CENTRAL ELECTRICITY AUTHORITY

NOTIFICATION

New Delhi, the 8th June, 2023

No. CEA-PS-16/1/2021-CEI Division.—Whereas the draft of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2022 was published in six newspaper dailies, as required by sub-section (3) of section 177 of the Electricity Act, 2003 (36 of 2003) read with sub-rule (2) of rule 3 of the Electricity (Procedure for Previous Publication) Rules, 2005 for inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of forty-five days, from the date on which the copies of the newspaper containing the said draft regulations were made available to the public;

And whereas copies of the said newspapers containing the public notices and the said draft regulations on the website of the Central Electricity Authority were made available to the public on 14th June, 2022;

And whereas the objections and suggestions received from the public on the said draft regulations were considered by the Central Electricity Authority;

Now, therefore, in exercise of the powers conferred by clause (b) of sub-section (2) of section 177 and read with section 53 of the Electricity Act, 2003, and in suppression of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, except as respects things done or omitted to be done before such suppressions, the Central Electricity Authority hereby makes the following regulations, namely: –

Chapter I

Preliminary

1. Short title and Commencement. – (1) These regulations may be called the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023.

(2) These regulations shall come into force on the date of publication in the Official Gazette.

(3) **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.

2. Definitions. – (1) In these regulations, unless the context otherwise requires,

(a) "Act" means the Electricity Act, 2003 (36 of 2003);

(b) "accessible" means within physical reach without the use of any appliance or special effort;

(c) "aerial bunched cable" means polyethylene or cross linked polyethylene insulated cable having three or four cores with aluminium conductors twisted over a central bare or insulated aluminium alloy or steel messenger wire;

(d) "apparatus" means electrical apparatus and includes all machines, fittings, accessories and appliances in which conductors are used;

(e) "bare" means not covered with insulating materials;

(f) "bonding conductor" means the inter connecting conductors for the purpose of equipotential bonding with the main earth;

(g) "cable" means a length of insulated single conductor, solid or stranded, or two or more such conductors each provided with its own insulation, which are laid up together;

(h) "chartered electrical safety engineer" means a person authorised by the Appropriate Government as referred in regulation 6;

(i) "circuit" means an arrangement of conductor or conductors for conveying electricity and forming a system or a branch of a system and protected at the origin;

(j) "circuit breaker" means a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified duration and breaking currents under specified abnormal circuit condition;

(k) "concentric cable" means a composite cable comprising an inner conductor which is insulated and one or more outer conductors which are insulated from one another and are disposed over the insulation of, and more or less around, the inner conductor;

(l) "conductor" means any wire, cable, bar, tube, rail or plate used for conducting electricity;

(m) "conduit" means rigid or flexible metallic tubing or mechanically strong and fire resisting non-metallic tubing into which a cable or cables may be drawn for the purpose of affording it for mechanical protection;

(n) "connected load" means the sum of the ratings in kilowatt or kilovolt-ampere of the apparatus connected to the installation of the consumer which may be connected simultaneously to the source;

(o) "contact potential" means electric potential difference across the junction of two different objects in the absence of electric current;

(p) "covered with insulating material" means adequately covered with insulating material of such quality and thickness as to prevent danger;

(q) "cut out" means any device for automatically interrupting the flow of electricity through the conductor when the current increases above a pre-determined value, and shall also include fusible cut-out;

(r) "danger" means risk to health or life or any part of body from electric shock, burn or other injuries to person, or property, or from fire or explosion, attendant upon the generation, transmission, transformation, conversion, distribution or use of electricity;

(s) "dead" means at or about earth potential and disconnected from any live system and is used only with reference to current carrying parts when these parts are not live;

(t) "designated person" means a person whose name appears in the record maintained under sub-regulation (2) of regulation 3 by the supplier or consumer, or the owner, agent or manager of all electrical installations including mine, or the agent of any company operating in an oil-field or the owner of a drilled well in an oil-field or a contractor;

(u) "earthing" means connection of the exposed conductive and extraneous parts of an installation to the main earthing terminal of that installation or connection of neutral of transformer or generator or equipment to general mass of earth or earth bonded bar of that installation;

(v) "earthing arrangement or earthing system" means all the electric connections and devices involved in the earthing of a system, an installation or equipment;

(w) "electric vehicle" means any vehicle propelled, partly or wholly, by an electric motor drawing current from a rechargeable storage battery, or other portable energy storage devices or other self-generating electric source;

(x) "electric vehicle supply equipment" means an element in electric vehicle charging infrastructure that supplies electric energy for recharging the battery of electric vehicles;

(y) "enclosed substation" means any premises or enclosure or part thereof, being large enough to enable the entry of a person after the apparatus therein is in position, containing apparatus for transforming or converting electricity to or from a voltage at or exceeding six hundred fifty volt (other than transforming or converting solely for the operation of switch gear or instruments) with or without any other apparatus for switching, controlling or otherwise regulating the electricity, and includes the apparatus therein;

(z) "enclosed switching station" means any premises or enclosure or part thereof, being large enough to enable the entry of a person, after the apparatus therein is in position, containing apparatus for switching, controlling or otherwise regulating electricity at or exceeding six hundred fifty volt but not for transforming or converting electricity (other than for transforming or converting solely for the operation of switchgear or instruments) and includes the apparatus therein;

(za) "equipotential bonding" means an electrical connection putting various exposed conductive parts and extraneous conductive parts at a substantially equal potential;

(zb) "exposed conductive part" means a conductive part which can readily be touched and which is not normally live, but which may become live under fault conditions;

(zc) "extraneous conductive part" means a conductive part not forming part of the electrical installation and liable to introduce an electric potential, generally the electric potential of a local earth;

(zd) "flameproof enclosure" means an enclosure in which the parts which can ignite an explosive atmosphere are placed and which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the spread of explosion to the explosive atmosphere surrounding the enclosure;

(ze) "flexible cable" means a cable consisting of one or more cores each formed of a group of wires, the diameter and the physical properties of the wires and insulating material are to allow flexibility;

(zf) "guarded" means covered, shielded, fenced or otherwise protected by means of suitable casings, barrier,

rails or metal screens to remove the possibility of dangerous contact or approach by persons or objects to a point of danger;

(zg) "hand-held portable apparatus" means an apparatus designed to be capable of being held in the hands and moved while connected to a supply of electricity;

(zh) "high voltage direct current" means direct current voltage one hundred kilovolt and above used for transmission of power;

(zi) "inspector of mines" means an inspector appointed under the mines Act, 1952 (35 of 1952);

(zj) "installation" means any composite electrical unit used for the purpose of generating, transforming, transmitting, converting, distributing or utilizing electricity;

(zk) "Installation Manager" has the same meaning as defined in the Oil Mines Regulations, 2017;

(zl) "intrinsically safe circuit" means any circuit in which any spark or any thermal effect produced in the conditions specified in the relevant standards, which include normal operation and specified fault conditions and not capable of causing ignition of a given explosive gas atmosphere;

(zm) "intrinsically safe apparatus" means an electrical apparatus in which all the circuits are intrinsically safe circuits;

(zn) "lightning arrester" means a device which has the property of diverting to earth any electrical surge of excessively high amplitude applied to its terminals and is capable of interrupting follow on current, if present, and restoring itself thereafter to its original operating conditions;

(zo) "linked switch" means a switch with all the poles mechanically linked to operate simultaneously;

(zp) "live" means electrically charged;

(zq) "load despatcher" means the personnel engaged in operation of Load Despatch Centre;

(zr) "metallic covering" means mechanically strong metal covering surrounding one or more conductors;

(zs) "mine" shall have the same meaning as defined in clause (j) sub-section (1) of section 2 of the Mines Act, 1952 (35 of 1952);

(zt) "neutral conductor" means that conductor of a multi-wire system, the voltage of which is normally intermediate between the voltages of the other conductors of the system and shall also include return wire of a single phase system;

(zu) "notified voltage" means a voltage notified by the Appropriate Government under intimation to the Authority for the purpose of specifying the voltage level up to which self-certification is to be carried out under regulation 32 and regulation 45;

(zv) "occupier" means the owner or person in occupation of the premises where electricity is used or proposed to be used;

(zw) "open sparking" means sparking which owing to the lack of adequate provisions for preventing the ignition of inflammable gas external to the apparatus would ignite such inflammable gas;

(zx) "owner or agent or manager of a mine" have the same meanings as are assigned to them in the Mines Act, 1952 (35 of 1952);

(zy) "portable apparatus" means an apparatus which is so designed as to be capable of being moved while in operation;

(zz) "portable hand lamp" means a portable light-fitting provided with suitable handle, guard and flexible cord connected to a plug;

(zza) "protective conductor" means a conductor used for protection against electric shock and intended for connecting together which may include exposed conductive parts, extraneous conductive parts, the main earthing terminal, and the earthed point of the source, or an artificial neutral;

(zzb) "self-certification" means a certification by a supplier or owner or consumer in the prescribed format as required under regulation 32 and regulation 45;

(zzc) "socket outlet" means an electrical device that is for fixing at a point where fixed wiring terminates, and provides a detachable connection with the pins of a plug, and has two or more contacts and includes a cord extension socket attached to a flexible cord that is permanently connected to installation wiring;

(zzd) "span" means the horizontal distance between two adjacent supporting points of an overhead conductor;

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(zze) "standard" means Indian Standard and in absence of Indian Standard, International Electrotechnical Commission Standard, Institute of Electrical and Electronic Engineers Standard, European Norms Standard in the sequence of their appearance unless stated otherwise;

(zzf) "street box" means an enclosed structure, either above or below ground containing apparatus for transforming, switching, controlling or otherwise regulating electricity;

(zzg) "supplier" means any generating company or licensee from whose system electricity flows into the system of another generating company or licensee or consumer;

(zzh) "supply lead" means a piece of equipment used to establish the connection between the electric vehicle and either a socket-outlet or a charging point;

(zzi) "switch" means a manually operated device for opening and closing or for changing the connection of a circuit;

(zzj) "switchboard" means an assembly including the switchgear for the control of electrical circuits, electric connections and the supporting frame;

(zzk) "switchgear" shall denote switches, circuit breakers, cut-outs and other apparatus used for the operation, regulation and control of circuits;

(zzl) "system" means an electrical system in which all the conductors and apparatus are electrically connected to a common source of electric supply;

(zzm) "telecommunication line" means any equipment, structure and cable designed or intended for use in telecommunication;

(zzn) "transportable apparatus" means apparatus which is operated in a fixed position but which is so designed as to be capable of being moved readily from one place to another;

(zzo) "watt" is a unit of active power; and

(zzp) "MW" means megawatt and is equal to 10^6 watts.

(2) Words and expressions used herein and not defined in these regulations but defined in the Act shall have the meanings respectively assigned to them in the Act.

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Chapter II

Designated Person, Chartered Electrical Safety Engineer, Training and Certification

3. Designated person to operate and carry out the work on electrical lines and apparatus. – (1) The supplier or consumer, or owner of electrical installation, owner or agent or manager of a mine, or agent of any company operating in an oil-field or owner of a drilled well in an oil-field or a contractor who has entered into a contract with a supplier or a consumer, or owner of electrical installation, owner or agent or manager of a mine, or agent of any company operating in an oil-field or owner of a drilled well in an oil-field to carry out duties incidental to the generation, transformation, transmission, conversion, distribution or use of electricity shall designate person for the purpose to operate and carry out the work on electrical lines and apparatus.

(2) The supplier or consumer, or owner or agent or manager of a mine, or agent of any company operating in an oil-field or the owner of a drilled well in an oil-field or a contractor referred to in sub-regulation (1) shall maintain a record, in paper or electronic form, wherein the names of the designated person and the purpose for which they are designated, shall be entered.

(3) No person shall be designated under sub-regulation (1) unless,-

(i) he possesses a certificate of competency or electrical work permit, issued by the Appropriate Government; and

(ii) his name is entered in the register referred to in sub-regulation (2).

4. Inspection of record of designated person. – (1) The record maintained under sub-regulation (2) of regulation 3 shall be produced before the Electrical Inspector as and when required.

(2) If on inspection, the Electrical Inspector finds that the designated person does not comply with sub-regulation (3) of regulation 3, he shall recommend the removal of the name of such person from the record.

5. Electrical Safety Officer. – (1) All suppliers of electricity including generating companies, transmission companies and distribution companies shall designate an Electrical Safety Officer for ensuring observance of safety measures specified under these regulations in their organisation for construction, operation and maintenance of electrical system of all generating stations, transmission lines, substations, distribution systems and supply lines.

(2) The Electrical Safety Officer shall possess a degree in Electrical Engineering with at least five years experience in operation and maintenance of electrical installations or a Diploma in Electrical Engineering with at least ten years experience in operation and maintenance of electrical installations:

Provided that the Electrical Safety Officer designated for mines shall possess educational qualification as mentioned in sub-regulation (2) with at least five years of experience in operation and maintenance of electrical installations relevant to mines.

(3) For every electrical installation including factory registered under the Factories Act, 1948 (63 of 1952) with more than 250 kW connected load and mines and oil-field as defined in the Mines Act, 1952 (35 of 1952), with more than 2000 kW connected load, the owner of the installation or the management of the factory or mines, as the case may be, shall designate Electrical Safety Officer under sub-regulation (1) and having qualification and experience specified in sub-regulation (2), for ensuring the compliance of the safety provisions laid under the Act and the regulations made thereunder:

Provided that the Electrical Safety Officer shall carryout recommended periodic tests as per the relevant standards, and inspect such installations at intervals not exceeding one year, and keep a record thereof in Form I or Form II or Form III or Form IV, as the case may be, of Schedule II of these regulations; test reports and a register of recommendations in regard with safety duly acknowledged by owner; compliances made thereafter; and such records shall be made available to the Electrical Inspector, as and when required.

6. Chartered Electrical Safety Engineer. – (1) The Appropriate Government shall authorise Chartered Electrical Safety Engineer from amongst persons having the qualification and experience as per the guidelines issued by the Authority to assist the owner or supplier or consumer of electrical installations for the purpose of self-certification under regulation 32 and regulation 45 of these regulations.

(2) The Appropriate Government shall upload the name of the Chartered Electrical Safety Engineer, as soon as any person is authorised as Chartered Electrical Safety Engineer, on the web portal of the Government or the Department dealing with matters of inspection of electrical installations for the information of the owner or supplier or consumer.

7. Safety measures for operation and maintenance of generating station. – (1) The Engineers and Supervisors engaged or appointed to operate or undertake maintenance of any part or whole of a generating station shall hold degree or diploma in Engineering relevant to the electrical installations from a recognised institute or university.

(2) The Engineers and Supervisors engaged or appointed for operation and maintenance of generating station shall have successfully undergone the type of training as specified by the Authority in its guidelines issued under sub-regulation (4) from time to time, within two years from the date of engagement or appointment.

(3) The Technicians to assist Engineers or Supervisors shall possess a certificate in appropriate trade, preferably with a two years course from an Industrial Training Institute recognised by the Central Government or the State Government and shall have successfully undergone the type of training as specified in sub-regulation (4), within two years from the date of engagement or appointment:

Provided that the existing employees, as on the date of notification of these regulations, who are extending technical assistance to Engineers or Supervisors and do not have requisite qualification as mentioned in this regulation, shall have to undergo the training either from Power Sector Skill Council or from training institute recognised by the Authority for carrying out trade specific course as per the guidelines issued by the Authority and get certificate as mentioned above within two years from the date of notification of these regulations.

(4) The Authority shall issue guidelines for the training for operation and maintenance of generating station within six months of the notification of these regulations:

Provided that the duration and content of the training course shall be as specified in the guidelines.

(5) The owner of every generating station shall arrange for training of personnel engaged or appointed to operate and undertake maintenance of the generating station from its own institute or any other institute recognised by the Authority or State Government as per the guidelines and shall maintain records of the assessment of these personnel issued by the training institute in the format prescribed in guidelines and such records shall be made available to the Electrical Inspector, as and when required.

(6) The certificate of recognition of the training institute under these regulations shall be displayed by the Institute on its website at home page.

(7) Notwithstanding anything contained in sub-regulation (4), the training syllabus may be customised by the owner of the generating station of capacity below 100 MW owning the training institute for the purpose of imparting training to its employees under intimation to the Authority.

8. Safety measures for operation and maintenance of transmission and distribution systems. – (1) The Engineers or Supervisors engaged or appointed to operate or undertake maintenance of transmission and distribution systems shall hold degree or diploma in appropriate trade of Engineering from a recognised institute or university.

(2) The Engineers and Supervisors engaged or appointed to operate or undertake maintenance of transmission and distribution systems shall have successfully undergone the type of training specified in guidelines as per sub-regulation (4), within two years from the date of engagement or appointment.

(3) The Technicians to assist Engineers or Supervisors shall possess a certificate in appropriate trade, preferably with a two years course from an Industrial Training Institute recognised by the Central Government or State Government and should have successfully undergone the type of training as specified in guidelines as per sub-regulation (4), within two years from the date of engagement or appointment:

Provided that the existing employees, as on the date of notification of these regulations, who are extending technical assistance to Engineers or Supervisors and do not have requisite qualification as mentioned in this regulation, shall have to undergo the training either from Power Sector Skill Council or from training institute recognised by the Authority for carrying out trade specific course as per the guidelines issued by the Authroity and get certificate as mentioned above within two years from the date of notification of these regulations.

(4) The Authority shall issue guidelines for the training for operation and maintenance of transmission, distribution systems within six months of the notification of these regulations:

Provided that the duration and content of the training course shall be as specified in the guidelines.

(5) Owner of every transmission or distribution system shall arrange for training of their personnel engaged or appointed to operate and undertake maintenance of transmission and distribution system, in his own institute or any other institute recognised by the Authority or State Government as per the guidelines and shall maintain records of the assessment of these personnel issued by the training institute in the format prescribed in guidelines and such records shall be made available to the Electrical Inspector, as and when required.

9. Training and Certification of personnel engaged for operation and maintenance at Load Despatch Centres. – (1) The personnel engaged for operation and maintenance at the control room shall hold degree or diploma in Electrical Engineering or in related trade of Engineering from a recognised institute or university.

(2) The Authority shall issue guidelines for the training and certification of personnel engaged for operation and maintenance at control room within six months of the notification of these regulations:

Provided that the roles and responsibilities of the certification agency, duration and content of the basic and advance certification and training course shall be as specified in the guidelines.

(3) The certification agency shall be a training institute recognised by the Authority:

Provided that the Load Despatch Centre shall arrange for training and certification of load despatcher from the certification agency recognised by the Authority as per guidelines issued under sub-regulation (2) of this regulation within six months of their engagement:

Provided further that no personnel shall be engaged as load despatcher without certification:

Provided also that existing employee engaged in Load Despatch Centre shall be trained as per guidelines specified under sub-regulation (2) of this regulation within two years from the date of coming in force of these regulations.

(4) The training institute shall maintain records of the assessment of load despatcher in electronic form in the format prescribed in guidelines specified under sub-regulation (2) of this regulation and such records shall be made available to the Secretary, Central Electricity Authority on annual basis.

(5) The personnel other than the load despatcher engaged in the Load Despatch Centre shall undergo requisite training in their related work in the Load Despatch Centre within six months of their engagement.

(6) The Load Despatch Centre shall submit the details of certified load despatchers and the training details of the other personnel to Secretary, Central Electricity Authority on annual basis in the prescribed format:

Provided that Appropriate Government may provide suitable incentive to load despatchers on successful completion of training.

10. Keeping of records and inspection thereof. – (1) The generating company or licensee shall maintain records of the maps, plans and sections relating to supply or transmission of electricity in physical or digital form and provide the same to the Electrical Inspector for inspection as and when required.

(2) The Electrical Inspector shall supply a copy of the report of inspection referred to in sub-regulation (1), to the generating company or licensee, as the case may be.

11. Deposit of maps. – Whenever a licence is granted by the Appropriate Commission, two sets of maps specifying the particular for which the licence is granted shall be signed and dated corresponding to the date of notification of the licence by an officer designated by the Appropriate Commission:

Provided that one set of maps shall be retained by the designated officer and the other set shall be furnished to the licensee.

12. Deposit of printed copies. – (1) Every person who is granted a licence shall, within thirty days of the grant thereof, have physical or digital copies of the licence and maps showing the area of supply as specified in the licence to exhibit the same for public inspection at all reasonable times at its head office, local offices, if any, and at the office of every local authority within the area of supply.

(2) Every such licensee shall, within the aforesaid period of thirty days, supply free of charge one copy of the licence along with the relevant maps to every local authority within the area of supply and shall also make necessary arrangements for the sale of physical or digital copies of the licence and maps to all persons applying for the same, at a price to be notified by the Appropriate Government from time to time.

13. Plan for area of supply to be made and kept open for inspection. – (1) The licensee shall, after commencing supply of electricity, forthwith cause a plan, to be made in physical or digital form, of the area of supply, and shall cause to be marked thereon the alignment and in the case of underground works, the approximate depth below the surface of all the existing electric supply lines, street distribution boxes and other works, and shall once in every year cause that plan to be duly corrected so as to show the electric supply lines, street distribution boxes and other works for the time being in position and shall also made sections showing the approximate level of all his existing underground works other than service lines.

(2) Every plan shall be drawn to such horizontal and vertical scale as the Appropriate Commission may require:

Provided that no scale shall be required unless maps of the locality on that scale are for the time being available to the public.

(3) Every plan and section so made or corrected, or a copy thereof, marked with the date when it was made or corrected, shall be kept by the licensee at his principal office or place of business within the area of supply, and shall at all reasonable times be open to the inspection of all applicants, and copies thereof shall be supplied.

(4) The licensee shall ensure that all new and old plans and sections shall be compatible to the Global Positioning System mapping or mapping through any other latest technology.

(5) The licensee shall, if required by an Electrical Inspector, and, where the licensee is not a local authority, by the local authority, if any, concerned, supply free of charge to such Electrical Inspector or local authority a duplicate copy of every such plan or section or a part of the same duly corrected.

(6) The copies of plans and sections under this regulation shall be supplied by the licensee to every applicant on the payment of such fee as the Appropriate Commission may, by regulation, specify.

Chapter III

General safety requirements

14. General safety requirements pertaining to construction, installation, protection, operation and maintenance of electric supply lines and apparatus. – (1) All electric supply lines and apparatus shall be of sufficient rating for power, insulation and estimated fault current and of sufficient mechanical strength, for the duty cycle which they may be required to perform under the environmental conditions of installation, and shall be constructed, installed, protected, worked and maintained in such a manner as to ensure safety of human beings, animals and property.

(2) Save as otherwise provided in these regulations, the relevant standards including National Electrical Code and National Building Code shall be followed to carry out the purpose of these regulations and where relevant Indian standards are not available, International standards shall be followed and in the event of any inconsistency, the provisions of these regulations shall prevail.

(3) The material and apparatus used shall conform to the relevant standards.

(4) All electrical equipment shall be installed above the Highest Flood Level and where such equipment is not possible to be installed above Highest Flood Level, it shall be ensured that there is no seepage or leakage or logging of water.

15. Service lines and apparatus on consumer's premises. – (1) The supplier shall ensure that all electric supply lines, wires, fittings and apparatus belonging to him or under his control, up to the point of commencement of

supply, which are on a consumer's premises, are in a safe-condition and in all respects fit for supplying electricity and the supplier shall take precautions to avoid danger arising on such premises from such supply lines, wires, fittings and apparatus.

(2) The 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.

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

(4) The consumer shall also ensure that the installation of the licensee under his control is kept in a safe condition.

16. Switchgear on consumer's premises. – (1) The supplier shall provide a suitable switchgear in each conductor of every service line other than an earthed or earthed neutral conductor or the earthed external conductor of a concentric cable within a consumer's premises, in an accessible position and such switchgear shall be contained within an adequately enclosed fireproof receptacle:

Provided that where more than one consumer is supplied through a common service line, each such consumer shall be provided with an independent switchgear at the point of rigid junction to the common service.

(2) Every electric supply line other than the earthed or earthed neutral conductor of any system or the earthed external conductor of a concentric cable shall be protected by a suitable switchgear by its owner.

17. Identification of earthed and earthed neutral conductors and position of switches and switchgear therein. – Where the conductors include an earthed conductor of a two-wire system or an earthed neutral conductor of a multi-wire system or a conductor which is to be connected thereto, the following conditions shall be complied with, -

(i) an indication of a permanent nature shall be provided by the owner of the earthed or earthed neutral conductor, or the conductor which is to be connected thereto, to enable such conductor to be distinguished from any live conductor and such indication shall be provided as per relevant standards, namely: –

(a) where the earthed or earthed neutral conductor is the property of the supplier, at or near the point of commencement of supply;

(b) where a conductor forming part of a consumer's system is to be connected to the supplier's earthed or earthed neutral conductor, at the point where such connection is to be made; and

(c) in all other cases, at a point corresponding to the point of commencement of supply.

(ii) no cut-out, link, switch or circuit breaker other than a linked switch arranged to operate simultaneously on the earthed or earthed neutral conductor and live conductors shall be inserted or remain inserted in any earthed or earthed neutral conductor of a two wire-system or in any earthed or earthed neutral conductor of a multi-wire system or in any conductor connected thereto:

Provided that the above requirement shall not apply in case of a link for testing purposes, or a switch for controlling a generator or transformer.

18. Earthed terminal on consumer's premises. – (1) The supplier shall provide and maintain on the consumer's premises for the consumer's use, a suitable earthed terminal in an accessible position at or near the point of commencement of supply as per relevant standards:

Provided that in the case of installation of voltage exceeding 250 V the consumer shall, in addition to the aforementioned earthing arrangement, provide his own earthing system with an independent electrode and the same shall be interlinked with the earthed terminal mentioned in sub-regulation (1) through a suitable link.

(2) The consumer shall take all reasonable precautions to prevent mechanical damage to the earthed terminal and its lead belonging to the supplier.

19. Accessibility to bare conductors. – Where bare conductors are used in a building, the owner of such conductors shall, -

(a) ensure that they are inaccessible to general public;

(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 standards.

20. Danger Notices. – The owner of every installation of voltage exceeding 250 V shall affix permanently in a conspicuous position a danger notice in Hindi or English and the local language of the district, with a sign of

skull and bones of a design as per relevant standards on, -

(a) every motor, generator, transformer and other electrical plant and equipment together with apparatus used for controlling or regulating the same;

(b) all supports of overhead lines of voltage exceeding 650 V which can be easily climbed upon without the aid of ladder or special appliances; and

(c) luminous tube sign requiring supply, X-ray and similar high frequency installations of voltage exceeding 650 V but not exceeding 33 kV:

Provided that where it is not possible to affix such notices on any generator, motor, transformer or other apparatus, they shall be affixed as near as possible thereto, or the word 'danger' and the voltage of the apparatus concerned shall be permanently painted on it:

Provided further that where the generator, motor, transformer or other apparatus is within an enclosure one notice affixed to the said enclosure shall be sufficient for the purposes of this regulation.

Explanation. – For the purposes of clause (b) rails, tubular poles, wooden supports, reinforced cement concrete poles and pre stressed cement concrete poles without steps, I-sections and channels, shall be deemed as supports which cannot be easily climbed upon.

21. Handling of electric supply lines and apparatus. – (1) Before any conductor or apparatus is handled, adequate precautions shall be taken, by earthing or other suitable means, to discharge electrically such conductor or apparatus, and any adjacent conductor or apparatus if there is danger therefrom, and to prevent any conductor or apparatus from being accidentally or inadvertently electrically charged when persons are working thereon shall be followed as per the relevant standards.

(2) Every person who is working on an electric supply line or apparatus or both shall be provided with, –

(a) personal protective equipment, tools and devices such as rubber gloves and safety footwear suitable for working voltage, safety belts for working at height, nonconductive ladder, earthing devices of appropriate class, helmet, line tester, hand lines, voltage detector and hand tools as per the relevant standards; and

(b) any other device for protecting him from mechanical and electrical injury due to arc flash and such personal protective equipment, tools and devices shall conform to the relevant standards and shall always be maintained in sound working condition.

(3) No person shall operate and undertake maintenance work on any part or whole of an electrical plant or electric supply line or apparatus and no person shall assist such person on such work, unless he is designated in that behalf and observes the safety precautions given in Part-I, Part-II, Part-III and Part-IV, as the case may be, of Schedule I.

(4) Every telecommunication line on supports carrying an overhead line of voltage exceeding 650 V but not exceeding 33 kV shall, for the purpose of working thereon, be deemed to be a line of voltage exceeding 650 V:

Provided that prior permission shall be taken from the concerned licensee before laying telecommunication lines on electric supports.

(5) For the safety of operating personnel, all non-current carrying metal parts of switchgear and control panels shall be properly earthed and insulating floors or mat conforming to the relevant standards, of appropriate voltage level shall be provided in front and rear of the panels where such personnel are required to carry out operation, maintenance or testing work.

(6) All panels shall be painted with the description of their identification at front and at the rear.

22. Supply to vehicles and cranes. – Every person owning a vehicle, travelling crane, or the like to which electricity is supplied from an external source shall ensure that it is efficiently controlled by a suitable switch enabling all voltage to be cut off in one operation and, where such vehicle, travelling crane or the like runs on metal rails, the owner shall ensure that the rails are electrically continuous and earthed at multiple points to ensure equipotential.

