



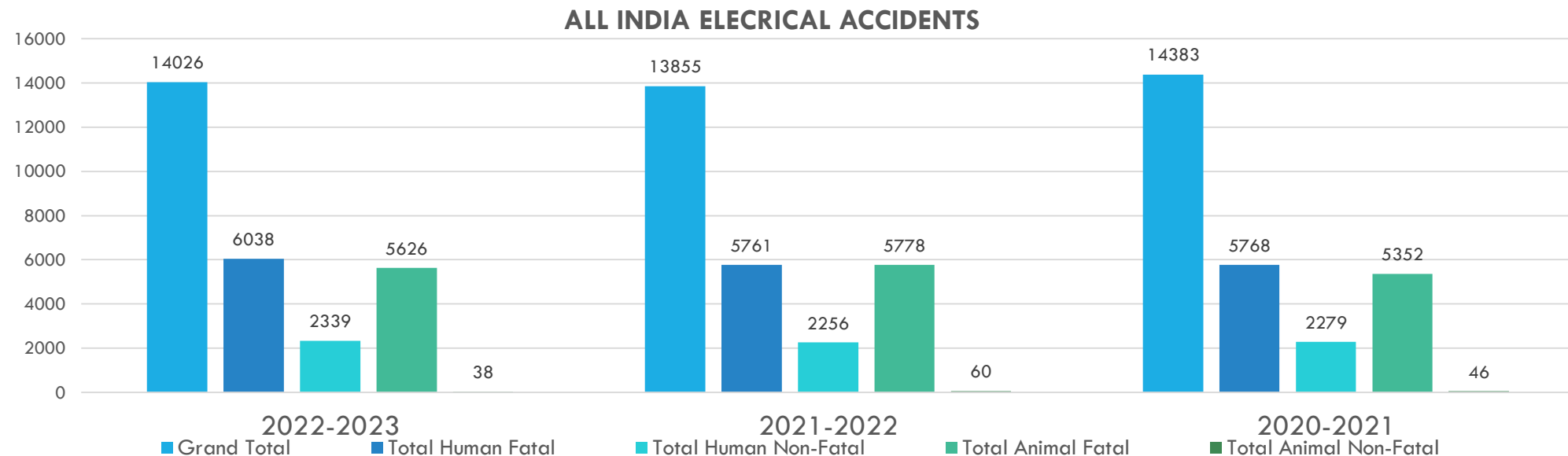
CEA (Measures relating to Safety and Electric Supply) Regulations), 2023

**Ms. Rishika Sharan,
Chief Electrical Inspector of Govt of India & Chief Engineer, CEA**

Electrical Accidents in India



- ❖ At present on average about **12,000-14000 electrical accidents** takes place in India every year, in which more than **5000 human lives are lost**.
- ❖ Generally, the accidents happens in hospitals, malls, hotels, residential buildings, factories, construction sites and other establishments due to electrocution or fire
- ❖ Electrical Safety regulations **emphasizes on the practices need** to be followed for Generation, transmission, distribution and safe usage of electricity.



EA,2003 Provision

Regulation/Notification formulated by CEA

Section 177. (Powers of Authority to make regulations): -

(1) The Authority may, by notification, make regulations consistent with this Act and the rules generally to carry out the provisions of this Act.

(2) (b) suitable measures relating to safety and electric supply under section 53;

Section 53: Provisions related to Safety and Electric Supply: CEA has to specify suitable measures in Regulation,2023.

consultation with the state governments for the protection of public from dangers arising from the generation, transmission or distribution or trading of electricity

Section 162:The Appropriate Government may, by MoP has issued Rules for Qualification, Powers and notification, appoint duly qualified persons to be Chief Functions of Chief Electrical Inspector and Electrical Electrical Inspector or Electrical Inspectors Inspectors Rules, 2006

Section 176: Clause(w),Subsection(2)

Intimation of Accidents(Form and Time of Service of Notice) Rules,2006

SCOPE of CEA Safety Regulations, 2023



Scope and extent of application. – These regulations shall be applicable to electrical installation including **electrical plant and electric line**, and the person engaged in the **generation or transmission or distribution or trading or supply or use of electricity**

Jurisdiction of CEI/EI , GoI

❖ Central Govt Electrical Installation.

