

SAFETY STANDARDS

No. RERC/ Secy/ Safety Standards

Date: 5th January 2004

In exercise of powers conferred on it by Section- 9 (1) (l) of the Rajasthan Power Sector Reforms Act, 1999 and all powers enabling it in that behalf the Rajasthan Electricity Regulatory Commission (RERC) makes the Safety Standards.

0.1 Short title, Commencement and Scope:

- (i) These standards shall be called Safety Standards.
- (ii) These shall be followed to the extent applicable by all licencees and generating companies operating in the State of Rajasthan.
- (iii) They shall come into force on the date of their publication in the Rajasthan Gazette.

0.2 Definitions:

- i 'Act' shall mean the Rajasthan Power Sector Reforms Act 1999.
- ii 'Commission' shall mean Rajasthan Electricity Regulatory Commission.
- iii 'Electrical Inspector or Inspector' shall have the meaning assigned to it in the Indian Electricity Rules 1956.
- iv "EHV" means Extra High Voltage (132 kV and above)
- v "GRID CODE" means the code prepared by the Licensee in accordance with clause 12 of the Transmission and Bulk Supply Licence
- vi "GSS" means Grid Sub Station i.e. Sub Station of system voltage exceeding 33 kV
- vii 'Licencee' shall mean utilities engaged in the business of transmission of energy and / or supply of energy to the licencees or consumers.
- viii "NREB" means Northern Regional Electricity Board
- ix "NRLDC" means Northern Regional Load Dispatch Centre
- x 'Officer' shall mean Officer of Licensee.
- xi "PTW" means Permit to Work
- xii "RULES" means the Indian Electricity Rules, 1956.
- xiii 'RVPN' shall mean Rajasthan Rajya Vidyut Prasaran Nigam Limited i.e. transmission & bulk supply licensee.
- xiv "SLDC" means State Load Dispatch Centre

- xv "SSGS" means State Sector Generating Stations
- xvi "Sub-Transmission" means electrical system where voltage exceeds 650 Volt and does not exceed 33000 Volts.
- xvii VVNL-shall mean distribution licensee.

Other terms used in these standards shall have meaning as defined in the Reforms Act & Rules & Regulations framed there under.

0.3 Scope:

- (i) Safety of consumers and maintenance staff of the utilities is of prime importance from hazards of electric shock, which may be caused in the transmission & distribution system. These standards aim at ensuring safety for construction and maintenance personnel of the Licensee as also other personnel including personnel of contractor, Generation Companies and members of general public from hazards of electric shock, which may be caused while working with Licencee's systems. The Licensee shall prepare a Safety Manual based on these Standards for internal use. The Safety Manual shall be prepared such that all the aspects and safety procedures to be followed are covered in a complete manner without inviting reference to any other Codes or Standards. Any references if required, be appended to the manual. Details of working zones and necessary isolations required for working on each equipment/line shall be clearly furnished in the Safety Manual. The Safety Manual shall also lay down foolproof procedures for issue of necessary permits and clearances (hereinafter called as "Permit to Work" or PTW) to the designated officer seeking such permits. The designated officer authorized to issue and receive such permits, shall be notified from time to time. A draft procedure for issue of PTW for inter-user boundary is appended at Annexure-A
- (ii) It is the duty of all persons who may be connected with the installation, operation and maintenance of electric lines and apparatus to make themselves thoroughly conversant with the regulations and safety rules governing the work they may have to undertake on these lines and apparatus.
- (iii) These standards are in addition to or an elaboration of the Indian Electricity Act, 1910 and Indian Electricity Rules, 1956, to be complied with by licensee, generator, owners of premises and consumers.
- (iv) Safety instructions laid down by electricity supply undertakings in the form of safety rules or standing orders for guidance of staff employed in connection with the execution of work on or near electric lines and apparatus and for their operation and maintenance should be in consonance with IE Act, IE Rules & these standards and should be strictly

- complied with at all times.
- (v) It shall be the responsibility of the designated officer to interpret and explain correctly the rules and regulations to all concerned staff and to ensure that the staff thoroughly understands the same.
 - (vi) For the purpose of these standards, a competent person is one who had been certified so by the State Government, for specific category of electrical work, as laid down in Rule 45 of the IE Rules 1956.
 - (vii) Transmission or Distribution licensee or generating company, shall arrange regular training/ refresher courses to specified percentages of operating staff (including Junior Engineer) every year on operational aspects, including safety. In addition, periodical field level meetings shall be held to educate operating staff about the requirement of safety.

0.4 Reporting of Accidents:

(Rule No. 44A of IE Rules 1956)

- (i) If any accident occurs in connection with the generation, transmission, supply or use of energy in or in connection with any part of electric supply lines or other works of any person and the accident results in or is likely to have resulted in loss of human or animal life or in any injury to a human being or an animal, such person or any authorized person of the RVPN/ VVNLs/supplier, not below the rank of Junior Engineer or equivalent shall send to the Inspector a telegraphic report within 24 hours of the knowledge of the occurrence of the fatal accident and a written report in a form set out in annexure-XIII of IE Rules within 48 hours of the knowledge of the occurrence of the fatal accident and all other accidents. Where practicable a telephonic message should also be given to the Inspector immediately the accident comes to the knowledge of authorized officer of RVPN/ VVNLs/ Supplier or other person concerned. A draft of accident reporting procedure is attached at Annexure-B.
- (ii) Irrespective of enquiry by electrical Inspector duly authorized officer of licensee (not below the rank of Executive Engineer) shall conduct a detailed enquiry into every electrical/mechanical accident within a period not exceeding fifteen days, to guard against the possibility of destruction or disappearance of material evidence being presented and to escape responsibility. Non-operation of protective relay shall be deemed to be cause of electrical accident and shall also be enquired. The enquiry in general shall fix the responsibility for the accident but it is more important that enquiry shall spell out technical and other reasons which caused electrical accident including failure of protective relays, in adequate clearance, deficiencies in licensee's standards/codes/standing instruction etc. to prevent recurrence of such accident. Remedial measures to be adopted to avoid its reoccurrence shall also be

suggested.

0.5 These Standards consist of six Sections:

Section 1: General Precautions and Grounding measures

Section 2: Safety measures in construction and maintenance works in Transmission & Distribution Lines.

Section 3: Safety measures in construction and maintenance works in Sub Stations.

Section 4: Safety measures in operation of sub-stations, transmission & distribution lines.

Section 5: Additional Safety requirements in generating stations (to be added later on)

Section 6: Public Safety

0.6 Review

0.6.1 This standard shall be reviewed as and when:-

- (i) CEA notifies rules/ code/ standards (referred to as 'safety code') specifying measures for safety under section 53 and section 177 (2) (b) of the Electricity Act 2003.
- (ii) Any change is effected in 'Safety Code' or Indian Electricity Rules or Indian Standards referred to in these standards or with the issue of new Indian Standards relevant to safety.
- (iii) Any difficulty is encountered in enforcing these standards or any deficiency is observed during its implementation.

0.6.2 For the contingencies mentioned at clause 0.6.1, the Commission may suo-moto or on the application made by any utility or any person initiate proceedings for review and effect amendments to these standards. Any change in Indian Electricity Rules or 'Safety Code' or relevant Indian Standards shall be brought to the notice of the Commission by the utility within 30 days with the proposed amendments to these standards. In the meanwhile, revised provisions of Indian Electricity Rules or Safety Code shall prevail.

