CEA (Measures relating to Safety and Electric Supply) Regulations, 2010 (as Amended)

SH. R.K. MEENA
Deputy Director, CEA
&
SH. MUKUL KUMAR
Assistant Director, CEA

Electrical Safety provisions of Electricity Act, 2003

Section 53 :- Provisions relating to safety and electricity supply

The CEA has to specify suitable measures in consultation with the state governments for the protection of the public & property from dangers arising from the generation, transmission or distribution or trading of electricity.

Section 73:- Functions and duties of Authority

CEA has to specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines.

Section 177:-**Powers of Authority to make regulation**

The CEA, by notification, can make regulations on suitable measures relating to safety and electric supply under section 53

Regulatory framework of Electrical Safety

Background

The Indian Electricity Rules, 1956 which was made under section 37 of the Indian Electricity Act, 1910 has its every rule related to safety.

CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010 on the provisions specified under sec-53 and Sec-177 of Electricity Act, 2003 was framed and notified on 24th Sept-2010.

These regulations replaced IE Rules, 1956 w.e.f the date of their notification as per Sec 185(c) of Electricity Act, 2003.

1st amendment of these regulations notified on 13th April 2015, 2nd amendment notified on 1st March 2018 and 3rd amendment on 28 June 2019.

Inquiry of Electrical Accidents

- **Intimation of Accidents:- Any electrical accidents related to utilities shall be intimated within 24 hours of the knowledge of the occurrence of the fatal/non-fatal accident and a report in writing in Form A within 48 hours of the knowledge of the occurrence of the fatal accident.**

- **CEIG or EIG to inquire and report as to the cause of any accident under its jurisdiction.**

- **Every Electrical Inspector holding an enquiry has all the powers of civil court under the Code of Civil Procedure.**

- **The prepared report may be given to the concerned organizations for further actions and to the concerned law enforcement agency.**

Section 162 :- The Appropriate Government may, by notification, appoint duly qualified persons to be Chief Electrical Inspector or Electrical Inspectors and every such Inspector so appointed shall exercise the powers and perform the functions of a Chief Electrical Inspector or an Electrical Inspector under this Act.

Jurisdiction of Chief Electrical Inspectorate (Govt. of India) for inspection for energization:-

i) All electrical installations above notified voltage under Central Govt. (except Railways, Defense, Mines and P&T), ISTS, ISGS and those electrical installations including that of Pvt. utility which connects to Central Grid, etc.

ii) All electrical installations above notified voltage within UTs of Daman & Diu, Dadra & Nagar Havelli, Andaman Nicobar Islands, Pondicherry.

CEA (Measures Relating to Safety and Electric Supply Regulations), 2010 (as amended)

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 (3-11)

Chapter III & IV - Safety to be observed in all kinds of electrical installations during const, O&M and use of electricity (12-32 &33-39)

Chapter V & VI – Safety Provisions for Electrical installations up to & above 650 V (40-42 & 43-54)

Chapter VII - Safety requirements for O/H lines, U/G Cables and Gen/Stns (55-77)

Chapter VIII - Safety requirements for Electric Traction (78-92)

Chapter IX - Safety requirements for mines & oil fields (93-116)

Chapter X - deviations allowed by the Government and Electrical Inspector in respect of matters referred in the regulations (R-116)

Reg.3: Designating person(s) to carry out electrical work

Supplier/Consumer/Owner/Contractor shall only designate persons having certificate of competency or electrical work permit, to operate and carry out work on electrical lines and apparatus.

Reg.5 & 5A: Electrical Safety Officer & Charted Electrical Safety Engineer (CESE)

To ensure observance of CEA Electrical Safety regulations, ESO shall be designated by

- all suppliers including generating/transmission/DISCOM
- management of every factory registered under Factory Act & having > 250 KW of connected load
- ESO shall have EE Degree with 5 yr (Diploma 10 Years) experience in O&M of electric installations
- periodic inspection & testing of the installation

•Appropriate Government may authorize a person as CESE to assist the Owner or Supplier or Consumer of electrical installations for the purpose of Self-Certification U/R 30 & 43 upto the notified voltage and generation capacity.

Qualification & Experience of CESE: same as ESO

Reg. 6 & 7: Qualification & Training for Engineers/ Supervisors and Technicians engaged in O&M

Qualifications

Engineers/Supervisors: Diploma/degree which are relevant to the electrical installations

Technicians: Certificate in appropriate trade preferably with 2 yr. course from ITI

Training: As specified in Schedule-I&II of the Regulations

Reg. 12-13: General safety requirements

- Relevant IS/NEC to be followed to carry out the purposes of this regulation (12)
- Material/apparatus shall conform to relevant IS/IEC (12(3))
- All electrical equipment shall be installed above the Mean Sea Level (MSL) where MSL is not declared by the local Municipal Authorities, Highest Flood level (HFL)record data shall be utilized for this purpose (12(4))
- The supplier shall ensure that all the electric supply lines, wire , fittings belonging to him in the consumer premises & under his control are kept in a safe condition (13)

Reg. 13: General safety requirements

- Service lines placed by the supplier on the premises of a consumer which are underground or which are accessible shall be so insulated and protected by the supplier as to be secured under all ordinary conditions against electrical, mechanical, chemical or other injury to the insulation (13(2))

- The consumer shall, as far as circumstances permit, take precautions for the safe custody of the equipment on his premises belonging to the supplier (13(3))

- The consumer shall also take precaution for the safe custody of the installation under his control in his premises (13(4))

Reg. 14-17: General safety requirements

- The supplier shall provide suitable switchgear in each conductor of every service lines in the consumer premises. Where more than one consumer is supplied though a common service line, each such consumer has to be provided with independent switch gear at the point of rigid junction (14).