- ❖ A generating company wholly or partially owned by central Govt.
- ❖ all installations belonging to or under the control of the Central Government and the Union Territories and Central Govt PSUs
- ❖ ISTS generating companies and Transmission Companies, trading and supply of electricity ,Central Govt Institutions like IITs, IIMs etc.
- ❖ SEZ having 51% or more Central Govt stake, Airports, defence, dockyard, Nuclear Power Stations, Oil & gas pipelines companies etc

❖ Some important notifications

- ❑ Notified Voltage - 11kV or below for Electrical Installations coming under Central Govt. Jurisdiction.
- ❑ Generating Capacity(Including RE) exceeding 500kVA are to be inspected
- ❑ For Buildings with height more than 15 meter , all electrical installations exceeding 11kV voltage at the point of commencement (irrespective of connected load) are to be inspected

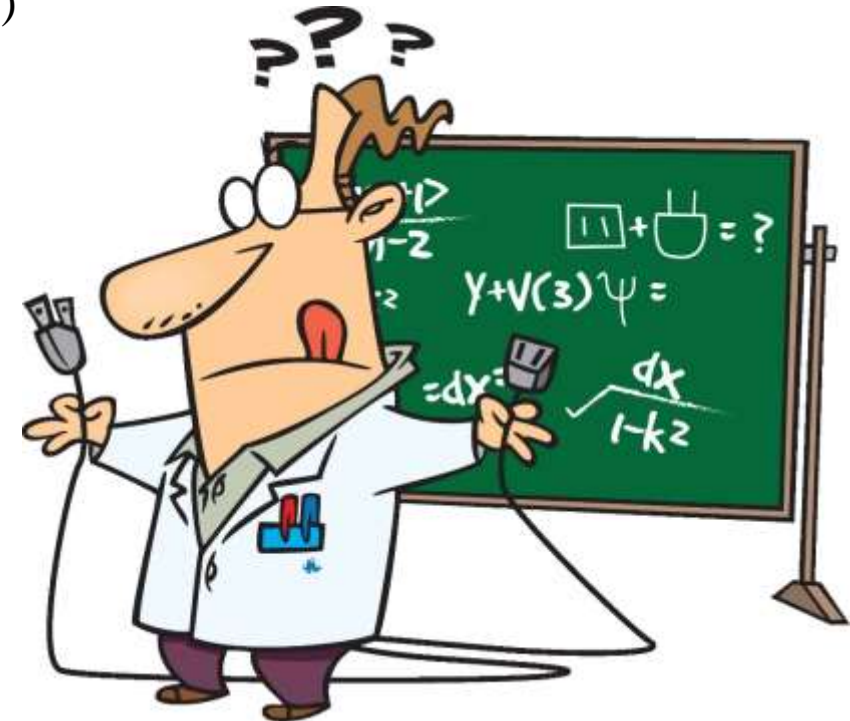
Safety regulation, 2010	Safety regulation,2023
Notified on 20 th Sep 2010	Notified on 08 th June 2023
116 regulations	136 regulations
10 chapters	14 chapters
13 Schedules	11 Schedules
3 Amendments	included in regulation

CEA Electrical Safety Regulation, 2023



CHAPTERS

- Chapter I** - Title, date of commencement and definitions (1-2)
- Chapter II** - Designating persons, Electrical Safety Officer & requirement of training of O&M staff etc. (3-13)
- Chapter III** - General safety requirements (14-34)
- Chapter IV** - General conditions relating to supply and use of electricity (35-41)
- Chapter V** - Safety provisions for electrical installations of voltage not exceeding 650Volts (42 - 44)
- Chapter VI** - Safety provisions for electrical installations of voltage exceeding 650 volts (45-56)
- Chapter VII** - Safety requirements for O/H lines, U/G Cables and Gen/Stations (57-80)
- Chapter VIII** Safety requirements for Electric Traction(81-95)
- Chapter IX** Additional Safety requirements for mines and oil fields(96-118)
- Chapter X**-Additional safety requirements for RE Stations.(119-122)
- Chapter XI**-Additional Safety requirement for EV Charging station(123-128)
- Chapter XII**-Additional Safety requirements for HVDC Stations(129-132)
- Chapter XIII**-Additional Safety requirements for GIS stations.(133-135)
- Chapter XIV**-Miscellaneous.(136)



DESIGNATED PERSON, CHARTERED ELECTRICAL SAFETY ENGINEER, TRAINING AND CERTIFICATION (CHAPTER 2 -CLAUSES (3-13))