23. Cables for portable or transportable apparatus. – (1) Flexible cables shall not be used for portable or transportable motors, generators, transformers, rectifiers, electric drills, electric sprayers, welding sets or any other portable or transportable apparatus unless they are insulated for required voltage as per the relevant standards and adequately protected from mechanical damage.

(2) Where the protection is by means of metallic covering, the covering shall be in metallic connection with the frame of any such apparatus and earthed.

(3) The cables shall be three core type and four core type for portable and transportable apparatus working on

single phase and three phase supply, respectively and the core meant to be used for earth connection shall be easily identifiable.

24. Cables protected by bituminous materials. – (1) Where the supplier or the owner has brought into use an electric supply line, other than an overhead line, which is not completely enclosed in a continuous metallic covering connected with earth and is insulated or protected in situ by composition or material of a bituminous character, –

(i) any pipe, conduit, or the like into which such electric supply line may have been drawn or placed shall, unless other arrangements are approved by the Electrical Inspector in any particular case, be effectively sealed at its point of entry into any street box so as to prevent any flow of gas to or from the street box; and

(ii) such electric supply line shall be periodically inspected and tested where accessible, and the result of each such inspection and test shall be duly recorded by the supplier or the owner.

(2) The supplier or the owner shall not bring into use any further electric supply line as aforesaid which is insulated or protected in situ by any composition or material known to be liable to produce noxious or explosive gases on excessive heating.

25. Street boxes. **–** (1) Street boxes shall not contain gas pipes, and precautions shall be taken to prevent, any influx of water or gas.

(2) Where electric supply lines forming part of different systems pass through the same street box, they shall be readily distinguishable from one another and all electric supply lines at or in street boxes shall be adequately supported and protected so as to prevent risk of damage to or danger from adjacent electric supply lines.

(3) All street boxes shall be regularly inspected for the purpose of detecting the presence of gas and if any influx or accumulation is discovered, the owner shall give immediate notice to the agency or company owning gas pipeline in the neighborhood of the street box and in cases where a street box is large enough to admit the entrance of a person therein have been placed in position, provision shall be made, -

(i) to ensure that any gas which may by accident have obtained access to the box shall escape before a person is allowed to enter and the box shall have provision for sufficient cross ventilation; and

(ii) for the prevention of danger from sparking.

(4) The owners of all street boxes or pillar boxes containing circuits or apparatus shall ensure that their covers and doors are kept closed and locked and are so provided that they can be opened only by means of a key or a special appliance.

(5) The street or pillar boxes shall be erected with the live parts at least 0.6 metre above the ground level or above the flood level of the local site condition, whichever is higher.

26. Distinction of different circuits. – The owner of every generating station, substation, junction box or pillar box in which there are any circuits or apparatus, whether intended for operation at different voltages or at the same voltage, shall ensure by means of indication of a permanent nature that the respective circuits are readily distinguishable from each other.

27. Distinction of the installations having more than one feed. – The owner of every installation including substation, double pole structure, four pole structure or any other structure having more than one feed, shall ensure by means of indication of a permanent nature, that the installation is readily distinguishable from other installations.

28. Accidental charging. – (1) The owners of all circuits and apparatus shall so arrange them that there shall be no danger of any part thereof becoming accidentally charged to any voltage beyond the limits of voltage for which they are intended.

(2) Where alternating current and direct current circuits are installed on the same box or support, they shall be so arranged and protected that they shall not come into contact with each other.

29. Provisions applicable to protective equipment. – (1) 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 enclosed switching-stations in convenient location.

(2) Appropriate type of fire extinguisher conforming to the relevant standards, shall be installed, maintained, periodically inspected and tested as per the relevant standards for extinguishing and controlling fire and record of such tests shall be maintained.

(3) Sufficient number of first-aid boxes or cupboards conspicuously marked and equipped with such contents as the State Government may specify or as per the relevant standards, shall be provided and maintained at

appropriate locations in every generating station, enclosed substation, enclosed switching station and in vehicles used for maintenance of lines so as to be readily available and accessible at all the times and all such boxes and cupboards shall, except in the case of unattended substations and switching stations, be kept under the charge of responsible persons who are trained in first-aid treatment and one of such persons shall be available during working hours.

(4) Two or more gas masks shall be provided conspicuously and installed and maintained at accessible places in every generating station with capacity of five megawatt and above and enclosed substation with transformation capacity of five megavolt-ampere and above for use in the event of fire or smoke:

Provided that where more than one generator with capacity of five megawatt and above is installed in a power station, each generator shall be provided with at least two separate gas masks in an accessible and conspicuous place.

(5) In every generating station, substation or switching station, an artificial respirator, fire extinguishers, first-aid boxes and gas masks shall be provided and kept in good working condition and locations of the same shall be displayed in the control room and operator cabin.

(6) Address and contact number of the nearest Doctor, Hospital with a facility for first-aid treatment for electric shock and burns, ambulance service and fire service shall be prominently displayed near the electric shock treatment chart in control room and operator cabin.

30. Display of instructions for resuscitation of persons suffering from electric shock. – (1) Instructions, in English or Hindi and the local language of the District and where Hindi is the local language, in English and Hindi for the resuscitation of persons suffering from electric shock, shall be affixed by the owner in a conspicuous place in every generating station, enclosed substation, enclosed switching station, mines and in every factory as defined in the Factory Act, 1948 (63 of 1952) in which electricity is used and in such other premises where electricity is used as the Electrical Inspector may, by notice in writing served on the owner, direct.

(2) The owner of every generating station, enclosed substation, enclosed switching station and every factory or other premises to which these regulations apply, shall ensure that all designated persons or persons engaged or appointed to operate and maintain electrical plants or transmission or distribution systems are acquainted with and are competent to apply the instructions referred to in sub-regulation (1).

31. Precautions to be adopted by consumers, owners, occupiers, electrical contractors, electrical workmen and suppliers. – (1) No electrical installation work, including additions, alterations, repairs and adjustments to existing installations, except such replacement of lamps, fans, fuses, switches, domestic appliances of voltage not exceeding 250 V and fittings as in no way alters its capacity or character, shall be carried out upon the premises of or on behalf of any consumer, supplier, owner or occupier for the purpose of supply to such consumer, supplier, owner or occupier except by an electrical contractor licenced in this behalf by the State Government and on its behalf under the direct supervision of a person holding a certificate of competency and by a person holding a permit issued or recognised by the State Government:

Provided that in the case of works executed for or on behalf of the Central Government and in the case of installations in mines, oil-fields and railways, the Central Government and in other cases the State Government, may, by notification in the Official Gazette, exempt on such conditions as it may impose, any such work described therein either generally or in the case of any specified class of consumers, suppliers, owners or occupiers:

Provided further that in the case of works executed for or on behalf of the Central Government and in the case of installations in mines, oil-fields and railways, an electrical contractor having licence issued by any State Government or Union Territory administration shall not require licence from other State Government in which the works are to be executed.

(2) No electrical installation work which has been carried out in contravention of sub-regulation (1) shall either be energised or connected to the works of any supplier.

32. Periodic inspection and testing of installations. – (1) The periodic inspection and testing of installation of voltage above the notified voltage belonging to the owner or supplier or consumer, as the case may be, shall be carried out by the Electrical Inspector:

Provided that the electrical installation below or equal to the notified voltage shall be self-certified by the owner or supplier or consumer, as the case may be.

(2) The periodicity of electrical inspection by the Electrical Inspector or the self-certification by the supplier, owner or consumer shall be as directed by the Appropriate Government:

Provided that the periodicity of electrical inspection and self-certification shall not exceed five years:

Provided further that in respect of the electrical installation belonging to mines, oil-fields and railways, such direction shall be issued by the Central Government.

(3) The periodic inspection and testing of installation of voltage equal to or below the notified voltage belonging to the owner or supplier or consumer, as the case may be, shall be carried out by the owner or supplier or consumer and shall be self-certified for ensuring observance of safety measures specified under these regulations and the owner or supplier or consumer, as the case may be, shall submit the report of self-certification to the Electrical Inspector in the Form I or Form II or Form III or Form IV, as the case may be, of Schedule II:

Provided that the electrical installation so self-certified shall be considered as duly inspected and tested only after the report of self-certification is duly received by the office of Electrical Inspector and if not acknowledged by the Electrical Inspector within three working days, it shall be deemed to be received:

Provided further that the owner or supplier or consumer has the option to get his installation inspected and tested by the Electrical Inspector of the Appropriate Government.

(4) Notwithstanding anything contained in sub-regulation (3), every electrical installation covered under section 54 of the Act including every electrical installation of mines, oil-fields and railways shall be periodically inspected and tested by the Electrical Inspector of the Appropriate Government.

(5) Where the supplier is directed by the Central Government or the State Government, as the case may be, to inspect and test the installation, such supplier shall report on the condition of the installation to the consumer concerned in the Form I, Form II, Form III and Form IV as provided in Schedule II and shall submit a copy of such report to the Electrical Inspector.

(6) The Electrical Inspector may, on receipt of such report, accept the report submitted by the supplier or record variations as the circumstances of each case may require and may recommend that the defects may be rectified as per report.

(7) In the event of the failure of the owner of any installation to rectify the defects in his installation pointed out by the Electrical Inspector in his report and within the time indicated therein, such installation shall be liable to be disconnected under the directions of the Electrical Inspector after serving the owner of such installation with a notice for a period not less than forty eight hours:

Provided that the installation shall not be disconnected in case an appeal is made under sub section (2) of section 162 of the Act and appellate authority has stayed the orders of disconnection.

(8) It shall be the responsibility of the owner of all installations to maintain and operate the installations in a condition free from danger and as recommended by the manufacturer or by the relevant standards.

33. Testing of consumer's installation. – (1) Upon receipt of an application for a new or additional supply of electricity and before commencement of supply or recommencement of supply after the supply has been disconnected for a period of six months, the supplier shall either test the installation himself or accept the test results submitted by the consumer when same has been duly signed by the licenced electrical contractor:

Provided that in case of voltage level equal to or below the notified voltage, Chartered Electrical Safety Engineer can also test the installation on request of owner.

(2) The testing and verifications shall be carried out as per relevant standards.

(3) The testing equipment shall be calibrated by a Government authorised or National Accreditation Board for Testing and Calibration Laboratories accredited laboratory at periodical interval as per the periodicity specified by them.

(4) The supplier shall maintain a record of test results obtained at each supply point to a consumer, as per the forms provided in Schedule III.

(5) If as a result of such inspection and test, the supplier is satisfied that the installation is likely to be dangerous, he shall serve on the applicant a notice in writing requiring him 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.

34. Generating units required to be inspected by Electrical Inspector. – The capacity above which generating units including generating units producing electricity from renewable sources of energy shall be required to be inspected by the Electrical Inspector before commissioning, shall be as per the notification issued by the Appropriate Government in this regard.

Chapter IV

General conditions relating to supply and use of electricity

35. Precautions against leakage before connection. – (1) The supplier shall not connect its works with the apparatus in the premises of any applicant seeking supply unless the supplier is satisfied that at the time of making the connection cause a leakage from that installation or apparatus of a magnitude detrimental to safety which shall be checked by measuring the installation's or apparatus' insulation resistance as stipulated in the relevant standards.

(2) If the supplier declines to make a connection under the provisions of sub-regulation (1) the supplier shall convey to the applicant the reasons thereof, in writing for so declining.

36. Leakage on consumer's premises. – (1) If the Electrical Inspector or the supplier has reasons to believe that there is leakage in the system of a consumer which is likely to affect injuriously the use of electricity by the consumer or by other persons, or which is likely to cause danger, he may give notice to the consumer in writing to inspect and test the consumer's installation.

(2) If after such notice, the consumer fails to provide access to its installation for inspection and testing, or an insulation resistance of the consumer's installation is so low as to prevent safe use of electricity, the supplier may, and if directed so by the Electrical Inspector shall discontinue the supply of electricity to the installation but only after giving to the consumer forty eight hours notice in writing for disconnection of supply and shall not recommence the supply until he or the Electrical Inspector is satisfied that the cause of the leakage has been removed.

37. Supply and use of electricity. – (1) The electricity shall not be supplied, transformed, converted, inverted or used or continued to be supplied, transformed, converted, inverted or used unless the conditions provided in sub-regulations (2) to (8) are complied with.

(2) The following controls of requisite capacity to carry and break the current shall be installed as near as possible after the point of commencement of supply so as to be readily accessible and capable of completely isolating the supply to the installation, such equipment being in addition to any control switch installed for controlling individual circuits or apparatus, namely: –

Supplied at voltage	Control
Below 11 kV.	Switch fuse unit or a circuit breaker by consumers.
11 kV and above.	A circuit breaker by consumers.

(3) In case of every transformer the following shall be provided, namely: –

(i) on primary side of transformer, a linked switch with fuse or gang operated air break switch with fuse or circuit breaker of adequate capacity:

Provided that the linked switch with fuse on the primary side of the transformer may be of such capacity as to carry the full load current and to break only the magnetising current of the transformer:

Provided further that for transformer having capacity of 1000 kVA and above, a circuit breaker shall be provided:

Provided also that the linked switch with fuse or gang operated air break switch with fuse or circuit breaker on the primary side of the transformer shall not be required for the unit auxiliary transformer and generator transformer;

(ii) on the secondary side of all transformers a circuit breaker of adequate rating shall be installed:

Provided that for supplier's transformers of capacity below 1000 kVA, a linked switch with fuse or circuit breaker of adequate rating shall be installed on secondary side.

(4) Except in the case of composite control gear designed as a unit each distinct circuit is to be protected against excess energy by means of a suitable fuse link or a circuit breaker of adequate breaking capacity, suitably located and so constructed as to prevent danger from overheating, arcing or scattering of hot metal when it comes into operation and to permit for ready renewal of the fuse link without danger.

(5) The supply of electricity to each motor or a group of motors or other apparatus meant for operating one particular machine shall be controlled by a suitable linked switch or a circuit breaker or an emergency tripping device with manual reset of requisite capacity placed in such a position as to be adjacent to the motor or a group of motors or other apparatus readily accessible to and easily operated by the person incharge and so connected in the circuit that by its means all supply of electricity can be cut off from the motor or group of motors or apparatus from any regulating switch, resistance of other device associated therewith.

(6) All insulating materials shall be as per their applicaton and their mechanical strength shall be sufficient for

the purpose so as to maintain adequately their insulating property under all working conditions in respect of temperature, moisture, salinity and pollution.

(7) Adequate precautions shall be taken to ensure that no live parts are exposed as to cause danger.

(8) Every consumer shall use all reasonable means to ensure that where electricity is supplied by the supplier, no person other than the supplier shall interfere with service lines and apparatus placed by the supplier on the premises of the consumer.

38. Provisions for supply and use of electricity in multi-storeyed building more than fifteen metre in height. – (1) The connected load and voltage of supply above which inspection is to be carried out by an Electrical Inspector for a multi-storeyed building of more than fifteen metre height shall be notified by the Appropriate Government.

(2) Before making an application for commencement of supply or recommencement of supply after an installation has been disconnected for a period of six months or more, the owner or occupier of a multi-storeyed building shall give not less than thirty days notice in writing to the Electrical Inspector specifying therein the particulars of installation and the supply of electricity shall not be commenced or recommenced within this period, without the approval in writing of the Electrical Inspector.

(3) The following safety measures shall be provided in the multi-storeyed buildings of more than fifteen metre height and other premises such as airports, hospitals, hotels, places of entertainment, places of worship, cultural centers, stadium, academic buildings, test labs, industrial installations, installation with explosive or flammable material, railway or metro stations and other public buildings, namely: –

(i) 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 three-phase, four-wire circuit and fixed in a conspicuous position at not more than 1.70 metre above the ground so as to completely isolate the supply to the building in case of emergency;

(ii) the owner or occupier of a multi-storeyed building shall ensure that electrical installations and works inside the building are carried out and maintained in such a manner as to prevent danger due to shock and fire hazards, and the installation is carried out as per the relevant standards;

(iii) no other service pipes and cables shall be taken through the ducts provided for laying of power cables and all ducts provided for power cables and other services shall be provided with fire barrier at each floor crossing;

(iv) the Fire Retardant Low Smoke and Low Halogen power cables shall be used in building of more than fifteen metre height as per relevant standards:

Provided that Halogen Free Flame Retardant power cables as per the relevant standards shall be used in airports, hospitals and hotels irrespective of height;

(v) distribution of electricity to the floors shall be done using bus bar trunking system;

(vi) lightning protection of the building shall be as per the relevant standards;

(vii) verification of electrical wiring of the building shall be carried out as per the relevant standards; and

(viii) electricity meter shall not be installed in the passage of staircase.

39. Conditions applicable to installations of voltage exceeding 250 Volts. – The following conditions shall be complied with where electricity of voltage above 250 V is supplied, converted, transformed or used, namely: **–**

(i) all conductors, other than those of overhead lines, shall be completely enclosed in mechanically strong metal casing or metallic covering which is electrically and mechanically continuous and adequately protected against mechanical damage unless the said conductors are accessible only to a designated person or are installed and protected so as to prevent danger:

Provided that non-metallic conduits conforming to the relevant standards may be used for installations of voltage not exceeding 650 V;

(ii) all metal works, enclosing, supporting or associated with the installation, other than that designed to serve as a conductor shall be connected with an earthing system as per relevant standards and the provisions of regulation 43;

(iii) every switch board shall comply with the following, namely: –

(a) a clear space of not less than one metre in width shall be provided in front of the switchboard;

(b) if there are any attachments or bare connections at the back of the switchboard, the space, if any,

behind the switchboard shall be either less than twenty centimetre or more than seventy five centimetre in width, measured from the farthest protruding part of any attachment or conductor; and

(c) if the space behind the switchboard exceeds seventy five centimetre in width, there shall be a passage way from either end of the switchboard, clear to a height of 1.8 metre;

(iv) in case of installations provided in premises where inflammable materials including gases and chemicals are produced, handled or stored, the electrical installations, equipment and apparatus shall comply with the requirements of flame proof, dust tight, totally enclosed or any other suitable type of electrical fittings depending upon the hazardous zones as per the relevant standards;

(v) where an application has been made to a supplier for supply of electricity to any installation, the supplier shall not commence the supply or where the supply has been discontinued for a period of six months or more, recommence the supply unless the consumer has complied with the relevant provisions in these regulations;

(vi) where a supplier proposes to supply or use electricity at or to recommence supply of voltage exceeding 250 V but not exceeding 650 V after it has been discontinued for a period of six months, he shall, before connecting or reconnecting the supply, give notice in writing of such intention to the Electrical Inspector; and

(vii) if at any time after connecting the supply, the supplier is satisfied that any provision of these regulations have not been complied with, the supplier shall give notice of the same in writing to the consumer and the Electrical Inspector, specifying the defects and to rectify such defects in a reasonable time:

Provided that if the consumer fails to rectify such defects the supplier may discontinue the supply after giving the consumer a reasonable opportunity of being heard and recording reasons in writing and the supply shall be discontinued only on written orders of an officer duly notified by the supplier in this behalf and shall be restored with all possible speed after such defects are rectified by the consumer to the satisfaction of the supplier.

40. Appeal to Electrical Inspector in regard to defects. – (1) If any applicant for a supply or a consumer is aggrieved by the action of the supplier in declining to commence, to continue or to recommence the supply of electricity to his premises on the grounds that the installation is defective or is likely to be dangerous, he may appeal to the Electrical Inspector to test the installation and the supplier shall not, if the Electrical Inspector intimates that the installation is free from the defect or danger complained of, refuse supply to the consumer on the grounds aforesaid, and shall, within twenty four hours after the receipt of such intimation from the Electrical Inspector, commence, continue or recommence the supply of electricity.

(2) Any test for which application has been made under sub-regulation (1), shall be carried out within seven days after the receipt of such application.

41. Precautions against failure of supply and notice of failures. – (1) The layout of the electric supply lines of the supplier for the supply of electricity throughout his area of supply shall under normal working conditions be sectionalised and so arranged, and provided with switchgear or circuit-breakers, so located, as to restrict within reasonable limits the extent of the portion of the system affected by any failure of supply.

(2) The supplier shall take all reasonable precautions to avoid any accidental interruptions of supply, and also to avoid danger to the public or to any employee or designated person when engaged on any operation during and in connection with the installation, extension, replacement, repair and maintenance of any works.

(3) The supplier shall send to the Electrical Inspector a notice of failure of supply of such kind as the Electrical Inspector may from time to time require to be notified to him, and such notice shall be sent by the earliest mode of communication after the failure occurs or after the failure becomes known to the supplier and shall be in the Form given in Schedule IV.

(4) For the purpose of testing or for any other purpose connected with the efficient working of the supplier's installations, the supply of electricity may be discontinued by the supplier for such period as may be necessary, subject to not less than twenty four hours notice being given by the supplier to all consumers likely to be affected by such discontinuance:

Provided that no such notice shall be given in cases of emergency.

Chapter V

Safety provisions for electrical installations and apparatus of voltage not exceeding 650 V

42. Test of insulation resistance. – Where any electric supply line for use at voltages not exceeding 650 V has been disconnected from a system for the purpose of addition, alteration or repair, such electric supply line shall not be reconnected to the system until the supplier or the owner has carried out the test.

43. Connection with earth. – The following conditions shall apply to the connection with earth of systems at

voltage exceeding 50 V but not exceeding 650 V, namely: –

(i) neutral conductor of a three phase, four-wire system and the middle conductor of a two-phase, three-wire system shall be earthed as per the relevant standards;

(ii) 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 shall be at the consumer's premises;

(iii) in the case of a system comprising electric supply lines having concentric cables, the external conductor or armour of such cables shall be earthed by two separate and distinct connections with earthing system;

(iv) in a direct current system, earthing and safety measures shall be as per the relevant standards;

(v) every building shall have protective equipotential bonding by interconnecting the exposed and extraneous conductive parts as per the relevant standards;

(vi) the alternating current systems which are connected with the earth as provided in this regulation shall be electrically interconnected:

Provided that each connection with the earth is bonded to the metal sheathing and metallic armouring, if any, of the electric supply lines;

(vii) the frame of every generator, stationary motor, portable motor, and the metallic parts, not intended as conductors, all transformers and any other apparatus used for regulating or controlling electricity, and all electricity consuming apparatus, of voltage exceeding 250 V but not exceeding 650 V shall be earthed by two separate and distinct connections with earth by the owner as specified in the relevant standards;

(viii) all metal casing or metallic coverings containing or protecting any electric supply line or apparatus shall be connected with the earth and shall be so joined and connected across all junction boxes and other openings as to provide good mechanical and electrical connection throughout the length:

Provided that the conditions mentioned in this regulation shall not apply, where the supply voltage does not exceed 250 V and the apparatus consists of wall tubes or brackets, electroliers, switches, ceiling fans or other fittings, other than portable hand lamps and portable and transportable apparatus, unless provided with the earth terminal and to class-II apparatus and appliances of the relevant standards:

Provided further that where the supply voltage is not exceeding 250 V and where the installations are either new or renovated, all plug sockets shall be of the three pin type, and the third pin shall be permanently and effectively earthed;

(ix) All earthing systems shall, –

(a) consist of equipotential bonding conductors capable of carrying the prospective earth fault current without exceeding the allowable temperature limits as per relevant standards in order to maintain all non-current carrying metal works reasonably at earth potential and to avoid dangerous contact potentials being developed on such metal works;

(b) have earth fault loop impedance sufficiently low to permit adequate fault current for the operation of protective device within the time stipulated in the relevant standards; and

(c) be mechanically strong, withstand corrosion and retain electrical continuity during the life of the installation and all earthing systems shall be tested to ensure effective earth bonding as per the relevant standards, before the electric supply lines or apparatus are energised;

(x) all earthing systems belonging to the supplier shall in addition, be tested for resistance on dry day during the dry season at least once in a year;

(xi) earth fault loop impedance shall be tested to ensure the automatic operation of the protective device and a record of every earth test made and the result thereof shall be kept by the supplier for a period of not less than two years after the day of testing and shall be available to the Electrical Inspector when required;

(xii) earth fault loop impedance of each circuit shall be limited to a value determined by the type and current rating of the protective device used such that, on the occurrence of an earth fault, disconnection of the supply shall occur before the prospective touch voltage reaches a harmful value; and

(xiii) the neutral point of every generator and transformer shall be earthed by connecting it to the earthing system not by less than two separate and distinct connections.

44. Residual Current Device. – The use of electricity to electrical installation, shall be controlled by a residual current device to disconnect the supply having rated residual current and duration as per the relevant standards:

Provided that in domestic installation, residual current device having residual operating current not

exceeding 30 milliampere shall be used:

Provided further that such protective device shall not be required for supply lines having protective devices which are effectively bonded to the neutral of supply transformers and conforming to regulation 76.

Chapter VI

Safety provisions for electrical installations and apparatus of voltage exceeding 650 V

45. Approval by the Electrical Inspector and self-certification. – (1) (a) Every electrical installation of notified voltage and below shall be inspected, tested and self-certified by the owner or supplier or consumer, as the case may be, of the installation before commencement of supply or recommencement after shutdown for six months or more for ensuring observance of safety measures specified under these regulations and such owner or supplier or consumer, as the case may be, shall submit the report of self-certification to the Electrical Inspector in the forms as provided under Schedule II of these regulations:

Provided that the self-certified electrical installation shall be considered fit for the commencement of supply or recommencement after shutdown for six months only after the report of self-certification is duly received by the office of Electrical Inspector and if not acknowledged by the Electrical Inspector within three working days, it shall be deemed to be received:

Provided further that the owner or supplier or consumer, as the case may be, has the option to get his installation inspected and tested by the Electrical Inspector of the Appropriate Government;

(b) Notwithstanding anything contained in clause (a), every electrical installation covered under section 54 of the Act including every electrical installation of railways shall be inspected and tested by the Electrical Inspector of the Appropriate Government as specified in sub-regulation (3).

(2) The voltage above which inspection and testing of electrical installations including installations of supplier or consumer to be carried out by the Electrical Inspector, shall be notified by the Appropriate Government;

(3) Every electrical installation of voltage above the notified voltage and all the apparatus of the generating units above the capacity specified under regulation 34, shall be inspected and tested by the Electrical Inspector before commencement of supply or recommencement after shutdown for six months or more for ensuring observance of safety measures specified under these regulations.

(4) Before making an application to the Electrical Inspector for permission to commence or recommence supply in installations above the notified voltage after an installation has been disconnected for six months or more, the supplier shall ensure that electric supply lines or apparatus of more than notified voltage belonging to him are placed in position, properly joined, and duly completed and examined, and the supply of electricity shall not be commenced by the supplier for installations of voltage needing inspection under these regulations unless the provisions of regulations 14 to 31, regulations 35 to 37, regulations 46 to 53 and regulations 57 to 80 have been complied with and the approval in writing of the Electrical Inspector has been obtained by him:

Provided that the supplier may energise the aforesaid electric supply lines or apparatus for the purpose of tests specified in regulation 48.

(5) The owner of any installations of voltage above the notified voltage shall, before making application to the Electrical Inspector for approval of his installation or additions thereto, test every circuit or additions thereto, other than an overhead line, and satisfy himself that they withstand the application of the testing voltage set out in regulation 48 and shall duly record the results of such tests and submit them to the Electrical Inspector:

Provided that the Electrical Inspector may direct such owner to carry out such tests, as he deems necessary or accept the certified tests of the manufacturer in respect of any particular apparatus in place of the tests required by this regulation.

(6) The owner of any installation who makes any addition or alteration to his installation shall not connect to the supply his apparatus or electric supply lines, comprising the said alterations or additions, unless and until such alteration or addition has been approved in writing by the Electrical Inspector or self-certified by the owner of the installation, as the case may be.

(7) In case of installations of mines and oil-fields, the electrical installations of voltage 650 V and above shall not be connected to supply, unless and until such installation work including alterations or additions or recommencement after shutdown for six months are approved in writing by the Electrical Inspector of Mines:

Provided that the electrical installations of voltage below 650 V in mines and oil-fields are to be self-certified by the owner or agent or manager of the mine before commencement of supply or recommencement after shutdown for six months or more in the manner specified in sub-regulation (1).

46. Use of electricity at voltage exceeding 650 V. – (1) The Electrical Inspector where the supply voltage exceeds

the notified voltage shall not authorise the supplier to commence supply or recommence the supply, where the supply has been discontinued for a period of six months or more, or the supplier, where the supply voltage is equal to or below the notified voltage but exceeds 650 V, shall not commence supply or recommence the supply where supply has been discontinued for a period of six months or more, to any consumer unless, –

(a) all conductors and apparatus situated on the premises of the consumer are so placed as to be inaccessible except to the designated person;

(b) the consumer has provided and agreed to maintain a separate building or a locked weather proof and fire proof enclosure of agreed design and location, to which the supplier at all times shall have access for the purpose of housing his apparatus and metering equipment, or where the provision for a separate building or enclosure is impracticable, the consumer has segregated the aforesaid apparatus of the supplier from any other part of his own apparatus:

Provided that the segregation shall be made by the fire walls, if the Electrical Inspector considers it to be necessary:

Provided further that in the case of an outdoor installation the consumer shall suitably segregate the aforesaid apparatus belonging to the supplier from his own;

(c) all pole type substations are constructed and maintained in accordance with regulation 52.