- **The supplier shall provide and maintain on the consumer's premises, a suitable earthed terminal in an accessible position at or near the point of commencement of supply. (16)**

- **Provided that in the case of installation of voltage exceeding 250V the consumer shall, in addition to the aforementioned earthing arrangement, provide his own earthing system with an independent electrode. (16)**

Reg. 17-18: General safety requirements

•**Where bare conductors are used in a building, the owner of such conductors shall,-(17)**

- (a) ensure that they are inaccessible;
- (b) provide in readily accessible position switches for rendering them dead whenever necessary; and
- (c) take such other safety measures as are specified in the relevant Indian Standards.

•**Danger notice plate 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 on (18)**

✓**every motor, generator, transformer, plant and equipment of voltage exceeding 250 V**

✓**all supports of O/H lines of voltage exceeding 650 V**

Reg. 19: Handling of electric supply lines and apparatus

- Before any conductor/apparatus is handled, adequate precaution shall be taken to discharge it (19)
- Every person who works on an electric supply line/apparatus shall be provided with tools & devices such as gloves, shoes, safety belts, helmets, earthing devices, etc (19(2))
- All non-current carrying metal parts of SWGR & CP shall be earthed and insulating mat conforming to IS-15652: 2006, shall be provided in front of the panels (19(5))
- All panels shall be painted with the description of its identification at front & rear (19(6))

Reg. 27: Provisions applicable to protective equipment

Fire buckets: Fire buckets filled with clean dry sand and ready for immediate use for extinguishing fires in addition to fire extinguishers suitable for dealing with fires, shall be conspicuously marked and kept in all generating stations, enclosed substations and switching-stations in convenient location

(2) The fire extinguishers shall be tested for satisfactory operation as per relevant Indian Standard at least once a year and record of such tests shall be maintained.

First-aid boxes: should be conspicuously marked and equipped with such contents as the State Government may specify, shall be provided and maintained in all Gen/Stn, S/S, Sw/S & in vehicles used for maintenance of lines (27(3))

Gas masks: 2 or more gas mask shall be provided conspicuously, installed & maintained at accessible places in every Gen/Stn with capacity of 5 MW and above and enclosed S/S with transformation capacity of 5 MVA and above for use in the event of fire or smoke (27(4)).

Reg. 28: Display of Instructions for the resuscitation

- Instructions for the resuscitation of person suffering from electric shock shall be affixed in a conspicuous place in every Gen/Stn, S/S & Sw/S in English/Hindi and the local language of the District (28)

- All designated persons shall be acquainted with and are competent to apply the instructions (28(2))

- In every manned Gen/Stn, S/S & Sw/S of voltage exceeding 650 V, an artificial respirator shall be provided and kept in good working condition (28(3))

Reg. 29: General safety requirements

- **Electrical works to be carried out only by LEC and under direct supervision of a person holding Certificate of Competency *except replacement of lamps, fans, fuses, switches, domestic appliances of voltage not exceeding 250V (29)***

- **Exemption, by notification in the Official Gazette, may be allowed by the Govt. in case of works executed for or on behalf of the Govt. in the case of any specified class of consumers, suppliers, owners or occupiers (29).**

- **Electrical installation work which has been carried out in contravention of above shall not be energized by the Supplier (29(2))**

Reg. 30: Periodical Inspection

- 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 (30).

- Installations of voltage equal to or below notified voltage, except mines, oil-fields & railways and installation covered under section 54 of EA, 2003, shall be self-certified.

- Installations of voltage above notified shall be periodically inspected by the EI.

Reg. 31-32:
General safety requirements

- (1) For a new or additional supply and before the connection or reconnection of the same after a period of six months to the consumer installation, the supplier shall either test the consumer installation himself or, accept the test results submitted by the consumer, which has been duly signed by the licensed Electrical Contractor and maintain the record of the same.

- 2) If as a result of such inspection and test, the supplier is satisfied that the installation is likely to be dangerous, he shall serve, a notice in writing requiring to make such modifications as are necessary to render the installation safe and may refuse to connect or reconnect the supply until the required modifications have been completed.(31(3))

Installation and testing of generating units: - Capacity above which generating units qualify for inspection by the Electrical Inspector before commissioning which is presently 500 KVA.