SECTION-1

GENERAL PRECAUTIONS AND GROUNDING MEASURES:

- 1.1 All conductors and equipment in the vicinity and not covered by PTW, shall be treated as energized. The designated officer shall ascertain the following conditions before permitting workmen to commence work:
 - (a) The lines or equipment are de-energized and grounded,
 - (b) Any hazards of induced voltages are not present,
 - (c) Adequate clearance as per clause 1.15 are maintained or other means are implemented to prevent contact with energized lines or equipment, and or line / equipment under PTW.
- 1.2 Bare wires of telecommunication lines if any, on power lines or structures, which are not protected by insulating materials shall be treated as energized.
- 1.3 The following procedure shall be adopted for deenergizing lines and equipment in cases where means of disconnection from electricity supply is not visibly open:
 - (a) The Particular section of line or equipment to be deenergized shall be clearly identified and isolated from all sources of voltage.
 - (b) For each transmission line/equipment, the designated authority authorized to issue a PTW shall take the following precautions:
 - (i) The circuit breakers and associated isolators through which there is a possibility of supply of electrical energy to the particular section of the line or equipment to be worked upon shall be kept open. In addition to circuit breakers, its associated isolator need always be opened before taking up any work on deenergised line/ system.
 - (ii) Caution Boards indicating "Men at Work" shall be fixed on panels from which all the above circuit breakers and isolators are operated.
 - (iii) If design of circuit breakers and isolators permit automatic operation or operation from a remote place, the same shall be rendered inoperable.
 - (iv) Isolators / grounded switches are usually provided with padlocking arrangement for both open and closed positions. Where such facility exists, normally isolators are padlocked in

- open and ground switch in closed position before issuing permit to work (PTW) to avoid inadvertent operation.
- (c) Once all the required circuit breakers and switches have been opened and rendered inoperable, visual inspection shall be carried out to ensure physical separation from energized system or otherwise ascertaining through communication from other end of line. Grounding of the line / equipment shall be made and only thereafter testing for voltage be conducted before accessing the line or equipment. Testing of de-energized and grounded line / equipment can be safely carried out by normal "multimeter" as grounding ensures practically no voltage on line / equipment.
 - (d) Protective grounds shall be provided to the disconnected lines or equipment to be worked on. If there is any grounding switch available in disconnected portion, the same shall be closed.
 - (e) Guards or barriers duly mounted cautioned marks/plates shall be erected wherever found necessary to the adjacent energized lines.
 - (f) When more than one independent crew requires PTW for the same line or equipment, each one should obtain separate PTW. The designated officer/official in charge (for each such independent crew) shall place a "Work in Progress" board on all line or equipment or its control gear.
- 1.4 On completion of work on de-energized lines or equipment, each crew in charge shall ensure the following:
- (a) All the employees in his crew are clear off the work site and accounted for, and
 - (b) Only after ascertaining that protective grounds installed by his crew have been removed, the crew in charge shall report to the holder of PTW that all tags demarcating the work area may be removed.
- 1.5 When attaching grounds, the ground end shall be attached first, and then the other end shall be attached to the equipment or line by means of insulated tools or other suitable devices.
- 1.6 While removing the grounds after completion of work, the attachment at the conductor or line end shall be removed by means of insulated tools or other devices before the grounding at ground end is removed.
- 1.7 While working on line or sub-station equipment, grounding provided on tower / pole or sub-station should be used. Such grounds should be made/ remixed by means of insulated tools or devices.
- 1.8 In some cases establishing a ground connection to any equipment may become impracticable or the conditions resulting there-from would be more hazardous. In such cases working on lines or

equipment without grounding such equipment may be permitted and the ungrounded line or equipment shall be treated as energized for working purposes even though they may have been disconnected from the source of electric supply.

- 1.9 Grounds may be temporarily removed only when necessary for test purposes. Extreme caution shall be exercised during such test procedures.
- 1.10 The ground electrodes shall have a resistance to ground as low as possible so that they may not cause any danger or harm to the working personnel due to induced voltages. In case of any accidental contact with live conductors, either the voltage rise shall be too small to cause any shock hazards or the same shall result isolation of the circuit causing the voltage rise by fast acting relays.
- 1.11 The minimum size of ground lead shall be 70 sq.mm PVC insulated aluminum or 2 SWG copper. The earth electrodes for temporary earths shall be of mild steel rods of at least 20mm diameter and 1524mm length. These shall have clean metal surfaces, free from rust or any coating of paint or other poor conducting material and be driven to a depth of at least one meter in a spot considered to give good earth. The earth leads shall be connected to the ground rod using an appropriate crimped terminal for the lead and through suitable bolts and nuts to the ground rod. Earthing chains, used for grounding overhead lines up to 33kV voltage, shall be made of brass wire rods of dia 1.5 mm. The length of each chain shall be 9 meters and it shall be provided with a electro plated steel ball weight at one end and a brass clip (like battery terminal) at the other end. The brass ball shall be round in shape and shall be of 30 gms. approximately. The weight of each link shall be 15 gms. approximately. The weight of complete chain shall be approx. 400 gms.
- 1.12 Grounding of generating stations, grid sub stations & sub stations shall be checked periodically.

1.13 Fire Protection & First Aid

- (a) In addition to fire extinguishers suitable for dealing with electric fires fire buckets filled with clean dry sand and ready for immediate use for extinguishing fires, shall be conspicuously marked and kept in all generating stations, enclosed sub-stations and switch stations at convenient situations. The fire extinguishers shall be tested for satisfactory operation at least once a year and record of such tests shall be maintained.
- (b) First-aid boxes or cupboards, conspicuously marked and equipped with such contents as the State Government may specify, shall be provided and maintained in every generating station enclosed sub-station and enclosed switching station so as to be readily accessible

during all working hours. Except in the case of unattended sub-stations and switch stations, all such boxes and cupboards shall be kept in charge of responsible persons, who are trained in first-aid treatment. One of such person shall be available during working hours.

- (c) Instructions to avoid electrocution, provisions of first aid and safety against spillage/ fumes of electrolytes (acid or alkali) of battery are to be displayed in each sub station.
- (d) Safety devices like insulated pliers, hand gloves, helmets, insulated shoes, safety belts, insulated crimping tools, insulated mats should be provided for employees / operators working at generating station/ sub station/ grid sub-stations.
- (e) No employee shall be allowed to work without using safety devices like insulated pliers, hand gloves, helmets, and insulated mat etc.

1.14 Wherever infringement of clearances, with respect to provisions of rule 79 & 80 of IE Rules are observed during inspection or otherwise, action as per Rule 79 of IE Rules will be taken and rectification will be effected at owner's cost & if owner's responsibility could not be fixed then at supplier's cost (Ref rule 79).

1.15 The following minimum safety working clearances shall be maintained for the bare conductors or live parts of any apparatus in outdoor sub-stations, excluding overhead lines of HV and EHV installations.

Highest System Voltage (KV)	Safety working clearances (Meters) (As per rule 64 (2) (a) (ii) of IE Rules)
12	2.6
36	2.8
72.5	3.1
145	3.7
245	4.3
420	6.4

Notes: -

- (1) The above values are valid for altitude not exceeding 1000 meter (m). A correction factor of 1.25 per cent per 100m is to be applied for increasing the clearance for altitudes more than 1000m and up to 3000m.
- (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).

- 1.16 While working at night, operation area will be well lighted by torches/focused lights etc.

