

BANGALORE ELECTRICITY SUPPLY
COMPANY LIMITED



Registered Office:
K. R. Circle, Bangalore 560 001
Website: www.bescom.org.



Create safe working environment for the employees, create awareness among the public on electrical safety to avoid electrical accidents and thereby save the lives and property and make BESCOM an accident free organization.

Preface



The Statistics of Electrical accidents in BESCOM presents a very grim picture showing no signs of reduction, and on the other hand there has been a steady rise in no. of accidents for the last few years. Analysis of the statistics of accidents clearly indicates that the majority of accidents are due to non adherence of safety procedures. This is a cause of great concern to the organization. Further, the CEA have issued guidelines on Safety for electrical industries in the country.

Keeping the above in view BESCOM have initiated action based on the guidelines of CEA. The policy on safety aims to tackle electrical accidents by creating safety organizations and safety committees, duly assigning the responsibilities for the employees at various levels, providing the requisite safety gadgets and imparting training to all the employees.

I am sure that this will only meet the basic requirement of 'Safety' whereas if desired results are to be achieved the complacent attitude of the employees has to change. They should realize that no part of operations is of greater importance than accident prevention. The degree of safety and the results accomplished are directly proportional to the efforts put in, to control the conditions, practices and human actions that are responsible for accidents. In the interest of safeguarding the precious lives it is imperative that the non adherence of safety rules and procedures be dealt seriously which may even call for disciplinary actions. Unless the safety procedures, rules and instructions are observed religiously by everyone it is not possible to achieve the results.

It is hoped that the Manual on Safety will go a long way in educating the employees on safety aspects and thus the Manual has been updated and revised to make it more comprehensive and to accomplish highest standards of safety.

Managing Director

IGNORANCE OF RULES AND REGULATIONS WILL
RESULT IN ACCIDENTS TO HIMSELF AND HIS
CO-WORKERS.



STUDY THE MANUAL CAREFULLY



NO OPERATION OR ACTIVITY IS SO URGENT THAT IT
HAS TO BE PERFORMED IN AN UNSAFE MANNER.



TIME IS IMPORTANT BUT SAFETY IS MORE IMPORTANT.



SAFETY IS FIRST, NEXT AND ALWAYS.



SAFETY PROTECTS THE LIFE



QUALITY PROTECTS THE BUSINESS

Chapter No.	Description	Page No.
Chapter 1	Terminology	11-13
Chapter 2	Fundamentals of Safety	15-20
Chapter - 3	Responsibility for Safety	21-23
Chapter - 4	Safety Wing and Safety Committees in BESCOM	25-30
Chapter - 5	Accidents	31-33
Chapter - 6	First Aid	35-42
Chapter - 7	Permit to Work	43-48
Chapter - 8	Safety Precautions	49-60
Chapter - 9	Safety Devices	61-66
Chapter - 10	List of Safety equipments to be maintained by Linemen and Section Officers	67-68
Chapter - 11	Accident Investigation System	69-74
Chapter - 12	CEA Guidelines	75-76
APPENDICES		
Appendix - I	Work Permit Form	77
Appendix - II	Sample Permit Form (Line Clear Form)	78
Appendix - III	Application for Pre-arranged shutdowns	80
Appendix - IV	Accident Report Telephone Message	81
Appendix - V	Form for reporting electrical accidents	82-83
Appendix-VI	Electrical Safety "Do's and Don'ts	84-85
Acknowledgement		86



Chapter - I

Terminology

A danger foreseen, an accident prevented



Terminology

The terms used in this manual shall be interpreted in the most commonly accepted sense consistent with electrical industry.

1.1 Authorized Person:

One who is properly authorized to perform specific duties under certain conditions or who is carrying out order from competent authority and as defined under rule 3 of IE Rules of 1956.

1.2 Unauthorized person:

One who is not permitted to work on electrical apparatus, except under the personal supervision of an authorized person.

1.3 Clearance (for work):

Authorization to perform a specified work or permission to enter a restricted area.