Reg. 33-34: General conditions relating to supply and use of electricity

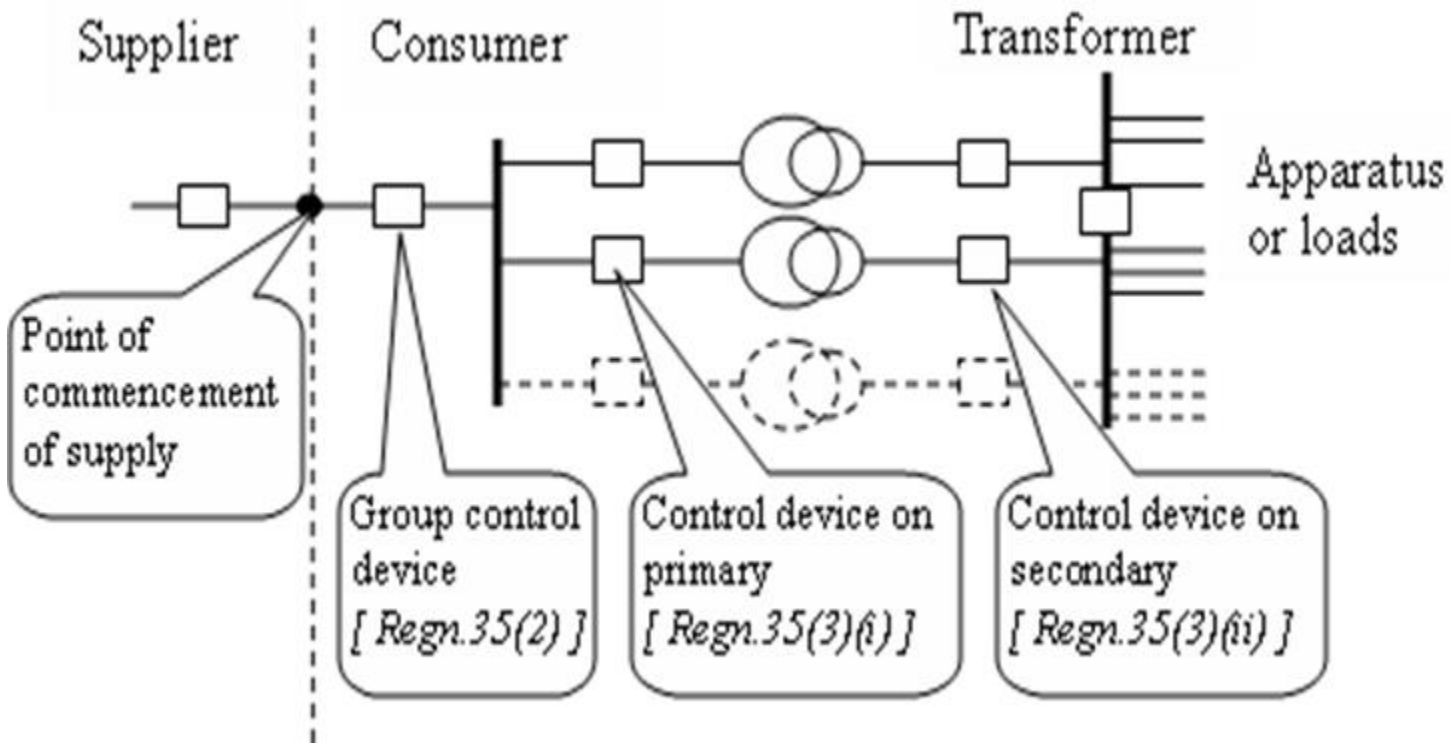
- **Precautions against leakage - IR value between each live wire and earth: (33)**

IR Value	Voltage for 1 min.
At least 1 Mega Ohm	500 V DC
(for installation & equipment upto 650 V)	
At least 5 Mega Ohm	2.5 kV DC
(650 V<for installation & equipment<33 kV)	

- **If the supplier or EI has any reason to belief about any leakage in the consumer premises they may give in writing to the consumer for inspection. However, even after receiving notice the consumer does not provide reasonable facilities to the inspector/ supplier for inspection than the supplier may on direction from EI disconnect the supply to the consumer. (34)**

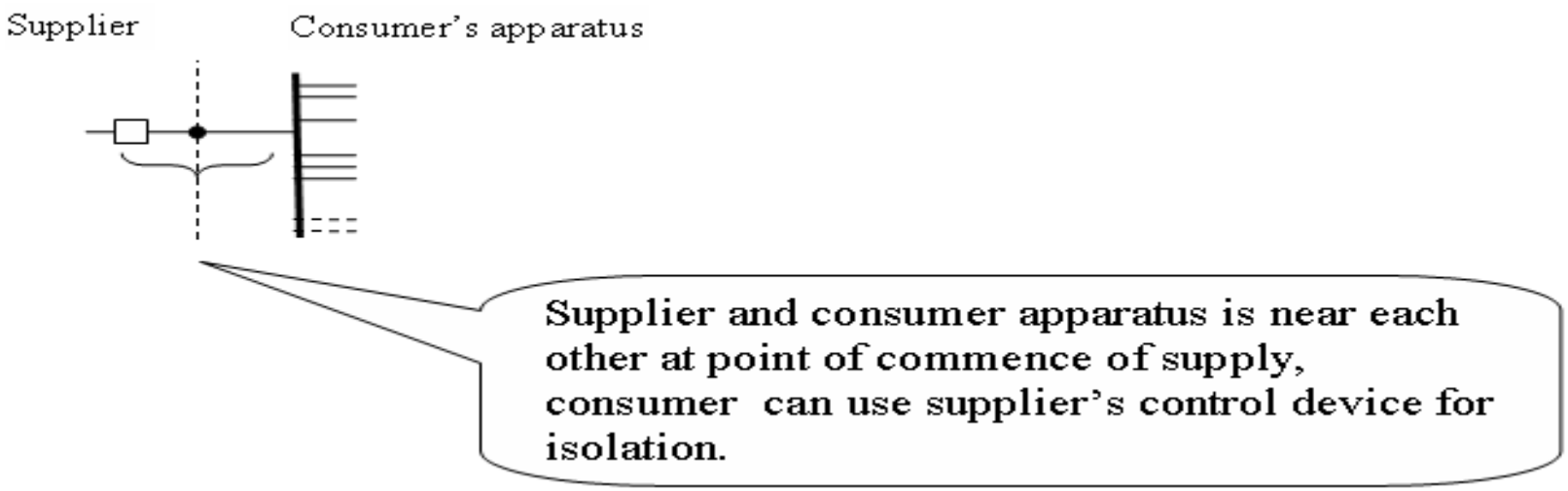
Reg. 35(2): General conditions relating to supply and use of electricity

A linked s/w with fuse or CB shall be provided as Group Control Device:



Reg. 35(2): General conditions relating to supply and use of electricity

If point of commencement of supply and the Consumer apparatus are near each other, one linked switch with fuse or CB near the point of commencement of supply shall be sufficient