	Designated Person	ESO	CESE
Roles & Responsibilities	to operate and carry out the work on electrical lines and apparatus	for ensuring observance of safety measures by carrying out periodic test at an interval not exceeding one year and keeping records	to assist the owner or supplier or consumer of electrical installations for the purpose of self-certification
Qualifications and experiences	certificate of competency or electrical work permit, issued by the Appropriate Government	Degree/diploma in Electrical Engineering with five years/10 years experience in operation and maintenance of electrical installations	Degree/diploma in Electrical Engineering with five years/10 years experience in operation and maintenance of electrical installations. CESE should not hold any post in Govt/Semi Govt /PSUs Retired person CEI/EI can also join

DESIGNATED PERSON, CHARTERED ELECTRICAL SAFETY ENGINEER, TRAINING AND CERTIFICATION (CHAPTER 2 -CLAUSES (3-13))

Mandatory Training required for Engineers Supervisors and Technician	<ul style="list-style-type: none">➤ <u>Engineers and Supervisors</u> to undergone the type of training as specified by the Authority within two years from the date of engagement or appointment➤ <u>Technicians</u> to assist Engineers or Supervisors - a certificate in appropriate trade, preferably from an ITI recognised by the Central Government or the State Government and for exiting employee Power Sector Skill Council or from training institute recognised by the Authority for carrying out trade specific course within two years from the date of Notification of Reg.➤ <u>Load Despatchers/Personnel</u> engaged operation & maintenance at Control centres also to undergo for the Mandatory training and certifications		
Guidelines issued by CEA	<p>CEA has issued guidelines for the training for operation and maintenance of transmission, Distribution systems , generating Stations and Load Despatchers in January 2024.</p> <p>This includes the criteria and periodicity for recognition of training Institutes, type of courses and its Certifications etc.</p>		

Electrical Inspection (First Time Charging) – Form-A



Reg
45

Documents required

1. Work completion Certificate (CEA's Format)
2. Updated SLD, Earthing layout, Site layout
3. List of Equipments (CEA's Format)
4. Manufacturer Test report
5. Pre-Commissioning Test reports
6. Contractor and Supervisory Licence
7. Free from Encroachment declaration

Approval of EI:

Supplier/Consumer/Owner to obtain approval before energizing the installation of voltage exceeding notified voltage/capacity(45):

- ✓ **For new installation**
- ✓ **For installation remained disconnected from supply for more than 6 months**
- ✓ **For any modification in existing installation**

Periodical Inspection (Form-C)

Reg
32

Documents required

1. Updated SLD
2. List of Equipments (CEA's Format)
3. **Previous Approvals**
4. ESO Details
5. **Duly filled Forms I, II & III**
6. **Equipment test reports**

- Every installation already connected to the supply system of the supplier or trader, shall be **periodically inspected and tested at intervals not exceeding five years (32)**
- Installations of voltage above notified voltage shall be periodically inspected by the EI.
- **Periodicity:** Interval not exceeding five years

GENERAL SAFETY REQUIREMENTS (14-34)

Regulation 14.

- All electric supply lines and apparatus shall be :
 - ❖ sufficient rating for power,
 - ❖ Sufficient insulation for estimated fault current
 - ❖ sufficient mechanical strength.
- For the purpose of regulations, Relevant standards, National Electrical Code and National Building Code and where relevant Indian standards are not available, International standards shall be followed.
- ❖ Material and apparatus used shall conform to the relevant standards
- All electrical equipment shall be installed above the Highest Flood Level(HFL)

Regulation 19: Where **bare conductors** are used in a building, Ensure that they are inaccessible



Regulation 20: Danger notice plates in Hindi or English and the local language of the District, with a sign of skull and bones of a design as per IS -2551 shall be affixed permanently in a conspicuous position.



REGULATION 29: PROVISIONS APPLICABLE TO PROTECTIVE EQUIPMENT



Fire buckets: Fire buckets filled with clean dry sand and **ready for immediate use**



First-aid boxes: **should be conspicuously marked and equipped with items**



The locations of fire extinguishers, first-aid boxes, gas masks and artificial respirator shall be displayed in the control room and operator cabin and be kept in good condition

Regulation 21. Handling of electric supply lines and apparatus:

- (1) when persons are working, adequate precautions shall be taken by earthing or other suitable means, to **discharge electrically**.
- (2) **personal protective equipment (PPE)**, tools and devices such as rubber gloves and rubber safety footwear suitable for working voltage, safety belts, nonconductive ladder, earthing devices helmet, line tester, hand lines lamp, voltage detector and hand tools as per Standards should be used
- (3) **List of Safety equipment and Emergency tools** (Should be made available at suitable locations)

PPE Stands for

Personal

Protective

Equipment



Best Practices in Maintenance

Overview:

1



Complete disconnection of all sources of power.