1.4 Clearance (between objects):

The clear distance between two objects measured surface-to-surface.

1.5 Dead:

Dead means at or about earth potential and disconnected from any live system. Provided that the apparatus separated from a live conductor by a spark gap shall not be deemed to be DEAD.

Note: The term Dead is used only with reference to current carrying parts, when these parts are not alive.

1.6 De-Energized:

Free from any electrical connection to a source of potential difference and from electric charge; not having a potential different from that of the earth.

1.7 Disconnected:

Disconnected from any energy source.

1.8 Earth:

Earth means conducting mass of earth or of any conductor in direct electrical connection therewith.

1.9 Earthed:

Earthed means connected to earth in such a manner as it will ensure immediate discharge of electrical energy without danger at all times.

1.10 Effectively Grounded:

Intentionally connected to earth though a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazard to connected equipment or to persons.

1.11 Emergency:

Emergency for the purpose of this code means an unusual condition which exists that endangers life and/or property.

1.12 Energized (also Alive or Live):

Electrically connected to a source of potential difference or electrically charged so as to have a potential different from that of the earth or different from that of adjacent conductors or equipment.

1.13 Ground (noun):

The connection, established either intentionally or accidentally, of an electric circuit or equipment with reference ground through a conductor, or other conducting object or substance.

1.14 Ground (reference):

That conductive body, usually earth, to which an electric potential is referenced.

Terminology

Chapter - I

1.15 Ground (verb):

Connecting or establishing a connection, either intentionally or accidentally, of an electric circuit or equipment to reference ground. Connect to earth or some conducting body that serves in place of earth.

1.16 Grounding Electrode (Ground Electrode):

A conductor embedded in the earth, used for maintaining ground potential on conductors connected to it and for dissipating into the earth current conducted to it.

1.17 Grounded System:

A system of conductors, in which at least one conductor or point (usually the middle wire or neutral point of transformer or generator winding) is intentionally grounded, either solidly or through a current-limiting device (not a current-interrupting device).

1.18 Guarded:

Protected by personnel, or covered, fenced, or enclosed by means of suitable casings, barrier rails, screens, mats, platforms, or other suitable devices in accordance with standard barricading technique designed to prevent dangerous approach or contact by persons or objects. (Wires that are insulated but not otherwise protected are not considered guarded.)

1.19 Live:

Electrically charged.

1.20 Permit issuing Officer:

Permit issuing officer is a person who is authorized for ensuring that controlling switches and circuits have been isolated, made dead and inoperative and that adjacent circuits have been made safe for the work to be carried out and who is authorized to issue the 'Permit to work'.

1.21 Permit to work:

Permit to work means a form of declaration signed by and given by one authorized person to another authorized person in charge of work to be carried out on or adjacent to any electrical apparatus, mains or service lines, for the purpose of making known to such latter person exactly what apparatus, mains or service lines are made dead and earthed and safe for working.

1.22 Protective devices:

Protective devices means devices such as rubber gloves, rubber gauntlets, line hose, rubber boots, or other insulating devices, which are especially designed for the protection of workmen,

1.23 Low Voltage:

Where the voltage does not exceed 250 Volts under normal conditions but in no circumstances exceeds 263 Volts.

1.24 Medium voltage:

Where the normal voltage exceeds 250 volts but does not exceed 650 volts and in no circumstances exceeds 683 Volts.

1.25 High Voltage:

Where the normal voltage exceeds 650 Volts but does not exceed 33,000 Volts and in no circumstances exceeds 37,125 volts.

1.26 Extra High Voltage:

Where the voltage exceeds 33,000 Volts under normal conditions subject to 12.5% variation.

1.27 Unsafe Conditions:

Used to indicate dangerous conditions, hazardous conditions, defective conditions, or unusual conditions that could be conducive to accidents.



Chapter - II

Fundamentals of Safety

Always be careful



Fundamentals of Safety

Chapter - II

2.1 SAFETY

Safety is the proper planning of work, proper usage of safety tools, following proper safety procedures and exercise of good judgment and intelligent supervision and working with full concentration. Experience proves that majority of the accidents are preventable.