Reg. 35(3): General conditions relating to supply and use of electricity

Transformer Installation:

Primary	Secondary	Capacity
Consumer's Transformer		
linked s/w & fuse or CB	CB	Upto 1000 kVA
CB	CB	≥1000 kVA
Supplier's Transformer		
linked s/w & fuse or CB	linked s/w & fuse or CB	<1000 kVA
UAT & GT		
Not required	CB	

Reg. 36:
General conditions relating to supply and use of electricity

Multi-storeyed building more than 15 metres in height:

- **The supplier or owner of the installation shall provide at the point of commencement of supply a suitable isolating device with cut-out or breaker to operate on all phases except neutral in the 3-phase, 4-wire circuit and fixed in a conspicuous position at not more than 1.70 metres above the ground so as to completely isolate the supply to the building in case of emergency (36(3)).**

- **No other service pipes and cables shall be taken along the ducts provided for laying power cables and all ducts provided for power cables and other services shall be provided with fire barrier at each floor crossing(36(5)).**

Reg. 37:
General conditions relating to supply and use of electricity

Switchboard: (37(iii))

- A clear space of not less than 1 m in width shall be provided in front of the switchboard
- A space < 20 cm or > 75 cm in width behind the switchboard shall provided
- If the space behind the switchboard exceeds 75 cm in width, there shall be a passage way from either end of the switchboard, clear to a height of 1.8 m

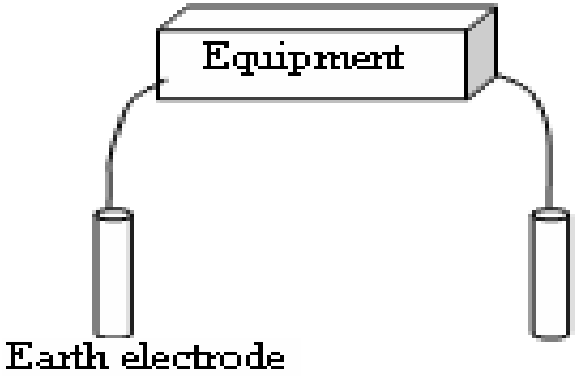
Reg. 41: Safety provisions for electrical installations of voltage not exceeding 650 V

- Neutral conductor shall be earthed by not less than <u>two separate and distinct connections</u> with a <u>minimum of two different earth electrodes</u> or such large number as may be necessary to bring the earth resistance to a satisfactory value both at Gen/Stn and S/S (41(i))

- Neutral conductor shall also be earthed at one or more points along the distribution system or service line in addition to any connection with earth which may be at the consumer's premises. (41(iii))

Reg. 41: Safety provisions for electrical installations of voltage not exceeding 650 V

Frame of every generator, motor, transformers and apparatus, of voltage exceeding 250 V but not exceeding 650 V shall be earthed by the owner by two separate and distinct connections (41(xii))



Reg. 41-42: Safety provisions for electrical installations of voltage not exceeding 650 V

- Neutral point of every generator and transformer shall be earthed by connecting it to the earthing system by not less than two separate and distinct connections (41(xiii))
- ELCB of 30 milliamp for installations of 2 KW and above for domestic connections and 100 milliamp for all other installations to disconnect the supply instantly on the occurrence of (42).

Reg. 43-54: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- **<u>Approval by EI:</u> Supplier/Consumer/Owner to obtain approval before energizing the installation of voltage exceeding notified voltage/capacity(43):**
  - ✓ For new installation
  - ✓ For installation remained disconnected from supply for more than 6 months
  - ✓ For any modification in existing installation
  - ✓ For generating units including units producing electricity from renewable sources

- **Supplier/owner may energise the installation for the purpose of tests & the section of line for anti-theft purpose.**

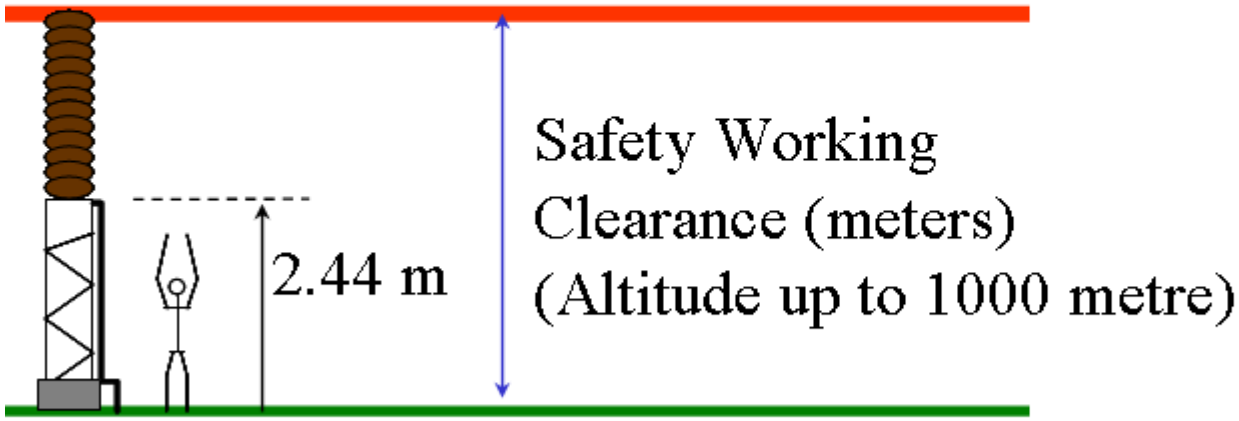
Reg. 43-54: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- **<u>Self Certification:</u>**
- **The owner can submit the self certification in prescribed forms for installations below notified voltage level (currently 11 KV)**
- **Form-I: Upto 250 Volt**
- **Form-II: above 250 and upto 650 volt**
- **Form-III: above 650 volt**