2



Protect against restart of all sources of power - strictly follow LOTO & PTW.

3



Positively determine that the system is de-energized. Mandatorily use proximity voltage detector.

5



Cordon off all adjacent energized parts.



Ensure only trained and authorized personnel are deployed and work is carried out under competent supervision. Tool box talk is mandatory before commencing any electrical work.

4



Ensure all phases are earthed & shorted.

PRECAUTIONS TO BE ADOPTED BY CONSUMERS, OWNERS, OCCUPIERS, ELECTRICAL CONTRACTORS, ELECTRICAL WORKMEN AND SUPPLIERS (REG 31-33)

- **Regulation 31:** No electrical installation work (additions, alterations, repairs and adjustment) except few of voltage not exceeding 250 V shall be done except by an licensed electrical contractor or under direct supervision of a person holding a certificate of competency and by a person holding a permit issued by State Govt.
- For Central Government work, an electrical contractor having license issued by any State Government or UT administration shall not require license from other State Government in which the works are to be executed.
- At present electrical contractor having license issued by one State Government can only work in that state only.

(In order to address the issue, one advisory has been issued, which allow the electrical contractors having license from state can take the work in other states by the way of Endorsement/Verification.)

NEW SAFETY FEATURES IN CEA SAFETY REGULATIONS, 2023 TO PREVENT ACCIDENTS/FIRE

Few changes which are made w.r.t CEA Safety Regulations, 2010 are as follows:

- **Earthing (Earth fault loop impedance) (Reg 43)**

- sufficiently low to permit adequate fault current for the operation of protective device
- tested periodically

- **Earth leakage (RCD) (Reg 44)**

- to disconnect the supply having rated residual current and duration
- in domestic installation RCD not exceeding 30 mA shall be used.

- **Cables (FRLS and FRLSZH) (Reg 38)**

- Fire Retardant Low Smoke and Low Halogen power cables shall be used in building of more than fifteen metre height, basement etc.
- Halogen Free Flame Retardant power cables shall be used in airports, hospitals and hotels irrespective of height.

SAFETY FEATURES IN CEA SAFETY REGULATIONS, 2023 TO PREVENT ACCIDENTS/FIRE

▪ **Transformer Fire fighting system.(>10MVA) (Reg 46)**

- Every transformer of 10 MVA or reactor of 10 MVAR and above rating shall be provided with automatic fire fighting system.
- apparatus having more than 2000 litres of oil are not to be installed in the basement where proper oil draining arrangement cannot be provided

▪ **Tapping of Transmission Lines:**

- There shall not be tapping of another transmission line from the main line for 66 kV and above class

▪ **Meter Installation**

- Electricity meter shall not be installed in passenger stair case.

SALIENT POINTS OF CEA SAFETY REGULATIONS, 2023

Few changes which are made w.r.t CEA Safety Regulations, 2010 are as follows:

- ❑ No tower footing or structure of an overhead line of voltage 33 kV or above or high voltage direct current, shall be closer than 25 meters from the a Petroleum or Natural Gas pipeline.
- ❑ the angle of crossing of the overhead line with respect to the pipelines shall preferably be at right angles for voltage 33 kV or above or shall not be less than 75 degrees.
- ❑ In case of Electric lines of 33 kV and below passing through the protected areas (National Parks, Wildlife Sanctuaries, Conservation Reserves, Community Reserves), Eco-sensitive zones around the protected areas and Wildlife Corridors, only underground cable shall be used

Minimum clearance in air above ground and across road surface of Highways or roads or railway corridors or navigational or non-navigational rivers for lowest conductor of an alternating current overhead lines, including service lines of nominal voltage system.