SECTION-2

SAFETY MEASURES IN CONSTRUCTION AND MAINTENANCE WORKS OF TRANSMISSION /SUBTRANSMISSION/ DISTRIBUTION LINES

(A) TRANSMISSION/ SUBTRANSMISSION & DISTRIBUTION LINES

- 2.1 The excavation for pad or pile type foundations in excess of 1.5 mtr, depth located on unstable earth, shall be either sloped to the angle of repose or shored if entry is required. Ladders shall be provided for access to pad or pile type-footing excavations in excess of 1.2 mtr.
- 2.2 Wherever the foundation is being constructed on unstable earth, the workmen shall not be permitted to enter the excavated pit unless shoring is used to protect them.
- 2.3 Only responsible and skilled employees shall be deployed for directing mobile equipment adjacent to footing excavation.
- 2.4 No workmen shall be permitted to remain in the excavated pit where concreting is done using machinery.
- 2.5 The mobile equipment shall be located only on leveled earth to ensure stability.
- 2.6 Sufficient care shall be taken during tower erection to see that more than the minimum number of workmen is not deployed. This will minimize exposure of falling objects on workmen, when working at two or more levels. Proper protection such as use of helmets, safety belts etc., shall be taken.
- 2.7 Tie ropes shall be used wherever necessary for maintaining steel sections or other parts in position to reduce the possibility of tilting etc.
- 2.8 Adequate supports shall be provided for the tower members and sections of panels during assembly.
- 2.9 The construction of Transmission towers, erection of poles, tools and machinery being used for the work shall meet the requirements of the relevant Indian Standard Specifications and Code of Practices along with the CBIP manual on Transmission Lines. The wire ropes, pulley blocks etc., shall be of tested quality and inspected by a responsible employee for its fitness before commencing the work.
- 2.10 Other than the supervisory staff and such of the workmen required to guide and assist the section being erected, no one else shall be permitted to come under a tower being erected.
- 2.11 If hoisting equipment are used for erection of towers adjacent to existing transmission lines, the lines shall be de-energized wherever possible. When this is not practicable, extraordinary precautions shall be exercised to maintain the minimum clearances required including those mentioned in sub clause 1.15 of section-1.

2.12 (a) All practical steps shall be taken to prevent operating the earth moving, lifting and housing machinery in dangerous proximity to a live overhead power line. In particular, any part (s) of such machinery shall not be permitted to approach as per clause 3.1.5.1 of IS 7293-1974 within the following distance of overhead power lines:

11kv and below	1.40m
33kv and below	3.60m
132kv and below	4.70m
220kv and below	5.70m
400kv and below	6.50m

(b) If it becomes necessary to operate the machinery with clearances less than those specified in (a), it shall be ensured that the overhead power lines are invariably shut off during the period of operating of the machinery. Location of any underground power cables in the area of operation shall also be ascertained and necessary safety precautions taken.

(c) Wherever cranes are used for erection, the same shall be set on firm foundations. The outriggers of the cranes shall be used wherever available. The wheels shall be locked in position to prevent dislocation during handling. While working with cranes it is necessary that 'Load' to be lifted or moved does not cross 'tipping load' of crane for boom length and radius at which operation is being performed.

2.13 Suitable tie ropes shall be used to maintain control of tower sections being raised and positioned wherever possible and proper care shall be taken to see that they do not create any hazard. The wire rope used for carrying the section shall not be detached before the section is adequately secured.

2.14 The erection or maintenance work shall not be carried out during high wind, thunderstorms and heavy rainfall, which would make the work hazardous, except during emergency restoration procedure.

2.15 The designated officer shall keep maintained all the equipment, tools and plant in safe operating conditions.

2.16 Adequate traffic control shall be maintained wherever erection work is being carried out at highway crossings. The permissions required from the concerned authorities, such as department of highway, police etc., shall be obtained before commencement of work. Similarly, for erection work at railway crossing, the permission / Railway block shall be obtained from railway authorities before commencing the work.

2.17 The designated officer shall ensure the required clearance to be maintained while equipment moving under or near the energized

- lines. While moving under or near an energized line, moving equipment needs to be earthed by earthing chain(s) etc. and it is to be ensured that no part of earthed equipment is at a height of 2.44 meters (i.e. 8 feet) above the ground. While operating an equipment from a fixed position, the section safety working clearance as per section-1 shall be maintained from operating foot in/ on earthed equipment.
- 2.18 Before commencing the stringing operations or removal of conductors a briefing shall be held by the supervisor with the workmen setting forth the following:
- (a) Plan of operation.
 - (b) The type of equipment, tools, and plant to be used.
 - (c) Grounding devices and procedures to be followed.
 - (d) Crossover methods to be employed, and
 - (e) The clearance authorization required.
- 2.19 Wherever there is a possibility of the conductor being handled coming in contact with an energized conductor, or there is a possibility of a dangerous voltage build up due to induction, the conductor being handled shall be grounded, unless a provision is made to insulate or isolate the employee. If the existing line is de-energized, a PTW shall be obtained and the line grounded on both sides of the cross over. In case the PTW cannot be obtained, the line shall be considered as energized for all practical purposes.
- 2.20 While executing the work of crossing over an existing line, suitable guard structures with rope nets shall be installed to isolate the conductors and workmen coming within the required minimum clearances specified for the voltage. If there is any auto reclosure installed on the energized line, the same shall be made inoperative. In addition, the line being handled shall be grounded on either side of the cross over.
- 2.21 The conductors being strung or removed shall be kept under control by using adequate reels, guard structures, tie line, or any other appropriate means to prevent accidental contact with energized wires.
- 2.22 The guard structure shall have sufficient strength and have adequate dimensions and supported adequately.
- 2.23 The wire ropes, come along clamps, anchors, guys and hoists shall have ample capacity to prevent failure/ accident. The load rating specified by the manufacturers for stringing equipment, pulley blocks, all other load bearing hardware and tools shall not be exceeded during operations. These shall be inspected regularly and replaced/ repaired when found damaged or when its dependability is doubtful.

- 2.24 Come along clamps designed for the specific conductor range only shall be used. During stringing or removal of conductors, no workmen shall be permitted to come directly under overhead operations, or on the cross arms. The dead end points of the conductors at section towers shall be adequately anchored before commencing operations. The grounds provided to the conductor shall be maintained intact until the conductors are hooked on to the insulators.
- 2.25 The reel handling equipment, including pulling and braking machines having ample capacity to operate smoothly, shall be leveled and aligned in accordance with the manufacturer's operating instructions. Reliable communication between the operator of these machinery and the stringing operators shall be provided.
- 2.26 Each conductor shall be dead-ended at both ends before commencing stringing of the conductor in the next section.
- 2.27 The sequence of stringing of conductors and ground wires shall strictly follow the design conditions of erection loads considered for the structure. The method of erection shall not impose loads in excess of design loads on the structure.
- 2.28 In addition to the above before commencing the stringing or releasing operations of any conductor adjacent to an energized line, the following precautions shall be observed:
- (a) The possibility of dangerous voltages due to induction, particularly during switching and fault conditions, shall be investigated.
 - (b) The tension stringing method or such other methods, which preclude unintentional contact between the lines being pulled and the employee, shall only be used.
 - (c) Specific provisions for tension stringing:
 - (i) All the pulling and tensioning equipment shall be isolated, insulated, or effectively grounded.
 - (ii) A ground rod shall be installed between the tensioning reel setup, and the first structure in order to ground each bare conductor, sub-conductor, or overhead ground wire during stringing operations.
 - (iii) The grounds shall be left in place until the conductor installation is completed.
 - (iv) These grounds shall be removed at the last phase of cleanup operations.
 - (v) These grounds shall be placed or removed only with a Hot Stick.
 - (d) During stringing or unstringing operations, each conductor or ground wire shall be grounded at the first tower adjacent to both the tensioning and pulling setup and in increments so that

no point is more than 2 KM apart. For lines of 132 kV & higher voltage, these shall not exceed 3 KM.

- (e) Conductor and ground wires shall be grounded at all dead- end points.
- (f) A ground shall be located at each side and within 3 Mtr. of working areas where conductors, or ground wires are being jointed at ground level. The two ends to be jointed shall be bounded to each other. The jointing shall be carried out either on insulated platform or on a conductive metallic grounding mat bounded to grounds. When grounding mat is used, the same shall be barricaded and an insulated walk way provided for access to the mat.
- (g) All the conductors and ground wire shall be bonded to the end tower where the work is to be completed. At the dead end tower, the de-energized line shall be grounded.
- (h) The grounds can be removed on completion of the work making sure that the line is not left open circuited at any tower at which the work is carried out.