Reg. 43-54: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V (44(2(iii)))

- Safety working clearances in outdoor sub-station (excluding OH lines)

Live part: Highest system voltage (KV)



Earth/ equipment /conductor

kV	Metre
12	2.6
36	2.8
72.5	3.1
145	3.7
245	4.3
420	6.4
800	10.3

(Correction factor above 1000 to 3000 metre: 1.25% per 100m)

Reg. 44: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

S/S with apparatus having more than 2 kL of oil: (44(2(vii)))

- **shall not be located in the basement where proper oil draining arrangement cannot be provided**
- **baffle walls of 4 hr fire rating shall be provided between apparatus: where,**

(i) Single phase transformer banks
(ii) Units not having adequate clearance
(iii) On the consumer premises

Reg. 44: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- **Provisions for oil soakpit, where more than 9 kL of oil in any one tank:(44(2(vii(b)))**

  - Provision for draining away of oil from tanks

  - Precaution for preventing fire from ignition

  - No spare oil storage near oil filled equipment

- **Transformers of 10 MVA and above or in case of oil filled transformers with oil capacity of more than 2000 liters are provided with fire fighting system as per IS - 3034: 1993 or with Nitrogen Injection Fire Protection system (44(2(ix)))**

Reg. 44: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

Locating Substation at basement:(44(2(x)))

- **Oil filled transformers not above ground or below 1st basement (at other than residential & commercial buildings)**
- **T/F room to be located at periphery of 1st basement**
- **Direct access to the T/F room from outside**
- **Entrances to the room shall be provided with fire resisting doors of 2 hr fire rating**
- **Curb (sill) at entrance - to prevent the flow of oil into other parts of basement**

Reg. 44: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

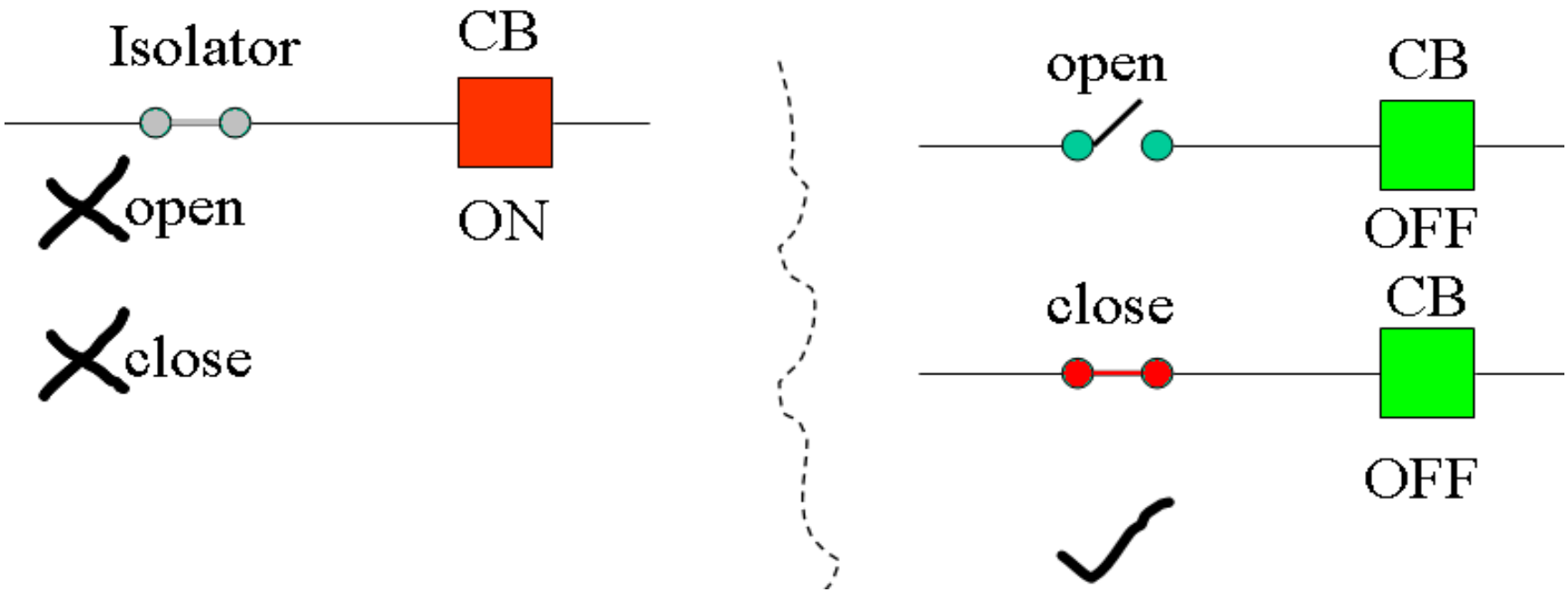
- Only dry type transformers - in Commercial and residential buildings(44(2(x)))
- Cables to primary and secondary - sealing at all floors and wall openings of at least 2 h rating
- Fire Retardent Low Smoke (FRLS) cable - 2 h rating
- Cable trenches - filled with sand, pebbles or non-inflammable materials or completely covered with non-inflammable slabs

Reg. 44: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- All apparatus shall be protected against lightning (44(3))
- Apparatus exceeding 220 kV shall also be protected against switching over voltages. (44(3))
- The minimum clearances specified in Schedule-VII & VIII shall be maintained for bare conductors or live parts of any apparatus in outdoor sub-stations, excluding overhead lines of High Voltage Direct Current installations (44(5))
- No tapping of another transmission line from the main line for 66 kV and above class of lines. (44(6))