(2) Where electricity at voltage exceeding 650 V is supplied, converted, transformed or used, the owner shall, –

(i) maintain safety clearances for electrical apparatus as per relevant standards specification so that sufficient space is available for easy operation and maintenance without any hazard to the operating and maintenance personnel working near the equipment and for ensuring adequate ventilation:

Provided that in case of mines, the safety clearances for electrical apparatus to be as per relevant mining regulations;

(ii) not allow any encroachment below such installation:

Provided that where the Electrical Inspector comes across any such encroachment, he shall direct the owner to remove such encroachments;

(iii) maintain minimum safety working clearances specified in Schedule V for the bare conductors or live parts of any apparatus in outdoor substations excluding overhead lines of installations of voltage exceeding 650 V;

(iv) ensure that the live parts of all apparatus within the reach from any position in which a person may require to be, are suitably protected to prevent danger;

(v) ensure that where the transformer is used, suitable provision shall be made, either by connecting with earth, a point of the circuit at the lower voltage or otherwise, to guard against danger by reason of the said circuit becoming accidentally charged above its normal voltage by leakage from or contact with the circuit at the higher voltage;

(vi) not install a substation or a switching station with apparatus having more than 2000 litre of oil in the basement where proper oil draining arrangement cannot be provided;

(vii) undertake the following measures, where a substation or a switching station with oil-filled apparatus, such as transformer, static condenser, switchgear or oil circuit breaker having more than 2000 litre of oil is installed, whether indoor or outdoors,-

(a) the separation wall or fire barrier walls of thickness and dimensions as specified in the relevant standards shall be provided between the apparatuses and between the apparatus and adjacent building if building wall adjacent to the apparatuses is not rated for four hours fire withstand rating;

(b) provisions shall be made for suitable oil soakpit and where use of more than 9000 litre of oil in any one oil tank, receptacle or chamber is involved, provision shall be made for the draining away or removal of any oil which may leak or escape from the tank, receptacle or chamber containing the same, and special precautions shall be taken to prevent the spread of any fire resulting from the ignition of the oil from any cause and adequate provision shall be made for extinguishing any fire which may occur;

(c) spare oil shall not be stored in the vicinity of any oil filled equipment in any such substation or switching station; and

(d) all the transformers and switchgears shall be maintained in accordance with the maintenance schedules prepared in accordance with the relevant standards;

(viii) without prejudice to the above measures, undertake adequate fire detection and protection arrangement for quenching the fire of the apparatus;

(ix) ensure that every transformer of 10 MVA or reactor of 10 MVAR and above rating shall be provided with automatic fire fighting system as per relevant standards;

(x) undertake the following measures, where it is necessary to locate the substation, or switching station in the basement, namely: –

(a) the transformer room be in the first basement at the periphery;

(b) the direct access to the transformer room be provided from outside and the surrounding walls of four hours fire withstand rating be provided as per relevant standards;

(c) the entrances to the transformer room be provided with fire resistant doors of two hour fire rating and the door shall always be kept closed and a notice of this effect be affixed on outer side of the door;

(d) a curb of a suitable height be provided at the entrance in order to prevent the flow of oil from a ruptured transformer into other parts of the basement;

(e) the cables to primary side and secondary side have sealing at all floors and wall opening of atleast two hours fire withstand rating; and

(f) Fire Retardant Low Smoke Low Halogen cable as per relevant standards be used;

(xi) ensure that oil filled transformers installed indoors in other than residential or commercial buildings are placed on the ground floor or not below the first basement;

(xii) ensure that only dry type transformer shall be used inside the residential and commercial buildings;

(xiii) ensure that cable trenches inside the substations and switching stations containing cables are filled with sand, pebbles or similar non-inflammable materials or completely covered with non-inflammable slabs; and

(xiv) ensure that unless the conditions are such that all the conductors and apparatus may be made dead at the same time for the purpose of cleaning or for other work, the said conductors and apparatus shall be so arranged that these may be made dead in sections, and that work on any such section may be carried on by the person designated or appointed or engaged or permited under these regulations without danger.

(3) The minimum clearances specified in Schedule VI shall be maintained for bare conductors or live parts of any high voltage direct current apparatus in outdoor substations, excluding high voltage direct current overhead lines.

(4) There shall not be tapping of another transmission line from the main line for 66 kV and above class of lines:

Provided that during natural calamities, tapping may be allowed to ensure emergency power supply to affected areas till normalcy is restored.

47. Inter-locks and protection for use of electricity at voltage exceeding 650 V. – (1) The owner shall ensure the following, namely: –

(i) isolators and the controlling circuit breakers shall be inter-locked so that the isolators cannot be operated unless the corresponding breaker is in open position;

(ii) isolators and the corresponding earthing switches shall be inter-locked so that no earthing switch can be closed unless and until the corresponding isolator is in open position;

(iii) where two or more supplies are not intended to be operated in parallel, the respective circuit breakers or linked switches controlling the supplies shall be inter-locked to prevent possibility of any inadvertent paralleling or backfeed;

(iv) when two or more transformers are operated in parallel, the system shall be so arranged as to trip the secondary breaker of the transformer in case the primary breaker of that transformer trips;

(v) all gates or doors which provide access to live parts of an installation shall be inter-locked in such a way that these cannot be opened unless the live parts are made dead and proper discharging and earthing of these parts shall be ensured before any person comes in close proximity of such parts; and

(vi) where two or more generators operate in parallel and neutral switching is adopted, inter-lock shall be provided to ensure that the generator breaker cannot be closed unless one of the neutrals is connected to the earthing system.

(2) The following protection shall be provided in all systems and circuits to automatically disconnect the supply under abnormal conditions, namely: –

(i) over current protection to disconnect the supply automatically if the rated current of the equipment, cable or supply line is exceeded for a time which the equipment, cable or supply line is not designed to withstand;

(ii) earth fault or earth leakage protection to disconnect the supply automatically, if the earth fault current exceeds the limit of current for keeping the contact potential within the reasonable values;

(iii) buchholz relay, pressure relief device and winding and oil temperature protection with alarm and trip contacts shall be provided on all transformers of ratings 1000 kVA and above;

(iv) transformers of capacity 10 MVA and above shall be protected against incipient faults by differential protection;

(v) all generators with rating of 100 kVA and above shall be protected against earth fault or leakage;

(vi) all generators of rating 1000 kVA and above shall be protected against faults within the generator winding using restricted earth fault protection or differential protection or by both;

(vii) high speed bus bar differential protection along with local breaker back up protection shall be commissioned and shall always be available at all 132 kV and above voltage substations and switching stations and generating stations connected with the grid:

Provided that in respect of existing 132 kV substations and switching stations having more than one incoming feeders, the high speed bus bar differential protection along with local breaker back up protection, shall be commissioned and shall always be available; and

(viii) in addition to above, all electrical protection system for generating stations, substations and transmission lines shall be as per the regulations notified by the Authority under clause (e) of sub-section (2) of section 177 of the Act.

48. Testing, Operation and Maintenance. – (1) Before the approval is accorded by the Electrical Inspector under regulation 45, the manufacturer's test certificates shall, if required, be produced for all the type, acceptance and routine tests as required under the relevant standards.

(2) No new apparatus, cable or supply line of voltage exceeding 650 V shall be commissioned unless such apparatus, cable or supply line are subjected to site tests as per relevant standards.

(3) No apparatus, cable or supply line of voltage exceeding 650 V which has been kept disconnected for a period of six months or more from the system for alterations or repair, shall be connected to the system until such apparatus, cable or supply line are subjected to the site tests as per relevant standards.

(4) Notwithstanding the provisions of this regulation, the Electrical Inspector may require certain tests to be carried out before or after charging the installations.

(5) All apparatus, cables and supply lines shall be maintained in healthy conditions and tests shall be carried out periodically as per the relevant standards.

(6) Records of all tests, trippings, maintenance works and repairs of all apparatus, cables and supply lines shall be duly kept in such a way that these records can be compared with the past records.

(7) It shall be the responsibility of the owner of all installations of voltage exceeding 650 V to maintain and operate the installations in a condition free from danger and as recommended by the manufacturer or by the relevant standards.

(8) Failures of any 220 kV and above voltage level transformer, reactor and transmission line towers shall be reported by the owner of electrical installation, within forty eight hours of the occurrence of the failure, to the Authority and the reasons for failure and measures to be taken to avoid recurrence of failure shall be sent to the Authority within one month of the occurrence in the forms provided in Schedule VII:

Provided that in case of mines and oil-fields, the failure of 10 MVA or above transformers shall be reported to Electrical Inspector of mines.

49. Precautions to be taken against excess leakage in case of metal sheathed electric supply lines. – The following precautions shall be taken in case of electric supply lines other than overhead lines, for use at voltage exceeding 650 V, namely: **–**

(i) the conductors of the cable except the cable with thermoplastic or cross linked polyethylene, insulation without any metallic screen or armour shall be enclosed in metal sheathing which shall be electrically continuous and connected with earth, and the conductivity of the metal sheathing shall be maintained and reasonable

precautions shall be taken where necessary to avoid corrosion of the sheathing;

(ii) the resistance of the earth connection with metallic sheath shall be kept low enough to permit the controlling circuit breaker or cut-out to operate in the event of any failure of insulation between the metallic sheath and the conductor.

Explanation. – For the purposes of this regulation;

(a) in the case of thermoplastic insulated and sheathed cables with metallic armour, the metallic wire or tape armour shall be considered as metal sheathing; and

(b) where an electric supply line as aforesaid has concentric cables and the external conductor is insulated from an outer metal sheathing and connected with earth, the external conductor may be regarded as the metal sheathing for the purposes of this regulation provided that the foregoing provisions as to conductivity are complied with.

50. Connection with earth for apparatus exceeding 650 V. – (1) The entire switchyard or substation equipment and buildings including all non-current carrying metal parts associated with an installation shall be effectively earthed to an earthing system or mat which shall, –

(i) limit the touch and step potential to tolerable values as per relevant standards;

(ii) limit the earth potential rise to tolerable values as per relevant standards, so as to prevent danger due to transfer of potential through ground, earth wires, cable sheath, fences, pipe lines or other such equipment; and

(iii) maintain the resistance of the earth connection to such a value as to make operation of the protective device effective.

(2) In the case of star connected system with earthed neutrals or delta connected system with earthed artificial neutral point,-

(i) the neutral point of every generator and transformer shall be earthed by connecting it to the earthing system not by less than two separate and distinct connections:

Provided that the neutral point of a generator may be connected to the earthing system through an impedance to limit the fault current:

Provided further that in the case of multi-machine systems, neutral switching may be resorted to, for limiting the injurious effect of harmonic current circulation in the system;

(ii) the generator or transformer neutral shall be earthed through a suitable impedance where an appreciable harmonic current flowing in the neutral connection causes interference with the communication circuits; and

(iii) in case of the delta connected system, the neutral point shall be obtained by the insertion of a earthing transformer and current limiting resistance or impedance wherever considered necessary at the commencement of such a system.

(3) In case of generating stations, substations and other installations of voltage exceeding 33 kV, the system neutral earthing and protective frame earthing may be, if system design so warrants, integrated into common earthing grid provided the resistance to earth of combined mat does not cause the step and touch potential to exceed the values as per relevant standards.

(4) Single phase systems of voltage exceeding 650 V shall be effectively earthed.

(5) In the case of a system comprising electric supply lines having concentric cables, the external conductor shall be connected with the earth.

(6) Where a supplier proposes to connect with earth an existing system for use at voltage exceeding 650 V which has not hitherto been so connected with earth, he shall give not less than fourteen days notice in writing together with particulars of the proposed connection with earth to the telegraph authority established under the Indian Telegraph Act, 1885 (13 of 1885).

(7) Where the earthing lead and earth connection are used only in connection with earthing guards laid under overhead lines of voltage exceeding 650 V but not exceeding 33 kV where they cross a telecommunication line or a railway line, and where such lines are equipped with earth leakage protective device, the earth resistance shall not exceed twenty five ohms and the project authorities shall obtain no objection certificate from Railway Authorities and Power and Telecommunication Coordination Committee before energisation of the facilities.

(8) Every earthing system belonging to either the supplier or the consumer shall be tested for its resistance to earth on a dry day during dry season not less than once in a year and records of such tests shall be maintained

and produced, if so required, before the Electrical Inspector.

51. General conditions for transformation and control of electricity. – Where electricity of voltage exceeding 650 V is transformed, converted, regulated or otherwise controlled in substations or switching stations including outdoor substations and outdoor switching stations or in street boxes constructed underground, the following provisions shall be ensured, namely: **–**

(i) substations and switching stations shall preferably be erected above ground, but where necessarily constructed underground due provisions for ventilation and drainage shall be made and any space housing switchgear shall not be used for storage of any materials especially inflammable and combustible materials or refuse; and

(ii) (a) outdoor substations except pole type substations and outdoor switching stations shall, unless the apparatus is completely enclosed in a metal covering connected with earth, the said apparatus also being connected with the system by armoured cables, be protected by fencing not less than 1.8 metre in height or other means so as to prevent access to the electric supply lines and apparatus therein by an unauthorised person and the fencing of such area shall be earthed efficiently; and

(b) transformer mounting structure shall be as per the regulations notified by the Authority under clause (e) of sub-section (2) of section 177 of the Act.

52. Pole type substations. – Where platform type construction is used for a pole type substation and sufficient space for a person to stand on the platform is provided, a proper hand rail shall be built around the platform and if the hand rail is of metal, it shall be connected with the earth:

Provided that in the case of pole type substation on wooden supports and wooden platform, the metal hand rail shall not be connected with the earth.

53. Condensers. – Suitable arrangement shall be made for immediate and automatic or manual discharge of every static condenser on disconnection of supply.

54. Supply to luminous tube sign installations of voltage exceeding 650 V but not exceeding 33 kV. – (1) Any person who proposes to use or who is using electricity for the purpose of operating a luminous tube sign installation, or who proposes to transform or is transforming electricity to a voltage exceeding 650 V but not exceeding 33 kV for any such purpose shall comply with the following conditions, namely: –

(i) all live parts of the installation, including all apparatus and live conductors in the secondary circuit, but excluding the tubes except in the neighbourhood of their terminals, shall be inaccessible to undesignated persons and such parts shall be effectively screened;

(ii) irrespective of the method of obtaining the voltage of the circuit which feeds the luminous discharge tube sign, no part of any conductor of such circuit shall be in metallic connection, except in respect of its connection with earth, with any conductor of the supply system or with the primary winding of the transformer;

(iii) all live parts of an exterior installation shall be so disposed as to protect them against the effects of the weather and such installation shall be so arranged and separated from the surroundings as to limit, as far as possible, the spreading of fire;

(iv) the secondary circuit shall be permanently earthed at the transformer and the core of every transformer shall be earthed;

(v) where the conductors of the primary circuit are not in metallic connection with the supply conductors, one phase of such primary circuit shall be permanently earthed at the motor generator or convertor, or at the transformer and an earth leakage circuit breaker of sufficient rating shall be provided on the side of voltage not exceeding 250 V to detect the leakage in such luminous tube sign installations;

(vi) a sub-circuit which forms the primary circuit of a fixed luminous discharge tube sign installation shall be reserved solely for such purpose;

(vii) a separate primary final sub-circuit shall be provided for each transformer or each group of transformers having an aggregate input not exceeding 1000 volt-amperes of a fixed luminous discharge tube sign installation;

(viii) an interior installation shall be provided with suitable adjacent means for disconnecting all phases of the supply except the "neutral" in a three-phase, four-wire circuit;

(ix) for installations on the exterior of a building a suitable emergency fire-proof linked switch to operate on all phases except the neutral in a three-phase, four-wire circuit shall be provided and fixed in a conspicuous position at not more than 1.70 metre above the ground;

(x) a special "caution" notice shall be affixed in a conspicuous place on the door of every enclosure of voltage exceeding 650 V but not exceeding 33 kV to the effect that the supply must be cut off before the enclosure is opened;

(xi) where static condensers are used, they shall be installed on the load side of the fuses and the primary side of the transformers where the voltage does not exceed 250 V;

(xii) where static condensers are used on primary side, provision shall be made for automatic or manual discharging of the condensers when the supply is cut off; and

(xiii) before using the static condensers or any interrupting device on the voltage exceeding 650 V, the executing agencies shall test and ensure that automatic discharging device is functional thereon.

(2) The owner or user of any luminous tube sign or similar installation of voltage exceeding 650 V but not exceeding 33 kV shall not bring the same into use without giving to the Electrical Inspector not less than fourteen days' notice in writing of his intention so to do.

55. Supply to electrode boilers of voltage exceeding 650 V but not exceeding 33 kV. – (1) Where a system having a point connected with earth is used for supply of electricity to an electrode boiler of voltage exceeding 650 V which is also connected with earth, the owner or user of electrode boiler shall comply with the following conditions, namely: **–**

(i) the metal work of the electrode boiler shall be efficiently connected to the metal sheathing and metallic armouring, if any, of the electric supply line of voltage exceeding 650 V but not exceeding 33 kV whereby electricity is supplied to the electrode boiler;

(ii) the supply of electricity at voltage exceeding 650 V to the electrode boiler shall be controlled by a suitable circuit-breaker so set as to operate in the event of the phase currents becoming unbalanced to the extent of ten per cent of the rated current consumption of the electrode boiler under normal conditions of operation:

Provided that if in any case a higher setting is essential to ensure stability of operation of the electrode boiler, the setting may be increased so as not to exceed fifteen per cent of the rated current consumption of the electrode boiler under normal conditions of operation;

(iii) an inverse time element device may be used in conjunction with the aforesaid circuit breaker to prevent the operation thereof unnecessarily on the occurrence of unbalanced phase currents of momentary or short duration; and

(iv) the supplier or owner shall serve a notice in writing on the telegraph authority at least seven days prior to the date on which such supply of electricity is to be afforded specifying the location of every point, including the earth connection of the electrode boiler, at which the system is connected with earth.

(2) The owner or user of any electrode boiler of voltage exceeding 650 V shall not bring the same into use without giving the Electrical Inspector not less than fourteen days' notice in writing of his intention so to do.

56. Supply to X-ray and high frequency installations. – (1) Any person, who proposes to use or who is using electricity for the purpose of operating an X-ray or similar high-frequency installation, other than portable units or shock-proof self contained and stationary units shall comply the following conditions, namely: –

(i) mechanical barriers shall be provided to prevent too close an approach to any parts of the X-ray apparatus of voltage exceeding 650 V but not exceeding 33 kV, except the X-ray tube and its leads, unless such parts of voltage exceeding 650 V but not exceeding 33 kV have been rendered shock proof by being shielded by earthed metal or adequate insulating material;

(ii) where generators operating at 300 kV peak or more are used, such generators shall be installed in rooms separate from those containing the other equipment and any step-up transformer employed shall be so installed and protected as to prevent danger;

(iii) a suitable switch shall be provided to control the circuit supplying a generator and shall be so arranged as to be open except while the door of the room housing the generator is locked from the outside;

(iv) X-ray tubes used in therapy shall be mounted in an earthed metal enclosure; and

(v) every X-ray machine shall be provided with a milliammeter or other suitable measuring instrument, readily visible from the control position and connected, if practicable, in the earthed lead, but guarded if connected in the lead of voltage exceeding 650 V but not exceeding 33 kV:

Provided that earth leakage circuit breaker of sufficient rating shall be provided on the side wherein voltage does not exceed 250 V to detect the leakage in such X-ray installations.

Explanation. – For the purposes of this regulation "shock proof", as applied to X-ray and high-frequency equipment, shall mean that such equipment is guarded with earthed metal so that no person may come into contact with any live part.

(2) In the case of nonshock proof equipment.-

(i) the overhead conductors of voltage exceeding 650 V but not exceeding 33 kV, unless suitably guarded against personal contact, shall be adequately spaced and high voltage leads on tilting tables and fluoroscopes shall be adequately insulated or so surrounded by barriers as to prevent inadvertent contact;

(ii) the circuit of voltage not exceeding 250 V of the step up transformer shall contain a manually operated control device having overload protection, in addition to the over current device for circuit protection, and these devices shall have no exposed live parts and for diagnostic work there shall be an additional switch in the said circuit, which shall be of one of the following types:-

(a) a switch with a spring or other mechanism that will open automatically except while held close by the operator; or

(b) a time switch which will open automatically after a definite period of time for which it has been set;

(iii) if more than one piece of apparatus be operated from the same source of voltage exceeding 650 V, each shall be provided with a switch of voltage exceeding 650 V to give independent control;

(iv) low frequency current-carrying parts of a machine of the quenched-gap or open gap type shall be so insulated or guarded that they cannot be touched during operation but the high frequency circuit-proper which delivers high-frequency current normally for the therapeutic purposes shall be exempt from such insulation;

(v) all X-ray generators having capacitors shall have suitable means for discharging the capacitors manually; and

(vi) except in the case of self-contained units, all 200 kV peak or higher X-ray generators shall have a sphere gap installed in the system of voltage exceeding 650 V but not exceeding 33 kV adjusted so that it will break down on over voltage surges.

(3) (i) all non-current carrying metal parts of tube stands, fluoroscopes and other apparatus shall be properly earthed and insulating floors, mats or platforms shall be provided for operators in proximity to parts of voltage exceeding 650 V unless such parts have been rendered shock proof; and

(ii) where short wave therapy machines are used, the treatment tables and examining chairs shall be wholly non-metallic.

(4) The owner of any X-ray installation or similar high frequency apparatus shall not bring the same into use without giving to the Electrical Inspector not less than fourteen days' notice in writing of his intention to do so:

Provided that the aforesaid notice shall not be necessary in the case of shock-proof portable X-ray and high-frequency equipment which have been inspected before the commencement of their use and periodically thereafter.

Chapter VII

Safety requirements for overhead lines and underground cables

57. Material and strength. – (1) All conductors of overhead lines other than those provided in regulation 70 shall have a breaking strength of not less than 350 kgf.

(2) Where the voltage does not exceed 250 V and the span is less than fifteen metre and is drawn through the owner's or consumer's premises, a conductor having an actual breaking strength of not less than 150 kgf may be used.

58. Joints. – (1) No conductor or earthwire of an overhead line shall have more than one joint in a span:

Provided that there shall be no joints in the conductor or earthwire in a span of crossing over the highways, expressways and railway lines.

(2) The joint between conductors or earthwires of overhead lines shall be mechanically and electrically secured

under the conditions of operation and the ultimate strength and the electrical conductivity of the joint shall be as per relevant standards.

59. Maximum stresses and factors of safety. – (1) The load and permissible stresses on the structural members, conductors and earth wire of self supporting steel lattice towers or steel monopole towers for overhead transmission lines shall be as per relevant standards.

(2) Overhead lines not covered in sub-regulation (1) shall have the minimum factors of safety as per the table given below:-

Description	**Minimum factor of safety**
metal supports	1.5
mechanically processed concrete supports	2.0
hand-moulded concrete supports	2.5
wood supports	3.0

(3) The minimum factor of safety shall be based on such load as may cause failure of the support to perform its function, assuming that the foundation and other components of the structure are intact.

(4) The load shall be equivalent to the yield point stress or the modulus of rupture, as the case may be, for supports subject to bending and vertical loads and the crippling load for supports used as strut.

(5) The strength of the supports of the overhead lines in the direction of the line shall not be less than one-fourth of the strength required in the direction transverse to the line.

(6) The minimum factor of safety for stay-wires, guard-wires or bearer-wires shall be 2.5 based on the ultimate tensile strength of the wire.

(7) The tension limit for conductor and earth wire shall be as per relevant standards.

(8) For the purpose of calculating the factors of safety in sub-regulation (2), the following conditions shall be observed, namely: –

(i) the maximum wind pressure shall be as specified in the relevant standards;

(ii) for cylindrical bodies the effective area shall be taken as full projected area exposed to wind pressure; and

(iii) the maximum and minimum temperatures shall be as specified in the relevant standards.

(9) Notwithstanding anything contained in sub-regulation (2) to (8), in localities where overhead lines are likely to accumulate ice or snow, the load and permissible stresses on the structural members, conductors and earth wire of self supporting steel lattice towers and steel monopole towers for overhead transmission lines shall be as per relevant standards and in accordance with the specifications laid down, from time to time, by the Appropriate Government by order in writing.

60. Clearance in air of the lowest conductor of overhead lines. – (1) The minimum clearance above ground and across road surface of National Highway or Expressway or State Highway or other road or highest traction conductor of railway corridor or navigational or non-navigational river of the lowest conductor of an alternating current overhead line, including service lines, of nominal voltage shall have the values specified in Schedule VIII A.

(2) The minimum clearances regarding high voltage direct current line shall be as per Schedule VIII B.

(3) 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.

(4) No tower footing or structure of an overhead line of voltage 33 kV or above or high voltage direct current, shall be closer than twenty five metre from the edge of the right of way of a Petroleum or Natural Gas pipeline.

(5) Wherever overhead line of voltage 33 kV or above or high voltage direct current intending to cross the right of way of 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 and, in any case, the crossing angle shall not be less than seventy five degrees.

61. Clearance between conductors and trolley wires. – (1) No conductor of an overhead line crossing a tramway or trolley bus route using trolley wires shall have less than the following clearances above any trolley wire, namely: **–**

(i) lines of voltage not exceeding 650 V - 1.2 metre:

Provided that where an insulated conductor suspended from a bearer wire crosses over a trolley wire the minimum clearance for such insulated conductor shall be 0.6 metre.

(ii) lines of voltage exceeding 650 V up to and including 11000 V - 1.8 metre;

(iii) lines of voltage exceeding 11000 V but not exceeding 33000 V - 2.5 metre;

(iv) lines of voltage exceeding 33 kV - 3.0 metre.

(2) In any case of a crossing specified in sub-regulation (1), whoever lays his overhead line later, shall provide the clearance between his own overhead line and the overhead line which will be crossed in accordance with the provisions of the sub-regulation (1):

Provided that if the later entrant is the owner of the lower overhead line and is not able to provide adequate clearance, he shall bear the cost for modification of the upper line so as to comply with sub-regulation (1).

62. Clearance from buildings of lines of voltage and service lines not exceeding 650 V. – (1) 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.

(2) 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, namely: –

(i) for any flat roof, open balcony, varandah roof and lean-to-roof, –

(a) when the line passes above the building, a vertical clearance of 2.5 metre from the highest point; and

(b) when the line passes adjacent to the building, a horizontal clearance of 1.2 metre from the nearest point;

(ii) for pitched roof, –

(a) when the line passes above the building, a vertical clearance of 2.5 metre immediately under the line; and

(b) when the line passes adjacent to the building, a horizontal clearance of 1.2 metre.

(3) Any conductor so situated as to have a clearance less than that specified in sub-regulation (2) shall be replaced with Aerial Bunched Cable and to be attached at suitable intervals to a bare earthed bearer wire having a breaking strength of not less than 350 kgf.

(4) The horizontal clearance shall be measured when the line is at a maximum deflection from the vertical due to wind pressure.

(5) The vertical and horizontal clearances shall be measured as per illustration provided in Schedule VIII C.

Explanation. – For the purposes of this regulation, the expression "building" shall be deemed to include any structure, whether permanent or temporary.

63. Clearances from buildings of lines of voltage exceeding 650 V. – (1) 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.

(2) Where an overhead line of voltage exceeding 650 V passes above or adjacent to any building or part of a building it shall have on the basis of maximum sag a vertical clearance above the highest part of the building immediately under such line, of not less than, –

(i) for lines of voltages exceeding 650 V and up to and including 33 kV - 3.7 metre;

(ii) for lines of voltages exceeding 33 kV - 3.7 metre plus 0.30 metre for every additional 33 kV or part thereof.

(3) The horizontal clearance between the nearest conductor and any part of such building shall, on the basis of maximum deflection due to wind pressure, be not less than, –

(i) for lines of voltages exceeding 650 V and up to and including 11 kV - 1.2 metre;

IndiaCode

(ii) for lines of voltages exceeding 11kV and up to and including 33 kV - 2.0 metre;

(iii) for lines of voltages exceeding 33 kV - 2.0 metre plus 0.3 metre for every additional 33 kV or part thereof.

(4) For high voltage direct current systems, the vertical and horizontal clearances, on the basis of maximum deflection due to wind pressure, from buildings shall be maintained as below:

Sl. No.	High Voltage Direct Current	Vertical Clearance (metre)	Horizontal Clearance (metre)
1.	100 kV	4.6	2.9
2.	200 kV	5.8	4.1
3.	300 kV	7.0	5.3
4.	400 kV	7.9	6.2
5.	500 kV	9.1	7.4
6.	600 kV	10.3	8.6
7.	800 kV	12.4	10.7

(5) The vertical and horizontal clearances shall be as measured as illustrated in Schedule VIII C.

Explanation. **–** For the purposes of this regulation, the expression "building" shall be deemed to include any structure, whether permanent or temporary.

64. Conductors at different voltages on same supports. – Where conductors of different voltages are laid on the same supports, the owner shall make adequate provision to guard against danger to linemen and others, from the lower voltage system being charged above its nominal voltage, by leakage from or contact with the higher voltage and the methods of construction and the applicable minimum clearances between the conductors of the two systems shall be as provided in regulation 71.

