

# CENTRAL ELECTRICITY AUTHORITY

**(Measures relating to Safety and Electric Supply) Regulations, 2010,**

**Dated: 20.09.2010 with amendment Dated: 13.04.2015, 01.03.2018, 28.06.2019**

Sl. No.	Description	Summary
1.	<b>Control Period/Review Period</b>	N.A.
2.	<b>Electrical Safety Officer</b>	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 power stations, sub-stations, transmission and distribution lines.
3.	<b>Chartered Electrical Safety Engineer</b>	The Appropriate Government shall authorise Chartered Electrical Safety Engineer, having the qualification and experience as specified by the Authority under sub-regulation (3) to assist the owner or supplier or consumer of electrical installations for the purpose of self-certification.
4.	<b>Safety measures for Operation and Maintenance of Electric Plants and Transmission, Distribution Systems</b>	<ol style="list-style-type: none"> <li>1 Engineers and supervisors appointed to operate or undertake maintenance of any part or whole of a power generating station.</li> <li>2 The Technicians to assist engineers or supervisors shall possess a certificate in appropriate trade, preferably with a two years course from a Industrial Training Institute recognized by the Central Government or the State Government.</li> </ol>
5.	<b>Deposit of Maps</b>	When a license has been granted, two sets of maps showing, as regards such licensee, the particulars specified in application for license shall be signed and elated to correspond with the date of notification of the grant of the license by an officer designated by the Appropriate Commission in this behalf.
6.	<b>Plan for Area of Supply to be made and kept Open for Inspection</b>	The licensee shall, after commencing to supply electricity, forthwith cause a plan, to be made in electronic 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 distributing 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 distributing boxes and other works for the time being in position and shall also, if so required by an Electrical Inspector, cause to be made sections showing the approximate level of all his existing underground works other than service lines.
7.	<b>General Safety Requirements</b>	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.
8.	<b>Identification of Earthed and Earthed Neutral Conductors</b>	<ol style="list-style-type: none"> <li>1 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</li> </ol>

	<b>and position of Switches and Switchgear</b>	<p>live conductor and such indication shall be provided-</p> <p>(a) where the earthed or earthed neutral conductor is the property of the supplier, at or near the point of commencement of supply;</p> <p>(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;</p> <p>(c) in all other cases, at a point corresponding to the point of commencement of supply or at such other points as may be approved by an Electrical Inspector.</p> <p>2 no cut-out, link or switch 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.</p>
9.	<b>Earthed Terminal on Consumer's Premises</b>	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.
10.	<b>Danger Notices</b>	<p>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 IS -2551 on-</p> <p>(a) every motor, generator, transformer and other electrical plant and equipment together with apparatus used for controlling or regulating the same;</p> <p>(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;</p> <p>(c) luminous tube sign requiring supply, X-ray and similar high frequency installations of voltage exceeding 650 V but not exceeding 33 kV.</p>
11.	<b>Handling of Electric Supply-Lines and Apparatus</b>	<p>1 No person shall work on any live electric supply line or apparatus and no person shall assist such person on such work, unless he is designated in that behalf, and takes the safety precautions.</p> <p>2 Every telecommunication line on supports carrying a 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.</p>
12.	<b>Cables- Protected by Bituminous Materials</b>	<p>1 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.</p> <p>2 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.</p>
13.	<b>Street Boxes</b>	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 of voltage exceeding 650 V 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.
14.	<b>Accidental Charging</b>	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 when live.