[See sub-regulation (1) of regulation (60)]

Nominal voltage of system	Clearance above ground			Clearance between conductor and road surface across Highway (m)	Clearance between conductor and rail level across Railway Corridor (m)		Clearance above HFL for River crossing	
	Across Street (m)	Along Street (m)	Elsewhere (m)		Normal OHE (where no double stack containers are to be run on railway tracks.)	High rise OHE for running of double stack containers on railway tracks.	Navigational river (m)	Non-navigational river (m)
Upto 650 V	5.80	5.50	4.60	U/G Cable	U/G Cable	U/G Cable	16.50	5.80
11 kV	6.50	5.80	4.60	U/G Cable	U/G Cable	U/G Cable	19.00	6.50
22 kV	6.50	5.80	5.20	U/G Cable	U/G Cable	U/G Cable	19.00	6.50
33 kV	6.50	5.80	5.20	11.60 or U/G Cable	U/G Cable	U/G Cable	19.00	6.50
66 kV	6.50	6.10	5.50	11.60 or U/G Cable	U/G Cable	U/G Cable	19.00	6.50
110 kV	6.50	6.10	6.10	11.60	15.56	17.56	19.00	6.50
132 kV	6.50	6.10	6.10	11.60	15.56	17.56	19.22	6.50
220 kV	7.02	7.02	7.02	12.52	16.46	18.46	20.10	7.02
400 kV	8.84	8.84	8.84	14.00	18.26	20.26	21.90	8.84
765 kV	18.00*	18.00*	18.00*	18.80	21.86	23.86	25.55	18.00
1200 kV	24.00*	24.00*	24.00*	30.00	25.46	27.46	29.90	24.00

REG 65. ERECTION OR ALTERATION OF BUILDINGS, STRUCTURES, FLOOD BANKS AND ELEVATION OF ROADS

- ✓ subsequent to the erection of an overhead line, any person proposes to carry out any type of work shall give intimation in writing of his intention to do so, to the supplier or owner and to the Electrical Inspector
- ✓ On receipt of such intimation, the supplier or owner shall examine the case and such person was liable to pay the cost of alteration of the overhead line.
- ✓ In case of dispute in cost, the same be referred to Electrical Inspectors

REGULATION 121: ADDITIONAL SAFETY REQUIREMENTS FOR SOLAR INSTALLATIONS

- ❖ **Clear pathways**, walkways between rows and columns shall be provided for cleaning and maintenance.
- ❖ Cables shall be laid in trenches for ground based photovoltaic installation
- ❖ Non current carrying metal receptacles, electrical boxes, appliance frames, PV module mounting structure, Inverters and control systems shall be **earthed**
- ❖ **Lightning protection for Solar plant ,SPD(Surge protection Devices)** in combiner box shall be provided.
- ❖ Ground mounted solar installations shall be protected by fencing not less than 1.8 metre in height so as to prevent unauthorized entry.



REGULATION 121: ADDITIONAL SAFETY REQUIREMENTS FOR SOLAR INSTALLATIONS

- ❖ Arc faults and faulty wiring, climate condition can cause solar panels to catch fire. Fire detection system and automated fire suppression system shall be provided.



REGULATION 122: ADDITIONAL SAFETY REQUIREMENTS FOR WIND INSTALLATIONS

All equipment of Relevant Standards.

Portable fire extinguishers shall be kept at various locations for immediate action.

Any wind turbine workers exposed to a potential fall shall be supported by a certified fall arrest system such as a full body safety harness



REGULATION 122 TO 128: ADDITIONAL SAFETY REQUIREMENTS FOR EV CHARGING STATIONS

- ❏ The **portable socket outlets** shall not be permitted for electric vehicle charging.
- ❏ The **lightning protection system** shall be provided for the electric vehicle charging stations as per relevant standards.
- ❏ **Underground cables** through the charging area or vehicles passage shall be avoided and if provided shall be at a minimum depth of one metre from the finish ground surface.
- ❏ All electric vehicle charging stations shall be provided with an **earth continuity monitoring system** that disconnects the supply in the event of the earthing connection to the vehicle becomes ineffective.
- ❏ Enclosure of electric vehicle supply equipment shall be made of **fire retardant material with self-extinguishing property** and free from halogen.