65. Erection or alteration of buildings, structures, flood banks and elevation of roads. – (1) If at any time subsequent to the erection of an overhead line, whether covered with insulating material or not or underground cable, any person proposes to erect a new building or structure or flood bank or to raise any road level or to carry out any other type of work whether permanent or temporary or to make in or upon any building, or structure or flood bank or road, any permanent or temporary addition or alteration, such person and the contractor whom he employs to carry out the erection, addition or alteration, shall give intimation in writing of his intention to do so, to the supplier or owner and to the Electrical Inspector and shall furnish therewith a scale drawing showing the proposed building, structure, flood bank, road or any addition or alteration and scaffolding thereof required during the construction.

(2) On receipt of such intimation, the supplier or owner shall examine,-

(a) whether the overhead line or underground cable under reference was laid in accordance with the provisions of these regulations and any other law for the time being in force;

(b) whether it is technically feasible;

(c) whether it meets the requirement of right of way; and

(d) whether such person was liable to pay the cost of alteration of the overhead line or underground cable and if so, issue a notice within a period of thirty days to such person together with an estimate of the cost of the expenditure likely to be incurred to alter the overhead line or underground cable and require him to deposit, within thirty days of the receipt of the notice, with the supplier or owner, the amount of the estimated cost.

(3) If such person disputes the cost of alteration of the overhead line or underground cable estimated by the supplier or owner or even the responsibility to pay such cost, the dispute may be referred to the Electrical Inspector who shall after hearing both parties decide upon the issue in accordance with sub-regulation (4).

(4) The Electrical Inspector shall estimate the cost of alteration of overhead line or underground cable on the following basis, namely: –

(a) the cost of material used for the alteration after accounting for the depreciated cost of the material of the

existing line or underground cable;

(b) the wages of labour employed in the alteration; and

(c) the supervision charge to the extent of fifteen per cent of the wages mentioned in clause (b) and charges incurred by the owner or supplier or consumer in complying with the provisions of section 67 of the Act, in respect of alterations.

(5) Any addition or alteration to the building or structure shall be allowed only after the deposit of such estimated cost to the supplier or owner.

(6) No work upon such building, structure, flood bank, road and addition or alteration thereto shall commence or continue until the Electrical Inspector certifies that regulations 60, 62 , 63, 66 and regulation 79 have not been contravened either during or after the construction:

Provided that the Electrical Inspector may, if he is satisfied that the overhead line or underground cable has been so guarded as to secure the protection of persons or property from injury, certify within fifteen days that the work may be executed prior to the alteration of the overhead line or underground cable or in the case of temporary addition or alteration, without alteration of the overhead line or underground cable.

(7) The supplier or owner shall, on receipt of such deposit, alter the overhead line or underground cable in such a way that it does not contravene the regulations 60, 62, 63 and 79 either during or after such construction within two months from the date of such deposit or within such longer period as the Electrical Inspector may permit for reasons to be recorded in writing.

66. Transporting and storing of material near electric lines. – (1) No rods, pipes or similar materials shall be taken below, or in the vicinity of any bare overhead conductors or lines:

Provided that if these materials contravene the regulations 62 and 63, such materials shall be transported under the direct supervision of a person designated or appointed or engaged or permitted under these regulations.

(2) No rods, pipes or other similar materials shall be brought within the flash over distance of bare live conductors or overhead lines.

(3) 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 or lines in contravention to the regulations 62 and 63.

(4) No flammable material shall be stored under the electric line.

(5) No fire shall be allowed below overhead lines and above the demarcated underground cables.

67. General clearances. – (1) For the purpose of computing the vertical clearance of an overhead line, the maximum sag of any conductor shall be calculated on the basis of the maximum sag in still air and the maximum temperature as specified under regulation 59 and computing any horizontal clearance of an overhead line the maximum deflection of any conductor shall be calculated on the basis of the wind pressure specified under regulation 59.

(2) No blasting for any purpose shall be done within three hundred metre from the boundary of a substation or from the electric supply lines of voltage exceeding 650 V or tower structure thereof without the written permission of the owner of such substation or electric supply lines or tower structures; and in case of mining lease hold area, without the written permission of the Electrical Inspector of mines.

(3) No cutting of soil within ten metre from the tower structure of 110 kV and above voltage level shall be permitted without the written permission of the owner of tower structure.

(4) No person shall construct brick kiln or other polluting units near the installations or transmission lines of 220 kV and above within a distance of 500 metre.

68. Routes in proximity to airport or aerodromes. – Overhead lines shall not be laid in the vicinity of airport or aerodromes unless the Airport Authorities or concerned defence authorities have approved in writing the route of the proposed overhead lines as per relevant standards.

69. Maximum interval between supports. – All conductors shall be attached to supports at intervals not exceeding the safe limits based on the ultimate tensile strength of the conductor and the factor of safety specified under regulation 59:

Provided that in the case of overhead lines carrying conductors of voltage not exceeding 650 V when laid over, along or across any street, the interval shall not, without the consent in writing of the Electrical Inspector, exceed sixty five metre.

70. Conditions to apply where telecommunication lines and power lines are carried on same supports. – (1) Every overhead telecommunication line laid on supports of an electric line shall consist of conductors each

having a breaking strength of not less than 270 kgf.

(2) Every telecommunication line laid on supports of an electric line shall be protected against lightning as per relevant standards.

(3) Where a telecommunication line is laid on supports of an electric line of voltage exceeding 650 V, a suitable arrangement shall be made to safeguard any person against injury resulting from contact, leakage or induction between such electric and telecommunication lines.

71. Lines crossing or approaching each other and lines crossing street and road. – Where an overhead line crosses or is in proximity to any telecommunication line, the owner of the overhead line or the telecommunication line, whosoever lays his line later, shall arrange to provide for protective devices or guarding arrangement as per code of practice or guidelines issued by Power and Telecommunication Coordination Committee and shall observe the following provisions, namely: –

(i) when it is intended to lay a telecommunication line or an overhead line which will cross or be in proximity to an overhead line or a telecommunication line, as the case may be, the person proposing to lay such line shall give one month notice of his intention so to do along with the relevant details of protection and drawings to the owner of the existing line;

(ii) guarding arrangement shall be provided where a line of voltage not exceeding 33 kV crosses a road or street or telecommunication line;

(iii) where an overhead line crosses or is in proximity to another overhead line, guarding arrangements shall be provided so as to safeguard against the possibility of their coming into contact with each other; and

(iv) where an overhead line crosses another overhead line, minimum clearances as provided in the table below shall be ensured:-

Minimum clearances in metre between lines crossing each other

Sl. No.	Nominal System Voltage (kV)	11-66 kV	110-132 kV	220 kV	400 kV	765 kV	1200 kV
1.	below 11	2.44	3.05	4.58	5.49	7.94	**10.44**
2.	11-66	2.44	3.05	4.58	5.49	7.94	**10.44**
3.	110-132	3.05	3.05	4.58	5.49	7.94	**10.44**
4.	220	4.58	4.58	4.58	5.49	7.94	**10.44**
5.	400	5.49	5.49	5.49	5.49	7.94	**10.44**
6.	765	7.94	7.94	7.94	7.94	7.94	**10.44**
7	**1200**	**10.44**	**10.44**	**10.44**	**10.44**	**10.44**	**10.44**

Provided that no guarding arrangement is required when an electric line of voltage exceeding 33 kV crosses over another line of 250 V and above voltage or a road or a tram subject to the condition that adequate clearances are provided between the lowest conductor of the line of voltage exceeding 33 kV and the top most conductor of the overhead line crossing underneath the line of voltage exceeding 33 kV and the clearances as stipulated in regulation 60 from the topmost surface of the road maintained;

(v) where an overhead direct current line crosses another overhead line, minimum clearances as provided in the table below shall be ensured:-

Minimum clearances in metre between AC and DC lines crossing each other

Sl.No.	System Voltage AC/DC	100 kV DC	200 kV DC	300 kV DC	400 kV DC	500 kV DC	600 kV DC	800 kV DC
1.	below 11 kV AC	3.05	4.71	5.32	6.04	6.79	7.54	9.04
2.	11-66 kV AC	3.05	4.71	5.32	6.04	6.79	7.54	9.04
3.	110-132 kV AC	3.05	4.71	5.32	6.04	6.79	7.54	9.04
4.	220 kV AC	4.58	4.71	5.32	6.04	6.79	7.54	9.04

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5.	200 kV DC	4.71	4.71	5.32	6.04	6.79	7.54	9.04
6.	300 kV AC	5.32	5.32	5.32	6.04	6.79	7.54	9.04
7.	400 kV AC	5.49	5.49	5.49	6.04	6.79	7.54	9.04
8.	400 kV DC	6.04	6.04	6.04	6.04	6.79	7.54	9.04
9.	500 kV DC	6.79	6.79	6.79	6.79	6.79	7.54	9.04
10.	600 kV DC	7.54	7.54	7.54	7.54	7.54	7.54	9.04
11.	765 kV AC	7.94	7.94	7.94	7.94	7.94	7.94	9.04
12.	800 kV DC	7.94	7.94	7.94	7.94	7.94	9.04	9.04
13.	1200 kV AC	10.44	10.44	10.44	10.44	10.44	10.44	10.44

(vi) a person laying or proposing to lay a line which may cross or be in proximity with an existing line, shall provide arrangements on his own line or require the owner of the other overhead line to provide guarding arrangements as referred to in clause (iii) and (iv);

(vii) in all cases referred to in this regulation the expenses of providing the guarding arrangements or protective devices shall be borne by the person whose line was laid later;

(viii) where two lines cross each other, the crossing shall be made as nearly at right angles as the nature of the case admits and as near the support of the line as practicable, and the support of the lower line shall not be placed in the right of way of the upper line; and

(ix) the guarding arrangement shall be carried out by the owner of the support on which it is made and he shall be responsible for its proper maintenance.

72. Guarding. – (1) Where guarding arrangement is required under these regulations, the following shall be observed, namely: –

(i) every guard wire shall be connected with the earth at each point at which its electrical continuity is broken;

(ii) every guard wire shall have an actual breaking strength of not less than 635 kgf and if made of iron or steel, shall be galvanised; and

(iii) every guard wire or cross-connected system of guard wires shall have sufficient current carrying capacity to ensure them rendering dead, without risk of fusing of the guard wire, till the contact of any live wire has been removed.

(2) In the case of a line crossing over a trolley wire, the guarding arrangement shall be subjected to the following conditions, namely: –

(i) where there is only one trolley-wire, two guard-wires shall be provided as illustrated in DIAGRAM-A;

(ii) where there are two trolley wires and the distance between them does not exceed forty centimetre, two guard-wires shall be provided as illustrated in DIAGRAM-B;

(iii) where there are two trolley wires and the distance between them exceeds forty centimetre but does not exceed 1.2 metre, three guard-wires shall be provided as illustrated in DIAGRAM-C;

(iv) where there are two trolley-wires and the distance between them exceeds 1.2 metre, each trolley-wire shall be separately guarded as illustrated in DIAGRAM-D;

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DIAGRAM-A

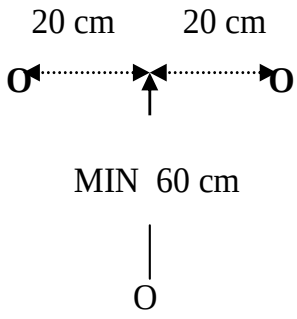


DIAGRAM-B

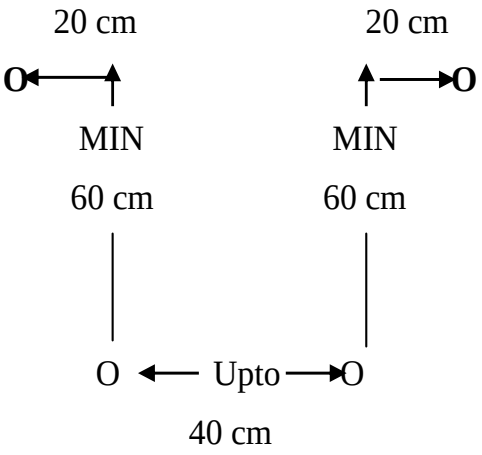
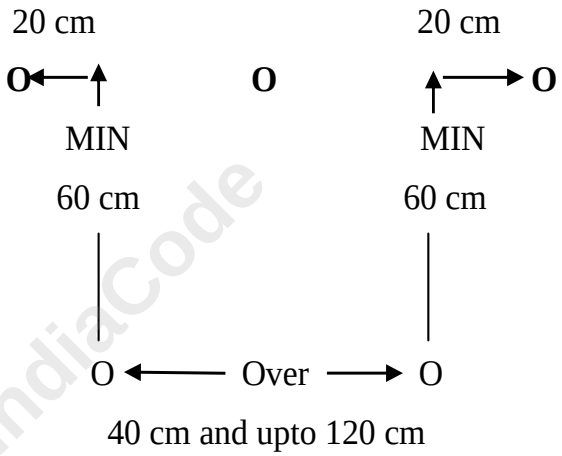
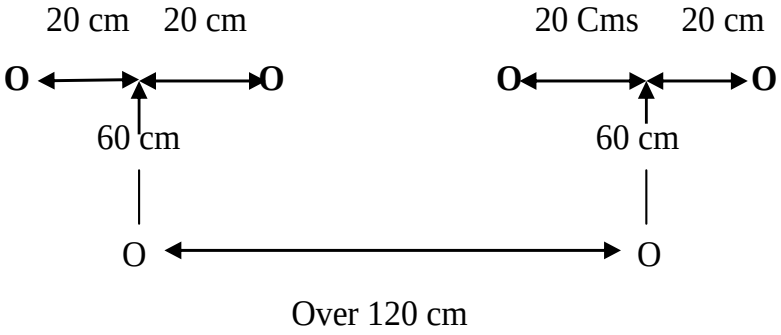


DIAGRAM-C



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DIAGRAM-D



(v) the rise of trolley boom shall be limited such that the trolley wire shall not foul the guard wires; and

(vi) where a telegraph-line is liable to fall or be blown down upon an arm, stay-wire or span-wire and so slide-down upon a trolley-wire, guard hooks shall be provided to prevent such sliding.

73. Service lines from overhead lines. – No service line or tapping shall be taken off an overhead line except at a point of support:

Provided that the number of tappings per conductor shall not be more than six in case of connections at voltage not exceeding 650 V.

74. Earthing. – (1) Earthing of support of overhead lines up to 33 kV shall be provided as under, namely: –

(a) all metal supports and all reinforced and pre-stressed cement concrete supports of overhead lines and metallic fittings attached thereto, shall be permanently and effectively earthed by providing a continuous

earth wire and securely fastened to each pole and connected with the earth at each support and the metallic fittings attached thereto shall also be permanently and effectively earthed;

(b) metal cross arms and insulator pins for Plain Cement Concrete and Pre-Stressed Cement Concrete poles shall be bonded together and normally earthed at every pole;

(c) for locations involving railways, electric line crossings and special structures, pipe or rod type earthing shall be provided;

(d) all steel poles on which switches, transformers, fuses are mounted shall be earthed;

(e) for poles of the electric lines below 650 V guarding arrangement with continuous earth wire or messenger wire in case of aerial bunched cable shall be provided and shall be connected to earth at three equidistant points in every km; and

(f) each stay-wire shall be similarly earthed unless insulator of same voltage class as that of line has been placed in it at a height not less than three metre from the ground and shall be provided with insulated tube up to three metre height from the ground.

(2) For 66 kV and above voltage class overhead line, earthing and requirement of earth wire shall be as per the regulations notified by the Authority under clause (e) of sub-section (2) of section 177 of the Act.

75. Anti-climbing devices. – The owner of every overhead line of voltage exceeding 650 V shall make adequate arrangements as per relevant standards to prevent unauthorised persons from climbing any of the supports of such overhead lines which can be easily climbed upon without the help of a ladder or special appliances:

Provided that the barbed wires conforming to relavant standards for a vertical distance of 30 to 40 cm, at a height of 3.5 metre to 4 metre from ground level or clamps with protruding spikes at a height of 3 to 4 metre shall be provided on each pole or tower of 11 kV line and above.

Explanation. – For the purposes of this regulation, rails, reinforced cement concrete poles and pre-stressed cement concrete poles without steps, tubular poles, wooden supports without steps, I-sections and channels shall be deemed as supports which cannot be easily climbed upon.

76. Safety and protective devices. – (1) Every overhead line which is not being suspended from a dead bearer wire, not being covered with insulating material and not being a trolley-wire, is laid over any part of a street or other public place or in any factory or mine or on any consumer's premises shall be protected with earth guarding for rendering the line electrically harmless in case its conductor breaks.

(2) An Electrical Inspector may, by notice in writing, require the owner of any such overhead line, wherever it may be laid, to protect it in the manner specified in sub-regulation (1) of this regulation.

(3) To prevent bird dropping on the suspension insulator strings, suitable bird guards as per relevant standards, shall be provided on cross arms of suspension tower or suspension pole structures, over the suspension insulator strings.

77. Protection against lightning. – (1) The owner of every overhead line, substation or generating station which is exposed to lightning shall adopt means as per relevant standards for diverting electrical surges to the earth due to lightning which may result into injuries.

(2) The earthing lead for any lightning arrester shall be as short as possible and shall not pass through any iron or steel pipe, but shall be taken as directly as possible from the lightning arrester without touching any metal part to a separate vertical earth electrode or junction of the earth mat already provided for the substation of voltage exceeding 650 V subject to the avoidance of bends wherever practicable:

Provided that a vertical earth electrode shall be connected to the junction of the earth mat.

78. Unused overhead lines. – Where an overhead line ceases to be used as an electric supply line, namely: –

(i) the owner shall maintain it in a safe mechanical condition in accordance with regulation 59 or remove it; and

(ii) the Electrical Inspector shall, by a notice in writing served on the owner, require him to maintain it in a safe mechanical condition or to remove it within thirty days of the receipt of the notice.

79. Laying of cables. – (1) No underground power cable of voltage level up to 33 kV shall be laid without a minimum underground depth from ground surface to top of the cable as per relevant standards:

Provided that the underground power cable meant for use exceeding 33 kV shall be laid with a minimum underground depth of 1.2 metre.

(2) No underground telecommunication cable shall be laid without a minimum separation distance of 0.3 metre

and 0.6 metre to the underground power cable of voltage up to 33 kV and exceeding 33 kV, respectively.

80. Protection against electromagnetic interference. – The owner of every electric supply line of voltage level 11 kV or above shall obtain the clearance of Power Telecommunication Co-ordination Committee to ensure the safety of the personnel and telecommunication line as per the requirement of section 160 of the Act.

Chapter VIII

Additional Safety requirements for electric traction

81. Application of Chapter. – (1) The regulations in this chapter shall apply only where electricity is used for the purposes of traction:

Provided that nothing in this chapter shall apply to electricity used for the public carriage of passengers, animals or goods on, or for the lighting or ventilation of the rolling stock of any railway or tramway subject to the provisions of the Railways Act, 1989 (24 of 1989).

(2) In this chapter the conductor used for transmitting electricity to a vehicle is referred to as the "line" and the other conductor as the "return".

(3) The owner of the line, return, rails or trolley wire, as the case may be, shall be responsible for the observance of regulations 82 to 95.

(4) Before an application is made by the owner of an installation of voltage exceeding 650 V to the Electrical Inspector for permission to commence or recommence supply after such installation has been disconnected for six months and above, the supplier shall ensure that the electric supply lines or apparatus at voltage exceeding 650 V belonging to him are placed in position, properly connected and duly completed.

(5) The supply of electricity shall not be commenced by the supplier unless and until the Electrical Inspector is satisfied that the provisions of regulations 46 to 52 and regulations 82 to 95 have been complied with and the approval in writing of the Electrical Inspector has been obtained by him.

82. Voltage of supply to vehicle. – No person shall supply electricity to any trolley wire or other conductor at voltage exceeding 650 V used in direct electrical and mechanical connection with any vehicle, except with the written approval of the Central Government or the State Government, as the case may be, and subject to such conditions as the State Government may think reasonable to impose.

83. Insulation of lines. – Every line shall be insulated throughout and a line may consist of either bare conductors supported on structures through insulators or insulated cable.

84. Insulation of returns. – (1) Where any rails on which cars run, or any conductors laid between or within 0.9 metre of such rails, form any part of a return, such part may be uninsulated and all other returns or parts of a return, shall be insulated, unless they are of such conductivity as to secure the conditions under sub-regulations (2) and (3) of regulation 85.

(2) Where any part of a return is uninsulated, it shall be connected with the negative or neutral of the system.

85. Proximity to metallic pipes. – (1) Where an uninsulated return is in proximity to any metallic pipe, structure or substance not belonging to the owner of the return, the owner of uninsulated return shall, if so required by the owner of such pipe, structure or substance, connect his return therewith at his own expense.

(2) Where the return is partly or entirely uninsulated, the owner shall, in the construction and maintenance of his system, adopt such means for reducing the difference produced by the current between the potential of the uninsulated return at any one point and the potential of the uninsulated return at any other point as to ensure that the difference of potential between the uninsulated return and any metallic pipe, structure or substance in the vicinity shall not exceed four volts where the return is relatively positive, or one and one-third volts where the return is relatively negative.

(3) The owner of any such pipe, structure or substance in respect of it require the owner of the uninsulated return at reasonable times and intervals to ascertain by test in his presence or in the presence of his representative, whether the condition specified in sub-regulation (2) is fulfilled, and, if such condition is found to be fulfilled, all reasonable expenses of, and incidental to, carrying out of the test shall be borne by the owner of the pipe, structure or substance.

(4) The potential of uninsulated return with respect to earth at any point shall not exceed 50 V under normal conditions.

(5) The petroleum sidings installation earth shall be connected to the uninsulated return to make it equipotential and pipelines in the vicinity of the track should be properly earthed.

86. Difference of potential on return. – Where the return is partly or entirely uninsulated, the owner shall keep a

continuous record of the difference of potential, during the working of his system, between every junction of an insulated return with an uninsulated return and the point on the route most distant from that junction, and the difference of potential shall not, under normal running conditions, exceed a mean value of seven volts between the highest momentary peak and the average for the hour of maximum load.

87. Leakage on conduit system. – Where both the line and the return are placed within a conduit, the following conditions shall be fulfilled in the construction and maintenance of the system, namely: –

(i) where the rails are used to form any part of the return, they shall be electrically connected at distances not exceeding thirty metre apart, with the conduit by means of copper strips having a cross-sectional area of at least 0.40 sq. cm or by other means of equal conductivity and where the return is wholly insulated and contained within the conduit, the latter shall be connected with earth at the generating station or substation through an instrument suitable for the indication of any contact or partial contact of either the line or the return with the conduit; and

(ii) the leakage current shall be ascertained daily, before or after the hours of running, when the line is fully charged and if at any time it is found to exceed 0.6 ampere per km of single tramway track, the transmission and use of electricity shall be suspended unless the leakage is stopped within twenty four hours.

88. Leakage on system other than conduit system. – Where both the line and the return are not placed within a conduit, the leakage current shall be ascertained daily before or after the hours of running, when the line is fully charged and if at any time it is found to exceed 0.3 ampere per km of single tramway track, the transmission and use of electricity shall be suspended unless the leakage is stopped within twenty four hours.

89. Passengers not to have access to electric circuit. – Precautions to the satisfaction of an Electrical Inspector shall be taken by the owner of every vehicle to prevent, -

(i) the access of passengers to any portion of the electric circuit where there is danger from electric shock; and

(ii) any metal, hand-rail or other metallic substance liable to be handled by passengers, becoming charged.

90. Isolation of sections. – Every trolley wire shall be constructed in sections not exceeding 1.6 km in length, and means shall be provided for isolating each section.

91. Minimum size and strength of trolley wire. – No trolley-wire shall be of less cross-sectional area than 0.5 sq. cm or shall have an actual breaking load of less than 2000 kg.

92. Height of trolley wire and length of span. – A trolley wire or a traction feeder on the same supports as a trolley wire shall, at no place be, at a height from the surface of the street of less than 5.2 metre except, where it passes under a bridge or other fixed structure, or through or along a tunnel or mineshaft or the like in which case it shall be suspended to the satisfaction of an Electrical Inspector.

93. Earthing of guard wires. – Every guard wire shall be connected with earth at each point at which its electrical continuity is broken and shall also be connected with the rails at intervals of not more than five spans.

94. Proximity to magnetic observatories and laboratories. – Traction works shall not be carried out in the vicinity of geomagnetic observatories and laboratories without the concurrence of the Central Government or of any officer authorised by it in this behalf.

95. Records. – (1) The owner shall keep the following records, namely: –

(i) daily records showing, **–**

(a) the maximum working current from the source of supply;

(b) the maximum working voltage at the source of supply;

(c) the difference of potential, as required under regulation 86; and

(d) the leakage current, if any, as required under regulations 87 and 88;

(ii) occasional records showing, –

(a) every test made under sub-regulation (2) and (3) of regulation 85;

(b) every stoppage of leakage, together with the time occupied; and

(c) particulars of any abnormal occurrence affecting the electrical working of the system.

(2) The records so kept under sub-regulation (1) shall be open to examination by Electrical Inspector.

Chapter IX

Additional Safety requirements for mines and oil-fields

96. Application of chapter. – The regulation in this chapter shall apply only where electricity is used in mines as defined in the Mines Act, 1952 (35 of 1952) and oil-fields.

97. Responsibility for observance. – (1) It shall be the duty of every person in charge of and responsible to the mine including the owner, agent, manager, engineer and installation manager and Engineer of mine and oil-field to comply with and enforce the regulations and it shall be the duty of all persons employed to conduct their work in accordance with the regulations:

Provided that in case of power stations, transformer substations, converter substations, rectifier substations and accumulator, storage stations for supplying electricity to solely and mainly for the purpose of working of the mine or number of mines and which do not fall in the precincts of a mine, Engineer holding a degree in electrical engineering from university with adequate experience may be appointed as manager of that installations.

Explanation. – For the purposes of this regulation, the word "Engineer" shall, –

(i) in the case of a coal mine, have the same meaning as assigned to it in the Coal Mines Regulations, 2017;

(ii) in the case of a metalliferous mine, have the same meaning as assigned to it in the Metalliferous Mines Regulations, 1961, as amended from time to time; and

(iii) in the case of an oil-field, means the Installation Manager' under the Oil Mines Regulations, 2017.

98. Notices. – (1) On or before the first day of February in every year, in respect of every mine or oil-field, returns giving the size and type of apparatus, together with such particulars in regard to circumstances of its use as may be required, shall be sent to the Electrical Inspector of mines by the persons specified in regulation 97 in the Form provided in Schedule IX or, as the case may be, Schedule X, whichever is applicable.

(2) The persons specified in regulation 97, shall also give to the Electrical Inspector of mines not less than seven days notice in writing of the intention to bring into use any new installation in a mine or oil-field giving details of apparatus installed and its location:

Provided that in case of any additions or alterations to an existing installation of voltage not exceeding 650 V, immediate notice in writing shall be sent to the Electrical Inspector of mines before such additions or alterations are brought into use:

Provided further that this regulation shall not apply to telecommunication or signalling apparatus:

Provided also that in case of emergency which may lead to loss of life or machinery and is detrimental to safety of mine, intimation shall be given within twenty four hours to the Electrical Inspector of mines giving the healthiness of the apparatus alongwith self-certification report of such additions or alterations undertaken.

99. Plans. – (1) A correct plan, on the same scale as the plan kept at the mine in fulfillment of the requirements of the Mines Act, 1952 (35 of 1952), and Single Line Diagram of the electrical installations from point of commencement of supply shall be available in the office at the mine showing the position of all fixed apparatus and conductors therein, other than lights, telecommunication or signalling apparatus, or cables for the same.

(2) A similar plan on the scale not less than 25 cm to a km (1:4000) shall be kept by the manager or owner of one or more wells in any oil-field.

(3) A similar plan and Single Line Diagram on such scale as the Central Government may direct and Single Line Diagram showing the position of all electric supply lines shall be kept in the office of any licensee, owner or other person transmitting or distributing electricity in a mine or oil-field.

(4) The plans specified under this regulation shall be examined and corrected as often as necessary to keep them up-to-date and the dates of such examinations shall be entered thereon by the manager or owner of the mine or wells and such plans shall be available to the Inspector, or inspector of mines, at any time and in case extent of hazardous area is revised, equipment covered under such area shall be reviewed as per the relevant standards and or ATmosphere EXplosible.

100. Lighting, overhead lines, communication and fire precautions. – (1) Adequate illumination by electricity as per relevant standards shall be provided in the mines:

Provided that in a belowground coal mine, such lighting fixtures shall be of a type approved by the Chief Inspector of mines:

Provided further that one or more flame safety lamps or such lighting system approved by the Chief Inspector of mines shall be maintained in all places where failure of the electric light at any time shall be prejudicial to safety:

Provided also that in a belowground metalliferous mine or any open cast mine or oil-fields, such lighting fixtures shall be suitable for the type of application conforming to the relevant standards or harmonised standards, and adequate emergency lighting system shall be maintained in all places where failure of the electric light at any time shall be prejudicial to safety.

(2) Efficient means of communication shall be provided in every mine between the point where the switchgear under sub-regulation (1) of regulation 107 is erected, the shaft bottom and other distributing centres in the mines.