2.2 Fundamentals of Safety:

Prevention of accidents requires the whole hearted cooperation of all employees of the organization. A capable mentally alert employee will avoid accidents.

A careless man is a liability to the Organization. He is dangerous to himself, his fellow workers, the public and the Organization.

Accidents do not just happen. Accidents are the result of unsafe acts of the persons engaged in the work or unsafe conditions where the persons are engaged in the work or a combination of both.

2.3 Unsafe Acts:

Accidents, which occur due to

2.3.1 Non-adherence of the safety rules

These are due to the fault of the persons engaged in the work which may cause accidents. Such as

1. Opening and closing of switches without authority or warning, operating hoists and trucks without warning, failure to place warning signs or signals where needed.
2. Working unsafely such as throwing materials or tools, at another worker, jumping from vehicles and platforms or unnecessary haste.
3. Making safety devices inoperative.
4. Using unsafe equipment, wrong tools for the job, or using hands instead of hand tools.
5. Working on live electrical equipment that could conveniently be de-energized.

6. Taking unsafe position or posture too close to opening and lifting while in awkward position (riding on running boards or other unsafe places of vehicles)
7. Distracting, teasing practical joking, horseplay, quarrelling or annoying.

2.3.2 Non usage of proper safety gadgets for the specific work.

1. Failure to use safe clothing or protective equipment such as failure to use rubber gloves, helmets etc as specified for the work or energized equipment.

2.4 Unsafe Conditions:

The conditions which may result in accidents and include the following:

1. Unguarded floor openings and excavations, exposed live circuits
2. Improper illumination such as insufficient light or unsuitable location producing glare or objectionable shadows.
3. Unsafe design and construction, such as poor scaffolding, and structure.
4. Structures like platforms should have large safety factors, and their construction and design in general should incorporate safety features.
5. Ignorance of potential hazards
6. Not explaining the anticipated hazards.

2.5 General Instructions for Safety:

2.5.1 Responsibility of Individuals:

Definite responsibility of individuals is to act so as to provide

1. Safety to himself
2. Safety to his fellow employees
3. Safety to the public



Fundamentals of Safety

Chapter - II

4. Protection to the property of the Organization.

5. Protection to public property.

Every employee shall carefully study the Safety Manual, familiarize himself with its contents and apply them to work, more specifically the rules applicable to their assigned duties. Ignorance of Rules and Regulations will result in accidents to himself and his co-workers and cannot be considered as an excuse.

Every employee shall ensure complete compliance with the safety rules contravention of which may call for disciplinary action.

Whenever in doubt, regarding any rules and regulations, or inadequacy of facilities, considering the nature of the hazard, he should consult his Section Officer (AE/JE). However, the decision of the Section Officer (AE/JE) shall be final in the matter.

The Manual deals with the requirement considering the average conditions. The extremities can always be there and the employees shall use good judgment in dealing with such extraordinary conditions or consult the superiors.

Before attempting any work in a condition that he considers to be unsafe, he is required to bring them to the attention of the person in charge of the work and seek his advice.

Every employee is expected to understand the work completely before the commencement of the work and communication from the supervisor should be complete and fully understood by the employee.

2.5.2 Taking Chances:

Before commencing any work that may be hazardous, care shall be taken to establish a safe procedure. When more than one employee is engaged in the same job, all employees concerned shall understand the procedures to be

followed (tailboard conference).

2.5.3 Overconfidence:

Experience shows that the overconfidence (it will never happen to me) is one of the major causes for accidents. Every employee should bear in mind that the Electricity never excuses.

Under no circumstances shall safety be sacrificed for speed.

Employees shall always try to place themselves in a safe and secure position.

It will be the duty of every employee to report promptly to his Section Officer (AE/JE) any dangerous or improper condition of equipment he notices.