15.	<b>Provisions Applicable to Protective Equipment</b>	Two or more gas masks shall be provided conspicuously and installed and maintained at accessible places in every generating station with capacity of 5 MW and above and enclosed sub-station with transformation capacity of 5MVA and above for use in the event of fire or smoke.
16.	<b>Instructions</b>	<b>Instructions for resuscitation of persons suffering from electric shock:</b> In every manned generating station, sub-station or-switching station of voltage exceeding 650 V, an artificial respirator shall be, provided and kept in good working condition.
17.	<b>Periodical Inspection and Testing of Installations</b>	<ol style="list-style-type: none"> <li>1 Where an installation is already connected to the supply system of the supplier or trader, every such installation shall be periodically inspected and tested at intervals not exceeding five years either by the Electrical Inspector or by the supplier as may be directed by the Government.</li> <li>2 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.</li> </ol>
18.	<b>Testing of Consumer's Installation</b>	Upon receipt of an application for a new or additional supply of electricity and before connecting the supply or reconnecting the same after a period, of six months, the supplier, shall either test the installation himself or accept the test results submitted by the consumer when the same has been duly signed by the licensed Electrical Contractor.
19.	<b>Installation and Testing of Generating, Units</b>	The capacity above which generating units including generating units producing electricity from renewable sources of energy will be required to be inspected by the Electrical Inspector before commissioning, shall be as per the notification to be issued by the Appropriate Government under the sub-section (1) of section 162 of the Act.
20.	<b>Precautions Against Leakage before Connection</b>	<ol style="list-style-type: none"> <li>1 on application of 500 V DC between each live conductor and earth for a period of one minute the insulation resistance of installation and equipment of voltage not exceeding 650 V shall be at least 5 MEGA OHM or as specified in the relevant Indian Standard.</li> <li>2 on application of 2.5 kV·DC between each live conductor and earth for a period of one minute, the insulation resistance of installation and equipment of voltage exceeding 650 V but not exceeding 33kV shall be at least 5 MEGA OHM or as specified in the relevant Indian Standard.</li> </ol>
21.	<b>Supply and use of Electricity</b>	<ol style="list-style-type: none"> <li>1 The following controls of requisite capacity to carry and break the current shall be placed as near as possible after the point of commencement of supply so as to be readily accessible and capable of being operated to completely isolate the supply to the installation, such being in addition to any equipment installed for controlling individual, circuits or apparatus, namely <ol style="list-style-type: none"> <li>(a) A linked switch with, fuse or a circuit breaker by consumers of voltage which does not exceed 650 V.</li> <li>(b) A linked switch with fuse or a circuit breaker by a consumer of voltage exceeding 650V but not exceeding 33 kV having aggregate installed transformer or apparatus capacity upto 1000 KVA to be supplied at voltage upto 11 kV and 2500 KVA at higher voltages (above 11 kV and not exceeding 33kV).</li> <li>(c) A circuit breaker by consumers at voltage exceeding 650 V but not exceeding 33kV having an aggregate installed transformer and apparatus capacity above 1000 KVA and supplied, it voltage upto 11 kV and above 2500 KVA at higher voltage (above 11 kV and not</li> </ol> </li> </ol>

		<p>exceeding 33kV).</p> <p>(d) A circuit breaker by a consumer of voltage exceeding 33 kV.</p> <p>2 In case of every transformer the following shall be provided; namely</p> <p>(a) on primary side for transformer a linked switch with fuse or circuit breaker of adequate capacity. For all transformers-</p> <ul style="list-style-type: none"> <li>• having a capacity of 5000 KVA and above installed before the year 2008.</li> <li>• having a capacity 1000 KVA and above installed in or after the year 2000, a circuit breaker shall be provided.</li> </ul> <p>(b) In respect of all transformer installed in or after the year 2000, on the secondary side of all transformers a circuit breaker of adequate rating shall be installed.</p>
22.	<b>Conditions Applicable to Installations of Voltage, exceeding 250 Volts</b>	<p>1 Non-metallic conduits conforming to the relevant Indian Standard Specifications may be used for installations of voltage not exceeding 650V.</p> <p>2 Every switchboard shall comply with the following:</p> <p>(a) a clear space of not less than one metre in width shall be provided in front of the switchboard,</p> <p>(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 20 cm or more than 75 cm in width, measured from the farthest protruding part of any attachment or conductor,</p> <p>(c) if the space behind the switchboard exceeds 75 cm in width, there shall be a passage way from either end of the switchboard, clear to a height of 1.8 m.</p>
23.	<b>Test for Resistance of Insulation</b>	Where any electrical 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 applied the test.
24.	<b>Connection with Earth</b>	<p>(a) Neutral point of every generator and transformer shall be earthed by connecting it to the earthing system by not less than two separate and distinct connections.</p> <p>(b) All earthing systems shall consist of equipotential bonding conductors capable of carrying the Prospective earth fault current and a group of pipes, rods and plate electrodes for dissipating the current to the general mass of earth without exceeding the allowable temperature limits, as per relevant Indian 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.</p>
25.	<b>Earth Leakage Protective Device</b>	The supply of electricity to every electrical installation other than voltage not exceeding 250 V, below 2 kW and those installations of voltage not exceeding 250 V, which do not attract provisions of section 54 of the Act, shall be controlled by an earth leakage protective device whose maximum earth leakage threshold for tripping should not exceed 30 milliamps for domestic connections and 100 milliamps for all other installations, so as to disconnect the supply instantly on the occurrence of earth fault or leakage of current.
26.	<b>Electrical Installations and Apparatus of Voltage exceeding 650 Volts</b>	<p>1 The electrical installation so self-certified 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.</p> <p>2 Before making an application to the Electrical Inspector for permission to</p>