Excessive growth of vegetation was observed in sub station



Insulation mats are not provided for panels



CABLE TRENCHES ARE FILLED WITH DRAINAGE WATER



T/F OTI and WTI settings not configured



All these pictures were taken during the inspections



Workers in unsafe environment



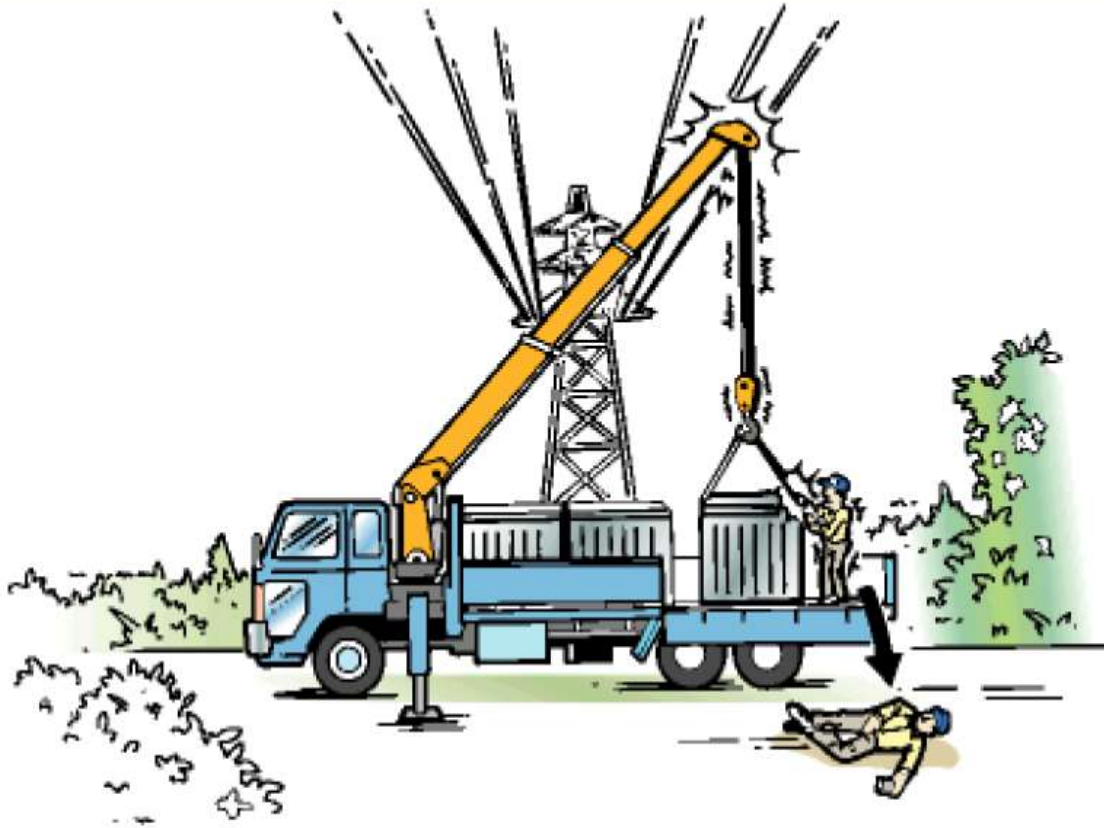
Body earthing not done properly



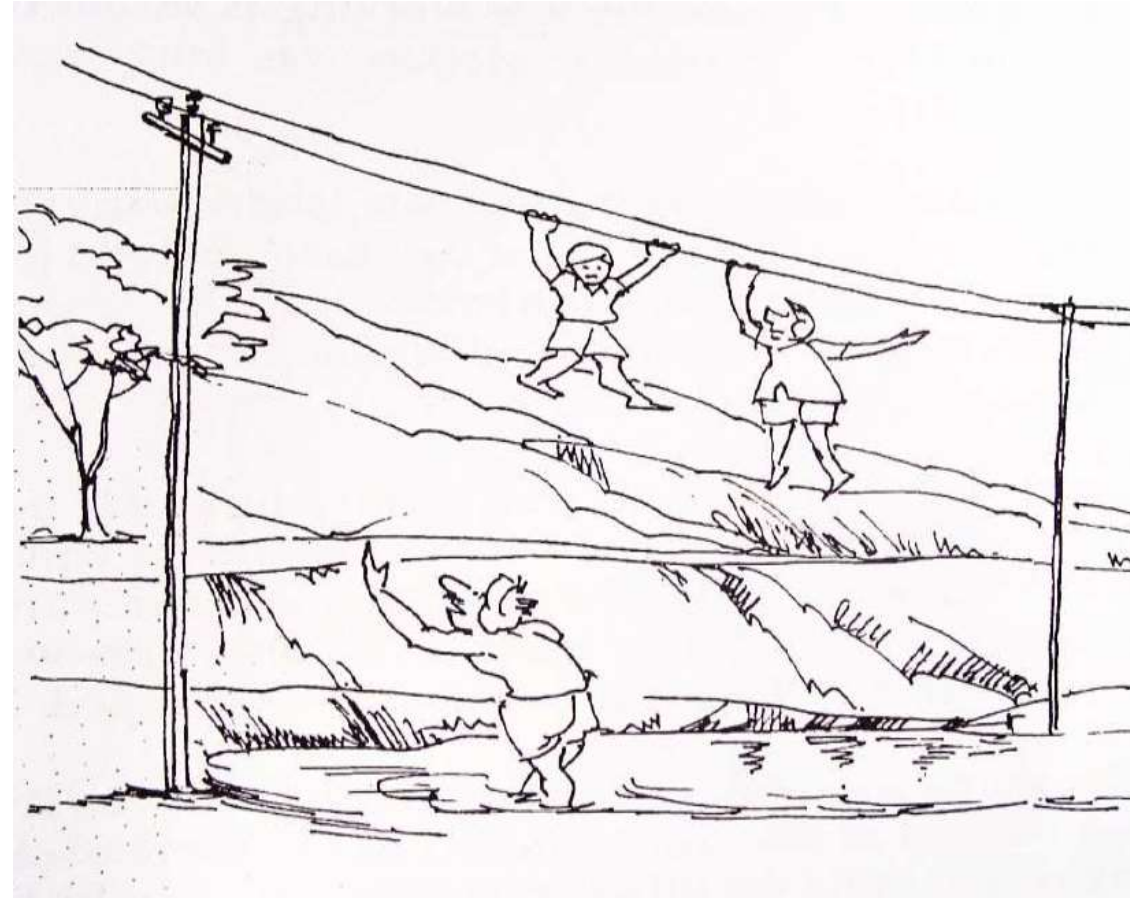