2.6 Personal Conduct:

2.6.1 Use of Alcoholic Beverages and Drugs:

Use of intoxicating liquor while on job is strictly prohibited. No employee shall report for work while he is under the influence of liquor and no Section Officer (AE/JE) shall knowingly permit a man to go to work while he is under the influence of liquor. Such acts call for strict disciplinary action without any prejudices.

2.6.2 Smoking:

Smoking is strictly prohibited in the areas where it may cause fire hazards. Specifically, in the areas like battery rooms, and locations where the flammable liquid/materials are stored and used or other areas where combustible materials are kept, Absence of "No Smoking" signs shall not excuse smoking in dangerous places.

2.6.3 Mobile Phones:

Avoid using mobile phones in the work area especially during working. The distraction by unnecessary phone calls and other than those



Fundamentals of Safety

Chapter - II

connected with the work may result in accidents. It is advisable to switch off the mobile phones when one is engaged in the work and it should be used only to the extent of essential communication.

2.6.4 Dress codes:

The clothing of the employees is as decided by the management from time to time considering the safety aspects and nature of work to be performed by the employees.

All the metallic parts should be removed from the body before commencing work in the vicinity of the exposed energized parts of the line or equipment. The metallic parts like key bunches, watch chains, rings, bracelets, arm bands etc may become the cause for inadvertent contact with the live line or lead to shock hazard due to induction effect or they may obstruct the normal working while attending on a pole or structure etc.

Even while wearing the gloves the metal articles like rings, watches, bracelets, and other objects should be removed from the hand as they may damage the gloves and defeat the purpose of the wearing of the gloves.

2.6.5 Joking, Teasing:

Practical joking and horseplay while on the job is strictly prohibited as it may lead to distraction of mind and may lead to accident or may compromise the safety of employees or the public.

2.6.6 Working in a hurry:

Generally it is observed that the employees waste away their time at the beginning and finally attempts to finish the work in a hurry. This leads to accidents.

No employee shall distract the attention of another worker from his job unless he thinks that the worker is doing something, which is

dangerous to his person, other workman or to the equipment. Even while bringing these dangerous conditions to the knowledge of the employee who is at work, care must be taken to see that the person does not get perturbed all of a sudden which itself may lead to accident.

Any employee who endangers his own or other's safety by violating the foregoing requirements of personal conduct shall render himself liable to disciplinary action.

2.6.7 Always Be Careful (ABC):

The workman should place himself in a safe position while working to avoid falling, stumbling, or moving backwards against live parts.

The workman should satisfy himself regarding the safe working conditions before starting the work. The care exercised by others should be checked.

2.7 House Keeping:

Workmen are frequently injured by tripping, stumbling, stepping on or bumping into tools, material and other objects left lying around or by carelessly placed objects falling from above.

1. Every employee should contribute to good house keeping.
2. To ensure good housekeeping following precautions should be observed.
3. The place of work both within the building and around the work area in the outside yard should be kept neat and clean.
4. Handling and usage of flammable liquids, oils, cleaning solvents should be carried out as per the prescribed manner so that they will not become the potential source of fire hazard.
5. The storage area should be neatly maintained and the materials should be stored systematically and in an orderly manner to prevent their falling or spreading and to eliminate tripping and stumbling hazards.