		commence or recommence supply in installations above the notified voltage after an installation has been disconnected for six months, 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 12 to 29, regulations 33 to 35, regulations 44 to 51 and regulations 55 to 77 have been complied with and the approval in writing of the Electrical Inspector has been obtained by him.
<b>27.</b>	<b>Use of Electricity at Voltage Exceeding Notified Voltage</b>	<ol style="list-style-type: none"> <li>1 A sub-station or a switching station with apparatus having more than 2000 litres of oil shall not be located in the basement where proper oil draining arrangement cannot be provided.</li> <li>2 Provision shall made for suitable oil soakpit and where use of more than 9000 litres of oil in any one oil tank, receptacle or chambers 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.</li> <li>3 he shall ensure that the transformers of 10 MVA and above rating or in case of oil filled transformers with oil capacity of more than 2000 liters are provided with fire fighting system its per IS - 3034: 1993 or with Nitrogen Injection Fire Protection system.</li> <li>4 All apparatus shall be protected against lightning and apparatus exceeding 220 kV shall also be protected against switching over voltages.</li> </ol>
<b>28.</b>	<b>Inter-locks and Protection for use of Electricity at Voltage Exceeding 650 Volts</b>	<ol style="list-style-type: none"> <li>1 Gas pressure type and winding and oil temperature protection to give alarm and tripping shall be provided on all transformers of ratings 1000 KVA and above.</li> <li>2 Transformers of capacity 10 MVA and above shall be protected against incipient faults by differential protection.</li> <li>3 All generators with rating of 100 KVA and above shall be protected against earth fault or leakage.</li> <li>4 In respect of existing 132 kV sub-stations 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.</li> <li>5 Distance protection and carrier communication protection shall be provided for all lines connecting to 400/220 kV substation.</li> </ol>
<b>29.</b>	<b>Testing, Operation and Maintenance</b>	<ol style="list-style-type: none"> <li>1 No new apparatus, cable or supply line of voltage exceeding 650 Volts shall be commissioned unless such apparatus, cable or supply line are subjected to site tests as per relevant code of practice of the Bureau of Indian Standards.</li> <li>2 Failures of transformers and reactors of 20 MVA or MVAR and higher capacity shall be reported by the consumer and the suppliers of electricity, within forty eight hours of the occurrence of the failure, to the Central Electricity Authority and the reasons for failure and measures to be taken to avoid recurrence of failure shall be sent to the Central Electricity Authority within one month of the occurrence.</li> </ol>
<b>30.</b>	<b>Pole type Sub-stations</b>	In the case of pole type sub-station on wooden supports and wooden platform the metal hand-rail shall not be connected with earth.