(3) Fire extinguishing appliances of adequate capacity and of an approved type as per relevant standards as amended from time to time shall be installed and properly maintained in every place in a mine containing apparatus, other than cables, telecommunication and signalling apparatus.

(4) In case of mines, minimum clearance above ground of the lowest conductor of overhead lines or overhead cables where dumpers or trackless vehicles are being operated, shall not be less than twelve metre in height from the ground across the road where dumpers or trackless vehicles cross:

Provided that where dumper bucket in raised position, the clearance between the top of dumper body and to the lowest conductor of overhead lines or overhead cables shall not be less than one metre.

101. Isolation and fixing of transformer and switchgear. – (1) Transformers and switchgear shall be placed in a separate room, compartment or box where necessary or in a manner to prevent danger of mechanical damage and spread of fire.

(2) Unless the apparatus is so constructed, protected and worked as to obviate the risk of fire, no inflammable material shall be used in the construction of any room, compartment or box containing apparatus, or in the construction of any of the fittings therein and each such room, compartment or box shall be substantially constructed and shall be kept dry and illuminated and efficient ventilation shall be provided for all apparatus installed therein.

(3) All apparatus that has to be worked or attended to and all handles intended to be operated shall be placed at a spacious working place which is accessible, clear of obstruction and free from danger, so far as circumstances permit.

102. Method of earthing. – (1) Where earthing is necessary in a mine, it shall be carried out by connection to an earthing system at the surface substation of the mine.

(2) All metallic sheaths, coverings, handles, joint boxes, switchgear frames, instrument covers, switch and fuse covers of boxes, all lamp holders, unless efficiently protected by an insulated covering made of fire resisting material, and the frames and bedplates of generators, transformers and motors, including portable motors, shall be earthed by connection to an earthing system in the manner specified in sub-regulation (1).

(3) Where cables are provided with a metallic covering constructed and installed in accordance with clause (iv) (d) of regulation 108, such metallic covering may be used as a means of connection to the earthing system.

(4) All conductors of an earthing system shall have conductivity, at all parts and all joints, at least equal to fifty per cent of that of the largest conductor used solely to supply the apparatus, a part of which is desired to be earthed:

Provided that no conductor of an earthing system shall have a cross-sectional area less than 0.15 sq. cm except in the case of the earth conductor of a flexible cable used with portable apparatus where the voltage does not exceed 125 V, and the cross-sectional area and conductance of the earthcore is not less than that of the largest of the live conductors in the cable.

(5) All joints in earth conductors and all joints in the metallic covering of cables shall be properly soldered or otherwise effectively made.

(6) No switch, fuse or circuit breaker shall be inserted in any earth conductor.

(7) This regulation shall not apply, except in the case of portable apparatus, to any system in a mine in which the voltage does not exceed 30 V.

103. Protective equipment. – (1) In the interest of safety, the earth fault current shall not be more than 750 milliampere in installations of voltage exceeding 250 V and up to 1100 V for below ground mines and oil-fields, and 50 ampere in installations of voltage exceeding 1100 V and up to 11 kV in open cast mines and the magnitude of the earth fault current shall be limited to these specified values by employing suitably designed, restricted neutral system of power supply including neutral-ground monitoring protection system:

Provided that all electrical installations, in or after notification of these regulations, of voltage exceeding 1100 V and up to 11 kV for below ground mines, open cast mines and oil mines or oil-fields, the magnitude of the earth fault current shall be limited up to 10 A by employing suitably designed, restricted neutral system of

power supply including neutral-ground monitoring protection system:

Provided further that the settings of protective relays thereof shall be set between 200 to 400 milliampere for individual apparatus of voltage up to 1100 V with suitable time delay protection.

(2) The operation of the switchgear and the relays shall be recorded daily at the generating station, substation or switch station in a register kept for the purpose and in electronic form also.

(3) The effectiveness of switchgear and protective system shall always be kept in working order and shall be checked by calibrating and testing at least once in a year and the result thereof shall be recorded in separate register kept for the purpose and in electronic form:

Provided that wherever numerical relays are being used they shall be checked by testing procedure as per guidelines of original equipment manufacturer or the relevant standards and periodicity of such checking shall be at least once in a year.

104. Voltage limits. – Electricity shall not be transmitted into a belowground mine at a voltage exceeding 11000 V and shall not be used therein at a voltage exceeding 6600 V:

Provided that, -

(i) where hand-held portable apparatus is used, the voltage shall not exceed 125 V;

(ii) where electric lighting is used, –

(a) in belowground mines, the lighting system shall have a mid or neutral point connected with earth and the voltage shall not exceed 125 V between phases;

(b) on the surface of a mine or in an open cast mine or oil mines or oil-fields, the voltage may be raised to 250 V, if the neutral or the mid-point of the system is connected with earth and the voltage between the phases does not exceed 250 V;

(iii) where portable hand-lamps are used in belowground mines and hazardous area of oil mines or oil-fields, the voltage shall not exceed 30 V;

(iv) where any circuit is used for the remote control or electric inter-locking of apparatus, the circuit voltage shall not exceed 30 V for below ground mine or hazardous area of oil-fields:

Provided that in hazardous areas of oil mines or oil-fields, the said voltage can be up to 250 V, if the on-off control push-button stations or remote controls are housed in an appropriate enclosure like:

(i) Flame proof enclosure type ‘d’;

(ii) Pressurised enclosure type ‘p’;

(iii) Sand filled apparatus type ‘q’;

(iv) Increased safety enclosure type ‘e’, ‘n’, and ‘o’:

Provided further that the control circuit shall have suitable protection against shock hazards, and the trippings due to faults do not adversely affect the operational safety:

Provided also that in fixed plants on surface of the mines or opencast mines, the said voltage for the remote control or electric inter-locking may be permitted up to 250 V.

105. Transformers. – In mines or oil-fields, the transformers used for providing voltages to control circuits or remote control or interlocking or for hand held apparatus, shall have suitable provision to guard against danger by reason of the lower voltage apparatus becoming accidentally charged above its normal voltage by leakage from or contact with the higher voltage apparatus.

106. Switchgear and terminals. – Switchgear and all terminals, cable ends, cable joints and connections to apparatus shall be totally enclosed and shall be constructed, installed and maintained as to comply with the following requirements, namely: –

(i) all parts shall be of mechanical strength sufficient to resist rough usage;

(ii) all conductors and contact areas shall be of adequate current-carrying capacity and all joints in conductors shall be properly soldered or otherwise efficiently made;

(iii) the lodgement of any matter likely to diminish the insulation or affect the working of any switchgear shall be prevented;

(iv) all live parts shall be so protected or enclosed as to prevent persons accidentally coming into contact with them and to prevent danger from arcs, short-circuits, fire, water, gas or oil;

(v) where there may be risk of igniting gas, coal-dust, oil or other inflammable material, all parts shall be so protected as to prevent open sparking; and

(vi) every switch or circuit-breaker shall be so constructed as to be capable of opening the circuit it controls and dealing with any short-circuit without danger.

107. Disconnection of supply. – (1) Properly constructed switchgear for disconnecting the supply of electricity to a mine or oil-field shall be provided at a point recommended by the Electrical Inspector of mines.

(2) At any time, when any cable or overhead line supplying electricity to the mine from the aforesaid switchgear is live, a person designated to operate the said switchgears shall be available within easy reach thereof:

Provided that in the case of gassy coal seam of second degree and third degree gassiness, the main mechanical ventilator operated by electricity shall be interlocked with the switchgear so as to automatically disconnect the power supply in the event of stoppage of main mechanical ventilator.

(3) When necessary in the interest of safety, any apparatus suitably placed, shall be provided for disconnecting the supply from every part of a system.

(4) If the Electrical Inspector of mines, in the interest of safety considered it necessary, he may direct that the apparatus specified in sub-regulation (3) shall be so arranged as to disconnect automatically, from the supply, any section of the system subjected to a fault.

(5) Every motor shall be controlled by switchgear which shall be so arranged as to disconnect the supply from the motor and from all apparatus connected thereto and such switchgear shall be so placed as to be easily operated by the person designated to operate the motor.

(6) A suitably rated switchgear incorporated with protective mechanism to disconnect automatically the supply in the event of conditions of over-current, earth fault or leakage, under voltage and single phasing.

(7) Auxiliary fan shall be interlocked with the switchgear controlling power supply to the in-bye face equipment of below ground coal mine for automatic disconnection of power supply in the event of the stoppage of the auxiliary fan.

(8) Every feeder of the mine shall be controlled by a suitably rated switchgear incorporated with protective mechanism in a manner so as to disconnect the supply automatically in the event of conditions of over-current, short circuit, single phasing, under voltage and earth fault or leakage as relevant.

108. Cables. – All cables, other than flexible cables for portable or transportable apparatus, shall fulfill the following requirements, namely: –

(i) all such cables, other than the outer conductor of a concentric cable, shall be covered with insulating material and shall be efficiently protected from mechanical damage and supported at sufficiently frequent intervals and in such a manner as to prevent damage to such cables;

(ii) (a) except as provided in clause (iii) no cables other than concentric cables or single core or two core or multi core cables protected by a metallic covering and which contain all the conductors of a circuit shall be used where the voltage exceeds 125 V or when an Inspector considers that there is risk of igniting gas or coal dust or other inflammable material, and so directs;

(b) the sheath of metal-sheathed cables and the metallic armouring of armoured cables shall be of a thickness not less than that recommended from time to time in the relevant standard of the Bureau of Indian Standards;

(iii) where a voltage exceeding 250 V but not exceeding 650 V direct current system is used, two single core cables may be used for any circuit provided that their metallic coverings are bonded together by earth conductors so placed that the distance between any two consecutive bonds is not greater than thirty metre measured along either cable;

(iv) The metallic covering of every cable shall be. –

(a) electrically and mechanically continuous throughout;

(b) earthed, if it is required, to be earthed by a connection to the earthing system of conductivity;

(c) efficiently protected against corrosion where necessary;

(d) of a conductivity at all parts and at all joints at least equal to fifty per cent of the conductivity of the largest conductor enclosed by the said metallic covering; and

(e) where there may be risk of igniting gas, coal-dust, or other inflammable material, so constructed as

to prevent, as far as practicable, the occurrence of open sparking as the result of any fault or leakage from live conductors;

(v) cables and conductors where connected to motors, transformers, switchgear and other apparatus, shall be installed so that, -

(a) they are mechanically protected by securely attaching the metallic covering to the apparatus; and

(b) the insulating material at each cable end is efficiently sealed so as to prevent the diminution of its insulating properties;

(vi) where necessary to prevent abrasion or to secure gas-tightness, properly constructed glands or bushes shall be provided;

(vii) unarmoured cables or conductors shall be conveyed either in metallic pipes or metal casings or suspended from efficient insulators by means of non-conducting materials which will not cut the covering and which shall prevent contact with any timbering or metal work and if separate insulated conductors are used, they shall be installed at least 3.75 cm apart and shall not be brought together except at lamps, switches and fittings.

109. Flexible cables. – (1) Flexible cables for portable or transportable apparatus shall be two core or multi core, unless required for electric welding, and shall be covered with insulating material which shall be efficiently protected from mechanical injury.

(2) If flexible metallic covering is used either as the outer conductor of a concentric cable or as a means of protection from mechanical injury, it shall not be used by itself to form an earth conductor for such apparatus, but it may be used for that purpose in conjunction with an earthing core.

(3) Every flexible cable intended for use with portable or transportable apparatus shall be connected to the system and to such apparatus by properly constructed connectors:

Provided that for machines of voltage exceeding 650 V but not exceeding 11 kV a bolted type connector shall be used and the trailing cable shall be suitably anchored at the machine end.

(4) At every point where flexible cables are joined to main cables, a circuit breaker shall be provided which is capable of automatically disconnecting the supply from such flexible cables.

(5) Every flexible cable attached to a portable or transportable machine shall be examined periodically by the person designated to operate the machine, and if such cable is used underground, it shall be examined at least once in each shift by such person and if such cable is found to be damaged or defective, it shall forthwith be replaced by a cable in good condition.

(6) If the voltage of the circuit exceeds 250 V, all flexible cables attached to any transportable apparatus shall be provided with flexible metallic screening or pliable armouring and cables of portable apparatus shall be provided with flexible metallic screening on all the power and pilot cores:

Provided that the provision of this regulation shall not apply to flexible cables attached to any transportable or portable apparatus used in open cast mines or below ground mines where reeling and unreeling of such cables is necessary as per design features of the equipment.

(7) All flexible metallic screening or armouring specified in sub-regulation (6) shall fulfill the requirement specified in clause (iv) of regulation 108:

Provided that in the case of separately screened flexible cables the conductance of each such screen shall not be less than twenty five per cent of that of the power conductor and the combined conductance of all such screens shall in no case be less than that of 0.15 sq. cm copper conductor.

(8) Flexible cable exceeding hundred metre in length shall not be used with any portable or transportable apparatus:

Provided that such flexible cable when used with coal cutting machines or cutter or loader or armoured face conveyor for long wall operation, or with shuttle cars or load haul dumper or cutter loader or all alike equipment for development and de-pillaring operation shall not exceed two hundred fifty metre in length:

Provided further that the aforesaid cable in case of an open cast mine when used with electrically operated heavy earth moving machinery shall not exceed six hundred metre in length and for bucked wheel excavator at 11 kV shall not exceed one thousand metre in length:

Provided also that in case of dragline or 42 cubic metre capacity shovel, flexible cable length may be raised up to 600 metre.

(9) Flexible cable, when installed in a mine, shall be efficiently supported and protected from mechanical injury.

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(10) Flexible cables shall not be used with apparatus other than portable or transportable apparatus:

Provided that, in case of applications like, submersible pumps, and skid mounted pumps, installed in the mines, the use of flexible cable is allowed subject to the follow of measures as to prevent the mechanical damage to the cables.

(11) Where flexible cables are used they shall be detached or otherwise isolated from the source of supply when not in use, and arrangements shall be made to prevent the energising of such cables by undesignated persons.

110. Portable and transportable machines. – The person designated to operate an electrically driven coal-cutter, or other portable or transportable machine, shall not leave the machine while it is in operation and shall, before leaving the area in which such machine is operating, ensure that the supply is disconnected from the flexible cable which supplies electricity to the machine and when any such machine is in operation, steps shall be taken to ensure that the flexible cable is not dragged along by the machine:

Provided that all portable and transportable machines used in underground mines shall operate on remote control from the concerned switchgear with pilot core protection:

Provided further that the portable and transportable machines used in open cast mines shall have the provision such that the power supply to the machine from concerned switchgear is remotely controlled from the machine:

Provided also that the portable or transportable machines used in open cast mine, provision of tripping device or switch device from the operator's cabin shall be provided to disconnect power supply to such machine from the field switchgear.

111. Sundry precautions. – (1) All apparatus shall be maintained reasonably free from dust, dirt and moisture, and shall be kept clear of obstruction.

(2) All apparatus other than portable and transportable apparatus shall be housed in a room, compartment or box so constructed as to protect the contents from damage occasioned by falling material or passing traffic.

(3) Inflammable or explosive material shall not be stored in any room, compartment or box containing apparatus, or in the vicinity of any apparatus.

(4) In case of a fault in any circuit, the part affected shall be made dead without delay and shall remain so until the fault has been remedied.

(5) While lamps are being changed the supply shall be disconnected.

(6) No lamp holder shall have metallic connection with the guard or other metal work of a portable hand lamp.

(7) The following notices in Hindi and local language of the district, so designed and protected as to be easily legible at all times, shall be exhibited at the following places, namely: –

(i) where electrical apparatus is in use, a notice forbidding undesignated persons to operate or otherwise interfere with such apparatus;

(ii) in the interior or at the surface of the mine where a telephone or other means of communication is provided, a notice giving full instructions to person, at the surface of the mine, designated to effect the disconnection of the supply of electricity to the mine.

(8) All apparatus, including portable and transportable apparatus, shall be operated only by those persons who are designated for the purpose.

(9) Where a plug-and-socket-coupling other than of bolted type is used with flexible cables, an electrical inter-lock or other approved device shall be provided to prevent the opening of the coupling while the conductors are live.

112. Precautions where gas exists. – (1) In any part of a coal-seam of the first degree gassiness, **–**

(i) all cables shall be constructed, installed, protected, operated and maintained in such a manner as to prevent risk of open sparking;

(ii) all signalling, telecommunication, remote control and insulation tester circuits shall be so constructed, installed, protected, operated and maintained as to be intrinsically safe;

(iii) all apparatus including portable and transportable apparatus including lighting fittings used at any place which lies in-bye of the last ventilation connection shall be flame-proof:

Provided that electrically operated or battery operated portable or transportable apparatus such as shuttle car, men or material transporting equipment of increased safety type "e" shall be permitted at any place with suitable monitoring devices for detection of gases, if any;

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(iv) all electric lamps at any place which lie in-bye of the last ventilation connection and return airways shall be in flame proof enclosure and at other places these shall be in increased safety enclosure type 'e'.

(2) At any place which lies in any part of a coal-seam of second and third degree gassiness, –

(i) all signalling, telecommunication, remote control and insulation tester circuits shall be so constructed, installed, protected, operated and maintained as to be intrinsically safe;

(ii) all cables shall be constructed, installed, protected, operated and maintained in such a manner as to prevent risk of open sparking;

(iii) all apparatus, including portable and transportable apparatus used at any place within ninety metre of any working face or goaf in case of a second degree gassy mine and within two hundred seventy metre of any working face or goaf in case of third degree gassy mine or at any place which lies in-bye of the last ventilation connection or in any return airways shall be flame-proof; and

(iv) all electric lamps shall be enclosed in flame-proof enclosures.

(3) In any oil mine or oil-field, at any place within the zone-2 hazardous areas, –

(i) all signalling and telecommunication, remote control and insulation tester circuits shall be so constructed, installed, operated, protected and maintained as to be intrinsically safe;

(ii) all cables shall be so constructed, installed, operated and maintained as to prevent risk of open sparking;

(iii) all apparatus including portable and transportable apparatus shall have the enclosures conforming to the relevant standards; and

(iv) all electric lamps shall be enclosed in increased safety enclosure type 'e'.

(4) In oil mine or oil-fields at any place within the zone-1 hazardous areas, –

(i) all signalling and telecommunication, remote control and insulation tester circuits shall be so constructed, installed, operated, protected and maintained as to be intrinsically safe;

(ii) all cables shall be so constructed, installed, operated and maintained as to prevent risk of open sparking;

(iii) all apparatus including portable and transportable apparatus shall have enclosures conforming to the relevant standards; and

(iv) all electric lamps shall be enclosed in flame-proof enclosures.

(5) In any oil mine at any place within zone-0 hazardous area, no electrical equipment shall be used and where it is not practicable, intrinsically safe apparatus are only to be used which shall be conforming to relevant standards and such installation of apparatus shall conform to relevant standards and the details of installation, certified by the owner or agent or manager or installation manager shall be submitted to the Electrical Inspector of mines.

(6) In any coal-seam of degree second and degree third gassiness or the hazardous area the supply shall be discontinued,-

(i) immediately, if open sparking occurs;

(ii) during the period required for examination or adjustment of the apparatus, which shall necessitate the exposing of any part liable to open sparking;

(iii) the supply shall not be reconnected until the apparatus has been examined by the electrical supervisor or one of his duly appointed assistants and until the defect, if any, has been remedied or the necessary adjustment made; and

(iv) a flame safety lamp shall be provided and maintained in a state of continuous illumination near an apparatus, including portable or transportable apparatus, which remains energised and where the appearance of the flame of such safety lamps indicates the presence of inflammable gas, the supply to all apparatus in the vicinity shall be immediately disconnected and the incident reported forthwith to an official of the mine and such apparatus shall be interlocked with the controlling switch in such a manner as to disconnect power supply automatically in the event of percentage of inflammable gas exceeding one and one quarter in that particular district:

Provided that where apparatus for automatic detection of the percentage of inflammable gas or vapor are employed in addition to the flame safety lamps, such apparatus shall be approved by the inspector of mines and maintained in perfect order.

(7) In any part of a coal-seam of any degree of gassiness or in any hazardous area of an oil-fields, if the presence of inflammable gas in the general body of air is found at any time to exceed one and one quarter per cent, the supply of energy shall be immediately disconnected from all cables and apparatus in the area and the supply shall not be reconnected so long as the percentage of inflammable gas remains in excess of one and one quarter per cent.

(8) In oil-fields where concentration of inflammable gas exceeds twenty percent of its lower explosive limit a system should be in place to activate an audio alarm at appropriate location. On activation of such alarm immediate action shall be taken to make operations safe and to isolate the cause in order to ensure safety of men, equipment, environment. In case the lower explosive limit rises to forty percent, the supply of electricity shall be cut-off immediately from all cables and apparatus lying within thirty metre of the installation and all sources of ignition shall also be removed from the said area and normal work shall not be resumed unless the area is made gas-free:

Provided that such disconnection shall not apply to intrinsically safe environment monitoring scientific instruments.

(9) Any such disconnection or reconnection of the supply shall be noted in the log sheet in hard copy and electronic form which shall be maintained in the form set out in Schedule XI and shall be reported to the Electrical Inspector of mines.

(10) The provisions of this regulation shall apply to any metalliferrous mine which may be notified by the inspector of mines if inflammable gas occurs or if the inspector of mines is of the opinion that inflammable gas is likely to occur in such mine.

Explanation. – For the purposes of this regulation, **–**

(1) The expression 'coal-seam of first degree gassiness', 'coal-seam of second degree gassiness', 'coal-seam of third degree gassiness' and 'flame-proof apparatus' shall have the meanings respectively assigned to them in the Coal Mines Regulations, 2017.

(2) The following areas in oil mine or oil-fields shall be known as hazardous areas, namely: –

(i) an area of not less than ninety metre around an oil-well where a blow-out has occurred or is likely to occur, as may be designated by the Installation Manager or the senior most official present at the site;

(ii) an area within sixteen metre of an open discharge of petroleum bearing fluid from a well under production test;

(iii) an area within fifteen metre of:

(a) a producing well-head or any point of open discharge of the crude there from or other point where emission of hazardous atmosphere is normally likely to arise; or

(b) any wildcat or exploration well-head being drilled in an area where abnormal pressure conditions are known to exist;

(iv) any area within three metre of:

(a) any producing well-head where a closed system of production is employed such as to prevent the emission or accumulation in the area in normal circumstances of a hazardous atmosphere; or

(b) exploration or interspaced well-head being drilled in an area where the pressure conditions are normal and where the system of drilling employed includes adequate measures for the prevention in normal circumstances of emission or accumulation within the area of a hazardous atmosphere;

(3) "hazardous atmosphere" means "an atmosphere containing any inflammable gases or vapours in a concentration capable of ignition".

(4) "Zone 0 hazardous area" means "an area in which hazardous atmosphere is continuously present".

(5) "Zone 1 hazardous area" means "an area in which hazardous atmosphere is likely to occur under normal operating conditions".

(6) "Zone 2 hazardous area" means "an area in which hazardous atmosphere is likely to occur under abnormal operating conditions".

113. Shot-firing. – (1) When shot-firing is in progress adequate precautions shall be taken to protect apparatus and conductors, other than those used for shot-firing, from injury.

(2) Current from lighting or power circuits shall not be used for firing shots.

(3) The construction of shot firing cables shall conform to relevant standards and adequate precautions shall be taken to prevent such cable touching other cables and apparatus.

114. Signalling. – Where electrical signalling is used, -

(i) adequate precautions shall be taken to prevent signal and telephone wires coming into contact with other cables and apparatus;

(ii) the voltage used in any one circuit shall not exceed 30 V;

(iii) contact-makers shall be so constructed as to prevent the accidental closing of the circuit; and

(iv) bare conductors, where used shall be installed in suitable insulators.

115. Haulage. – Haulage by electric locomotives on the overhead trolley-wire system, at voltage not exceeding 650 V and haulage by storage battery locomotives may be used with the prior permission in writing of the Electrical Inspector of mines, and subject to such conditions as he may impose in the interests of safety.

116. Earthing of neutral points. – Where the voltage of an alternating current system exceeds 30 V, the neutral or mid-point shall be earthed by connection to an earthing system in the manner specified in regulation 102:

Provided that when the system concerned is required for blasting and signalling purposes, the provisions of this regulation shall not apply:

Provided further, that in case of unearthed neutral system, it shall be equipped with a suitable ground protection system approved by the Electrical Inspector of Mines to ensure isolation of power supply to the faulty section in appropriate manner.

117. Supervision. – (1) One or more electrical supervisors shall be appointed in writing by the owner, agent or manager of a mine or by the agent or the owner, of one or more wells in an oil-field to supervise the installation and such number of supervisors shall be on duty as per guidelines issued by Directorate General of Mines Safety from time to time under intimation in writing to the Authority or as directed by the Electrical Inspector of mines.

(2) The electrical supervisor so appointed shall be the person holding a valid Electrical Supervisor's Certificate of Competency, covering mining installations issued by the Appropriate Government.

(3) Adequate number of electricians as per guidelines issued by Directorate General of Mines Safety from time to time under intimation in writing to the Authority and or as directed by the Electrical Inspector of mines shall be appointed in writing by owner, agent or manager of a mine or by the owner or Agent of oil-field for carrying out the duties.

(4) The Electrician shall be a person holding license under sub-regulation (1) of regulation 31.

(5) For small open cast mines and below ground mines receiving supply at voltage not more than 650 V and not having portable or transportable apparatus, electrical supervisor and electrician shall be appointed for more than one mine with the approval of the Electrical Inspector of Mines.

(6) Every person appointed to operate, supervise, examine or adjust any apparatus shall be competent to undertake the work which he is required to carry out as directed by the Engineer.

(7) The electrical supervisor shall be responsible for the proper performance of the following duties, by himself or by an electrician appointed under sub-regulation (1), –

(i) thorough examination of all apparatus, including the testing of earth conductors and metallic coverings for continuity, as often as may be necessary to prevent danger; and

(ii) examination and testing of all new apparatus, and of all apparatus, re-erected in the mine before it is put into service in a new position.

(8) In the absence of any electrical supervisor, the owner, agent or manager of the mine and oil-field shall appoint in writing a substitute electrical supervisor.

(9) The electrical supervisor or the substitute electrical supervisor appointed under sub-regulation (8) to replace him shall be personally responsible for the maintenance at the mine or oil-field, of a log-book made up of the daily log sheets prepared in the form set out in Schedule XI and the results of all tests carried out in accordance with the provisions of sub-regulation (7) shall be recorded in the log-sheets prepared in the form set out in Schedule XI.

118. Training of personnel engaged for operation and maintenance of electrical installations in mines and oil-fields. – (1) The persons engaged for operation and maintenance of electrical installations in mines are required to undergo the type of training meant for the particular mining installations of Coal or Oil or Metal, training

syllabus as issued by Directorate General of Mines Safety from time to time under intimation in writing to the Authority.

(2) The owner or manager or agent of the mine shall arrange for training of their personnel engaged in the operation and maintenance of electrical installations of mines in his own institute or any other institute recognized by the Central Government or State Government.

(3) The refresher training shall be imparted at a periodicity of intervals not more than two years. A register or in electronic form by the Owner or Manager or Agent of a mine or by the owner or agent, of one or more wells in an oil-fields of the mine shall be maintained wherein the names of the persons trained, due date of refresher training and the like shall be entered and the register maintained shall be produced before the Electrical Inspector of mines whenever required by him.

Chapter X

Additional safety requirements for renewable generating stations

119. Additional safety requirements for renewable generating stations. – The regulations under this chapter shall be applicable to renewable generating stations which shall be in addition to the regulations provided from chapter I to VII.

120. Safety requirements for biomass and waste to energy installations. – All biomass plants and waste to energy plants including Municipal solid waste or refuse derived fuel shall comply with the safety standards as mentioned in Regulations notified by the Authority under clause (e) of sub-section (2) of section 177 of the Act.

121. Safety requirements for solar installations. – (1) The following general safety requirement for solar installations shall be ensured, namely: –

(i) clear pathways of minimum seventy five centimetre in width with hand rails for roof access and emergency exit shall be provided for roof top system;

(ii) there shall be clear pathways, walkways between the rows or columns of solar panels which is necessary for cleaning and maintenance;

(iii) cables shall be laid in trenches for ground based photovoltaic installation;

(iv) ground mounted solar installations shall be protected by fencing or other means not less than 1.8 metre in height so as to prevent unauthorised entry;

(v) disconnection switches or circuit breakers provided in combiner boxes to disconnect the photovoltaic system from all other conductors of the system shall be located at a readily accessible location;

(vi) three phases on the alternating current side, and positive and negative conductor on the direct current side shall be marked and identified with different colours;

(vii) inverter unit for solar photovoltaics shall be installed in the periphery of the building and as near as the solar panel:

Provided that the direct current cable shall be ultraviolet protected or routed through ultraviolet protected pipe;

(viii) there shall be a manual disconnection switch to isolate the system from grid and shall be situated outside the alternating current combiner box; and

(ix) protection shall be deployed (for both input and output) on site for overload, surge current, surge voltage, short circuit, high temperature, over voltage, under voltage and over frequency, under frequency, reverse polarity and lightning.