(B) SPECIFIC PROVISIONS FOR HOT LINE MAINTINANCE WORKS ON TRANSMISSION & SUB-TRANSMISSION LINES

2.29 The following precautions shall be taken for Hot-Line bare hand work in addition to all other applicable precautions specified in these Standards:

- (a) Only qualified and trained employees, trained for Hot-Line bare-hand technique and the pertinent safety requirements thereto, shall be permitted for the work.
- (b) The following checks shall be made before commencing Hot-Line bare hand work on energized high-voltage conductors or equipment:
 - (i) The voltage rating of the circuit on which the work is to be carried out,
 - (ii) The clearance to ground of the line and other energized parts on which work is to be carried out,
 - (iii) The voltage limitations of the aerial-lift equipment intended to be used.
- (c) The Hot Line equipment to be used shall be of proper design and tested.
- (d) Only a person trained and qualified to carry out Hot-Line bare-hand work shall supervise the work.

- (e) If any automatic re-closing feature is available on the circuit breakers or switches, the same shall be made inoperative before commencing the work on any energized Line or equipment.
- (f) The work shall not be carried out during thunderstorms.
- (g) A conducting Bucket liner or any other suitable conducting device shall be provided for bonding the insulated aerial device to the energized Line or equipment.
- (h) The employee shall be connected to the Bucket liner through conducting shoes, leg clips or by any other suitable means.
- (i) Adequate electrostatic shielding for the rated voltage of the line or equipment on which work is being carried out shall be provided to the workmen wherever necessary or conducting clothing shall be provided.
- (j) Only tools and plant intended for hot Line bare-hand work shall be used, and these shall be kept clean and dry.
- (k) The out riggers on the aerial truck shall be extended and adjusted to stabilize the body of the truck before the boom is elevated. The body of the truck shall be bonded to an effective ground or barricaded and considered as energized equipment for all purposes.
- (l) All the controls at ground level and bucket available in the truck shall be checked and tested to determine their proper working condition before moving.
- (m) Every day, and each time, before commencing the work, "arm current tests" shall be carried out. Aerial buckets used for hot-Line bare-hand work shall also be subjected to these tests. This test shall be carried out by placing the Bucket in contact with an energized source equal to the voltage to be worked upon for a minimum period of three (3) minutes and the leakage current shall not exceed one (1) microampere per kilo-volt of nominal line-to line voltage. The work shall be suspended immediately if any indication of a malfunction in the equipment is noticed.
- (n) All the aerial lifts shall have dual controls (lower and upper) as follows:
 - (i) The upper control shall be within easy reach of the employee in the basket. If a two-basket type lift is used, access to the controls shall be within easy reach from either basket.
 - (ii) The lower set of controls shall be located near the base of the boom that will permit over-ride operation of the equipment at any time.

- (o) Ground level lift control shall not be operated without the permission of the employee in the lift, except in case of emergency.
- (p) The conducting Bucket Liner shall be bonded to the energized conductor by means of a reliable connection before the employee contacts the energized part. This shall remain attached to the energized conductor until the work is completed.
- (q) Minimum clearance as per recommendations of hot line equipment supplier, corresponding to basic impulse level and switching surge level of the line shall be maintained from all grounded objects and from lines and equipment at a different voltage, to which the insulated aerial device is bonded, unless such grounded insulated guards cover objects or other lines and equipment. These distances shall be maintained when approaching, leaving, and when bonded to the energized circuit.
- (r) The above minimum distance shall be maintained between all parts of the insulated boom assembly and any grounded parts including the lower arm or portions of the truck, while approaching, leaving or bonding to an energized circuit.
- (s) The above table shall be printed on a plate of durable non-conducting material, mounted in the Buckets or its vicinity in such a position that the same is clearly visible to the operator of the boom. Insulated measuring sticks only shall be used to verify the clearances.
- (t) During positioning the bucket alongside an energized bushing or an insulator string, the minimum line-to-ground clearances indicated in the above table must be maintained.
- (u) The use of handlines between buckets, booms, and ground is prohibited.
- (v) No conducting material longer than 0.9 meter, other than the jumpers of appropriate length, armor rods, and tools shall be placed in the bucket.
- (w) Non-conductive type handlines may be used from line to ground only when the same is not supported from the bucket.
- (x) The bucket and the upper insulated boom shall not be overstressed by attempting to lift or support weights in excess of the manufacturer's rating.

(c) INSPECTION & TESTING

2.30 Inspection & testing shall be carried out as provided in section 6 of safety code.

SECTION-3

SAFETY MEASURES IN CONSTRUCTION & MAINTENANCE WORKS IN SUB STATIONS

- 3.1 Before commencement of a construction or maintenance work in an energized substation, appropriate authorization and the PTW shall be obtained from the designated, authorized person.
- 3.2 Before commencing the work, the protective equipment shall be checked for satisfactory performance and necessary precautions for safety of the personnel shall be ensured.
- 3.3 Extraordinary caution shall be exercised in handling bus bars, structures, and equipment in the vicinity of the energized facilities.
- 3.4 No employee/ operator shall be permitted to approach or take any conductive object, without a suitable insulating handle, closer to exposed energized parts than the minimum clearance as per recommendations of hot line equipment supplier, corresponding to basic impulse level and switching surge level of the line to which exposed energized part is connected.
- 3.5 The minimum working distance stated in the above table shall not be normally violated. These clearances can be curtailed only under the following conditions:
 - (a) The employee is insulated or guarded from the energized part or
 - (b) The energized part is insulated or guarded from him and other conductive object is at a different potential, or
 - (c) The employee is isolated, insulated, or guarded from any other conductive object (as during hot-line bare handwork).
- 3.6 When it is necessary to deenergize the equipment or lines for protection of employees the requirements of Clause-2.29 of section 2 shall be complied with.
- 3.7 Barricades or barriers shall be installed to prevent accidental contact with energized lines or equipment. Where appropriate, signs indicating the hazard shall be pasted near the barricade or barrier.
- 3.8 Only designated employees shall be permitted to work on equipment under PTW or adjacent control panels. All precaution shall be taken to avoid accidental operation of relays or other protective devices due to jamming, vibration, or improper wiring.
- 3.9 Designated employees shall at all time control the use of vehicles, cranes, and other equipment in restricted and hazardous areas.
- 3.10 All mobile cranes and derricks shall be effectively grounded when being moved or operated in close proximity with energized lines or

equipment. If this is not possible, the equipment shall be considered energized.

- 3.11 When a substation fence is to be expanded or removed for construction purposes, a temporary fence affording similar protection, like the site is unattended, shall be provided. Adequate interconnection with ground shall be maintained between temporary and permanent fences.
- 3.12 All gates in all the unattended substations shall be locked when the work is in progress.
- 3.13 Safety precautions against fire hazards in sub-station may be considered same as mentioned section-1.
- 3.14 It should be ensured that all tool/equipment are within its prescribed capability.

3.15 Clearances:

- (a) The licensee/ utility/ company shall draw its standards of line construction taking into considerations, the relevant factors like, structure type, (i.e. its height, mechanical strength etc.), conductor type (i.e. ACSR, AAC, line type (single circuit, double circuit, composite with/without shield /earth wire), conductor configurations span etc. All clearance will be based on 75 Deg. C conductor temperature to take into account the direct solar heating. Wherever, during inspection or otherwise clearances are less than such standards, the remedial measures will be taken with first priority attached to line crossing the road/ electrical line.
- (b) Guarding shall be provided wherever required to maintain electrical clearance. Minimum vertical clearance between ground & guarding of lines across or along the road or otherwise shall not be less than minimum clearance for low & medium voltage lines for similar case under rule 77, 77 (1) (a), 77 (2) (a) respectively. The horizontal clearance between guarding & any portion of building or structure shall be as decided by the Electrical Inspector in each case but shall not be less than that for high voltage line as per rule 80. Clearance between guard & lower line shall be as mutually agreed by owners of the lines.

3.16 INSPECTION & TESTING

Inspection & testing shall be carried out as provided at section 6 of safety code.