Transformers without fencing



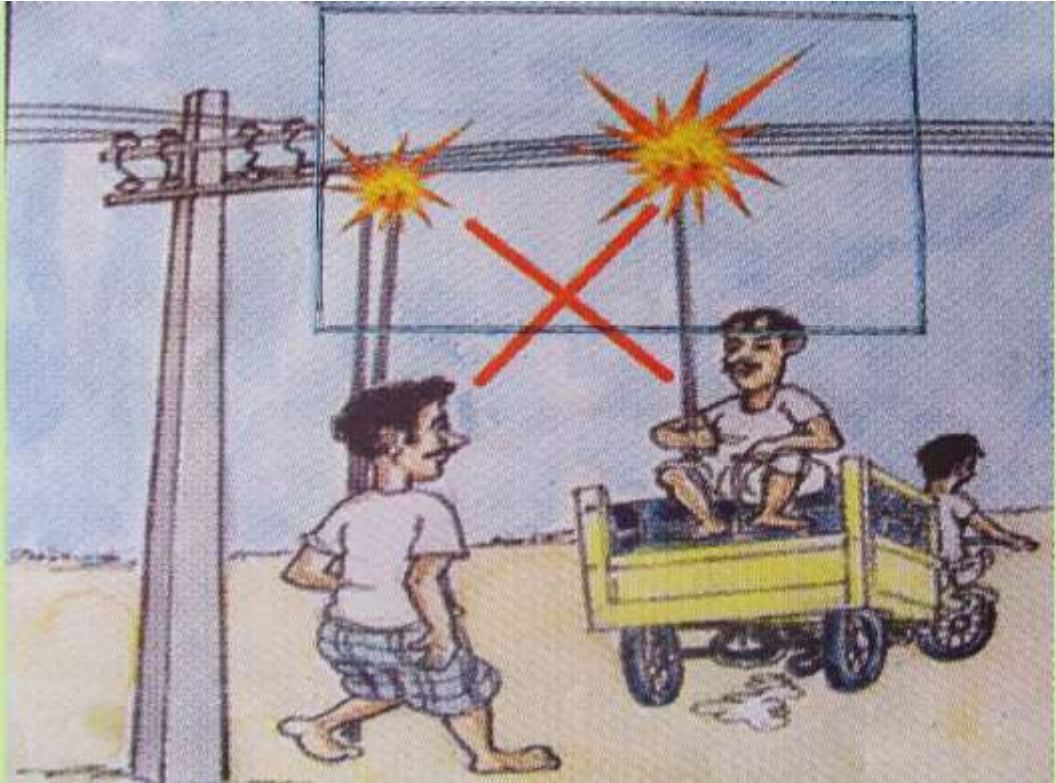
**Operating crane under power line
causing accident**



**packing huge earth
under power line causing accident**



**Crossing power line holding metal stick
vertically causing accident**



**Operating the vehicle under power line
causing accident**



Live part Protection



Motor terminal box in open and closed condition.