(2) The following earthing requirements for solar installations shall be ensured, namely: –

(i) solar earthing shall be as per the relevant standard;

(ii) the frame of inverter cabinet shall be connected with the earthing bus bar through the earthing terminals using flexible braided copper wire;

(iii) all metal casing and shielding of the plant, each array structure of the photovoltaic yard, equipment, inverters and control systems shall be earthed through proper earthing;

(iv) earthing system shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chasis and photovoltaic module mounting structures in one long run and the earth strips shall be interconnected by proper welding and shall not be bolted;

(v) there shall be adequate number of interconnected earth pits provided in each location and minimum

required gap shall be provided in between earth pits as per relevant standard.

(3) The following protection, testing and interlocking requirement for solar installations shall be ensured; namely: –

(i) the solar photovoltaic power plant shall be provided with lightning and over voltage protection by deploying required number of lightning arresters as per the relevant standards;

(ii) every combiner box shall be provided with suitable surge protective device with arc extinguishing capability as per the relevant standards to avoid any risk of fire;

(iii) the input circuits of combiner box shall be provided with over current protection as per the relevant standards;

(iv) the output circuits of combiner box shall be provided with isolation protection;

(v) earth fault protection and insulation monitoring for photovoltaic arrays and inverters shall be provided;

(vi) all photovoltaic modules safety qualification shall comply with relevant standards.

(4) **Requirement to prevent fire for solar installations.** – A fire detection system and automatic fire suppression system shall comply with the relevant standards.

(5) Additional safety requirements for floating solar photovoltaic energy installations. – Photovoltaic modules and associated structure of floating solar power plant shall comply with the relevant standards for tests such as salt mist, ammonia corrosion, environmental stress cracking of High Density Poly Ethylene, stress cracking resistance of High Density Poly Ethylene and standard test method for tensile properties of plastics.

122. Safety requirements for wind energy installations. – (1) All wind energy generation systems including wind turbines, wind power plants onshore and offshore connected with the grid shall be as per relevant standards.

(2) Transformers for wind turbine applications shall be as per the relevant standards.

(3) Portable fire extinguishers shall also be kept at various locations in plants to take immediate action in case of fire.

(4) 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.

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Chapter XI

Additional safety requirements for electric vehicle charging station

123. **Additional safety requirements for electric vehicle charging station. –** The regulations under this chapter shall be applicable to electric vehicle charging stations which shall be in addition to the regulations provided from chapter I to VII.

124. General safety requirements for electric vehicle charging station. – (1) Electric vehicle charging stations shall be provided with separate protection against the overload of input supply and output supply as per relevant standards.

(2) Socket-outlet of supply of electric vehicle charging points shall be installed at least 800 millimetre above the finished ground level.

(3) A cord extension set or second supply lead shall not be used in addition to the supply lead for the connection of the electric vehicle to the charging point and shall not be used as a cord extension set.

(4) No adaptor shall be used to connect a vehicle connector to a vehicle inlet.

(5) The distance between the charging point and the connection on the electric vehicle shall not be more than five metre during charging.

(6) The portable socket outlets shall not be permitted for electric vehicle charging.

(7) The lightning protection system shall be provided for the electric vehicle charging stations as per relevant standards.

(8) The electric vehicle charging station shall be equipped with a protective device against the uncontrolled reverse power flow from electric vehicle to the charging point.

(9) One second after disconnecting the electric vehicle from the supply mains, the voltage between accessible conductive parts or any accessible conductive part and earth shall be less than or equal to 42.4 V_{peak} (30 V_{rms}), or 60 V DC, and the stored energy available shall be less than 20 J:

Provided that, if the voltage is greater than 42.4 V_{peak} (30 V_{rms}) or 60 V DC, or the energy is 20 J or

more, a warning label shall be attached in a conspicuous position on the charging stations.

(10) A vehicle connector used for direct current charging shall be locked on the vehicle inlet if the voltage is higher than 60 V DC and in case of charging system malfunction, a means for safe disconnection shall be provided.

(11) The electric vehicle charging point shall disconnect supply of electricity to prevent overvoltage at the battery, if the output voltage exceeds maximum voltage limit permissible for the vehicle.

(12) The electric vehicle charging points shall not energise the charging cable when the vehicle connector is in unlock position.

(13) The electric vehicle connector shall not unlock if the voltage between the vehicle connector and the earth is more than 60 V.

(14) Safety clearance between the oil or gas dispenser and electric vehicle charging point shall be as per the order issued by the Authority.

(15) Only four core cable shall be used for charging points which require three phase power supply.

(16) Underground cables shall not cross the underground oil tank or oil pipeline.

(17) 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 finished ground surface.

125. Earth protection system for the charging station. – (1) Each electric vehicle charging points shall be supplied individually by a dedicated sub-circuit protected by an overcurrent protective device complying with the relevant standards and the overcurrent protective device shall be part of a switchboard.

(2) Co-ordination of all protective devices in the charging stations shall be ensured.

(3) 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.

(4) The charging lead shall be fitted with an earth-connected metal shielding and the cable insulation shall be wear resistant and maintain flexibility over the operating temperature range.

(5) A protective earth conductor shall be provided to establish an equipotential connection between the earth terminal of the supply and the conductive parts of the vehicle which shall be as per the relevant standards.

126. **Requirement to prevent fire for electric vehicle charging station. –** (1) The enclosure of electric vehicle supply equipment shall be made of fire retardant material with self-extinguishing property and free from halogen.

(2) The fire detection, alarm and control system shall be provided as per relevant standards.

127. Testing of charging station. – The owner of the charging station shall ensure that the tests as specified in the manufacturer's instructions for the residual current devices and the charging station have been carried out.

128. Maintenance of records. – (1) The owner of the charging station shall keep records of design, construction and labelling to be compatible with a supply of standard voltage at a nominal frequency of 50 Hz of the charging station.

(2) The owner of the charging station shall keep records of the relevant test certificates as indicated in these regulations and as per the relevant standards.

(3) The owner of the charging station shall keep records of the results of every inspection, testing and periodic assessment and details of any issues observed during the assessment and any actions required to be taken in relation to those issues.

(4) The owner of the charging station shall retain a copy of all records, as specified in sub-regulation (1), (2) and (3) of above, either in hard form or in electronic form, for at least seven years and shall provide a copy of the records to the officials during the inspection.

Chapter XII

Additional safety requirements for high voltage direct current

129. Additional safety requirements for high voltage direct current. – The regulations under this chapter shall be applicable to high voltage direct current which shall be in addition to the regulations provided from chapter I to VII.

130. General safety requirements. – (1) A wire mesh shall be provided beneath the walk way; wherever constructed above the hanging valves in the valve hall.

(2) Cables used for sensitive measurements shall be laid in separate and completely screened or covered channels or galvanised steel pipes.

(3) A separate emergency source of illumination with automatic initiation shall be provided in every room or compartment of high voltage direct current station.

(4) No oil immersed apparatus shall be kept within the valve hall.

(5) All doors of compartments containing modules equipped with laser diodes and junction boxes of the fibre optic cables shall be locked and marked with laser warning symbols.

131. Fencing of filter banks. – (1) Alternating Current and Direct Current filter banks area shall be efficiently protected by fencing or other means, not less than 1.8 metre in height, so as to prevent access to the conductors and apparatus therein by any unauthorised person and the fencing of such area shall be effictively earthed.

(2) The gate of fencing and earth switch of the filter bank shall be interlocked such that the gate can be opened only after the disconnection and discharging of the filter bank completely.

(3) The air core smoothing reactor shall be fenced all around and the fence shall not fall in the Magnetic Clearance Contour of the smoothing reactor.

(4) Common neutral bus in Alternating Current filters shall be earthed at one point only.

132. Earthing requirements. – (1) Converter transformer shall be provided with separate perimeter earthing conductor.

(2) The line side neutral of the converter transformer bank shall be earthed at one point only.

(3) Every part of support structure circumference of the air cored reactor shall be earthed in a manner such that it is not forming closed loops.

(4) Radio Frequency Interference screen of valve hall shall be electrically connected and effectively earthed.

(5) Metallic sheet, prefabricated structure members and trusses housing high voltage direct current apparatus shall be electrically connected and effectively earthed.

(6) Insulating pads or sleeves shall be provided between the steel reinforcement components, in foundation beneath the smoothing reactor, wherever they are crossing each other.

Chapter XIII

Additional safety requirements for gas insulated substation

133. Additional safety requirements for gas insulated substation. – The regulations under this chapter shall be applicable to gas insulated substation which shall be in addition to the regulations provided from chapter I to VII.

134. General safety requirements. – (1) A separate emergency source of illumination with automatic initiation shall be provided in every room or campartment of gas insulated substation.

(2) Cable cover protection unit shall be provided between flanges of gas insulated substation and cable termination unit.

(3) Gas insulated substation installation of 220 kV and above voltage shall be provided with partial discharge monitoring system.

(4) SF_6 gas leakage rate from any single compartment of gas insulated substation to atmosphere and between compartments shall not exceed as stipulated in the relevant standards.

135. Earthing requirements. – (1) Enclosure of gas insulated substation bay shall be earthed for high frequency transient voltage as per original equipment manufacturer recommendations, apart from the regular earthing.

(2) Earthing of gas insulated substation installation shall be as per relevant standards.

(3) Travelling wave energy generated inside the gas insulated substation due to switching operations shall be diverted to the earth by providing effective earthing from bushing shroud to the earth.

Chapter XIV

Miscellaneous

136. Deviations. – (1) The Central Government or the State Government, as the case may be, by an order in writing, allow deviations in respect of matters referred in these regulations except regulation 32.

(2) The Electrical Inspector or the Electrical Inspector of mines may, by an order in writing, and reasons to be

recorded allow deviation in respect of matters referred in regulations 14 to 19, regulation 30, sub-regulations (2), (3) and (5) of regulation 37, sub-regulation (3) of regulation 38, clauses (i) to (iv) of regulation 39, clause (xii) of regulation 43, regulation 45, sub-regulation (2) of regulation 46, regulations 48, regulations 54 to 56, regulations 59 to 63, regulation 67, regulation 74, regulation 77, regulations 81 to 94, regulation 104, sub-regulations (6), (8) and (10) of regulation 109, regulation 116 and regulations 119 to 135 on case to case basis.

Explanation. – Every order allowing the deviations by the Electrical Inspector or the Electrical Inspector of Mines under sub-regulation (2) shall be placed before the Central or State Government which shall have the final decision.

Schedule I

Handling of electric supply lines and apparatus

[See sub-regulation (3) of regulation (21)]

Part-I

Precautions to be observed: -

(1) Hotline maintenance trained personnel only shall be designated to do work on line.

(2) Work permit shall be taken from the terminal substations at each end of the line.

(3) Work shall be performed with proper planning and prior understanding and clarity.

(4) Favourable climatic condition for hotline operations is sunny weather. If the weather forecasts rain or thunderstorms work will not begin.

(5) Organisation of work shall be discussed among the members and responsibility of each team member fixed.

(6) Before going to the work site, all equipment and tools shall be inspected and checked for correct operation.

(7) Auto re-closure shall be in `OFF' position for the line at both ends.

(8) The work procedure shall be discussed with the team member at the tower location and the responsibility of each member shall be properly defined.

(9) The land in close vicinity to the tower/poles shall be cleared to provide a site area for the required tools.

(10) All cleaned hot sticks, strain carrier and other assemblies shall be kept on the hotline tool rack to avoid ground contact.

(11) Helmet, safety shoes and safety belt shall compulsorily be used.

(12) All hot sticks and ladders shall be cleaned and checked for integrity by the hot sticks tester.

(13) All linemen in the hotline team shall be equipped with personal protective equipment during the work.

(14) No live-line team members on the tower and conductor shall wear any metallic chain, wristwatch or ring to avoid any circulating current.

(15) The team of linemen shall wear conductive socks, boots, helmets and hand gloves. The `hot-end' lineman shall wear complete bare hand suit.

(16) Tarpaulin sheet should be laid on the work area.

(17) A light vehicle shall be kept nearby during entire work period.

Tools normally required for hot line maintenance operation: -

The following tools conforming to the relevant standards or equivalent specifications shall be used in on-line working:

(1) Wire tongs;

(2) Wire tongs saddle;

(3) Tie sticks;

(4) Strain link sticks;

(5) Roller link sticks;

(6) Suspension link sticks;

(7) Auxiliary arms;

(8) Strain carrier;

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(9) Gin poles;

(10) Cum-a-along clamp;

(11) Safety equipment like conductor guards, X-arm guards, insulator covers, hand gloves and the like; and

(12) Hot sticks.

Safe Working Distance: -

The following safe working distances shall be observed for hot line maintenance operations:

Phase to Phase	Safe Clearance
kV	Metre
11	0.61
33	0.71
66	0.91
110	1.02
132	1.07
220	1.52
400	2.13

Handling electric supply lines and apparatus for carrying out shutdown work or testing

[See sub-regulation (3) of regulation (21)]

Part-II

Precautions to be observed: -

(1) Before commencement of any shutdown work or testing in an electric supply line or apparatus, the Engineer or Supervisor in-charge of the work or testing shall identify the possible hazards, such as; electrocution, flash over, fall of person from height, fall of objects from height, failure of tools and plants, fire, and the like, that may be encountered while carrying out the work or testing near charged area and take necessary precaution to protect the working personnel.

(2) The Engineer or Supervisor in-charge of the work shall, before commencement of any work, brief the entire working group or gang regarding the hazards that may be encountered and the necessary precautions to be taken by them.

(3) The Engineer or Supervisor in-charge of the work shall obtain proper permit-to-work from the concerned Operation In-charge(s) and ensure that the electric supply line or apparatus or section is isolated from all sources of energy, de-energised and earthed.

(4) The Engineer or Supervisor in-charge of the work shall ensure that adequate and appropriate local earths are fixed at the zone of working, and the earthing rods remain connected to the isolated section of the electric supply line or apparatus or section till all men and materials have been moved away to safe zone and permit to work is returned on completion of the work.

(5) If the local earths are required to be removed for any testing purpose, the same shall be done only when all the working personnel are in the safe zone, on the ground or on the tower, and in the presence of the Engineer or Supervisor. If the working personnel are required to go up or approach the conductor(s) subsequently for any work, such as removal of test leads, tightening or adjustment, they shall be permitted to proceed only after re-fixing the local earths, as required.

(6) The Engineer or Supervisor in-charge of the work shall positively confirm by suitable means that the electric supply line or apparatus or section is totally dead before giving clearance for the working personnel to approach the same.

(7) The Engineer or Supervisor in-charge of the work shall, while carrying out the shutdown work or testing, ensure that working personnel are maintaining safe distance from the adjacent charged electric supply line or apparatus or section, and also, no objects, such as tools and plants, ladders, cranes, man-lifts, and the like, are moved, so as to infringe the safe distance, endangering the working personnel.

(8) Mobile cranes, derricks, man lifts and wheel mounted ladders shall be effectively earthed when being moved or

operated in close proximity with energised apparatus or section.

(9) Portable ladders and poles shall be carried only in the horizontal position when being moved in close proximity with energised lines or equipment or area.

Further Precautions to be observed: -

(1) Adequate and effective supervision shall be ensured by the owner as well as the contractor for all activities while working or testing on electric supply lines and apparatus when any shutdown work or testing is done near charged electric supply line or apparatus or section.

(2) Lone worker shall never be allowed to work on electric supply lines, equipment and apparatus or while testing.

(3) Sufficient supervisory personnel shall be deployed for close monitoring while various type of works are under progress at the same or different locations. Supervising work shall never be delegated to the sub-contractors' personnel.

(4) The deployed Supervising Personnel shall not leave the working spot when shutdown work at height or testing is in the progress, as the working personnel may not be aware of the consequences of unsafe practices. No other work, which requires them to move out of the location, shall be undertaken by Supervising personnel, when shutdown work or testing is in the progress.

(5) Wherever shutdown activities are required to be carried out for more than one day on any electric supply lines, apparatus or section, earthing provided at the said work site shall be inspected by the Engineer or Supervisor everyday morning for their healthiness, fitness and proper tightening, before giving clearance for the working personnel to climb the tower or structure to resume the work.

Handling high voltage direct current apparatus for carrying out shutdown work or testing

[See sub-regulation (3) of regulation (21)]

Part-III

Precautions to be observed: -

(1) The Engineer or Supervisor in-charge of the work shall obtain proper Permit-To-Work (PTW) from the concerned Operation In-charge(s) and ensure that the electric supply line or apparatus or section is isolated from all sources of energy, de-energised and earthed.

(2) Before commencement of any shutdown work or testing of high voltage direct current apparatus, the Engineer or Supervisor in-charge of the work or testing shall identify the possible hazards, such as; electrocution, flash over, fall of person from height, fall of objects from height, failure of tools and plants, fire, and the like, that may be encountered while carrying out the work or testing near charged area and take necessary precaution to protect the working personnel.

(3) The Engineer or Supervisor in-charge of the work shall, before commencement of any work, brief the entire working group or gang of the hazards that may be encountered and the necessary precautions to be taken by them.

(4) Attach warning labels to all neighboring installation parts (to be removed after the works have been carried out).

(5) The Engineer or Supervisor in-charge of the work shall allow access to the valve hall, DC Filter Area, AC Filter Area and DC hall (if any) only when the apparatus therein are completely de-energised and effectively earthed.

(6) The work on AC/DC filter bank shall only begin after earthing the entire capacitor bank.

(7) There shall be at least ten minute time gap between earthing the entire capacitor bank and starting the work on bank. There after unit must be short circuited.

(8) The de-energised bushing shall be checked for stored charge by touching all the surfaces of both indoor and outdoor side composite insulators and all other parts of the bushing using a proper test instrument.

(9) The gas pressure inside high voltage direct current through wall bushing shall be reduced to a level prescribed by the manufacturer before starting any work or handling of the bushing.

Handling Gas Insulated Switchgear (GIS) apparatus for carrying out shutdown work or testing

[See sub-regulation (3) of regulation (21)]

Part-IV

Precautions to be observed: -

(1) The Engineer or Supervisor in-charge of the work shall obtain proper Permit-To-Work from the concerned Operation In-charge(s) and ensure that the electric supply line or apparatus or section is isolated from all sources of energy, de-energised and earthed.

(2) Operation, maintenance and repair must be carried out by trained and certified personnel only.

(3) Before commencement of any shutdown work or testing of gas insulated switchgear apparatus, the Engineer or Supervisor in-charge of the work or testing shall identify the possible hazards, such as; electrocution, flash over, fall of person from height, fall of objects from height, failure of Tools and Plants, fire, and the like, that may be encountered while carrying out the work or testing near charged area and take necessary precaution to protect the working personnel.

(4) The Engineer or Supervisor in-charge of the work shall, before commencement of any work, brief the entire working group or gang of the hazards that may be encountered and the necessary precautions to be taken by them.

(5) Wear hearing protection during operation.

(6) Take care while touching the enclosure at any time as enclosures may heat up to the temperature of 70°C.

(7) Observe the procedures for storage, transportation, and the use of filling equipment.

(8) Wear the personal protective equipment: respirator mask (self-contained breathing equipment if necessary), protective overall, protective gloves, safety shoes, safety glasses.

(9) Attach warning labels to all neighboring installation parts (to be removed after the works have been carried out).

(10) Provide proper electrical clearance as required by interlocking rules. Mark e.g. main circuits and control circuits with appropriate tags.

(11) Block off neighboring live parts with screens, insulating mats or spacer grids in order to prevent unintended contacts.

(12) While working on any compartment in gas insulated switchgear, the immediate adjacent compartment(s) must be also depressurised for safety of the working person.

(13) SF_6 gas becomes contaminated and contains poisonous substances after events such as arc faults. Hence, handling of SF_6 in such cases must be done using proper PPEs and by a trained personnel, preferably from the original equipment manufacturer.

(14) The switchgear installation shall not be operated if the density of SF_6 gas indicated at the density monitors is not in the operating range.

(15) Do not remove any protective covers if an assembly is energized.

(16) The Engineer or Supervisor in-charge of the work shall ensure that adequate and appropriate local earths are fixed at the zone of working, and the earthing rods remain connected to the isolated section of the electric supply line or apparatus or section till all men and materials have been moved away to safe zone and Permit-To-Work is returned on completion of the work.

Schedule II

Forms of Inspection Report

[See regulation (32) and (45)]

FORM I

(Installations of voltage up to and including 250V)

Report _____

Date of inspection by Electrical Inspector or self-certification by supplier/owner/consumer _____

Date of last inspection or self-certification _____

1. Consumer No. _____

2. Voltage and system of supply:

(i) Volts _____(ii) No. of Phases _____ (iii) AC/DC _____

3. Type of wiring* _____

**State type of wiring whether casing capping, lead covered of teak wood batten, concealed conduit, Tough Rubber Sheathed and any other type.*

4. Name of the consumer or owner _____

5. Address of the consumer or owner _____

6. Location of the premises _____

7. Particulars of the installations:

			Number	Connected Load in kW
(a)	(i)	Light Points	_____	_____
	(ii)	Fan Points	_____	_____
	(iii)	Plug Points	_____	_____

(b) Other equipment (complete details to be furnished):

(i) _____

(ii) _____

Total connected load in kW _____

Maximum current demand in Amps _____

(on the basis of total connected load)

(c) Generators: (complete detail to be enclosed)

Make	S. No.	kVA rating	Voltage rating	Type
(i)				
(ii)				

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8. General conditions of the installation:

Sl. No.	Regulation No.	Requirements	Report
1.	Regulation 14	(i) Is/Are there any visible sign(s) of overloading in respect of any apparatus wiring?	Yes/No
		(ii) Condition of flexible cords, sockets, switches, plug-pins, cut-outs and lamp holders and such other fittings.	Satisfactory/ Not Satisfactory
		(iii) General condition of wiring.	Satisfactory/ Not Satisfactory
		(iv) Whether any unauthorised temporary installation exist?	Yes/No
		(v) State if sockets are controlled by individual switches.	Yes/No
		(vi) Any other defect or condition which may be a source of danger. If yes, give details.	Yes/No
2.	Regulation 15	Give report on condition of service lines, cables, wires, apparatus and such other fittings placed by the supplier or owner of the premises. If not satisfactory, give details.	Satisfactory/ Not Satisfactory
3. 1	Regulation 16	Whether suitable cut-outs provided by the supplier at the consumer's premises are within enclosed fire proof receptacle?	Yes/No
4. 1	Regulation 17	(i) State if switches are provided on live conductors.	Yes/No
		(ii) State if indication of a permanent nature is provided as per regulation so as to distinguish earthed or earthed	Yes/No

		neutral conductor from the live conductor.	
		(iii) Whether a direct line is provided on the neutral in the case of single-phase double pole iron clad switches instead of fuse?	Yes/No
5.	Regulation 18	(i) State if earthed terminal is provided by the supplier.	Yes/No
		(ii) Have three pin plugs been provided for plug points?	Yes/No
		(iii) General visible condition of the earthing arrangement.	Satisfactory/ Not Satisfactory
6.	Regulation 19	Are the live parts in building inaccessible?	Yes/No
7.	Regulation 36	State insulation resistance between conductors and earth in Mega Ohms.	-------- Mega Ohms
8.	Regulation 37	(i) State if linked switches of requisite capacity are provided near the point of commencement of supply.	Yes/No
		(ii) State if the wiring is divided in suitable number of circuits and each such circuit is protected by suitable cut-out.	Yes/No
		(iii) State if supply to each motor or apparatus is controlled by suitable linked switch.	Yes/No
9.	Regulation 43	(i) Have the frames of every generator, stationary motor and so far as practicable portable motor and the metallic parts (not intended as conductors) of all other apparatus used for regulating* or controlling electricity been earthed by two separate and distinct connections with earth?	Yes/No
		(ii) Is the earth wire free from mechanical damage?	Yes/No
		(iii) In the case of conduit, or lead covered wiring, has the conduit or lead-cover been efficiently earthed?	Yes/No
		(iv) If the consumer has his own earth-electrode, state if it is properly executed and has been tested. If yes, give value of earth resistance	------- Ohms
10.	Regulation 44	Whether residual current device of appropriate capacity as defined in Regulation have been provided?	Yes/No
11.	Overhead Lines	(i) State if the consumer has any overhead lines.	Yes/No
		(ii) Does the overhead line near the premises of consumer meets the requirement of regulation 60, 61 and 62? If not, give details.	Yes/No
		(iii) Is guarding provided for overhead lines as per Regulation 76?	Yes/No
		(iv) Any other remarks.	

Date:

Signature of the supplier/ Owner / Consumer

Name _____

Designation _____

File No. _____

To: Office of Electrical Inspector for ……...

***** Not applicable to isolated wall tubes or to brackets, electroliers, switches, ceiling fans and such other fittings (other than portable hand lamps and transportable apparatus) unless provided with earth terminal.

FORM II

[See Regulation (32) and (45)]

(Installations of voltage level more than 250 V up to and including 650 V)

Report / Application No. _____

Date of inspection by Electrical Inspector or self-certification by supplier/owner/consumer _____

Date of last inspection or self-certification _____

1. Consumer No. _____
2. Voltage and system of supply:
   (ii) Volts _____(ii) No. of Phases _____ (iii) AC/DC _____
3. Name of the consumer or owner _____
4. Address of the consumer or owner _____
5. Location of the premises _____
6. Particulars of the installations:
   (a) Motors:

Make	S. No.	kW/MW rating	Voltage rating	Type
(i)				
(ii)				

   (b) Other equipment (complete details to be furnished):
   (i) _____
   (ii) _____
   (c) Total connected load kW / kVA _____
   (d) Generators: (complete detail to be enclosed)

Make	S. No.	kVA rating	Voltage rating	Type
(iii)				
(iv)				

7. General condition of the installation:

Sl.No.	Regulation No.	Requirements	Report
1.	Regulation 3	Is the record of the designated persons properly made and kept up to date and duly attested?	Yes/No
2.	Regulation 14	(i) Is/Are there any visible sign(s) of overloading in respect of any apparatus wiring?	Yes/No
		(ii) Whether any unauthorised temporary installation exist?	Yes/No
		(iii) Are the electric supply lines and apparatus so installed, protected, worked and maintained as to prevent danger?	Yes/No
		(iv) Any other general remarks.	
3.	Regulation 15	Give report on condition of service lines, cables, wires, apparatus and such other fittings placed by the supplier or owner of the premises. If not satisfactory, give details.	Satisfactory/ Not Satisfactory
4.	Regulation 16	Whether suitable cut-outs/CBs provided by the supplier at the consumer's premises are within enclosed fire proof receptacle?	Yes/No
5.	Regulation 17	(i) Whether switches are provided on live conductors?	Yes/No
		(ii) Whether indication of a permanent nature is provided as per regulation so as to distinguish earthed or earthed neutral conductor from the live conductor as per IS color	Yes/No

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		code?	
		(iii) Whether a direct line is provided on the neutral in the case of single-phase double pole iron clad switches/Isolators/CBs instead of fuse?	Yes/No
6.	Regulation 18	(i) Whether earthed terminal is provided by the supplier?	Yes/No
		(ii) General visible condition of the earthing arrangement.	Satisfactory/ Not Satisfactory
7.	Regulation 19	(i) Are bare conductors in building inaccessible?	Yes/No
		(ii) Whether readily accessible switches have been provided for rendering them dead?	Yes/No
8.	Regulation 20	Whether "Danger Notice" in Hindi and the local language of the district and of a design as per the relevant standards is affixed permanently in conspicuous position?	Yes/No
9.	Regulation 21	(i) Whether insulating floor or mats have been provided?	Yes/No
		(ii) Whether identification of panel has been provided on the front and the rear of the panel?	Yes/No
10.	Regulation 23	Whether flexible cables used for portable or transportable equipment covered under the regulation, are heavily insulated and adequately protected from mechanical injury?	Yes/No
11.	Regulation 24	State the condition of metallic coverings provided for various conductors.	Satisfactory/ Not Satisfactory
12.	Regulation 26	Whether the circuits or apparatus intended for operating at different voltage(s) are distinguishable by means of indication(s) of permanent nature?	Yes/No
13.	Regulation 28	Whether all circuits and apparatus are so arranged that there is no danger of any part(s) becoming accidentally charged to any voltage beyond the limits of voltage for which it/they is/are intended?	Yes/No
14.	Regulation 29	(i) In the case of generating stations, whether fire-buckets filled with clean dry sand have been conspicuously marked and kept in convenient location in addition to fire-extinguishers suitable for dealing with fires ?	Yes/No
		(ii) Whether First Aid Boxes or cupboards conspicuously marked and properly equipped are provided and maintained?	Yes/No
		(iii) Is adequate staff trained in First Aid Treatment and firefighting?	Yes/No
15.	Regulation 30	(i) Whether instructions in English or Hindi and the local language of the district and where Hindi is the local language, in English and Hindi, for the resuscitation of persons suffering from electric shock have been affixed in a "conspicuous place"?	Yes/No
		(ii) Are the persons specified under this Regulation able to apply instructions for resuscitation of persons suffering from electric shock?	Yes/No
16.	Regulation 36	State insulation resistance between conductors and earth in Mega Ohms.	----- Mega Ohms
17.	Regulation 37	(i) Whether a suitable linked switch, or circuit breaker is placed near the point of commencement of supply so as to be readily accessible and capable of being easily operated	Yes/No

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		to completely isolate the supply?	
		(ii) Whether every distinct circuit is protected against excess electricity by means of a suitable circuit breaker or cut-out ?	Yes/No
		(iii) Whether suitable linked switch or circuit breaker is provided near each motor or apparatus for controlling supply to the motor or apparatus?	Yes/No
		(iv) Whether adequate precautions are taken to ensure that no live parts are so exposed as to cause danger?	Yes/No
18.	Regulation 39	(i) Whether clear space of 100 cm is provided in front of the main switchboard?	Yes/No
		(ii) Whether the space behind the switchboard exceeds 75 cm in width or is less than 20 cm?	Yes/No
		(iii) In case the clear space behind the switchboard exceeds 75 cm, state whether a passage way from either end of the switchboard to a height of 1.80 metre is provided.	Yes/No
19.	Regulation 43	(i) Have the frame of every generator, stationary motor and so far as practicable, portable motor and the metallic parts (not intended as conductors) of all transformers and any other apparatus used for regulating or controlling electricity and all apparatus consuming electricity at voltage exceeding 250 V but not exceeding 650 V been earthed by two separate and distinct connections with earth?	Yes/No
		(ii) Have the metal casings or metallic coverings containing or protecting any electric supply line or apparatus been properly earthed and so joined and connected across all junction boxes as to make good mechanical and electrical connection?	Yes/No
		(iii) Whether the consumer's earth-electrode is properly executed and has been tested. If yes, give value of earth resistance?	Yes/No _____Ohm
		(iv) Is the earth wire free from any mechanical damage?	Yes/No
		(v) Whether record of earth resistance value maintained?	Yes/No
		(vi) Is the protective equipotential bonding tested?	Yes/No
		(vii) Is the fault loop impedance at origin of installation tested?	Yes/No
		(viii) Is the fault loop impedance of each circuit tested?	Yes/No
		(ix) Is the fault loop impedance tested for all sources?	Yes/No
20.	Regulation 44	Whether Residual Current Device of Appropriate capacity as defined in Regulation have been provided?	Yes/No
21.	Regulation 47	Have the protections and interlocks for the generating units been provided. Details of the protections shall be given.	Yes/No
22.	Overhead Lines	(i) State if the consumer has any overhead lines.	Yes/No
		(ii) Does the overhead line near the premises of consumer meets the requirement of regulations 60, 61 and 62? If not, give details.	Yes/No
		(iii) Is guarding provided for overhead lines as per regulation 76?	Yes/No
		(iv) Any other remarks.	Yes/No

Date:

Signature of the supplier/ Owner / Consumer

Name _____

Designation _____

File No. _____

To: Office of Electrical Inspector for ……...