SECTION-4

SAFETY MEASURES IN OPERATION OF SUB-STATIONS, TRANSMISSION AND DISTRIBUTION LINES

4.1 Operational Safety Measures

The objectives of operation and maintenance management of a transmission system can be broadly defined as follows:

- (a) to ensure safety
- (b) to ensure maximum availability and high reliability
- (c) to reduce maintenance costs

Painted banners including following be fixed in yards entry, working room of workers, common places and offices;

- (a) Safety Saves Life
- (b) Use of hand gloves and safety measures saves your life.

The following operational safety measures should be taken during operation and maintenance on a transmission lines and sub-station:

4.2 Use of Gloves & Insulated shoes

Rubber gloves & insulated shoes should invariably be worn in all cases while operating gang operating switches controlling high tension lines and equipment where accidental contact of operating personnel with live parts are likely. While working near live lines and equipment and working on live low-tension lines and equipments, gloves should be worn.

4.3 Use of Safety Belts

Safety Belts should invariably be used in all cases while working on overhead system like transmission lines, Bus Bars, Sub-station equipment etc.

4.4 Use of rubber mats in Control Room/Switch Yard

Tested rubber mats should be kept in front of operating panels / switches etc. They should be checked for condition periodically and replaced as necessary.

4.5 Yard up-keeping

Grass, tree, and shrubs etc. should not be allowed to developed in the GSS yard. The land of yard should be treated with such chemicals, which prevents land fertility in the yards permanently. Periodically all shrubs and grass be cut from the yards particularly before rains and after rains. All branches of tree extending upto 2 meters from yard fencing should be trimmed before and after rains. The yard should be laid with stone gravel layer of 100 –150 mm thick with grit of 25 to 35 mm size.

4.6 Grounding of Yard Fence

- (i) The station fence should generally be far outside the sub-station equipment and grounded separately from the station ground. The station ground and the fence ground should not be inter-linked.
- (ii) To avoid any risk to a person walking near the fence inside the station, no metal part connected to the station ground, should be nearer to the fence than 1.5 meter. It is desirable to cover a strip about 3 meter wide inside the fence by a layer of crushed stone which keeps its high resistivity even under wet conditions.
- (iii) If the distance between the fence and the station structures cannot be increased to atleast 5 feet and if the fence is too near the sub-station equipment structure etc. the station fence should be connected to the station ground as otherwise a person touching the fence and the station ground through structure etc. simultaneously would be subjected to a very high potential under fault conditions. When the fence is connected to the station ground the danger zone will be outside the fence.

4.7 Sub-Station layout diagram & equipment numbering

- (i) A list should be prepared and put at a prominent place in the GSS Control Room showing all essential safety equipment and T&P to be maintained by all GSS.
- (ii) The numbering and identification of sub-station equipment and bus arrangement should be standardized and used consistently. All equipments shall have number and identification according to the scheme only. The numbering in the switchyard and in the control panels should be same to avoid possibility of any misunderstanding. The single line diagram in the control room shall have same numbering arrangement
- (iii) Single line schematic diagram (SLD) of the sub-station shall be put in the control room at prominent position. The SLD should indicate the bus and feeder arrangements with all associated

equipment in the GSS. The single line diagram shall be updated for any change /addition in the GSS.

- (iv) Seminars, demonstrations etc. be arranged from time to time for safety measures to be adopted. The workers be also explained that in 400 kV yards, because of electrostatic charge accumulation on sharp corners; nuts / bolts, structures and other items should be firmly gripped. The workers may feel discharge of charge from even earthed structure etc.

4.8 First Aid & Relief Measures

- (i) First Aid Box shall be maintained at each sub-station. These should be checked periodically and refilled or items replaced as necessary.
- (ii) Chart for providing relief and treatment of person-electrocuted should be displayed prominently at suitable places in the sub-stations. These should be checked for condition periodically and replaced as and when necessary.

4.9 Fire Fighting

- (i) Every licensee/ utility/ company shall carryout exercise of training, satisfactory operation of fire extinguishers once every year and maintain its record (Ref: Rule 43.)
- (ii) Fire fighting equipments such as fire buckets filled with sand and fire extinguishers for both electrical and oil fires should be maintained and kept at easily accessible place in sub-station and other working places required as per law. Fire fighting equipments are required to be inspected and maintained as per relevant legislation.

4.10 Circuit Breaker Operation

Make sure while doing maintenance work on circuit breaker:

- (i) Breaker is open before opening disconnects
- (ii) Line and bus isolators have been checked open
- (iii) There is no back feed from potential transformers
- (iv) Main fuses at the switchboard/panel have been removed and D.C. voltage is disconnected from breaker mechanism
- (v) Tools and equipment are in safe working condition.
- (vi) In outdoor HV or EHV breakers work must be done from ladders or platforms along side the breaker. Energized overhead conductors are dangerous for workmen to stand on these breakers. Essential work may be done from the top of the breaker only if protective barriers have been installed.

- (vii) Do not operate the breaker by solenoid or other operating mechanism without oil in the tank, as this will damage the breaker mechanism.
- (viii) When working on the mechanism with the breaker-closed, wire the trip latch or block the breaker closed so that it cannot be tripped accidentally.
- (ix) Be sure that auto-reclosure feature has been by-passed during maintenance work.
- (x) In case of ABCB and other pneumatically operated circuit breakers the circuit breakers should be closed after opening the isolators on both sides, to prevent fall of pneumatic pressure.
- (xi) After maintenance work is over the breaker should be operated by relay operation as test check. This ensures safety of the system for future faults.

4.11 Isolator Operation & Earth Switch Operation

- (i) The isolators should not operate (open or close) on load in any case.
- (ii) The isolators should not be operated (open or close) on charged line / transformer in any case.
- (iii) After opening isolator be sure that there is no pole stuck and all three poles of the isolators have been opened fully.
- (iv) After closing isolator be sure that all three poles of the isolators have been closed.
- (v) The isolator should be locked with pad lock and key after opening on PTW and should be closed when PTW is returned properly.
- (vi) When PTW is given for work on line the Earthing switch is closed after opening the isolator and both should be Locked in position till returned of PTW properly.

4.12 Precaution while Maintenance of Battery

- (a) While preparing electrolyte for initial filling up the new battery remember that the acid should be poured into water slowly and not the water into acid as it may splash acid on face or eyes.
- (b) Water should not be poured in concentrated acid as this will lead to chemical explosion.
- (c) If the acid is splashed in the eyes, immediately flush eyes with water followed by Olive Oil. If irritation does not subside bathe eyes with zinc and rose water lotion in eye glass.
- (d) If the acid is drunk by mistake, take a drink of soap suds and backing soda in a glass of water and get medical advice as soon as possible.
- (e) Don't take open flame near the battery especially while it is being charged.

4.13 While carrying / transporting any metal object in a sub station, no part of the object, shall be at a height exceeding 2.44 mtrs. (i.e 8 feet). Mobile crane will always be moved below energized bus with boom brought down to be below 2.44 mtrs.

4.14 Earthing :

- (i) Earth resistance: Licensee/ utility/ company shall draw standards for earth resistance of the GSS and shall maintain record of measurement of earth resistivity & earth resistance carried out before the commissioning of Grid sub-station or lines of above 33 KV voltage or each earthed structure of 33KV and lower voltage lines.
- (ii) The licensee/ utility/ company shall also carry out periodic measurement of earth resistance and will maintain its record. The periodicity will be as specified below. In case of any significant deviations the detailed investigations will be undertaken and requisite rectification will be carried out.
 - (a) Each manned sub-station/guarding Once every year.
 - (b) Other sub-station/line towers. 5% randomly selected locations every year.
- (iii) Earthing resistance shall be measured with reference to other electrode/earthmat at a distance at least 10 times the highest of length or breadth or depth of the earthing rod/electrode/earthmat. For such measurements, lead resistance will be subtracted.