Fundamentals of Safety

Chapter - II

6. Clothing or any other type of material should never be hanged behind the space of the panels or on the poles or structures, switchboards etc.
7. Growth of Vegetation/Weeds should never be allowed in and/ or around the neighborhood of substations, pole yards, buildings, oil tanks, or other structures.
8. Pathways, aisles, stairways, fire escapes surrounding area near the distribution boards, control panels etc and all other passages shall be kept clear of all obstructions.
9. Tools and materials should not be placed where they may cause tripping or stumbling hazards or where they may fall and strike any one below.
10. Puddles of oil and water create a slipping hazard and should be cleaned up promptly.
11. Nails in boards, such as those removed from scaffolds, forms and packing boxes, constitute a hazard and should be removed. The boards should be carefully stacked or stored.
12. Dirty and oily waste rags should be disposed off as soon as practicable to avoid fire hazard.
13. Broken light bulbs, glass, metal scrap and other sharp objects should be dumped in places provided specially for them.
14. Discarded fluorescent and other gas filled tubs shall be disposed off safely.
2. Scaffolding should be checked before use to ensure that it is of sufficient strength and rigidity to safely support the weight of the persons and material to which it will be subjected.
3. Employees shall not use a scaffold from 4 to 10 feet in height having a minimum horizontal dimension of less than 45 inches unless proper guardrails are present to provide adequate employee protection.
4. Scaffolds over 10 feet height should be provided with adequate employee protection with mid-rail or toe board etc.
5. Scaffold planks shall not extend too much over their end supports which may lead to danger to the personnel using such scaffolds
6. Scaffolds should not be moved without first removing all loose tools, materials, and equipment resting on the scaffold deck.
7. All scaffolds shall be sufficiently secured and braced.
8. The footing and anchorage points for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.
9. Scaffolds shall not be altered or moved horizontally while being used or occupied except when specifically designed for such use. Movable scaffolds shall have the casters or wheels locked to prevent movement.
10. The width of all scaffolds, ramps, and platforms shall be sufficient to prevent congestion of persons, materials, or equipment.
11. Employees working on suspended scaffolds shall be protected by an independent lifeline, body harness, and a lanyard.

2.8 Supports and Scaffolds:

1. Structures like poles, scaffolds, ladders, walkways, or portion of tree or any other elevated structure like crane or derrick etc should not be used as the support for men, material or equipment unless it is ensured that they are firmly secured and adequate enough to take the load.



Fundamentals of Safety

12. Safe access shall be provided for all scaffolds. Structural members should not be used as a means of access.

2.9 Handling of heavy objects and Storage

1. Employees shall not attempt to lift beyond their capacity. Necessary assistance should be obtained if it is inevitable or use equipment like crane, lifting shackles, pulley blocks etc.
2. Extra care should be exercised during lowering and lifting when two or more persons carry a heavy
3. It is always necessary that the persons carrying the load should face the direction in which the object is being moved when two or more persons are carrying an object.
4. Employees should avoid twisting or excessive bending when lifting or setting down loads.
5. Pushing should be resorted to when moving a load horizontally, rather than pulling it.
6. Gripping, grasping, and lifting with just the thumb and index finger should be avoided and whole hand and all the fingers should be used.
7. Storage of materials and equipment closer to energized lines or exposed energized parts of equipment should be avoided. If it becomes necessary, it should be stored in keeping the safe clearance taking into account the system voltage, sag, side swing etc. so that at no circumstances there will be any chance of the stored material coming into contact with the live lines.

Chapter - II

Failure to comply with safety precautions is an offence and is punishable

Chapter - III

Responsibility for Safety

A little care makes mishap rare



Responsibility for Safety

3.1 Responsibilities of Section Officer (AE/JE):

Section Officer (AE/JE) shall be responsible for ensuring that work under him is done in safe manner. It is the responsibility of the Section Officer (AE/JE) to ensure safety to all his personnel working under him, apart from his own safety.

Section Officers (AE/JE) have the definite responsibility of ensuring the following:

3.1.1 Safety of the personnel working under him.

1. Properly planned work performed in safe manner.
2. Clear work instructions and ensuring that his men understand clearly the following
 - i. Work to be done
 - ii. Hazards that may be encountered
 - iii. Proper procedure for doing the work safely
3. Application of the general and special safety instructions by their workmen.
4. Immediate steps to correct any violation of safety rules observed or reported to them.
5. He shall have complete knowledge of his personnel and their capabilities, strengths and weaknesses.
6. He shall assign jobs to employees, which they are capable of doing safely depending on their capability.
7. Accordingly, Section Officer (AE/JE) has to brief the work depending on the capability of the person to whom he assigns the work.
8. He will be responsible to ensure that the workmen under him work with all the safety precautions and use necessary safety gadgets as needed.