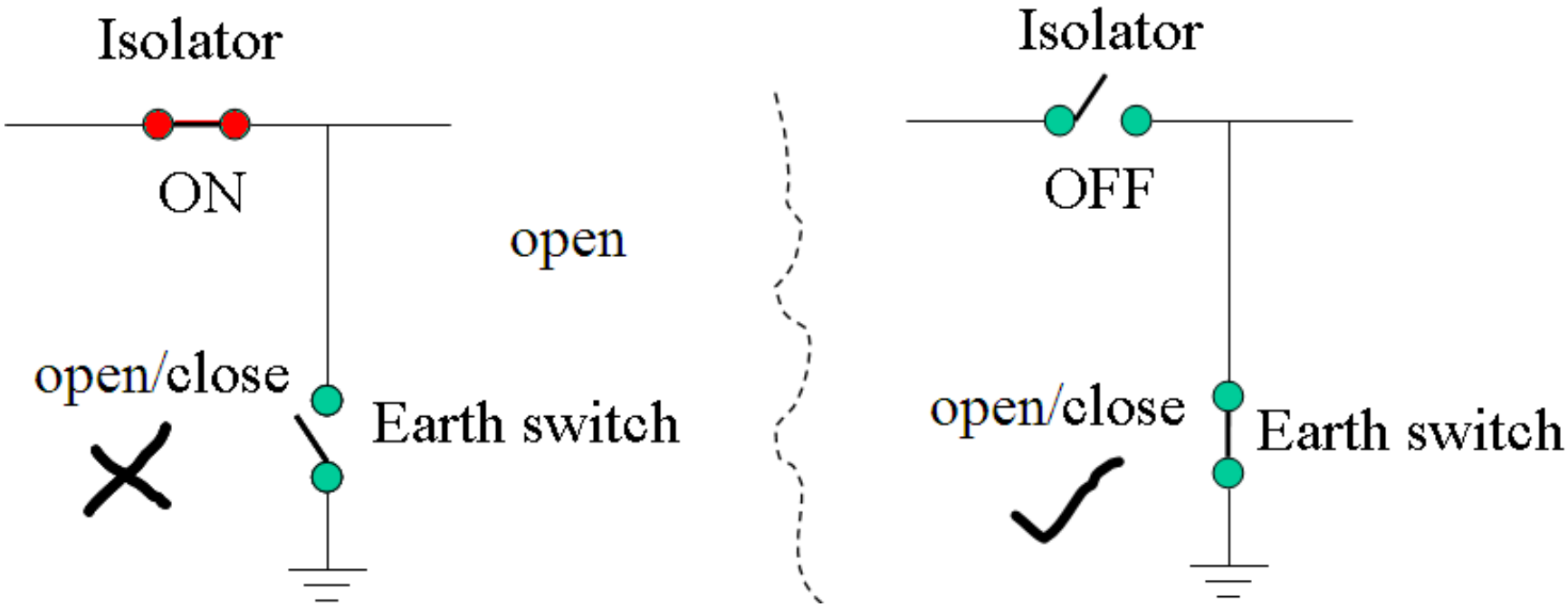
Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- Interlock: Isolator ⟷ Circuit breaker
  - Isolators cannot be operated unless breaker is open



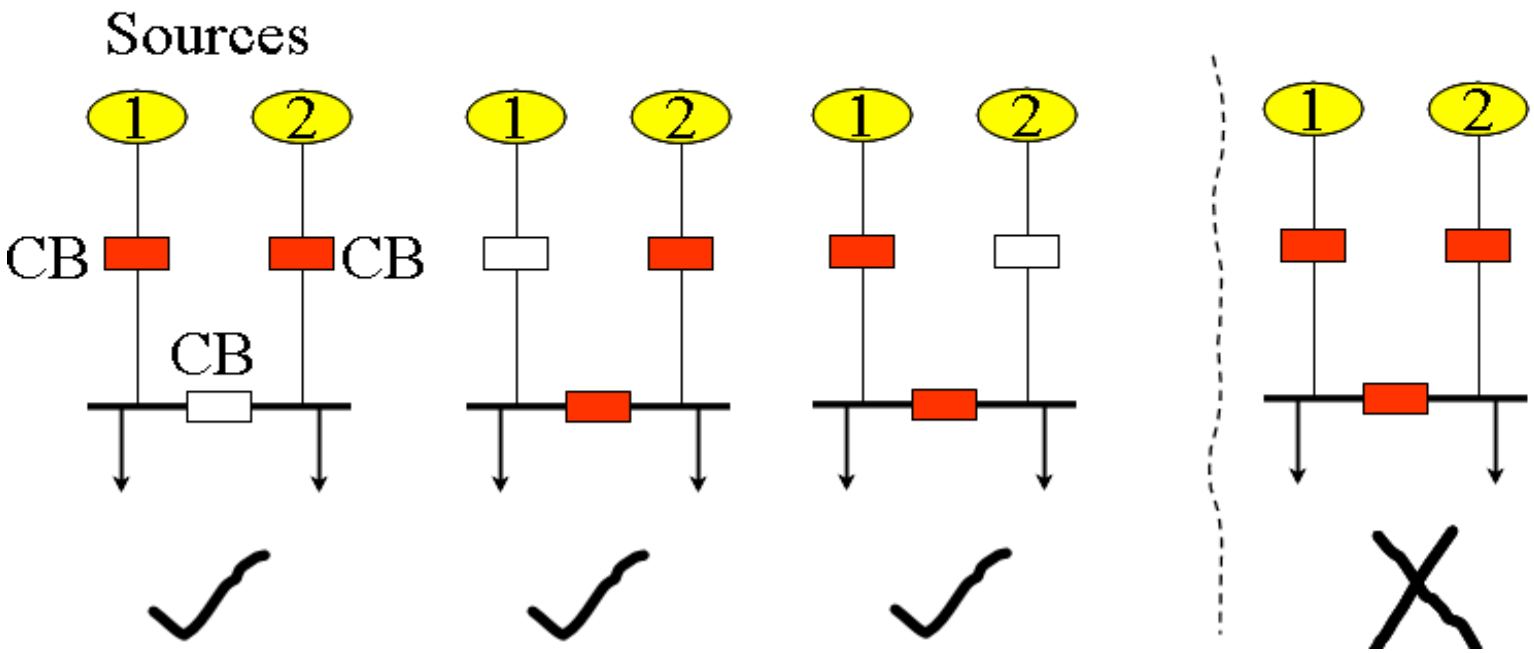
Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- Interlock: Isolator ⟷ Earth switch
  - earth switch can not be closed unless isolator is open