4.15 Protection for EHV Sub Station:

- (i) The licensee/ utility/ company shall provide & maintain appropriate protective relays at 132kV GSS or above on all 33 KV & higher voltage transmission lines. The protective relays will also be provided on 11 KV outgoing feeders from GSS.
- (ii) All protective relays shall be tested for their proper operations atleast once every year & record of such testing will be maintained.
- (iii) Record of mal-operations or non-operations of all protective relays shall be maintained. After every such mal-operation investigation for its causes will be carried out & remedial measures will be taken.

4.16 Safety devices:

- (i) The licensee/ utility/ company shall maintain record of issue of safety items, like gloves, rubber shoes, safety belts, ladders, earthing device, first aid boxes, gas masks, to operators. Their availability at accessible place, periodic inspection by the inspector or officer & their deposit when found unserviceable/defective shall also be maintained.
- (ii) Instructions in English and Hindi shall also be affixed for restoration of persons suffering from electric shock. The supplier shall submit to the Commission the list of manned above 33kV Grid sub-station provided with artificial respirator and schedule of providing these at each manned GSS and not provided with such facility.

4.17 Joints:

Joints between conductors of overhead lines shall be mechanically and electrically secure under the conditions of operation. The ultimate strength of the joint shall not be less than 95 per cent of that of the conductor and the electrical conductivity not less than that of the conductor. (Provided that no conductor of an overhead line shall have more than two joints in a span).

4.18 General Safety Requirement:

- (i) The licensee/utility/company shall comply with provisions of Indian Electricity Rules 1956 in respect of various safety requirements (specially as provided at Rule 29, 35, 36, 42, 43, 44, 64, 74 to 80, 87 & 92 & in case of Distribution licensee rule 30, 33, 40, 48, 61, 61A)
- (ii) For the safety of the public all equipments / lines shall be so installed that ground clearance shall be maintained from foot of a person at a position upto which he can approach unhindered.
- (iii) A compensation shall be provided by licensee/utility/company where loss of life/injury to human being or animals occurs on account of electrical accident due to their default.

4.19 Voltage:

The supplier shall maintain hourly log of manned 11kV, 33kV, 132kV, 220kV & 400kV bus voltage at the manned sub-stations and randomly selected tail end points as may be notified from time to time by RERC which shall not be less than 5 per circle at 11kV.

4.20 Frequency profile

The supplier shall maintain frequency profile log (at 15 minutes interval) for the integrated system and additional one point in each of the islanded system.

4.21 Current Profile:

The supplier shall maintain hourly log of current at manned 11kV, 33kV, 132kV, 220kV & 400kV transformers & transmission lines. The current unbalance, i.e. neutral current shall not exceed 3%.

4.22 Inspection & Testing

Inspection & testing shall be carried out as provided at section 6 of safety code.

SECTION-5

**ADDITIONAL SAFETY REQUIREMENTS IN GENERATING STATIONS
(To be added later)**

SECTION-6

PUBLIC SAFETY

6.1 It is essential that safety should be adhered all times in the installation, operation and maintenance work. The safety instructions contained in this section, should be followed as normal routine duty.

6.1.1 This Section of the Code shall be read in conjunction with the following: -

(i) The Indian Electricity Rules 1956

(ii) IS: 5216 Recommendations on safety procedures and practices in electrical work.

(a) Part 1 1982 General

(b) Part 2 1982 Life saving techniques

(iii) IS: 2551-1982 Specification for danger notice plates

(iv) IS: 8923-1978 Warning symbol for dangerous voltages

6.1.2 Save as otherwise provided in these rules, the relevant code of practice of the Bureau of Indian Standards including National Electrical Code if any may be followed to carry out the purposes of this rule and in the event of any inconsistency, the provision of these rules shall prevail.

6.2 INSPECTION & TESTING

6.2.1 The licensee shall carry out periodic inspection and testing of his electric supply lines (including underground cables), wire fittings, apparatus, cutouts etc., to ensure compliance of rule 30, 31, 39, 46, 47, 49, 57, 61, & 65 of IE Rules, 1956 & licensee shall maintain record of such inspection & testing.

6.2.2 Inspection & testing of consumer's installation shall be carried out by the licensee at the time of service connection & thereafter periodically, as per schedule approved by RERC. Licensee shall maintain records of such inspections. Periodicity of inspection shall not normally exceed 6 months for HT consumers and 3 years for LT consumers.

6.2.3 Wherever, any deficiency is observed during inspection & testing, it shall be rectified within 3 months.

6.3 GENERAL SAFETY REQUIREMENTS

6.3.1 Construction, installation, protection, operation and maintenance of electric supply lines and apparatus shall be in confirmation to rule 29 of IE Rules.

6.3.2 The licensee shall ensure that in accordance with rule 31 & 32 of the IE Rules, cut out or MCB on consumer's premises shall be provided in fire proof box and shall be provided at each point of junction of service line of two or more consumers. No cut out, link or switch shall be provided on neutral or earthed neutral conductor except where linked switch are provided to operate simultaneously with live conductor.

6.4 ACCESSIBILITY OF BARE CONDUCTORS

Bare conductors shall not be used in a building for electric supply or wiring. Where it is not feasible the owner of such conductors shall follow provisions of rule 34 and get the installation approved by the electrical inspector before energisation. Owner shall ensure that such wiring can not be accessed without rendering them dead.

6.5 EARTHING

6.5.1 All metal supports, all reinforced and prestressed cement concrete supports of overhead lines and metallic fittings attached thereto, shall be permanently and efficiently earthed. For this purpose a continuous earth wire shall be provided and securely fastened to each pole and connected with earth ordinarily at three points in every km. The spacing between the points shall be as nearly equidistance as possible. Alternatively, each support and the metallic fitting attached thereto shall be efficiently earthed or metallic bearer wire used for supporting insulated wire of low and medium voltage overhead service lines and each stay-wire shall be permanently & efficiently earthed as per rule 90 of IE Rules. For stay wire with proper insulator provided at a height not less than 3.0 meters from the ground, this provision shall not apply to position of stay wire at a height above 3.0 meters & on other side of insulator. Earthing of first three poles from the substation only shall be carried out.

6.5.4 Earthing shall effected as per code of practice for earthing. For sub station provided with earthing mat, IEEE guidelines for substation earthing shall be followed.

6.5.5 Earthing conductor shall have short time rating of three second equal to short circuiting rating of overhead lines, electrical equipment etc as standardised by the licensee for that voltage class & in no case be less than 8 SWG GI wire for earthing of the metal support & 70 sq mm for earthing the equipments and if made of iron or steel, shall be galvanised.

6.6 General conditions as to transformation and control of Energy

6.6.1 Where energy at high or extra-high voltage is transformed, converted, regulated or otherwise controlled in sub stations or switch

stations (including outdoor substations and out door switch stations) or in street boxes constructed underground, the provisions of rule 68 of IE Rules shall be followed.

6.6.2 Where a substation is provided with fencing as per rule 68 (b) of IE Rules, distance of live part measured up to top of fencing & then along the height of fencing shall not be less than safety clearance vide clause 1.15 of this code. Fencing shall be effectively earthed.

6.7 SAFETY AND PROTECTIVE DEVICES

6.7.1 Every overhead line, (not being suspended from a dead bearer wire and not being covered with insulating material and not being a trolley-wire) erected over any part of street or other public place or in any factory or mine or on any consumers' premises shall be protected through protecting relays and/ or shields for rendering the line electrically harmless in case it breaks.

6.7.3 The licensee shall make adequate arrangements to prevent unauthorized persons from ascending any of the supports of any overhead lines which can be easily climbed upon without the help of a ladder or special appliances. 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 for the purpose of this rule.

6.8 GUARDING

6.8.1 Where guarding is required to be provided under IE rules, it shall be provided as per rule 88 of IE Rules. In addition every guard wire shall be connected with earth at each pole/ support.