Motor double earthing

CASE STUDY REGARDING CLEARANCES



“AWARENESS PROGRAMS”



“Safety Starts from School”

- ❑ This year CEA organized All-India Electrical Safety awareness programme, especially designed for school students on 26th June, 2024 also observed as “ Electrical safety Day”
- ❑ “Safety Starts from School” and practices needs to be followed for safe usage of electricity which will ultimately help in minimizing Electrical Accidents
- ❑ “Electrical Safety Handbook for School students”, a comprehensive guide was launched.

Conduct of Safety Awareness Programs

- ❑ Organized more than 70 Nos. of Electrical Safety Workshops for O&M personnel and other electrical staff of Power utilities and Industries during FY 2023-24.

NEED TO BE MORE SACHET (सचेत) (CONSCIOUS)

https://cea.nic.in/wp-content/uploads/cei/2024/03/sachet_booklet__english.pdf



Stick to Safety Standards

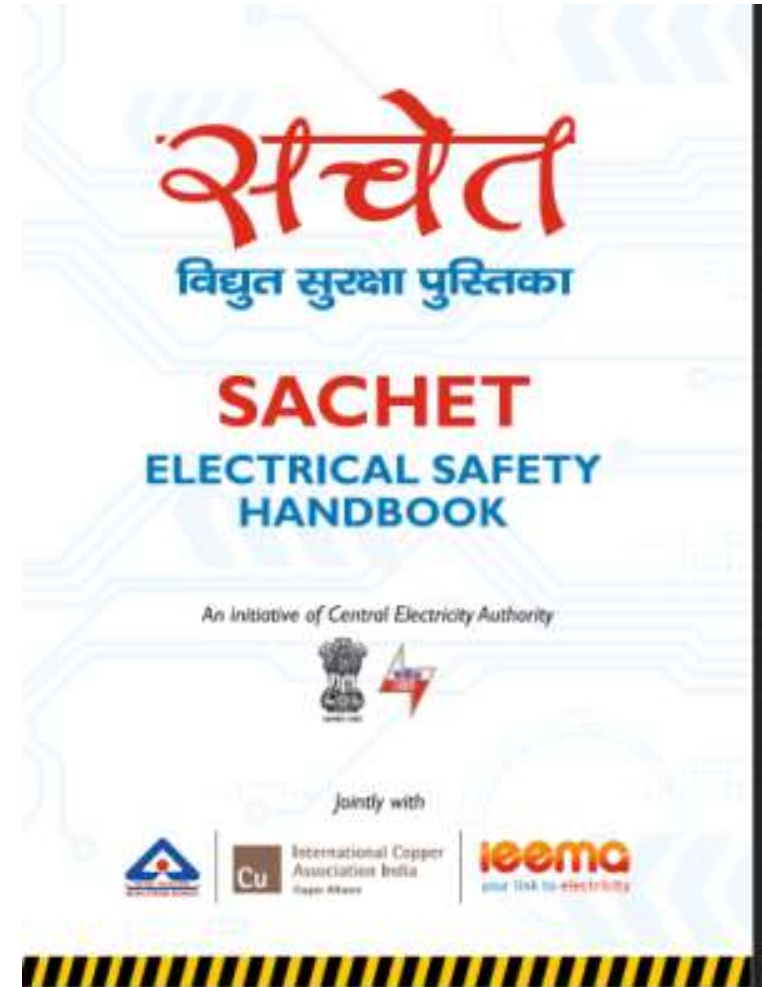
Adequate use of PPEs

Co-ordination at workplace

Hazards identification

Emergency action plan

Training to employees



“LINE MAN DIWAS -04TH MARCH 2024”



- ❑ This year CEA organized **Fourth Edition of Lineman Diwas on March 4th, 2024 in Delhi.**
- ❑ The aim was to honor the frontline heroes of the Indian Power Sector for their moral boost.
- ❑ This is an effective platform where exchange of ideas and sharing of Safety Best Practices by various participating organisations contribute to collective learning.
- ❑ Over 150 linemen and linewomen from over 40 State and Private Transmission and Distribution Companies joined the celebrations
- ❑ Some of the Outcome of the event:
 - ✓ Development of comprehensive safety training programs for linemen
 - ✓ Providing state-of-the-art safety equipment and technologies to enhance the protection in the field.
 - ✓ To increase awareness, Sharing of best practices and unique experiences etc
 - ✓ Development of Safety corner on website of utilities/CEA

**Let us work together in creating
“ Electrical Accident Free India” by
complying all safety standards**

Thank You