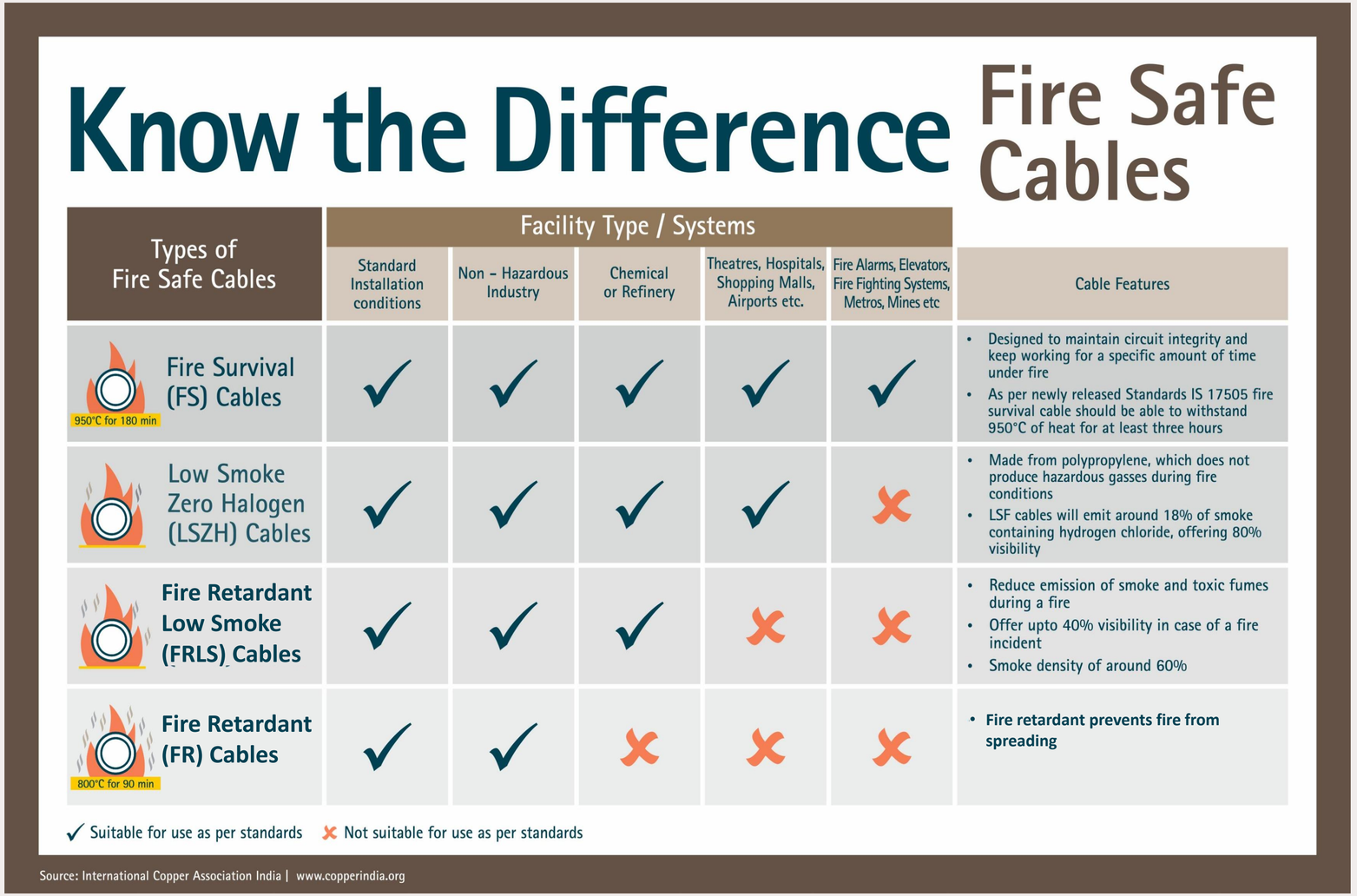
- Current carrying capacities - variation
- Derating
- Class of conductor
- Conductor cross section
- Right selection of insulation & conductor



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



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 mm^2 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 mm^2

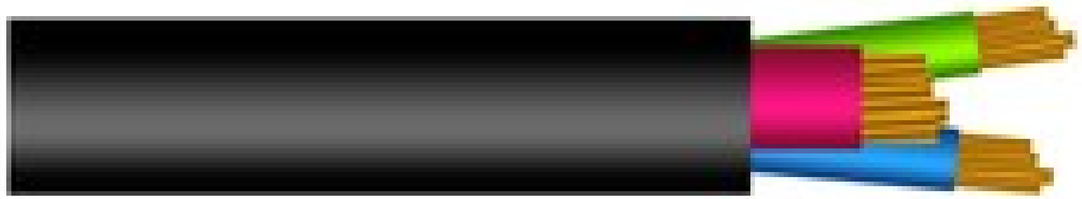
The copper-only mandate for conductor sizes has been raised from ≤16 mm^2 to ≤25 mm^2 a decisive expansion of copper's mandatory footprint.