6.8.2 Every guard wire or cross connected system of guard wires shall have short circuit current carrying capacity equal to protective switch gears with no risk of its fusing.

6.9 Consumers, owners, occupiers, electrical contractors, electrical workmen and suppliers shall carry out electrical installation works as per Rule 45 of IE Rules.

6.9.1 Electrical installation work which has been carried out in contravention of rule 45 of IE Rules and which has not complied with any other rule (including rule 50) shall neither be energized nor connected to the works of any licensee. If connected, it shall be disconnected on serving a 7 days notice.

6.10 Earth leakage protective device

The supply of energy to every electrical installation other than low voltage installation below 5KW, service lines, metering system, licensee's control gears & effectively earthed overhead lines with protective devices as per rule 91 of IE rules, shall be controlled by an earth leakage protective device so as to disconnect the supply instantly on the occurrence of earth fault or leakage of current. Earth leakage relay shall be single or three phase as per electrical supply to the installation.

6.11 The consumer/ owner shall comply with IE Rules specifically the following:

Rule No. 35 Danger Notices

Rule No. 36 Handling of electric supply lines and apparatus.

Rule No. 37 Supply to vehicles, cranes, etc.

Rule No. 38 Cables for portable or transportable apparatus.

Rule No. 39 Cables protected by bituminous materials.

Rule No. 42 Accidental Charge.

Rule No. 50 Supply and use of energy

Rule No. 50A Additional provisions for supply and use of energy in multi storeyed building (more than 15 meters in height)

Rule No. 51 Provisions applicable to medium, high or extra high voltage installations.

Rule No. 79 Clearances from buildings of low and medium voltage lines and service lines.

Rule No. 80 Clearances from buildings of high and extra high voltage lines.

Rule No. 81 Conductors at different voltages on same supports.

Rule No. 82 Erection of or alteration to buildings, structures, flood banks and elevation of roads.

6.12 SAFETY PRACTICES

In all electrical works, it is very necessary that certain elementary safety practices are observed. It has been found that quite a large number of accidents occur due to the neglect of these practices. The details of such practices are given in Appendix C of IS : 5216 (Part 1)-1982 and reproduced at annexure 'C'.

6.13 Equipment, Devices and Appliances- General guidelines regarding the same as given in IS : 5216 (Part 1)-1982 shall be followed.

6.14 Capacitors

The provisions of rule 70 in respect of automatic discharge of every static capacitor on the disconnection of supply shall be enforced on

consumer's premises except where rule 71 is not infringed and or where access to capacitor requires opening of appliance, e.g. Sodium vapour light fittings, fans, electronic devices etc.

6.15 Compensation for damage, injury, electrocution etc.

- (i) A compensation shall be provided by licensee/utility/company where loss of life/injury to human being or animals occurs on account of electrical accident due to their default.
- (ii) A licensee shall cause as little damage, detriment and inconvenience as may be, and shall make full compensation for any damage, detriment or inconvenience caused by him or by any one employed by him.

6.16 Complaint center where public can report unsafe installations shall be notified by distribution, transmission licensee & generation companies:

6.17 ACCIDENTS AND TREATMENT FOR ELECTRIC SHOCK

IS : 5216 (Part 2)-1982 shall be followed for safety procedures and practices in electrical work. Licensee / utilities/company shall ensure display of detailed instructions for safety precautions & procedure of operation of first aid boxes, safety devices etc.

6.18 Day and night visual aids (i.e. marking) for flight safety shall be provided as per IS 5613-1989. Within a radius of 20 Km from nearest air force station, all transmission lines and structures with height 45 meter or more shall be provided with day and night marking and beyond this distance, all structures with height of 45 meter or more shall be provided with day marking.

DRAFT PROCEDURE FOR ISSUE OF PERMIT TO WORK

1. SAFETY COORDINATION PROCEDURE

1.1 INTRODUCTION

This document lays down the procedure to be followed when work is required to be carried out on the line/equipment connected to state transmission system and defines the responsibility for the safety of persons working on the EHT net work to be established and maintained.

1.2 OBJECTIVE

The objective of this RVPN internal procedure is to ensure that work on inter-user boundary is carried out in safe and coordinated manner thus obviating any mis-happening /accident due to any misunderstanding in any form.

Through proper implementation of this procedure and RVPN safety code, the accidents to persons working on the EHV grid system will be reduced.

1.3 SCOPE

This procedure applied to all lines and sub-stations of SSGS, RVPN, and each Discom connected to the State Transmission System.

1.4 RESPONSIBILITY

Designated Officers (not below the level of Junior Engineers) of SSGS, RVPN and Discom, as the case may be shall be responsible for coordination and issue of PTW to ensure safety precautions.

1.5 METHODOLOGY

1.5.1 Designated Officers

- i. RVPN, SSGS and each Discom connected to the Rajasthan State Transmission System shall nominate suitably authorized persons to

be responsible for the co-ordination of safety across that company boundary before taking up the work involving inter-boundary. These persons shall be referred to as Designated Officers.

- ii. The names of Designated Officers shall be circulated to the other party/ other effected user with his designations and telephone numbers for issue of PTW (Permission to Work).

1.5.2 WORK AUTHORISATION

- i. Whenever work on any transmission line/equipment connected to the State Transmission System is to be carried out the Designated Officer of the constituent (which may be RVPN), wishing to carry out work shall personally contact the other relevant Designated Officer for permission to work.
- ii. If the permission to work cannot be obtained personally, the designated officers shall contact through telephone and exchange 'code words' to ensure correct identification of both parties.
- iii. Should the work extend over more than one shift the Designated Officer shall ensure that the Designated Officer of the new shift is fully briefed on the nature of the work and the code words for PTW return.
- iv. The Designated Officers shall co-operate to establish and maintain the precautions necessary for the required work to be carried out in a safe manner.
- v. The line under PTW should be earth form both the ends, where such facilities exist.
- vi. Work shall not be commenced until the Designated Officer of the User (who may be RVPN) is satisfied that all the safety precautions have been established. This Designated officer shall

- issue agreed safety documentation (PTW) to the working party to allow work to commence.
- vii. The PTW in respect of ISTS and specified EHV lines/ICT shall be issued with the consent of SLDC in coordination with NRLDC if required.
 - viii. The SLDC shall issue Code for 'switching in' and 'switching off' such lines/ICT.
 - ix. After completion of work and safety precautions are no longer required, the Designated Officer who has been responsible for the work being carried out shall make direct contact with the other Designated Officer to return the PTW and removal of those safety precautions.
 - x. The line/equipment shall only be put back to service when all safety precautions are confirmed as removed, by direct communication using code word contact between the two Designated Officers, and return of agreed safety documentation (PTW) from the working party has taken place.
 - xi. SLDC shift-in-charge shall make relevant entries as per data logging procedure in the Outage/Shut-down Register.

1. DRAFT ACCIDENT REPORTING PROCEDURE

1.1 INTRODUCTION

This document describes the RVPN internal procedures for reporting accidents causing serious injury or death of an employee or member of the public or any animal to the appropriate authorities.

1.2 OBJECTIVE

The implementation of this procedure will result in a clear, consistent, unambiguous communication throughout RVPN of each and every accident; so that lessons can be learned from the accident to avert recurrence of the accidents in future and observing legal requirement of intimation in prescribed manner to Electrical Inspector in accordance with the Indian Electricity Rules, 1956, (Rule 44-A).

1.3 SCOPE

This procedure applies to all SSGS, RVPN and each Discom connected to the Rajasthan State Transmission System.

1.4 RESPONSIBILITY

Shift Engineer, SLDC is responsible for monitoring and observing the reporting process of fatal and non-fatal accident.

Officer-in-charge (not below the rank of Junior Engineer) of the concerned RVPN sub-station/ line where accident took place shall be responsible for sending the reports of accident.

However, it should be noted that the first priority in the event of an accident is to provide relief and rescue operations for affected persons rather than writing of reports.