FORM III

(See Regulation 32 and 45)

(Installations of voltage exceeding 650 V)

Report / Application No. _____

Date of inspection by Electrical Inspector or self-certification by supplier/owner/consumer _____

Date of last inspection or self-certification _____

1. Consumer No. _____
2. Voltage and system of supply:

   (iii) Volts _____(ii) No. of Phases _____ (iii) AC/DC _____
3. Name of the consumer or owner _____
4. Address of the consumer or owner _____
5. Location of the premises _____
6. Particulars of the installations:

   (a) Transformers: (complete detail to be enclosed)

Make	S. No.	kVA/MVA rating	Voltage rating	Type
(i)				
(ii)				

   (b) Generators: (complete detail to be enclosed)

Make	S. No.	kVA/MVA rating	Voltage rating	Type
(v)				
(vi)				

   (c) List of Motors with rating, protection, overload setting, size of earth conductor used to be furnished

Make	S. No.	kW/MW rating	Voltage rating	Type
(iii)				
(iv)				

   (d) List of equipment with complete details of HT /LT switchgears/ apparatus with their rating to be furnished):

   (iii) _____

   (iv) _____

   (e) Total connected load kW / kVA _____

   Complete list of connected loads to be furnished.

7. General condition of the installation:

Sl. No.	Regulation No.	Requirements	Report

1.	Regulation 3	Is the record of the designated persons properly made and kept up to date and duly attested?	Yes/No
2.	Regulation 5	Whether Electrical Safety Officer as required under the Regulation is designated?	Yes/No
	Regulation 14	(i) Is/Are there any visible sign(s) of overloading in respect of any apparatus?	Yes/No
		(ii) Whether any unauthorised temporary installation exist?	Yes/No
		(iii) Whether the motors and controlling equipment are being overhauled periodically and record kept of the same in a register?	Yes/No
		(iv) Whether the transformer oil samples are being tested periodically and results recorded in a register? State value of dielectric strength of oil.	Yes/No ---- kV/mm
		(v) Whether suitable lightning arresters have been provided near the transformers for protection against lightning?	Yes/No
		(vi) Whether earth resistance is being measured periodically once a year and results recorded in a register? Copy of record to be enclosed.	Yes/No
		(vii) Any other defect or condition which may be a source of danger. If yes, please explain?	Yes/No
		(viii) Whether operation and maintenance data has been clarified, categorised and computerised for prompt and easy retrieval?	Yes/No
		(ix) Whether residual life assessment and life extension programmes are being undertaken for installations or equipment of voltage exceeding 650 V (applicable for installations or equipment more than 15 years old)?	Yes/No
		(x) Whether all required type and routine tests at factory done for equipment? Deficiencies and discrepancies in above test report and results, if any, shall be reported.	Yes/No
		(xi) Are there deficiencies in construction with reference to Indian Standard requirements? Please specify.	Yes/No
4.	Regulation 15	Give report on condition of service lines, cables, wires, apparatus and such other fittings placed by the supplier or owner of the premises. If not satisfactory, give details.	Satisfactory/ Not Satisfactory
5.	Regulation 16	Whether suitable cut-outs/CBs provided by the supplier at the consumer's premises are within enclosed fire proof receptacle?	Yes/No
6.	Regulation 17	(i) Whether switches are provided on live conductors?	Yes/No
		(ii) Whether indication of a permanent nature is provided as per Regulation so as to distinguish earthed or earthed neutral conductor from the live conductor?	Yes/No
		(iii) Whether a direct line is provided on the neutral in the case of single-phase double pole iron clad switches/CBs instead of fuse?	Yes/No
7.	Regulation 18	(i) Whether earthed terminal is provided by the supplier?	Yes/No
		(ii) General visible condition of the earthing arrangement.	Satisfactory/ Not Satisfactory

8.	Regulation 19	(i) Are live parts in building inaccessible?	Yes/No
		(ii) Whether readily accessible switches have been provided for rendering them dead?	Yes/No
9.	Regulation 20	Whether "Danger Notice" in Hindi and the local language of the district and of a design as per the relevant standards is affixed permanently in conspicuous position?	Yes/No
10.	Regulation 21	(i) Whether the practice of working on live lines and apparatus is adopted? If so, have the safety measure been adopted as per Schedule I?	Yes/No
		(ii) Whether insulating floor or mats conforming to the relevant standards have been provided?	Yes/No
		(iii) Whether identification of panel has been provided on the front and the rear of the panel?	Yes/No
11.	Regulation 23	Whether flexible cables used for portable or transportable equipment covered under the Regulation, are heavily insulated and adequately protected from mechanical injury?	Yes/No
12.	Regulation 24	State the condition of metallic coverings provided for various conductors.	Satisfactory/ Not Satisfactory
13.	Regulation 26	Whether the circuits or apparatus intended for operating at different voltage(s) are distinguishable by means of indication(s) of permanent nature?	Yes/No
14.	Regulation 28	Whether all circuits and apparatus are so arranged that there is no danger of any part(s) becoming accidentally charged to any voltage beyond the limits of voltage for which it/they is/are intended?	Yes/No
15.	Regulation 29	(i) In the case of generating stations and enclosed sub stations, whether fire-buckets filled with clean dry sand have been conspicuously marked and kept in convenient location in addition to fire-extinguishers suitable for dealing with electric fires?	Yes/No
		(ii) Whether First Aid Boxes or cupboards conspicuously marked and properly equipped are provided and maintained?	Yes/No
		(iii) Is adequate staff trained in First Aid Treatment and firefighting?	Yes/No
16.	Regulation 30	(i) Whether instructions in English or Hindi and the local language of the district and where Hindi is the local language, in English and Hindi, for the resuscitation of persons suffering from electric shock have been affixed in a "conspicuous place"?	Yes/No
		(ii) Are the persons mentioned in this regulation able to apply instructions for resuscitation of persons suffering from electric shock?	Yes/No
17.	Regulation 36	State insulation resistance between conductors and earth in Mega Ohms.	----- Mega Ohms
18.	Regulation 37	(i) Whether a suitable linked switch, or a circuit breaker, or an emergency tripping device is placed near the point of commencement of supply so as to be readily accessible and capable of being easily operated to completely isolate the supply?	Yes/No
		(ii) Whether suitable linked switch or a circuit breaker to carry and break the full load current is provided on the	Yes/No

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		secondary side of a transformer?	
		(iii) Whether every distinct circuit is protected against excess electricity by means of a suitable circuit breaker or cut-out?	Yes/No
		(iv) Whether linked switch or circuit breaker or emergency tripping device is provided near the motor or other apparatus at voltage exceeding 650 V but not exceeding 33kV for controlling supply to the motor or apparatus?	Yes/No
		(v) Whether adequate precautions are taken to ensure that no live parts are so exposed as to cause danger?	Yes/No
19.	Regulation 39	(i) Whether clear space of 100 cm is provided in front of the main switchboard?	Yes/No
		(ii) Whether the space behind the switchboard exceeds 75 cm in width or is less than 20 cm?	Yes/No
		(iii) In case the clear space behind the switchboard exceeds 75 cm, state whether a passage way from either end of the switchboard to a height of 1.80 metre is provided.	Yes/No
20.	Regulation 46	(i) Whether all conductors and apparatus including live parts thereof are inaccessible	Yes/No
		(ii) Whether all windings of motors or other apparatus are suitably protected?	Yes/No
		(iii) Whether the separation wall or fire wall between apparatuses or consumer premises, in a substation or a switching station with apparatus having more than 2000 litres of oil are installed, have been provided as required under the regulation?	Yes/No
		(iv) Where 9000 litre or more of oil is used in any one oil tank, has provision been made for draining away or removal of oil which may leak or escape from such tank(s)?	Yes/No
		(v) Whether suitable firefighting system as per the regulation has been provided?	Yes/No
		(vi) Whether trenches inside substation containing cables are filled with non-inflammable material or completely covered with non-inflammable slabs?	Yes/No
		(vii) Are conductors and apparatus so arranged that they may be made dead in sections for carrying out work thereon?	Yes/No
21.	Regulation 47	Whether protections and interlocks have been provided? Give the details of the protection schemes and their settings.	Yes/No
22.	Regulation 50	(i) Have all non-current carrying metal parts associated with the installation been effectively earthed with the earthing system or mat by two separate and distinct connections?	Yes/No
		(ii) Is the earth wire free from any mechanical damage?	Yes/No
		(iii) Has the neutral point at the transformer and generator been earthed by two separate and distinct connections with earth?	Yes/No
		(iv) Have the metal casings or metallic coverings containing or protecting any electric supply line or apparatus been properly earthed and so joined and connected across all junction boxes as to make good mechanical and	Yes/No

		electrical connections throughout their whole length?	
		(v) Whether earthing has been properly executed and has been tested. If yes, give value of earth resistance.	Yes/No ___Ohm
23.	Regulation 51	(i) Is the outdoor (except pole type) substation efficiently protected by fencing not less than 1.8 metre in height?	Yes/No
		(ii) Whether the mounting of a transformer on a single pole or H pole is done as per relevant standard.	Yes/No
24	Regulation 52	(i) Where platform type construction is used for pole type substation, has sufficient space for a man to stand on the platform been provided?	Yes/No
		(ii) Has hand-rail been provided and connected with earth (if metallic and if substation has not been erected on wooden supports and wooden platform)?	Yes/No
25.	Regulation 53	Has suitable provision been made for immediate and automatic or manual discharge of every static condenser on disconnection of supply?	Yes/No
26	Overhead Lines	(i) What is the minimum size of the conductors of overhead lines used? State the type of conductors. (Regulation 57)	Minimum size of Conductor ---
		(ii) Whether clearances above ground of the lowest conductor of overhead lines are as per regulation 60? State clearance.	Yes/No --- metre
		(iii) On the basis of maximum sag, whether vertical clearances where the line of voltage exceeding 650 V passes above or adjacent to any building or part of a building as per regulation 63? State clearance.	Yes/No --- metre
		(iv) On the basis of maximum deflection due to wind pressure, whether horizontal clearances between the nearest conductor and any part of such building are as per regulation 63? State clearance.	Yes/No --- metre
		(v) Where conductors forming parts of system at different voltages are erected on the same supports, whether adequate provision has been made as per regulation 64 to guard against danger to linemen and others from the lower voltage system being charged above its normal working voltage by leakage from or contact with the higher voltage system?	Yes/No
		(vi) Where overhead lines cross or are in proximity to each other whether they have been suitably protected to guard against possibility of their coming in contact with each other as per regulation 71?	Yes/No
		(vii) Has every guard wire been properly earthed as per regulation 72 at each point at which its electrical continuity is broken?	Yes/No
		(viii) (a) Whether metal supports of overhead lines and metallic fittings attached thereto are permanently earthed as per regulation 74? (b) Has each stay-wire (except in case where an insulator has been placed in it at a height not less than 3 metre from the ground) been earthed as per regulation 74?	Yes/No Yes/No
		(ix) (a) Whether overhead line is suitably protected with a device for rendering the line electrically harmless in case	Yes/No

		it breaks as per regulation 76? (b) Whether anti-climbing devices have been provided at each support as per regulation 75?	Yes/No
		(x) (a) Has the owner of overhead lines adopted efficient means for diverting to earth any electrical surges due to lightning in every overhead line which is so exposed as to be liable to injury from lightning as per regulation 77? (b) Whether earth lead from the lightning arresters is connected to a separate earth electrode as per regulation 77?	Yes/No Yes/No
		(xi) Whether unused overhead lines are maintained in a safe mechanical condition as per regulation 78?	Yes/No
		(xii) Whether statutory clearances from Authorities i.e. Forest Department/Railways/PTCC/Defence (AHQ) /Civil Aviation have been taken as per the relevant standards. If yes, enclose copies of the same.	Yes/No
		(xiii) Any other remarks.	Yes/No

In addition to above, following electrical equipment wise test details to be given, if applicable:

Sl. No.	**Equipment**	**Test Conducted**	**Test Results**	**Remarks**
1.	Linked Switch with fuses (s)	(i) Mechanical operation	Smooth/Trouble some	
		(ii) Rating of Fuse	-------Amps	
		(iii) Contact of blades	Full/Partial	
2.	Isolator (Sl. No.--- Make: Capacity:	(i) Mechanical operation	Ok/Not Ok	
		(ii) Remote Operation	OK/Not OK	
		(iii) Local Operation	OK/Not OK	
		(iv) Measurement of contact resistance		
		(v) Interlocking with earth switch	OK/Not OK	
		(vi) Interlocking with Circuit Breaker	OK/Not OK	
		(vii) IR Values • Open condition • Closed condition	Phase to Phase and Phase to Earth --- M Ohm --- M Ohm --- M Ohm --- M Ohm	
3.	Circuit Breaker (Circuit breaker location and no.) Circuit breaker control circuits	(i) Rating of Circuit Breaker • Type • Voltage • Normal Current • Rupturing Current	---------- ---------- kV ---------- Amps ---------- kA	
		(ii) IR Values • Open condition • Closed Condition	Phase to Phase and Phase to Earth --- M Ohm --- M Ohm --- M Ohm --- M Ohm	
		(iii) Contact Resistance including Dynamic Contact Resistance Measurement	----------micro ohm	
		(iv) Mechanical Operation	Instant smooth /time gap (Sec.)	
		(v) Remote operation	OK/Not OK	

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		(vi) Local Operation	OK/Not OK	
		(vii) Interlocking with Isolator	OK/Not OK	
		(viii) Interlocking with earth switch	OK/Not OK	
		(ix) Alarm and Trip for OTI/WTI/Buchholz/PRV/etc.,	OK/Not OK	
		(x) Earth Fault Relay	OK/Not OK	
		(xi) Over Current Relay	OK/Not OK	
		(xii) Under Voltage Relay	OK/Not OK	
		(xiii) other safety Alarms	OK/Not OK	
		(xiv) Whether all the provisions of Regulation 37 are satisfactory?	OK/Not OK	
4.	Transformer Transformer No., Location, (Transformer Sl. No. Make, Capacity, Voltage Ratio)	(i) Insulation Resistance Values • HT to LT • HT to Earth • LT to Earth	 ----------M ohm ----------M ohm ----------M ohm	
		(ii) Break down Voltage test • Oil sample I (Top) • Oil Sample II (Bottom)	 ---------- kV ---------- kV	
		(iii) Vector Group Test	OK/Not OK	
		(iv) Polarity Tests	OK/Not OK	
		(v) Magnetic Balance	OK/Not OK	
		(vi) Tan Delta Test	OK/Not OK	
		(vii) Oil level in conservator tank	OK/Not OK	
		(viii) Oil level in breather cup	OK/Not OK	
		(ix) OTI/WTI settings	A/T--- ^{0}C/--- ^{0}C A/T---^{0}C/--- ^{0}C	
		(x) OTI/WTI alarm and trip operation	OK/Not OK	
		(xi) Operation of Buchholz relay	OK/Not OK	
		(xii) Operation of PRV	OK/Not OK	
		(xiii) Oil leakage	OK/Not OK	
		(xiv) Interlock of door switch of dry transformer	OK/Not OK	
		(xv) Clearances • Side Clearance: • Between two Transformers:	 ---------cm ----------Metre	
		(xvi) Body Earth Resistance	---------- Ohm	
		(xvii) Neutral Earth Resistance	N_1---Ohm, N_2---Ohm	
		(xviii)Earth Flat Size Material used • Body: • Neutral:	 ---------- ----------	
		(xix) Operation of ON LOAD & OFF LOAD Tap Changers	OK/Not OK	
		(xx) Sweep Frequency Resonance Analysis Test (SFRA)	OK/Not OK	
		(xxi) Dielectric Frequency Resonance Analysis (DFRA) Test	OK/Not OK	
		(xxii) Partial Discharge Tests	OK/Not OK	
5	DG Generators: Generator No.,	(i) Type of Generator		
		(ii) Interlocking with other supply	OK/Not OK	

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	Location, (Alternator and Engine Sl. No. Make, Capacity)	sources		
		(iii) Body earth resistance	---------- Ohm	
		(iv) Neutral earth resistance	N_1---Ohm N_2---Ohm	
		(v) Earth Flat Size, Material used (Cu/Al) • Body: • Neutral:	---------- ----------	
		(vi) Generator Protection details	----------	
6.	Cable (Details to be given: size, length, type)	(i) Insulation Resistance Values: • Ph - Ph: • Ph – Earth: • Ph – Earth + other Ph:	 --------- M Ohm --------- M Ohm --------- M Ohm	
		(ii) Cable trays	Provided/ Not provided	
		(iii) Cable tray earthing	OK/Not OK	
		(iv) Cables bending radius	OK/Not OK ----------metre	
7.	Panels	(i) No. of panels	___ Nos	
		(ii) Location of panel	To be enclosed	
		(iii) Rating of the panel	___Amp	
		(iv) Size and current rating of the main Bus bars and the distribution Bus bars of the panel	____ mm, _____Amp	
		(v) Whether the Bus bar size of the panel suitable to rating of the panel	Yes/No	
		(vi) IP Protection of panel	_____	
		(vii) Type of cable entry	Top Entry/Bottom Entry	
		(viii) No. of Incomers and Bus couplers in a Panel	___ Nos	
		(ix) Ratings of the Circuit Breakers	____Amp	
		(x) No. of MCCBs of each rating in the panel	___ Nos	
		(xi) No. of spare MCCBs of each rating	___ Nos	
		(xii) Panel Clearance from the wall	____mm	
		(xiii) Clearance between two panels i.e. adjacent panels	____mm	
		(xiv) Whether all the provisions of Regulation 39 followed	Yes / No	
		(xv) Size of the Earth strip used for earthing of the panel	___sqmm	
8.	Earthing	(i) Metal and size of Earth Strips	Cu/Al/GI --- Sqmm	
		(ii) Type of earthing	Plate/Pipe/Counterpoise	
		(iii) Location and No. of earth electrode	____Nos	
		(iv) Values of Earth resistance of each earth electrode and Grid	_____Ω	
		(v) Earth mat resistance	_____Ω	
9.	Potential Transformer	(i) Ratio test	OK/not OK	
		(ii) Polarity test	OK/not OK	
		(iii) BDV of oil	---------- kV	
		(iv) IR test	(R) P-E-------M Ohm	

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			(Y) P-E-------M Ohm (B) P-E-------M Ohm	
		(v) Tan Delta and Capacitance measurement	_____	
10.	Current Transformer	(i) Ratio test	OK/not OK	
		(ii) Polarity test	OK/not OK	
		(iii) BDV of oil	---------- kV	
		(iv) IR test	(R) P-E-------M Ohm (Y) P-E-------M Ohm (B) P-E-------M Ohm	
		(v) Tan Delta and Capacitance measurement	_____	
11.	Overhead lines and DP structure	(i) Size of the poles of DP structure	_____	
		(ii) Clearance between phases to phase and phase to earth.	_____	
		(iii) Ground clearance of the conductors.	_____	
		(iv) Check of electrical clearance along the route of overhead line,	Ok/ Not Ok	
		(v) Check of guarding and clearance at road crossings.	Ok/ Not Ok	
		(vi) Check the footings of the poles.	Ok/ Not Ok	
		(vii) Earthing arrangements	Ok/ Not Ok	
		(viii) What is the minimum size of the conductors of overhead lines used? State the type of conductors.	_____	
		(ix) Whether all the provisions of regulation 60, 62, 63, 64, 71, 72 and 74 are satisfied.	Yes / No	

General Observations:

1.	Check of phase to phase, phase to ground and sectional clearance	
2.	Check of Manufacture test reports of individual equipment (Copies to be enclosed)	
3.	General observation and views (Specific deviation from the requirements of the Regulations shall be clearly brought out)	

Date:

Signature of the supplier/ Owner / Consumer

Name _____

Designation _____

File No. _____

To: Office of Electrical Inspector for ……...

(For Self-certification by supplier /owner /consumer)

CERTIFICATE

[Under Regulation (32) and (45) of CEA (Measures relating to Safety & Electricity Supply) Regulation, 2023]

This is to certify that the electrical installation is complete in all respects and the work has been carried out conforming to the CEA (Measures relating to Safety & Electric Supply) Regulation, 2023 and relevant standards. The site tests done are found to be in order and it is electrically safe to operate the apparatus free from any danger.

Encl: Test reports

(Signature) (Signature)

Self-certifying supplier / owner / consumer Chartered Electrical Safety Engineer

Name _____ Name _____

File No. _____

To: Office of Electrical Inspector for ……...

Forms of Inspection Report

[See sub-regulation (3) of regulation (32)]

FORM IV

(Electrical Installations in Mine)

Report No.: _____ Date of Inspection: _____

Date of last inspection: _____ Name of the Inspecting Officer: _____

1. Name of the Mine:
2. Name of the Owner:
3. Name of the Agent:
4. Name of the Mine Manager:
5. Name of the Colliery Engineer:
6. Name of the Safety Officer:
7. Name of the designated Electrical Safety Officer:
8. Name of the Electrical Supervisor:
9. Name of the workman Inspector (Electrical) :
10. Name of the Engineer (concerned Section) :
11. Name of the working seam:
12. Working district Inspected:
13. Name of the persons accompanied during inspection:
14. Voltage and system of supply:
    (i) Volts _____
    (ii) No. of Phases _____
    (iii) AC/DC _____
15. Particulars of the installations/ apparatus installed and their location as per mine plan:
16. Illumination level:
17. Percentage of methane/other explosive gas:
18. Dry bulb temperature, wet bulb temperature in case of underground mine:
19. Velocity/speed of air in case of underground mineL:
20. General conditions of the installation:

Sl. No.	Regulation No.	Requirements	Report
1.	Regulation 98	On or before the first day of February in every year, notice in the form set out in Schedule IX or Schedule X whichever is applicable is sent.	Yes/No
2.	Regulation 99	The plans specified under this regulation are kept in the office of the mine manager and available to the Inspector or inspector of	Yes/No

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		mines.	
3.	Regulation 100	(i) Whether adequate illumination by electricity without causing glare and strain has be provided in the mines?	Yes/No Satisfactory/ Not satisfactory
		(ii) Whether efficient means of communication is provided between the point where the switchgear under sub-regulation (1) Regulation 107 is erected, the shaft bottom and other distributing centers in the mine.	Yes/No Satisfactory/ Not Satisfactory
		(iii) Whether fire extinguishing appliances of adequate capacity and of an approved type are installed and properly maintained in every place containing apparatus, other than cables, telecommunication and signalling apparatus.	Yes/No Satisfactory/ Not Satisfactory
		(iv) Is minimum clearance above ground of the lowest conductor of overhead lines or overhead cables where dumpers or trackless vehicles are being operated, not less than twelve metre in height.	Yes/No
4.	Regulation 101	(i) Are transformers and switchgear placed in a separate room, compartment or box where necessary to prevent danger of mechanical damage?	Yes/No
		(ii) Is the room, compartment or box substantially constructed and kept dry and illuminated?	Yes/No
		(iii) Is efficient ventilation provided for all apparatus installed therein?	Yes/No
5.	Regulation 102	(i) Is earthing carried out by connection to an earthing system at the surface of the mine and in a manner approved by Electrical Inspector of mines?	Yes/No
		(ii) Are all metallic sheaths, coverings, handles, joint boxes, switchgear frames, instrument covers, switch and fuse covers of boxes, all lamp holders, unless efficiently protected by an insulated covering made of fire resisting material, and the frames and bedplates of generators, transformers and motors, including portable motors, earthed by connection to an earthing system in the manner specified in regulation 102?	Yes/No Satisfactory/ Not satisfactory
		(iii) Are all conductors, of an earthing system having conductivity, at all parts and all joints, at least equal to fifty per cent of that of the largest conductor used solely to supply the apparatus?	Yes/No
6.	Regulation 116	Whether the neutral or mid-point is earthed by connection to the earthing system in the manner specified in regulation 102.	Yes/No
7.	Regulation103	(i) Is automatically disconnection of supply to any part of the system, where a fault, including an earth fault, occurs and is the fault current limited to the specified values, by employing suitably designed, restricted neutral system of power supply?	Yes/No
		(ii) Whether the operation of the switchgear and the relays are recorded daily at the generating station, substation or switch station in a register kept for the purpose?	Yes/No
		(iii) Whether the effectiveness of the switchgear and the protective system being always kept and maintained in working order?	Yes/No
		(iv) Whether the switchgear and the protective system checked once every three months and the result thereof recorded in a	Yes/No