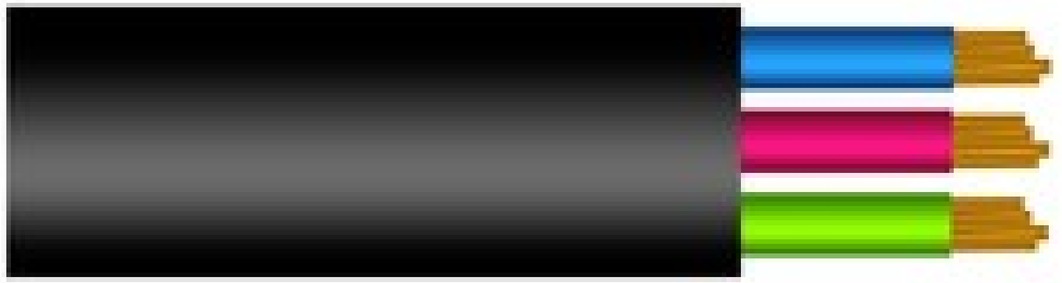
Critical Buildings

Very important public buildings and multi-storey towers now have specific copper mandates up to 50 mm^2 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.

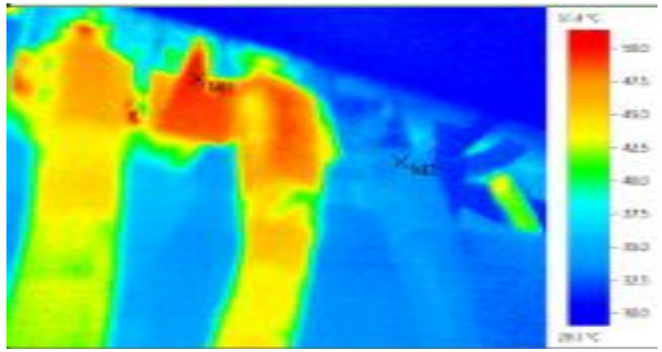
Electrical installation needs **verification**. This verification shall be done before connecting the installation to electric supply, after connecting to supply and then further periodically, **once in a year or at least once in five years**

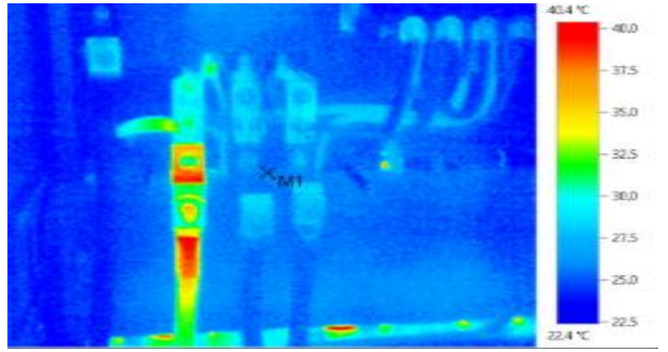
Case Studies highlighting the substandard selection of cables and its impact