31.	<b>Supply to Luminous tube sign Installations of Voltage Exceeding 650 Volts but not Exceeding 33 kV</b>	<ol style="list-style-type: none"> <li>1 An interior installation shall be provided with suitable adjacent means for disconnecting all phases of the supply except the "neutral" in a 3-phase, 4-wire circuit.</li> <li>2 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 3-phase, 4-wire circuit shall be provided and fixed in a conspicuous position at not more than 1.70 metres above the ground.</li> <li>3 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.</li> <li>4 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.</li> </ol>												
32.	<b>Supply to X-ray and high frequency Installations</b>	<ol style="list-style-type: none"> <li>1 Mechanical barriers shall be provided to prevent top 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 arid 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.</li> <li>2 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.</li> <li>3 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.</li> </ol>												
<b>Safety requirements for overhead lines, underground cables and generating stations</b>														
33.	<b>Material and Strength</b>	<ol style="list-style-type: none"> <li>1 All conductors of overhead lines shall have a breaking strength of not less than 350 kg.</li> <li>2 Where the voltage, does not exceed 250 V and the span is of less than fifteen metres, and is drawn through the owner's or consumer's premises, a conductor having an actual breaking strength of not less than 150 kg may be used.</li> </ol>												
34.	<b>Maximum Stresses and Factors of Safety</b>	<ol style="list-style-type: none"> <li>1 The following minimum factors of safety, namely: <table style="width: 100%; border: none;"> <tr> <td style="padding-left: 20px;">(a) for metal supports</td> <td style="text-align: right;">1.5</td> </tr> <tr> <td style="padding-left: 20px;">(b) for mechanically processed concrete supports</td> <td style="text-align: right;">2.0</td> </tr> <tr> <td style="padding-left: 20px;">(c) for hand-moulded concrete supports</td> <td style="text-align: right;">2.5</td> </tr> <tr> <td style="padding-left: 20px;">(d) for wood supports</td> <td style="text-align: right;">3.0</td> </tr> </table> </li> <li>2 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.</li> <li>3 The minimum factor of safety for conductors shall be two, based on their ultimate tensile strength, in addition, the conductor's tension at 32° C, without external load, shall not exceed the following percentages of the ultimate tensile strength of the conductor. <table style="width: 100%; border: none;"> <tr> <td style="padding-left: 20px;">(a) Initial unloaded tension</td> <td style="text-align: right;">35 percent</td> </tr> <tr> <td style="padding-left: 20px;">(b) Final unloaded tension</td> <td style="text-align: right;">25 percent</td> </tr> </table> </li> </ol>	(a) for metal supports	1.5	(b) for mechanically processed concrete supports	2.0	(c) for hand-moulded concrete supports	2.5	(d) for wood supports	3.0	(a) Initial unloaded tension	35 percent	(b) Final unloaded tension	25 percent
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35.	<b>Clearance above Ground of the Lowest</b>	<ol style="list-style-type: none"> <li>1 For lines of voltage exceeding 33 kV the clearance above ground shall not be less than 5.2 metres plus 0.3 metre for every 33,000 Volts or part thereof by which the voltage of the line exceeds 33,000 Volts.</li> </ol>												