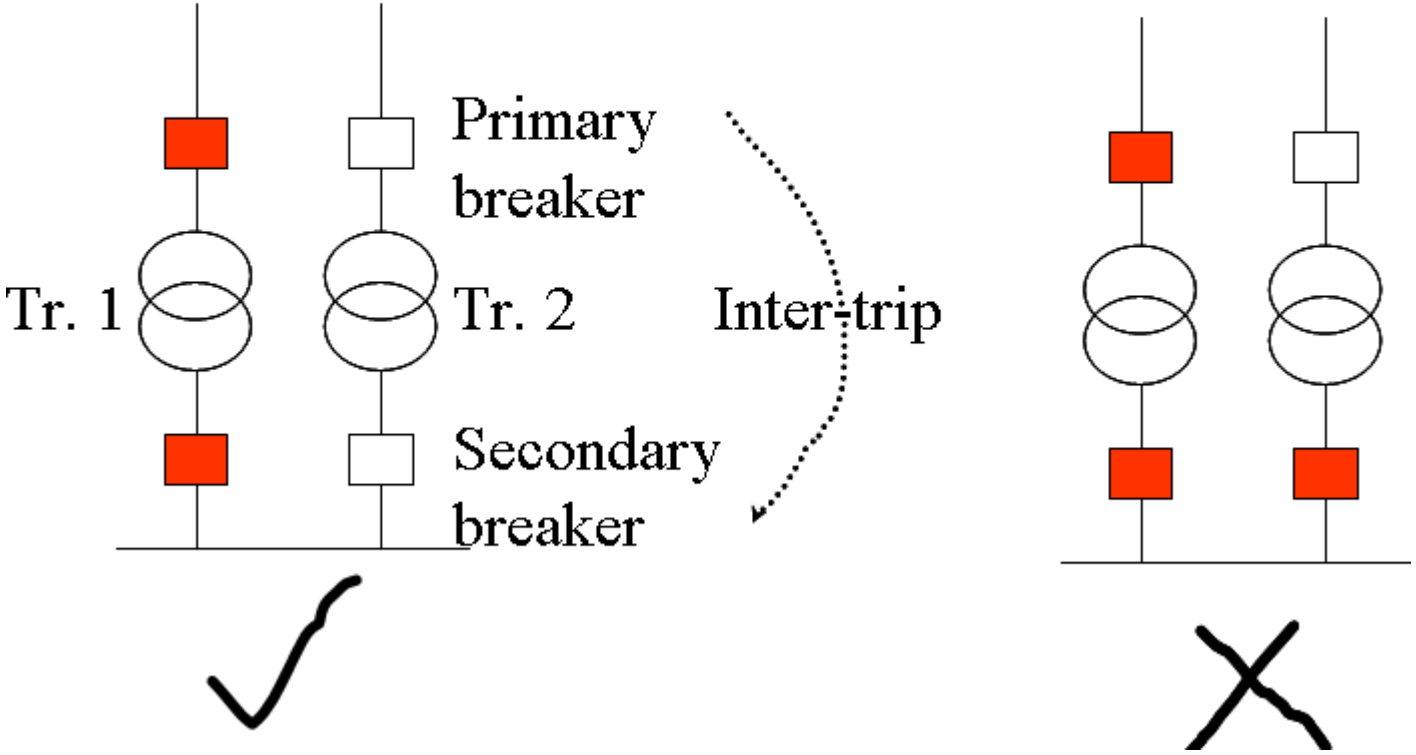
Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- Interlock: Parallel Sources
  - Supplies not intended for parallel operation; respective circuit breakers interlocked to avoid feedback



Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- Interlock: Parallel Transformers
  - Trip secondary CB in case primary CB trips



Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

Interlock - Live parts with access doors:

- Make live parts dead before access
- Discharge & earth these dead parts
- Examples: doors interlocked with CBs

  - Dry type transformer
  - Breaker housing panel

Reg. 45(2): Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

Protection to automatically disconnect supply under abnormal conditions:

Apparatus, Cable & Supply Lines Protection:

- ✓ O/C & E/F

Generator Protection:

- ✓ 100 kVA and above: E/F or leakage protection
- ✓ 1000 kVA and above: REF or/and Differential Protection for faults within generator winding

Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

Transformer Protection: 2(iii & iv)

- ✓ 1000 KVA and above: gas pressure type and WTI & OTI protection
- ✓ 10 MVA and above: Protection against incipient (internal) faults using differential protection

Reg. 45: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

S/S Protection:

- ✓ 132 kV and above: bus bar differential protection along with LBB (local breaker back)
- ✓ 220 kV & above: DR & Event Logger
- ✓ Lines connecting to 400/220 kV S/S: PLCC and distance protection