3.1.2 Provision and maintenance of Safety equipment:

1. Section Officer (AE/JE) shall have the responsibility of
2. Providing necessary equipment and its use.
3. Properly maintaining of tools and equipment in his area of responsibility.
4. Well maintained safety gadgets
5. Auditing of the conditions of the safety gadgets time to time and take action to replace them as and when required.
6. Taking action to test the safety gadgets time to time as prescribed.
7. Taking responsibility of ensuring the availability of safety gadgets sufficient in quantity at the specified places so as to avoid any chances of workmen neglecting the use of safety gadgets for the simple reason that it is not available at the required moment.
8. Initiating action to indent/ test/replace the safety gadgets in his jurisdiction of work area.

3.1.3 Working environment:

Section Officer (AE/JE) shall ensure

1. Safe working condition
2. Frequent and periodic inspection of construction, operation and maintenance equipment, work areas, conditions and methods to prevent fires and other accidents by taking advanced corrective actions.
3. Review and suggest/upgrade of the conditions, procedures and human actions wherever needed.
4. To have complete knowledge of the potential hazards that may lead to accident and he shall take advance corrective actions needed to avoid accidents.

Responsibility for Safety

3.1.4 Accident reporting

Reporting all accidents, however small they are and whoever is involved, including 'near-miss' cases enabling to take corrective action and prevent recurrence of such accidents.

3.1.5 Awareness on Safety

1. Once a week, every Monday morning between 0830 to 0845 hrs, before the start of work, he shall explain about Safety and its importance to all the linemen under his jurisdiction.
2. During this briefing he will explain to all the linemen about the importance of Safety equipment like Hand Glouse, Safety Belt, Hickory Rod, Earthing Rod, Helmet etc.

Chapter - III

3. He shall prevail upon and insist the use of specified safety gadgets/ equipment during the work.

4. He shall also instruct the linemen not to take up the work without proper Line Clear, Work Permit and Safe Zone.

3.2 Employees Responsibility:

This is fully covered under the Clause Nos. 2.5, 2.6, 2.7, 2.8 and 2.9 relating to general Instructions for safety.

3.3 Employer's Responsibility

The employer has a definite responsibility of creating a safe working environment in the Organization.

1. Ensure that proper budget is provided for providing, maintaining and replacement of safety equipments from time to time.
2. Ensure that the safety tools and equipment are made available all the time.
3. Ensure that the safety equipment are in good condition
4. Ensure that the employees positively use such safety equipment as necessary for the job that they are performing.
5. Provide necessary 'On the Job Training' and Training on 'Safety' to all the levels of the employees from time to time.
6. Arrange for the co-ordination meetings between the Transmission authorities and Distribution Companies.
7. Resolve common irritants related to line clear, hand trip etc between the two Companies from time to time.
8. Ensure proper co-ordination between the Transmission Authorities and Distribution Companies as these two agencies are continuously interacting and the work of the two organizations should be supplementary to each other.
9. Monitor the functioning of the Safety Organization.

Chapter - IV

Safety Wing and Safety Committees in BESCOM

A stitch in time saves nine



Safety Wing and Safety Committees in BESCOM

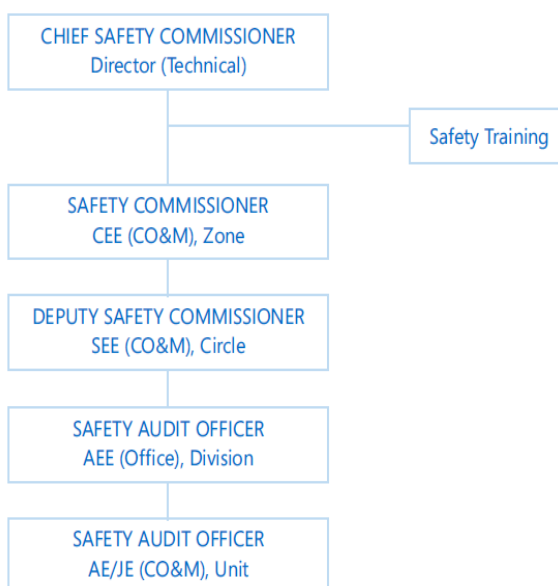
BESCOM Safety Wing and Safety Committees have been constituted to oversee the safety related issues both in the field structure and also employees.