1.5 METHODOLOGY

- i. All accidents fatal or non-fatal shall be promptly reported by the Shift-in-Charge of the concerned RVPN sub-station/line where accident occurred.
- ii. It should be determined if the accident has resulted in serious injury; whether the injury is fatal or non-fatal, whether the injured includes animal (s) and person (s), and the number (s) of each in initial and final written reports as per the Appendices mentioned herein.
- iii. Intimation of accidents shall be in accordance with the Indian Electricity Rules, 1956, Rule 44-A to the Electrical Inspector.
- iv. All accidents identified for intimation under Rule 44A of IE Rules shall be reported within 24 hours of the knowledge of the occurrence of the fatal accident.
- v. The written report of fatal and non-fatal accidents shall be sent within 48 hours of the knowledge of the occurrence of the fatal accident in the prescribed Form No. XIII of IE Rules (Appendix-A)

1.6 APPENDIX

1. IE Rules Form No. XIII – Appendix- A

GENERAL SAFETY PRACTICES IN ELECTRICAL WORK

1 EXERCISE CARE

(a) Place yourself in a safe and secure position to avoid slipping, stumbling or moving backward against live conductors or apparatus. Do not rely for protection upon the care assumed to be exercised by others.

(b) In the event of near approach of a lightning storm, all out door work on electrical system should cease.

(c) Make a habit of being cautious. Be on the lookout for danger notice plates, danger flags, warning boards and signals, etc. Warn others when they seem to be in danger near live conductors or apparatus.

2 PERSONAL APPAREL

(a) Use of overalls, dungarees, jumpers and coats having metal buttons, metal straps and similar metal fittings should be avoided. Bone buttons may be used. Buttons should be sewed in place with thread. Loose clothing should not be worn.

(b) While working on live conductors, do not roll up sleeves as dry cloth gives some protection against shocks.

(c) Do not wear shoes with nailed soles. Shoes should have sewn soles, or preferably rubber soles.

(d) Do not wear suspenders and armbands with metal buckles or other metal parts. These might come in close proximity to live parts and cause serious, if not fatal, injury.

(e) Metal key chains, or metal keepers for key rings or watch chains should not be worn on the outside of clothing. There is always a possibility that they may come in contact with live conductors or live apparatus.

(f) While welding wear goggles, safety glasses or any other eye protection as instructed by the person-in-charge depending upon the type of work handled.

3 TREAT EVERYTHING AS LIVE

Treat all electrical conductors and apparatus always as live and consequently dangerous to human life, unless it is positively known to be dead and properly earthed and take precautions accordingly.

4 THINK BEFORE YOU ACT

(a) Think carefully before you act. Make sure you are right. Watch out for the other man and make sure he is right.

(b) Never speak to any person working upon live mains or apparatus,

unless the person doing the work is aware of your presence.

5 DANGEROUS VOLTAGES

(a) All voltages are dangerous. It shall be borne in mind that even low voltage shock may be fatal.

(b) Every person-in-charge of work on any mains or apparatus shall ensure himself that the same is free from dangerous leakage or induction and has been effectively earthed locally before permitting men to work upon it.

6 DANGEROUS AREA

When working in areas that contain or may contain live mains and apparatus, fix danger notice plates, barriers, rails or other guarding arrangement for the working area. Do not store materials within high voltage enclosures or low voltage areas.

7 WARNING BOARDS

Warning boards shall be placed by the person-in-charge on all switchgear before men are permitted to work and should only be removed by the person who has placed them. It is desirable that the person issuing the permit shall place one warning board on the switch energizing the mains for each permit issued so that he can be sure that all the permits-to work are returned when he has to charge the mains.

8 VISITORS AND UNAUTHORIZED PERSONS

Visitors and unauthorized persons shall not be allowed to proceed in the vicinity of live mains and apparatus, unless accompanied by an authorized person whose responsibility it shall be to ensure that his instructions regarding safety are strictly complied with.

9 WORKING IN DAMP SITUATIONS

Extra precautions should be taken when working in abnormally damp area.

10 USE OF TONG OR CLIP-ON AMMETERS

These shall not be used on high voltage conductors, unless the conductors are lead-sheathed. On low voltage conductors, all persons, not accustomed to the handling of tong or clip-on ammeter, shall be warned of the necessary precautions to be observed before being allowed to use it.

11 WARNING THE PUBLIC

When, either accidentally or otherwise, live mains and apparatus constitute a danger to persons in a public place, a person shall be

detailed to stand by and personally warn the public until the danger has been removed.

12 PORTABLE ELECTRICAL APPARATUS

(a) All portable electrical apparatus shall be regularly examined, tested and maintained to ensure that the apparatus and leads are in good order.

(b) Ensure that all portable appliances are provided with 3-pin plug and socket connections and that metal work of the apparatus is effectively earthed.

(c) All loose wiring, such as flexible cables for portable lamps, tools and trailing cables and other portable and transportable apparatus, shall be tested regularly at frequent intervals to ensure safety.

APPENDIX-A

THE INDIAN ELECTRICITY RULES, 1956
(ANNEXURE-XIII)
FORM FOR REPORTING ELECTRICAL ACCIDENTS
(SEE RULE 44-A)

1. Date and Time of Accident
2. Place of accident
(Village/Town, Tehsil /Thana, District and State)
3. System and voltage of supply
(Whether EHV/HV/LV line, sub-station/generating station
/consumer's installations/ service lines/other
installations).
4. Designation of the Officer-in-charge (in whose
Jurisdiction the accident occurred).

5. Name of owner/user of energy in whose premises the accident occurred.

6. Details of victim (s)

(a) Human

S.NO.	NAME	FATHER'S NAME	SEX OF VICTIM	FULL POSTAL ADDRESS	APPORX. AGE	FATAL/NON-FATAL
1	2	3	4	5	6	7

(b) Animal

S.No.	Description of Animals	Number (s)	Name (s) of owner (s)	Address (es) of owner (s)	Fatal/Non-Fatal
1	2	3	4	5	6

7. In case the victim(s) is are employee(s)

(a) Designation of such person (s)

(b) Brief description of the job undertaken, if any.

- (c) Whether such person/persons was/were allowed to work on the job?
- 8. In case the victim(s) is/are employee (s) of a licensed contractor
 - (a) Did the victim(s) possess any electric workman's permits, supervisor's certificate of competency issued under Rule 45? If yes give number and date of issue and the name of issuing authority.
 - (b) Name and designation of the person who assigned the duties of the victim (s).
- 9. In case of accident in the suppliers system, was the Permit To Work (PTW) taken?
- 10. (a) Describe fully the nature and extent of injuries, e.g. fatal /disablement (permanent or temporary) of any portion of the body or burns or other injuries.
 - (b) In case of fatal accident, was the post mortem performed?
- 11. Detailed causes leading to the accident
(To be given in a separate sheet annexed to this form)
- 12. Action taken regarding first-aid, medical attendance etc. immediately after the occurrence of the accident (give details)
- 13. Whether the District Magistrate and Police Station concerned have been notified of the accident (if so, give details)
- 14. Steps taken to preserve the evidence in connection with the accident to the extent possible.
- 15. Names and designation(s) of the person(s) assisting, supervising the person (s) killed or injured.
- 16. What safety equipments were given to and used by the person(s) who met with this accident (e.g. rubber gloves, rubber mats, safety belts, and ladders etc.)?

17. Whether isolating switches and other sectionalizing devices were employed to deaden the section for working on the same? Whether working section was earthed at the site of work?
18. Whether the work on live lines was undertaken by authroised person(s)? If so, the name and the designation of such person(s) may be given.
19. Whether the artificial resuscitation treatment was given to the person(s) who met with the electric accident? If yes, how long was it continued before its abandonment?
20. Names and designations of persons present at and witnessed the accident.
21. Any other information remarks.

Place: -

Time: -

Date: -

Signature
Name
Designation
Address of the person reporting