Reg. 46: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

Testing, Operation and Maintenance:

- **Manufacturer's routine test certificates to be produced, before approval (1)**
- ***New installation: no commissioning without site test (2)***
- ***Disconnected for alteration/repair for 6 months or more: no reconnection without site test (3)***

Reg. 46: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- Every failure of transformer/reactor of 20 MVA/MVAR and higher capacity shall be reported by the consumer and the suppliers to the CEA within 48 hr of the failure. (8)

- Reasons for failure and measures to be taken to avoid recurrence of such failure shall be sent to the CEA within 01 month of the occurrence. (8)

Reg. 48: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

Connection with earth:

- Neutral point of every generator and transformer shall be earthed by not less than two separate and distinct connections 2(i)
- Neutral point of a generator may be connected to the earthing system through an impedance to limit the fault current to the earth. 2(i) proviso

Reg. 49: Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

- **Outdoor S/S be protected by fencing of not less than 1.8 metres in height 1(ii)**

  <u>Exception:</u> pole type S/S & completely enclosed S/S in a metal covering connected with earth

Reg. 55-77:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

- **Joints –** not more than one joint in a conductor in a span is allowed 56(1)

- **Guarding -** shall be provided where lines of voltage not exceeding 33 kV cross a road or street

- **Minimum underground depth of power cable**

  Above 33 kV - 1.2 meters (76)

  0.6m horizontal sep.

Reg. 58:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

- **Min. Clearance above ground of the lowest conductor:**

Ground clearance for O/H line across & along the street and elsewhere				
Voltage	Across	Along	Voltage	Elsewhere
≤ 650 V	5.8 m	5.5 m	≤11 kV	4.6 m if bare & 4.0 m if insulated
>650 V &≤ 33 kV	6.1 m	5.8 m	>11 kV & ≤ 33 kV	5.2 m
> 33 kV	6.1 m	6.1 m		5.2m+0.5 m for every 33 kV or part increase
Ground clearance for HVDC				
500 kV DC	10.6 m			
800 kV DC	13.9 m			

Reg. 60:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

Clearance from buildings of lines not exceeding 650 V

- An overhead line shall not cross over an existing building as far as possible and no building shall be constructed under an existing overhead line.

- Where an overhead line of voltage not exceeding 650 V passes above or adjacent to or terminates on any building, the following minimum clearances from any accessible point, on the basis of maximum sag, shall be observed:

	Vertical Clearance of line from highest point	Horizontal Clearance of line from nearest point
From any flat roof, open balcony and lean to roof	2.5m	1.2m
For pitched roof	2.5	1.2m

Reg. 61:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

- **Clearance from buildings (650 V & above lines):**

Voltage	Vertical clearances	Horizontal clearances
Upto 11 kV	3.7 m	1.2 m
Above 11 kV & upto 33 kV	3.7 m	2.0 m
Above 33 kV	3.7 m plus	2.0 m plus
	0.3 m for every 33 kV increase	

Reg. 64:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

Transporting and storing of material near overhead lines:

- No material or earth work or agricultural produce shall be dumped or stored, no trees grown below or in the vicinity of, bare overhead conductors (3)
- No flammable material shall be stored under the electric supply line. (4)
- No fire shall be allowed above underground cables. (5)
- Firing of any material below electric lines shall be prohibited. (6)

Reg. 65-66:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

General clearances:

- No blasting for any purpose shall be done within 300 m from the boundary of a sub-station or from the electric supply lines without the written permission of owner(2)

- No cutting of soil within ten meters from the tower structure of 132 kV and above without written permission of owner (3)

- No construction of brick kiln or other polluting units within a distance of 500 m from T/L of 220 kV and above (4)

- Routes proximity to aerodromes - AAI approval of route of the lines 66

Reg. 69:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

- **Lines crossing each other: (iii)**

Minimum clearances in m

SN	Nominal system voltage	11-66 kV	110-132 kV	220 kV	400 kV	800 kV
1	Upto 650 V	2.44	3.05	4.58	5.49	7.94
2	11-66 kV	2.44	3.05	4.58	5.49	7.94
3	110-132 kV	3.05	3.05	4.58	5.49	7.94
4	220 kV	4.58	4.58	4.58	5.49	7.94
5	400 kV	5.49	5.49	5.49	5.49	7.94
6	800 kV	7.94	7.94	7.94	7.94	7.94

Reg. 69:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

- **AC & DC lines crossing each other: (v)**

Minimum clearances in metres

Sl. No.	Sysytem Voltage AC/DC	500 kV DC	600 kV DC
1.	Low and Medium AC	6.79	7.54
2.	11-66 kV AC	6.79	7.54
3.	110-132 kV AC	6.79	7.54
4.	220 kV AC	6.79	7.54
5.	400 kV AC	6.79	7.54
6.	500 kV DC	6.79	7.54
7.	800 kV DC	7.94	7.94

Reg. 69:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

Crossing of lines:

- Made as nearly at right angles as possible (viii)
- Near the support of the upper line
- Supports of lower line not to be below upper line

Reg. 73-77:
Safety requirements for
O/H lines, U/G cables and Gen. Stn.

- **Provision of Anti Climbing Devices (ACD) as per IS 5613 73(3)**
- **Protection against lightning - earthing lead shall be taken as directly as possible from LA without touching any metal part to a separate vertical ground electrode or junction of the earth mat already provided for the sub-station. 74(2)**
- **Protection against electromagnetic interference – Power Telecommunication Co-Ordination Committee (PTCC) approval for lines of 11 kV & above (77)**

Thank You