4.1 Safety Wing:

Having observed the rising trend of electrical accidents in BESCOM due to safety precautions not being followed properly, besides improper maintenance of safety equipment, Safety Wing is created in BESCOM duly assigning the roles and responsibilities of various officers to implement and monitor safety procedures to reduce accidents. BESCOM Safety Wing shall ensure auditing of Safety Tools, replacing of faulty Safety Tools, and procurement of Safety tools. It also deals with the investigation of all the accidents duly taking necessary action to ensure non occurrence of such accidents. After investigation and getting findings, any disciplinary action to be initiated against erring officials, the same will be dealt by the Safety Wing.

4.1.1 BESCOM Safety Wing Organization Structure:

Chapter - IV



Safety Wing and Safety Committees in BESCOM

4.1.2 Roles and responsibilities of Safety Wing:

4.1.2.1 Chief Safety Commissioner:

The Director Technical BESCOM is nominated as the Chief Safety Commissioner of BESCOM.

1. The Safety Commissioner BMAZ will be the convener of the meeting
2. Review of activities of Safety Commissioners, Deputy Safety Commissioners & Executive Engineer (HRD) once in three months.

4.1.2.2 Safety Commissioner:

The Chief Engineer Ele. C O&M Zone is nominated as the Safety Commissioner (SC).

Chapter - IV

1. Scheduling of HRD Training programme to DSC, SAO & SO's on safety in consultation with HRD Centre.
2. Arrange to supply Safety Training Programme materials (Soft & Hard Copy such as presentations, course material etc.
3. Review of activities of DSC's & SAO's once in two months & submission of monthly progress of Safety activities of the Zone to Chief Safety Commissioner.
4. The SEE Ele., (Office) of C O&M Zone will be the conveners of Respective Zones.
5. Inspection of at least one Sub Division in each of the Division once in a year.
6. Feedback on updation of the Safety Manual & Course material to HRD Centre.
7. Report on occurrence of all accidents to Chief Safety Commissioner.
8. Attend Safety Committee meetings conducted by O & M Zone & Circles.

4.1.2.3 Deputy Safety Commissioner:

The Supt. Engineer (Ele.) C O&M Circle is nominated as the Deputy Safety Commissioner (DSC)

1. Monthly review of activities of SAO's & monthly submission of progress & activities of Circle to Safety Commissioner.
2. The EE Ele. (Office), C O&M Circle will be the convener.
3. Inspection of at least two Sub Divisions in each Division once in a year
4. Report on occurrence of all accidents to Safety Commissioner.
5. Attend Safety Committee meetings conducted by O & M Divisions.

4.1.2.4 Safety Audit Officer:

The Asst Executive Engineer (Office), C O&M Division is nominated as the Safety Audit Officer (SAO)

1. Carry out audit of all safety aspects as per the Safety Manual of Central Electricity Authority (CEA).
2. Monitor the remedial measures taken to prevent accidents
3. Inspect all the O&M Units in the Division once a year to verify that all the safety equipments are existing in sufficient numbers and in good condition in each O & M Unit and to issue Safety Certificate.
4. To analyze and report accidents and near- miss cases of accidents.
5. Report within 24 hours of occurrence of all Electrical /Mechanical, Fatal/ Non fatal Departmental/ Non departmental, Human/ animal through telephone /Fax, followed by a detailed report as per IE Act /Rules to Corporate Office & Deputy Safety Commissioner
6. To take action for procurement of Safety Materials required for Division.
7. To arrange for periodical testing of safety equipments

Safety Wing and Safety Committees in BESCOM

8. To prepare Safety Budget and Training schedule
9. To impart training to field staff on safety practices and procedures at section /sub divisional level & to arrange demonstrations on safety
10. To conduct monthly meetings with Safety Officers.