	<b>Conductor of Overhead Lines</b>	2 For High Voltage Direct Current (HVDC) lines, the clearance above ground shall not be less than:																								
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<b>36. Clearance from Buildings of Lines of voltage and Service Lines not Exceeding 650 Volts</b>	<p>1 for any flat roof, open balcony, varandah roof and lean-to-roof</p> <p>(a) when the line passes above the building a vertical clearance of 2.5 metres from the highest point, and</p> <p>(b) when the line passes adjacent to the building a horizontal clearance of 1.2 metres from the nearest point, and</p> <p>2 for pitched roof-</p> <p>(a) when the line passes above the building a vertical clearance of 2.5 metres immediately under the line, and</p> <p>(b) when the line passes adjacent to the building a horizontal clearance of 1.2 metres.</p> <p>3 Any conductor so situated as to have a clearance less than that specified above shall be adequately insulated and shall be attached at suitable intervals to a bare earthed bearer wire having a breaking strength of not less than 3 50 kg.</p>																									
<b>37. General Clearances</b>	<p>1 No blasting for any purpose shall be done within 300 metres from the boundary of a sub-station or from the electric supply lines of voltage exceeding 650 V or tower structure thereof without the written permission of the owner of such sub-station 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.</p> <p>2 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 metres.</p>																									
<b>38. Conditions to apply where Telecommunication Lines and Power lines are carried on same Supports</b>	<p>1 Every overhead telecommunication line erected on supports carrying a power line shall consist of conductors each having a breaking strength of not less than 270 kg.</p> <p>2 Where a telecommunication line is erected on supports carrying a power line of voltage exceeding 650 V, arrangement shall be made to safeguard any person against injury resulting from contact, leakage or induction between such power and telecommunication lines.</p>																									
<b>39. Guarding</b>	Every guard-wire shall have an actual breaking strength of not less than 635 kg and if made of iron or steel, shall be galvanized.																									
<b>40. Service lines from Overhead Lines</b>	The number of tappings per conductor shall not be more than four in case of connections at voltage not exceeding 650 V.																									

41.	<b>Earthing</b>	<ol style="list-style-type: none"> <li>1 Metallic bearer wire used for supporting-insulated wire of overhead service lines of voltage not exceeding 650 V shall be efficiently earthed or insulated.</li> <li>2 Each stay-wire shall be similarly earthed unless insulator has been placed in it at a height not less than 3.0 metres from the ground.</li> </ol>
42.	<b>Laying of Cables</b>	<ol style="list-style-type: none"> <li>1 No underground power cable of voltage exceeding 33 kV shall be laid without a minimum underground depth of 1.2 meters.</li> <li>2 No underground telecommunication cable shall be laid without a minimum separation distance of 0.6 meters to the underground power cable of Voltage exceeding 33 kV.</li> </ol>
43	<b>Voltage of Supply to Vehicle</b>	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.
44.	<b>Leakage on Conduit System</b>	<ol style="list-style-type: none"> <li>1 where the rails are used to form any part of the return, they shall be electrically connected at distances not exceeding 30 metres 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 sub-station through an instrument suitable for the indication of any contract or partial contact of either the line or the return with the conduit.</li> <li>2 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 km of single tramway track the transmission and use of electricity shall be suspended unless the leakage is stopped within twenty four hours.</li> </ol>
45.	<b>Isolation of Sections</b>	Every trolley wire shall be constructed in sections not exceeding 1.6 km. in length, and means shall be provided for isolating each section.
46.	<b>Method of Earthing</b>	Where earthing is necessary in a mine, it shall be carried out by connection to an earthing system at the surface of the mine and in such manner as may be approved by the Electrical Inspector of Mines.
47.	<b>Protective Equipment</b>	In the interest of safety, appropriate equipment shall be suitably placed in the mines for automatically disconnecting supply to any part of the system, where a fault, including an earth fault, occurs and fault current shall not be more than 750 milliampere in installations of voltage exceeding 250 V and upto 100 V for below ground mines and oil fields and 50 ampere in installations of voltage exceeding 11.00 V and upto 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.
48.	<b>Earthing Metal</b>	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.
49.	<b>Voltage Limits</b>	<ol style="list-style-type: none"> <li>1 Electricity shall not be transmitted into a mine at a voltage exceeding 11000 Volts and shall not be used therein at a voltage exceeding 6600 Volts.</li> <li>2 In fixed plants, the said voltage may be permitted upto 650 V, if the bolted type plug is used.</li> </ol>
50.	<b>Cables</b>	<ol style="list-style-type: none"> <li>1 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</li> </ol>