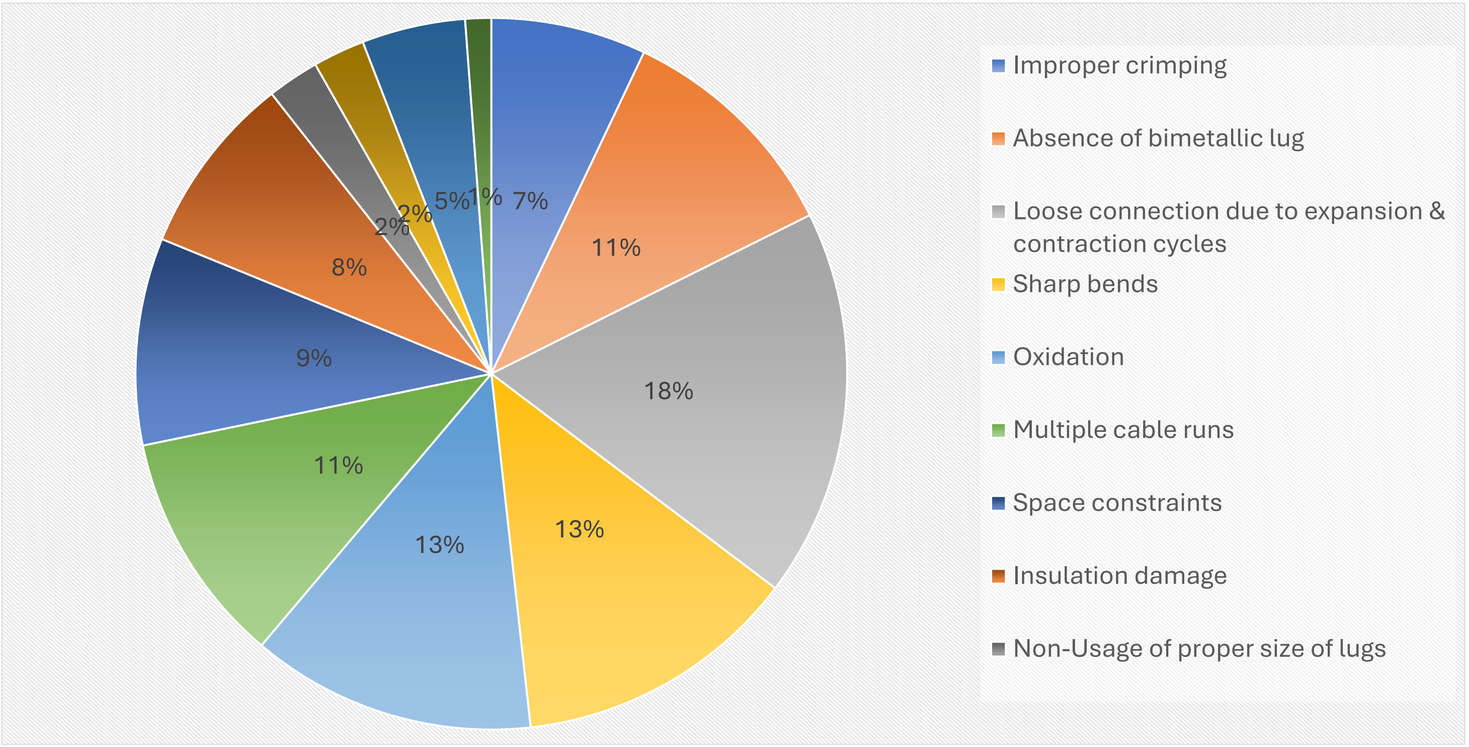
Cables Performance Test - Thermal

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



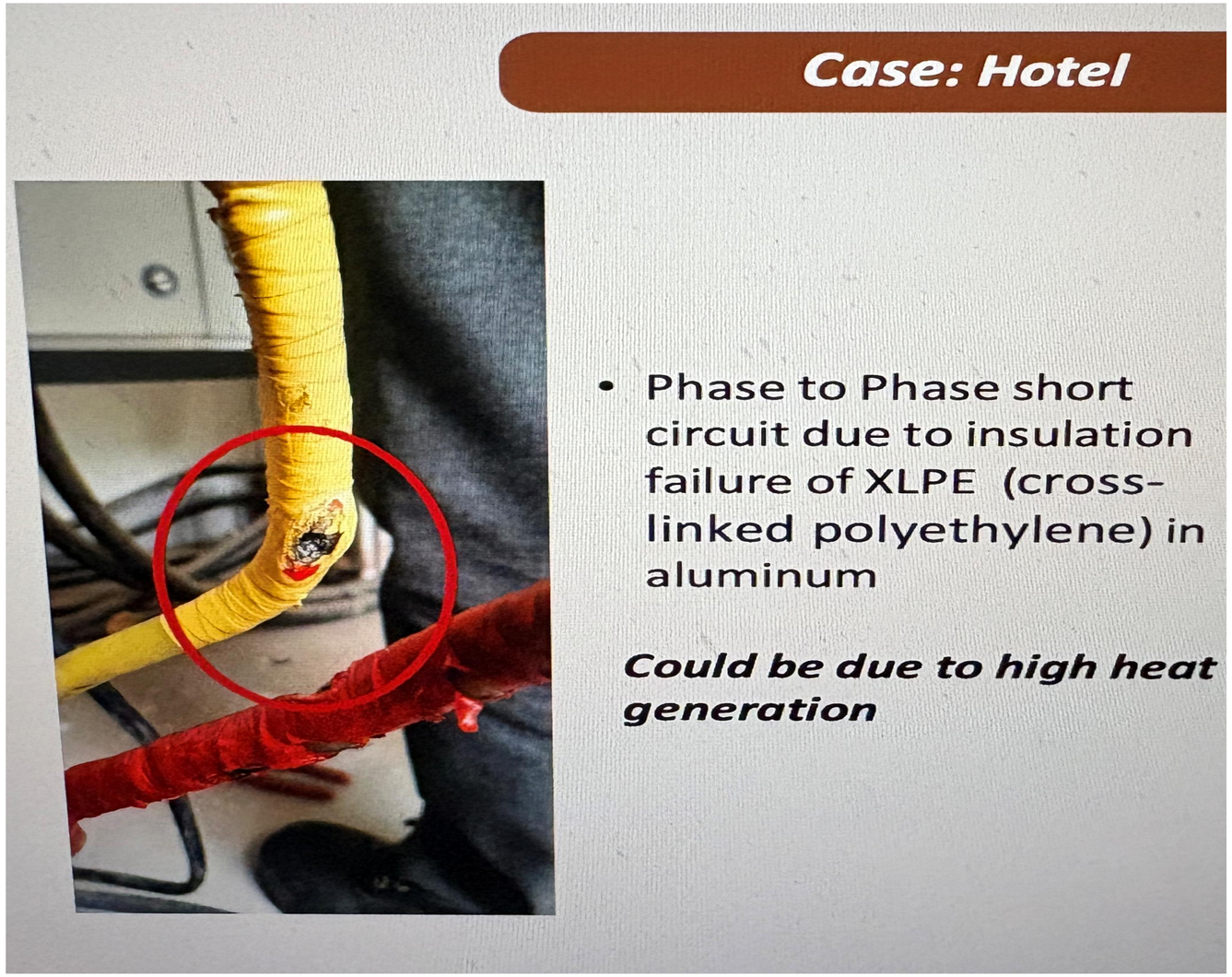




Cables Performance Test - Mechanical

Outcome:

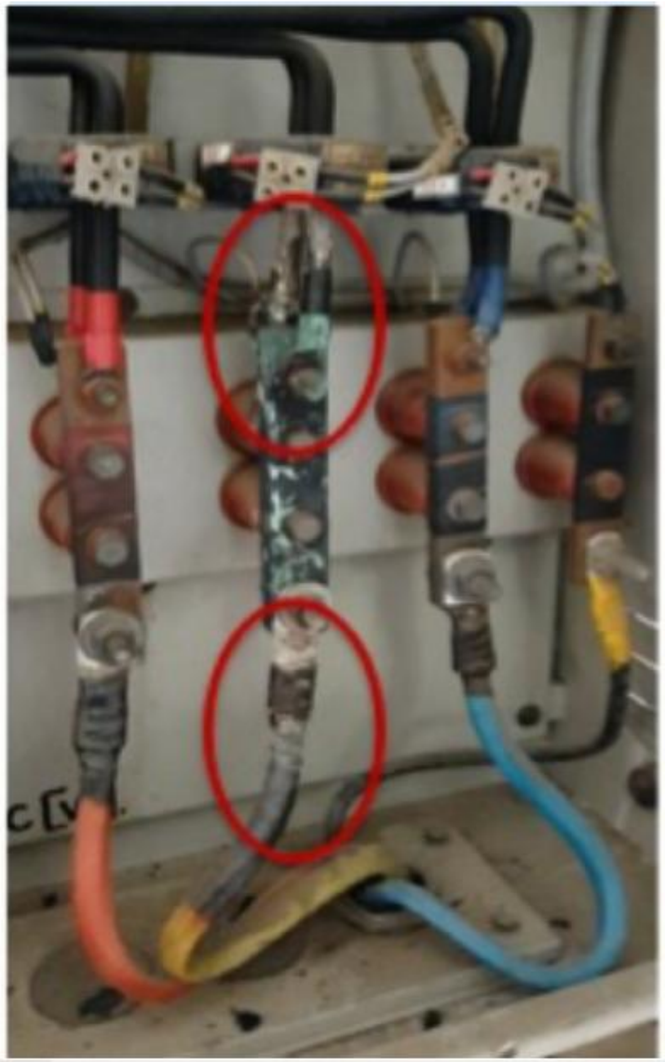
- Bending issues due to Space constraints
- Oxidation
- Galvanic effect
- Creep behavior of the Aluminium conductor vis a vis copper
- Thermal expansion and contraction



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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