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		separate register kept for the purpose?	
8.	Regulation 104	(i) Is electricity transmitted into a mine at a voltage exceeding 11000 V and used therein at a voltage exceeding 6600 V?	Yes/No
		(ii) Is the voltage of hand-held portable apparatus used, not exceeding 125 V?	Yes/No Applicable/ Not applicable
		(iii) In belowground mines, whether the lighting system has a mid or neutral point connected with earth and the voltage not exceeds 125 V between phases is used?	Yes/No Applicable/ Not applicable
		(iv) On the surface of a mine or in an open cast mine, has the neutral or the midpoint of the lighting system is connected with earth and the voltage between the phases not exceeds 250 V?	Yes/No
		(v) Is the voltage of portable hand-lamps used in underground working of mine or oil-fields not exceeding 30 V?	Yes/No Applicable/ Not applicable
9.	Regulation 105	Where electricity is transformed, has suitable provision made to guard against danger by reason of the lower voltage apparatus becoming accidentally charged above its normal voltage by leakage from or contact with the higher voltage apparatus.	Yes/No
10.	Regulation 107	(i) Whether properly constructed switchgear for disconnecting the supply of electricity provided at a point approved by Electrical Inspector of mines?	Yes/No
		(ii) When any cable or overhead line supplying electricity from the aforesaid switchgear is live, whether a person designated to operate the said switchgears is available within easy reach thereof?	Yes/No
		(iii) Whether the main mechanical ventilator operated by electricity interlocked with the switchgear so as to automatically disconnect the power supply in the event of stoppage of main mechanical ventilator?	Yes/No Applicable/ Not applicable
		(iv) Whether every motor is controlled by switchgear, arranged so as to disconnect the supply from the motor and from all apparatus connected thereto and whether such switchgear be so placed to easily operate by the person designated to operate the motor?	Yes/No
		(v) Is the switchgear so placed, disconnects the supply automatically, in the event of conditions of over-current, over-voltage and single phasing?	Yes/No
		(vi) Is the Auxiliary fan interlocked with the switchgear controlling power supply to the in bye face equipment of below ground coal mine for automatic disconnection of power supply in the event of the stoppage of the auxiliary fan?	Yes/No Applicable/ Not applicable
11.	Regulation 108	(i) Whether all cables are covered with insulating material and efficiently protected from mechanical damage and supported at sufficiently frequent intervals and in such a manner as to prevent damage to such cables?	Yes/No Satisfactory/Not satisfactory
		(ii) Whether all cables are protected by a metallic covering and which contain all the conductors of a circuit and the sheath of metal-sheathed cables and the metallic armouring of	Yes/No Satisfactory/Not

		armoured cables is of a thickness not less than that recommended in the relevant Standard?	satisfactory
		(iii) Is the metallic covering of every cable electrically and mechanically continuous throughout, earthed by a connection to the earthing system of conductivity specified therein and efficiently protected against corrosion?	Yes/No Satisfactory/Not satisfactory
		(iv) Whether the metallic covering of every cable is having a conductivity at all parts and at all joints at least equal to fifty per cent of the conductivity of the largest conductor enclosed by the said metallic covering?	Yes/No Satisfactory/Not satisfactory
		(v) Are the cables and conductors where connected to motors, transformers, switchgear and other apparatus, installed so that they are mechanically protected by securely attaching the metallic covering to the apparatus and the insulating material at each cable end is efficiently sealed so as to prevent the diminution of its insulating properties?	Yes/No Satisfactory/Not satisfactory
		(vi) Whether properly constructed and certified glands or bushes are used to prevent abrasion or to secure gas-tightness?	Yes/No
12.	Regulation 109	(i) Whether flexible cables used for portable or transportable apparatus are covered with insulating material which shall be efficiently protected from mechanical injury?	Yes/No
		(ii) Is the flexible metallic covering of a cable, used by itself to form an earth conductor for such apparatus without an earth conductor?	Yes/No
		(iii) Whether every flexible cable intended for use with portable or transportable apparatus connected to the system and to such apparatus by properly constructed connectors?	Yes/No
		(iv) At every point where flexible cables are joined to main cables, is a circuit breaker provided which is capable of automatically disconnecting the supply from such flexible cables?	Yes/No
		(v) Is every flexible cable attached to a portable or transportable machine examined periodically by the designated person?	Yes/No
		(vi) Whether flexible cable exceeding in specified length being used with any portable or transportable?	Yes/No
		(vii) Are flexible cables used with apparatus other than portable or transportable apparatus?	Yes/No
13.	Regulation 110	Whether all portable and transportable machines operate on remote control from the concerned switchgear with relevant provision?	Yes/No
14.	Regulation 111	(i) Whether all apparatus maintained reasonably free from dust, dirt and moisture, and kept clear of obstruction?	Yes/No Satisfactory/ Not satisfactory
		(ii) Whether the following notices in Hindi and local language of the district, so designed and protected as to be easily legible at all times, be exhibited at the following places, namely: – • where electrical apparatus is in use, a notice forbidding undesignated persons to operate or otherwise interfere with such apparatus; • in the interior or at the surface of the mine where a	Yes/No Yes/No

		telephone or other means of communication is provided, a notice giving full instructions to person, at the surface of the mine, designated to effect the disconnection of the supply of electricity to the mine?	
		(iii) Whether all apparatus, including portable and transportable apparatus, operated only by those persons who are designated for the purpose?	Yes/No
		(iv) Where a plug-and-socket-coupling other than of bolted type is used with flexible cables, whether an electrical inter-lock or other approved device provided to prevent the opening of the coupling while the conductors are live?	Yes/No
15.	Regulation 112	Give report on the compliance of provisions of this regulation as the case maybe.	Satisfactory/Not satisfactory
16.	Regulation 114	(i) Whether adequate precautions are taken to prevent signal and telephone wires coming into contact with other cables and apparatus?	Yes/No
		(ii) Is the voltage used in any one circuit not exceeding 30 V?	Yes/No
17.	Regulation 115	(i) Whether haulage by electric locomotives on the overhead trolley-wire system, at voltage not exceeding 650V?	Yes/No
		(ii) Whether haulage by storage battery locomotives used with the prior consent in writing of the Electrical Inspector of mines?	Yes/No
18.	Regulation 117	(i) Whether electrical supervisors, as directed by Electrical Inspector of mines are appointed in writing by the owner, agent or manager of a mine or by the agent or the owner, of one or more wells in an oil-field to supervise the installation?	Yes/No
		(ii) Whether electricians as directed by the Electrical Inspector of mines, are appointed in writing by the owner, agent or manager of a mine or by the agent or the owner, of one or more wells in an oil-field for compliance with the duties specified in this regulation?	Yes/No
		(iii) Whether persons appointed to operate, supervise, examine or adjust any apparatus are competent to undertake the work which he is required to carry out as directed by the Engineer?	Yes/No Satisfactory/Not satisfactory
		(iv) Whether the electrical supervisor is maintaining log-book made up of the daily log sheets prepared in the form set out in Schedule-XI?	Yes/No
19.	Regulation 118	Whether the persons engaged for operation and maintenance of electrical installations have undergone training meant for the particular mining installations	Yes/No Satisfactory/Not satisfactory

Date:

Signature of the Inspecting Officer

Name _____

Designation _____

File No. _____

Copy forwarded to Electrical Inspector for ……....

Schedule III

Form for obtaining test results by supplier at each supply point to consumer

[See sub-regulation (4) of regulation (33)]

1. Name and address of the consumer
2. Details of installation
3. Short circuit fault level of the installation
4. Date of commissioning of installation (in case of additional supply or reconnection)
5. Results of tests conducted:

Sl. No.	Equipment	Test Conducted	Test Results	Remarks
1.	Linked Switch with fuse(s)	(i) Mechanical operation	Smooth/troublesome	
		(ii) Rating of fuse	--------- Amp.	
		(iii) Contact of blades	Full/Partial	
2.	Isolator	(i) Mechanical operation	OK/not OK	
		(ii) Remote operation	OK/Not OK	
		(iii) Local operation	OK/Not OK	
		(iv) Measurement of contact resistance	----------micro Ohm	
		(v) Interlocking with earth switch	OK/Not OK	
		(vi) Interlocking with CB	OK/Not OK	
		(vii) IR Values • Open condition • Closed condition	Ph-Ph Ph-E --- M Ohm --- M Ohm --- M Ohm --- M Ohm	
3.	Circuit Breaker Sl. No. ------ Circuit Breaker Control Circuits	(i) Rating of Circuit Breaker (a) Type (b) Voltage (c) Normal Current (d) Rupturing capacity	 ---------- ---------- kV ---------- Amps ---------- KA	
		(ii) IR Values • Open condition • Closed condition	Ph-Ph Ph-E --- M Ohm --- M Ohm --- M Ohm --- M Ohm	
		(iii) Contact Resistance	----------micro Ohm	
		(iv) Mechanical operation	Instant smooth/ time gap (Sec.)	
		(v) Remote operation	OK/Not OK	
		(vi) Local operation	OK/Not OK	
		(vii) Interlocking with isolator	OK/Not OK	
		(viii) Interlocking with earth switch	OK/Not OK	
		(ix) Alarm and Trip for OTI/ WTI/ Buchholz / PRV	OK/Not OK	
		(x) Earth Fault Relay	OK/Not OK	
		(xi) Over Current Relay	OK/Not OK	
		(xii) Under Voltage Relay	OK/Not OK	
		(xiii) SF_6 pressure alarm and trip operation test	OK/Not OK	
4.	Transformer Sl. No. ----	(i) Insulation Resistance Values: • HT to LT	----------M ohm	

		• HT to Earth • LT to Earth	----------M ohm ----------M ohm	
		(ii) Break down Voltage Test • Oil Sample – I (Top) • Oil Sample – II (Bottom)	 ----------kV ----------kV	
		(iii) Vector Group Test	OK/Not OK	
		(iv) Polarity Tests	OK/Not OK	
		(v) Magnetizing Balance	OK/Not OK	
		(vi) Tan Delta Test (as per capacity)	OK/Not OK	
		(vii) Oil level in conservator Tank:	OK/Not OK	
		(viii) Oil level in breather cup	OK/Not OK	
		(ix) OTI/WTI settings	A/T---- ^{0}C A/T----^{0}C	
		(x) OTI/WTI alarm and trip operation	OK/Not OK	
		(xi) Operation of Buchholz relay	OK/Not OK	
		(xii) Operation of PRV	OK/Not OK	
		(xiii) Oil leakage	OK/Not OK	
		(xiv) Interlock of door switch for dry transformer	OK/Not OK	
		(xv) Clearances for • Side clearance • Between two Transformers	 --------- Cms ---------- Metre	
		(xvi) Body earth resistance	---------- Ohm	
		(xvii) Neutral earth resistance	N_1---Ohm N_2---Ohm	
5.	DG Set Sl. no. for • Alternator: • Engine:	(i) Interlocking with other Supply Sources	OK/Not OK	
		(ii) Body earth resistance	---------- Ohm	
		(iii) Neutral earth resistance	N_1---Ohm N_2---Ohm	
6.	Cables Size: ----Sq. mm	(i) Insulation Resistance Values: • Ph - Ph : • Ph – Earth: • Ph – Earth + other Ph:	 --------- M Ohm ---------M Ohm ---------M Ohm	
		(ii) Bending Radius	OK/Not OK	
7.	Earthing	(i) Metal and Size of Earth Strips	Cu/Al/GI --- Sq. mm	
		(ii) Type of Earthings: • Plate Earthing • Pipe Earthing • Counter poise Earthing	 Yes/No Yes/No Yes/No	
		(iii) Values of earth resistances of earth electrodes for • Reactor Neutral: • LAs: • Structure: • Frames/Bodies of equipment: • Motors:	 N_1 ----ohm N_2 ----ohm (R) ---ohm (Y) ---ohm (B) ----ohm --------ohm --------ohm --------ohm	
8.	Potential	(i) Ratio test	OK/Not OK	

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	Transformer	(ii) Polarity test	OK/Not OK	
		(iii) BDV of oil	----------kV	
		(iv) IR test	(R) P-E-------M Ohm (Y) P-E-------M Ohm (B) P-E-------M Ohm	
9.	Current Transformer	(i) Ratio test	OK/Not OK	
		(ii) Polarity test	OK/Not OK	
		(iii) BDV of oil	----------kV	
		(iv) IR test	(R) P-E-------M Ohm (Y) P-E-------M Ohm (B) P-E-------M Ohm	
10.	Transmission line	(i) Physical condition of conductor/tower	OK/Not OK	
		(ii) Check of tower accessories	OK/Not OK	
		(iii) Tower footing resistance	----------Ohm	
		(iv) Conductor continuity test	OK/Not OK	
		(v) Check of ground clearance	OK/Not OK	
		(vi) Check of electrical clearance along the route	OK/Not OK	

General Observations:

Sl. No.	Item	Observations
1.	Check of required phase to phase, phase to ground and sectional clearance.	
2.	Check of equipment lay out and over all installation details.	
3.	Test of resistance of earth mat or earth electrodes as applicable.	
4.	Check of consumer's pre-commissioning test reports of individual equipment.	
5.	Check of manufacturer's routine/type test reports of individual equipment.	
6.	Whether Inspector's approval if applicable is obtained?	
7.	Whether owner's self-certification about compliance with the Regulations is obtained?	
8.	General observation and views (specific deviation from the requirements of the Regulations shall be clearly brought out).	

Name, Signature and Seal of the Authority

Schedule IV

Form for notice in respect of failure of supply

[See sub-regulation (3) of regulation (41)]

(1) Name and address of the supplier :

(2) Date and time of failure of supply :

(3) Areas affected due to failure :

(4) Causes of failure :

(5) Probable time for restoration of supply :

(6) Additional information, if any :

Date :

(Name, Signature, Designation and Seal of Authoity)

Place:

Time:

Schedule V

Minimum safety working clearances where electricity at voltage exceeding 650 V is supplied, converted, transformed or used

[See sub-regulation (2)(iii) of regulation (46)]

Highest System Voltage (kV)	Safety Working Clearance (Metre)
12	2.6
36	2.8
72.5	3.1
145	3.7
245	4.3
420	6.4
800	10.3

(1) The above values are valid for altitude not exceeding 1000 m. A correction factor of 1.25 per cent per 100 m is to be applied for increasing the clearance for altitude more than 1000 m and up to 3000 m;

(2) The above safety working clearances are based on an insulation height of 2.44 m which is the height of lowest point on the insulator, where it meets the earthed metal, from the ground;

(3) "Safety Working Clearance" is the minimum clearance to be maintained in air between the live part of the equipment on one hand and earth or another piece of equipment or conductor on which it is necessary to carry out the work, on the other;

(4) The "Highest System Voltage" is defined as the highest rms phase to phase voltage which occurs under normal operating conditions at any time and at any point of the system. It excludes voltage transients (such as those due to system switching) and temporary voltage variations due to abnormal system conditions (such as those due to fault conditions or the sudden disconnection of large loads).

Schedule VI

Minimum safety clearances to be maintained for bare conductors or live parts of any apparatus in out-door HVDC substations, excluding overhead lines of HVDC istallations

[See sub-regulation (3) of regulation (46)]

Sl. No.	DC Voltage (kV)	Pole to Earth Clearance (Metre)	Ground Clearance (Metre)
1.	100 kV	1.17	4.55
2.	200 kV	1.80	5.65
3.	300 kV	2.45	6.75
4.	400 kV	3.04	8.00
5.	500 kV	3.65	9.00
6.	600 kV	3.98	10.10
7.	800 kV	5.30	11.20

(1) The above ground clearances are not applicable to equipment that are housed within fence or a building and where access is prevented under energised condition through a suitable safety interlocking scheme;

(2) The above pole to earth clearances are for conductor-structure electrode configuration using gap factor k equal to 1.35.

(3) It is recognised that within a substation many different types of electrode configurations shall be there with different values of k, therefore, the above clearance shall be modified based upon the values of gap factor for a particular electrode configuration subjected to the minimum ground clearance.

(4) Clearance shall be provided for electrical apparatus so that sufficient space is available for easy operation and maintenance without any hazard to the operating and maintenance personnel working near the equipment and for ensuring adequate ventilation.

Schedule VII

Part-A

Form for reporting failure of transformer & reactor of 220 kV and above voltage class

[See sub-regulation (8) of regulation (48)]

1.	Name of Substation	:	
2.	Utility	:	
3.	Faulty Equipment (ICT/auto-transformer/GT/reactor etc.)	:	
4.	Rating (MVA/MVAR, Voltage ratio, 1-phase/3phase)	:	
5.	Make (Original equipment manufacturer)	:	
6.	Serial No.	:	
7.	Date and time of occurrence of fault	:	
8.	Fault discovered during operation or periodic testing/ maintenance	:	
9.	Year of manufacturing	:	
10.	Date of commissioning	:	
11.	Sequence of events/Description of fault (SoE with time stamp, protection operated during fault)	:	
12.	Details of tests done after failure (What tests were conducted after the discovery of failure. If no tests were conducted, reasons for the same may be stated.)	:	
13.	Observations (Visual observations e.g. bulging of tank, fire, any leakage of oil, damage to various components of transformer/ reactor and nearby equipment/ material etc.)	:	
14.	Probable cause of failure	:	
15.	If original equipment manufacturer representative had inspected the equipment or visited the site after failure, their remarks, MoM etc. may be attached.	:	
16.	Present condition of equipment	:	

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	(Whether repairable or beyond repair)		
17.	(a) Details of previous maintenance (Activities carried out in previous maintenance including the tests conducted, periodicity of the maintenance activities) (b) Whether any abnormality observed in these tests. If yes, attach the test reports. (c) What steps were taken to address the abnormality?	:	
18.	Details of any previous failure on the same unit	:	
19.	Is tertiary winding provided	:	Yes/No
20.	Is tertiary loaded? If yes, specify load on tertiary	:	Yes/No
21.	Whether tertiary terminals are bare/ insulated?		
22.	Details of protection for tertiary	:	
23.	Whether relay time is synchronised with UTC?	:	Yes/No
24.	Bushing details (OIP/RIP/RIS, porcelain /polymer housing)	:	
25.	On Load Tap Changer or Off Circuit Tap Changer	:	
26.	Tap position of OLTC at the time of failure	:	
27.	Past record of operation of OLTC	:	
28.	Tap range	:	
29.	Details of P\protection provided for transformer/GT/reactor	:	
30.	Details of Protection operated	:	
31.	Whether equipment is properly earthed	:	
32.	Earth resistance of substation and date of its measurement	:	
33.	Surge arrester: (a) Is SA provided for protection? (b) Whether healthiness of SA is monitored? (c) Whether reading of SA counter changed during failure?	:	 Yes/No Yes/No Yes/No
34.	Lightning Impulse and Switching Impulse Withstand Voltage of the bushings of all voltage level	:	
35.	Lightning Impulse and Switching Impulse Withstand Voltage of the winding of all voltage level	:	
36.	Type of fire protection provided (Emulsifier system/ N_2 Injection based fire protection system/ foam based protection etc.)	:	
37.	Weather conditions at the time of failure (clear sky/rainy/thunderstorm etc.)	:	

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38.	Storage condition of equipment at site before commissioning: (a) Period of storage (b) Idle charged or uncharged (c) Dry air filled/Nitrogen filled/ oil-field illed	:	
39.	Whether short circuit test was carried out on this transformer or same design transformer/reactor or short circuit withstand capability was verified on the basis of calculation?	:	
40.	Number of through faults the equipment was subjected to before failure	:	
41.	Attach the following: (a) Single Line Diagram of the substation (b) Photographs of the failed equipment (c) Disturbance Recorder/Even Logger Data (d) Reports of tests conducted after (e) failure (f) Factory test results (g) Pre-commissioning test results (h) Protection schematic diagram	:	

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(Signature and name of Manager/

Executive Engineer of the installation)

Contact details (Address /Mobile No./Phone No./Email)

To,

The Secretary

Central Electricity Authority

Sewa Bhawan, R .K. Puram

New Delhi-110066

Part-B

Form for reporting failure of towers of 220 kV and above voltage class transmission lines

[See sub-regulation (8) of regulation (48)]

1. Name of Transmission line with voltage level:
2. Date and time of occurrence/discovery of failure:
3. Length of line (km):
4. Type of configuration: (S/C, D/C, M/C, S/C strung on D/C towers, narrow base and the like):
5. Number of Towers and Type of Towers failed:

   [Suspension/ tension/ dead end/ special tower/ river crossing tower/ Power line crossing/ Railway Crossing etc., with/ without extension (indicate the type & length of extension)]
6. Tower location no. with reference to nearest substation (indicate Name):
7. Name and size of conductor:
8. No. of sub-conductors per bundle and bundle spacing:

9. Number and size of earth wire/ OPGW (if provided):

10. Type of insulators in use (Porcelain/ Glass/ Polymer):

11. Configuration of insulators (I/ V/ Y/ tension):

12. No. of insulators per string and no. of strings per phase:

13. Year of construction/ commissioning:

14. Executing agency:

15. Weather condition on the date of failure:

16. Terrain category:

17. Reliability level:

18. Wind zone (1/2/3/4/5/6) and velocity of wind:

19. Details of earthing of tower (pipe type/ counter poise):

20. Line designed as per IS:802 (1977/1995/2015 any other code):

21. The agency who designed the line:

22. Any special consideration in design:

23. Details of last maintenance activity along with date:

24. Power flow in the line prior to failure:

25. Any missing member found before/ after failure of towers:

26. Condition of foundation after failure:

27. Brief description of failure:

[Along with photographs (if available), other related information like tower schedule, newspaper clipping for cyclone / wind storm etc.]

28. Probable cause of failure:

29. Details of previous failure of the line/ tower:

30. Whether line will be restored on ERS or spare tower will be used:

31. Likely date of restoration:

32. Present status:

33. Details of any tests carried out after failure (attach test reports):

34. Wind speed data of date & time of failure from nearby authorised observatory:

35. Location of failed tower:

a. Location Coordinates:

b. Nearest Airport:

c. District and State:

36. Single line diagram/ clearance diagram of failed tower(s) with all dimensions (horizontal & vertical dimensions including base width of tower):

37. Tower weight:

38. Tower spotting data:

39. Tower schedule of affected section:

40. Sag-tension calculation considered for design of tower:

41. Design document of failed towers:

42. Any other relevant information:

Date:

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(Signature and name of Manager/Executive Engineer/ Incharge of the installation)

Contact details (Address /Mobile No./Phone No./Email)

To,

The Secretary

Central Electricity Authority

Sewa Bhawan, R.K. Puram

New Delhi-110066

Schedule VIII A

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-navigatiional river (m)
Up to 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

For navigable rivers, clearances shall be fixed in relation to the tallest mast in consultation with the concerned navigational/port authorities.

* Higher clearance due to predominantly induction effects and time varying electric field (ICNIRP limit: 10kV/m for occupational exposure) at voltage exceeding 400 kV.

Schedule VIII B

The minimum clearance in air above ground and across road surface of Highways, or Minimum clearance between conductor and Rail Level or navigational or non-navigational rivers for lowest conductor of high voltage direct current overhead line of nominal voltage system [See sub-regulation (2) of regulation (60)]

Sl. No.	DC Voltage	Ground Clearance (m)	Clearance between conductor and road surface across Highway (m)	Minimum clearance between conductor and Rail Level (m)	Clearance above HFL for River crossing	
					Navigational River (m)	Non-navigatiional River (m)
1.	100 kV	6.50	11.25	#	19.00	6.50
2.	200 kV	7.30	12.05	#	19.90	7.30
3.	300 kV	8.50	13.25	#	20.90	8.50
4.	400 kV	9.40	14.15	#	21.90	9.40
5.	500 kV	12.50	17.25	21.23	22.90	12.50
7.	800 kV	18.00	22.75	25.74	25.90	18.00

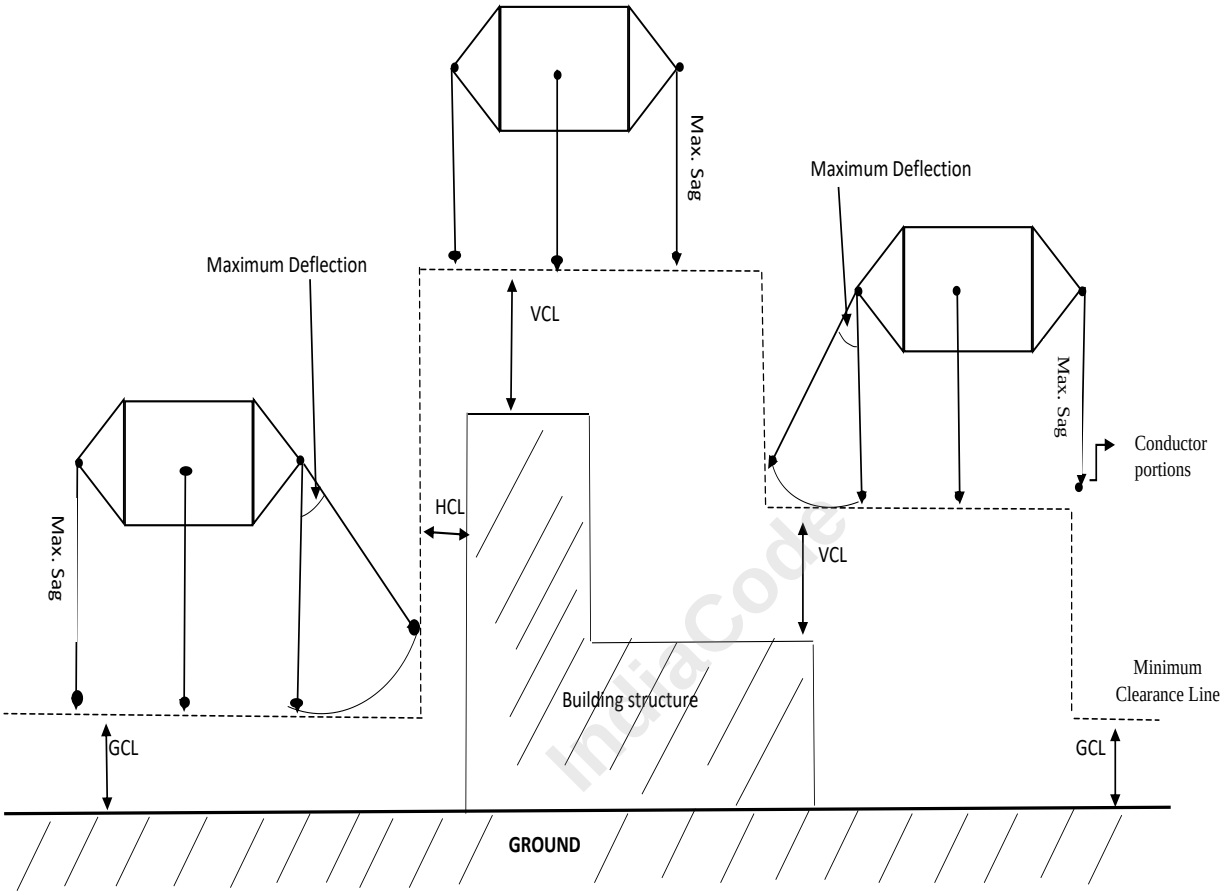
1. Highway clearances required 4.75 m higher then ground clearances (considering the vehicle hight is 4.75, as mentioned in the Indian Road Congress documents, 1983).
2. # Railway clearances required 10% higher value than HVAC values (HVAC values are mentioned in Indian Railway document: IRSOD, 2004).
3. Navigational River clearances as mentioned in the Regulation of Inland Waterways Authority of India (Classification of Inland Waterways in India), Regulation, 2006.

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Schedule VIII C

Ground, Vertical and Horizontal clearances

[See sub-regulation (1) of regulation 60, sub-regulation (5) of regulation 62 and sub-regulation (5) of regulation 63]



GCL: Ground Clearance as per regulation 60

VCL: Vertical Clearance as per regulation 62 and 63

HCL: Horizontal Clearance as per regulation 62 and 63

Schedule IX

FORM OF ANNUAL RETURN FOR MINES

[See sub-regulation (1) of regulation 98]

This form must be correctly filled up by the owner, agent, manager or engineer and sent to the Electrical Inspector of mines not later than the first day of February every year.

Part A

Year ending: ____

Name of Mine: State:

Situation of Mine: District:

Postal address of Mine:

Name and address of owner:

Name of agent:

Name of manager:

Name of engineer:

Name of Electrical Supervisor:

Part B

(1) System of supply (whether direct current or alternating current):

Voltage of supply:

Periodicity (if alternating current):

Source of supply:

(2) Voltage at which electricity is used for: -

Lighting:

Power:

(3) Particulars of motor etc.: -

POWER

(a) On Surface

Type of Motor (HP/KW)/ apparatus and voltage	Type of control gear	Location	Purpose for which used

(b) In Mine

Type of Motor (HP/KW)/ apparatus and voltage	Type of control gear	Location	Purpose for which used	Ventilation	Percentage of inflammable gas or vapour

(c) Lighting

Type of light fitting	Wattage	Location	Percentage of inflammable gas or vapor

Schedule X

FORM OF ANNUAL RETURN FOR OIL-FIELDS

[See sub-regulation (1) of regulation 98]

This form must be correctly filled up by the owner, agent, manager or engineer and sent to the Electrical Inspector of mines not later than the first day of February every year.

Part A

Year ending: ____

Name of Oil-field: State:

Situation of Oil-field: District:

Postal address of Oil-field:

Name and address of owner:

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Name of agent:

Name of manager:

Name of engineer:

Name of Electrical Supervisor:

Part B

(1) System of supply (whether direct current or alternating current):

Voltage of supply:

Periodicity (if alternating current):

Source of supply:

(2) Voltage at which electricity is used for: -

Lighting:

Power:

(3) Particulars of motor etc.: -

(a) On wells

No. or other identifying mark of well	Drilling or pumping	Type and H.P of motor	No. of lamps and type	Other electrical appliances
1	2	3	4	5

(b) Not on wells

Type and rating of motor	Purpose for which used	Identifying mark on map
1	2	3

(4) Other electrical appliances, not including in item 3, in use on the field: -

Appliances type and size in KW	Purpose for which used	Identifying mark on map

Schedule XI

LOG SHEET FOR MINES AND OIL-FIELDS

[See sub-regulation (9) of regulation 112, sub-regulation (9) of regulation (117)]

Daily log sheet for:

(1) Name of Electrical Supervisor

(2) Report as to:-

(a) Condition of the insulation of the system.

(b) Specified defects of insulation (particulars of each failure of apparatus should be given).

(c) Accidents or dangerous occurrence (including any cases of electric shock and any cases of open sparking in apparatus in use in places where regulation 112 applies.

(d) Disconnection and reconnection of supply as required by sub-regulation (9) of regulation 112.

(e) Examination of earth fault detectors or recorders as provided by sub-regulation (3) of regulation 102.

(f) Examinations of apparatus as provided by regulation 117.

(i) Routine examinations as required by of sub-regulation (9) of regulation 117.

(ii) Special examination* as required by of sub-regulation (9) of regulation 117.

(3) Remarks: -

Signed

Examined by

Electrical Supervisor:

Engineer:

Manager.

*State which apparatus has been examined or tested and its result.

Note: - This log sheet should be filled in as completely as possible. If, for instance, there are no defects of insulation to report, the word 'none' should be written in the vacant space.

RAKESH GOYAL, Secy.

[ADVT.-III/4/Exty./154/2023-24]

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