		<p>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.</p> <p>2 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 30 m measured along either cable.</p>
<b>51.</b>	<b>Flexible Cables</b>	<p>1 For machines of voltage exceeding 650 V but riot exceeding 33 kV a bolted type connector shall be used and the trailing cable shall be suitably anchored at the machine end.</p> <p>2 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 conductors.</p> <p>3 Flexible cable exceeding hundred metres in length shall not be used with any portable or transportable apparatus.</p>
<b>52.</b>	<b>Haulage</b>	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 consent in writing of the Electrical Inspector, and subject to such conditions as he may impose in the interests of safety.
<b>Safety Provisions for Electric Vehicle Charging Stations</b>		
<b>53.</b>	<b>safety Requirement</b>	<ol style="list-style-type: none"> <li>1. All electric vehicle charging stations shall be provided with protection against the overload of input supply and output supply fittings.</li> <li>2. All electric vehicle charging points shall be installed so that any socket-outlet of supply is at least 800 millimeter above the finished ground level.</li> <li>3. An adaptor shall not be used to connect a vehicle connector to a vehicle inlet.</li> <li>4. The electric vehicle parking place shall be such that the connection on the vehicle when parked for charging shall be within five meter from the electric vehicle charging point.</li> <li>5. Portable socket-outlets are not permitted to be used for electric vehicle charging.</li> <li>6. Suitable lightning protection system shall be provided for the electric vehicles charging stations as per Indian Standards Code IS/ IEC 62305.</li> <li>7. One second after having disconnected 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 D.C., and the stored energy available shall be less than 20 J (as per IEC 60950) and if the voltage is greater than 42.4 V peak (30 V rms) or 60 V D.C., or the energy is 20 J or more, a warning label shall be attached in an appropriate position on the charging stations.</li> <li>8. The Direct Current (D.C.) electric vehicle charging point shall disconnect supply of electricity to prevent overvoltage at the battery, if output voltage exceeds maximum voltage limit sent by the vehicle.</li> </ol>
<b>54.</b>	<b>Earth protection system for charging stations</b>	<ol style="list-style-type: none"> <li>1. All residual current device for the protection of supplies for electric vehicle shall, - <ul style="list-style-type: none"> <li>• have a residual operating current of not greater than 30 mA;</li> <li>• interrupt all live conductors, including the neutral; and</li> <li>• have a performance at least equal to Type A and be in conformity with IS 732-2018.</li> </ul> </li> <li>2. Each electric vehicle charging points shall be supplied individually by a dedicated final sub-circuit protected by an overcurrent protective device complying with IEC 60947-2, IEC 60947-6-2 or the IEC 60269 series and the overcurrent protective device shall be part of a switchboard.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Earthing of all electric vehicle charging stations shall be as per IS 732.</li> <li>4. 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 of sufficient rating to satisfy the requirements of IEC 60364-5-54.</li> </ol>
55.	<b>Requirement to prevent fire for electric vehicle charging stations</b>	<ol style="list-style-type: none"> <li>1. Fire detection, alarm and control system shall be provided as per relevant Indian Standards.</li> <li>2. Power supply cables used in charging station or charging points shall conform to IEC 62893-1 and its relevant parts.</li> </ol>
56.	<b>Testing of charging stations</b>	All apparatus of charging stations shall have the insulation resistance value as stipulated in the relevant IEC 61851-1.
57.	<b>Maintenance of records</b>	<ul style="list-style-type: none"> <li>• The owner of the charging station shall keep records in regard to design, construction and labelling to be compatible with a supply of standard voltage at a nominal frequency of 50 Hertz of the charging station.</li> <li>• The owner of the charging station shall keep records of the relevant test certificate as indicated in these regulations and as per IEC 61851.</li> </ul>
58.	<b>International Standard for charging stations</b>	<ul style="list-style-type: none"> <li>• The safety provisions of all Alternating Current charging stations shall be in accordance with IEC 61851-1, IEC 61851-21 and IEC 61851-22.</li> <li>• The safety provisions of all Direct Current charging stations shall be in accordance with IEC 61851-1, IEC 61851-21, IEC 61851-23 and IEC 61851-24.</li> <li>• Where the connection point is installed outdoors, or in a damp location, the equipment shall have a degree of protection of at least IPX4 (Ingress Protection Code) in accordance with IEC 60529.</li> </ul>