4.1.2.5 Safety Officers:

The AE/JE, C O&M section is nominated as the Safety Officer (SO)

SO should maintain the following data base

1. Safety training attended by each of the field officers and personnel
2. Safety equipments availability, condition and requirement.
3. List of deteriorated poles and lines without proper clearances and action taken to rectify the same
4. Accidents and near -miss cases
5. Complaints received from field personnel and public related to safety
6. To implement Line Clear Formats in all O & M Units
7. To ensure that all the employees (Lineman staff) wear 100% Cotton Uniforms and Safety slogan Badges before they proceed to work.

Duties and responsibilities of SO:

1. The safety officer should ensure that Accident Register is maintained at each of the O & M Units and circulating of Safety Magazine, circulars etc to all field personnel.
2. The SO must facilitate conducting safety meetings and awareness & training programmes at sub division and divisional level as per the direction of Safety audit Officer.

3. The SO must report within 24 hrs of occurrence all Electrical /mechanical fatal /non fatal, departmental/ non department, human /animal through telephone fax followed by a detailed report as per IE Act/ Rules to SAO.

4.1.2.6 HRD Centre:

1. The HRD Centre BESCOM shall impart safety training to all Safety Commissioners, Deputy Safety Commissioners, Safety Audit Officers & Safety Officers within one month.
2. Further, arrangements are to be made to supply presentation course material (soft & hard copy) & copies of the safety manual and relevant standards to all above officers.
3. Updating of safety manual & course material incorporating feed back from the Safety Commissioners.
4. To arrange field demonstration of safety equipment & practices.

4.2 Safety Committees:

For effective implementation of the Safety Practices in order to avoid accidents to the employees, Safety committees have been formed. The Safety Committees are responsible for campaigning the Safety to the employees duly designing, developing training module and imparting Safety Training to the employees. The shall also define safety tools/equipment to be provided to the linemen and section Officers and also set guidelines for usage of Safety Tools/equipment.

Safety Wing and Safety Committees in BESCOM

Constituents of Safety committees:

4.2.1 Divisional Safety Committee:

Chairman	Executive Engineer (Ele.)
Convener and Safety Audit Officer	Assistant Executive Engineer (Ele.) (Office)
Member	One representative from KPTCL Employees Union
Member	One representative from KEB Engineers' Association
Member	One representative from KEB SC/ST Welfare Association

4.2.3 Central Safety committee:

Chairman	Director (Tech)
Members	Chief Engineer, Electrical (C O & M) of the Zones
Convener	General Manager, HRD
Member	One representative from KPTCL Employees' Union
Member	One representative from KEB Engineers' Association
Member	One representative from KEB SC/ST Welfare Association

4.3 Guidelines for effective

implementation of safety practices:

1. Safety Committees shall meet once in a month to review the adoption of safety practice at all field work levels
2. Safety Committees shall analyze the causes for the accidents that have taken place, if any, in their jurisdiction and suggest means to avoid recurrence of such incidents.
3. Safety Committees shall ensure availability of all safety equipment / tools with the linemen and Section Officers.
4. Safety Committees shall ensure availability of Safety Manuals in all the sections.
5. Safety Committees shall ensure strict adherence of implementing 'Work Permit' practices in the field. The respective General Managers (Elect.) shall get the Work Permit formats printed and supplied to the field with instructions to adopt within two weeks.
6. The Safety Committees shall ensure imparting Safety Training to all the employees
7. The Safety Committees shall also review whether periodical testing of safety equipments is done or not and ensure that working condition of the safety equipments

Chapter - IV

4.2.2 Zonal Safety Committee:

Chairman	Chief Engineer, Electrical
Members	Superintending Engineer (Ele.) of O&M Circles
Convener	Executive Engineer (Ele.) (Zonal Office)
Member	One representative from KPTCL Employees Union
Member	One representative from KEB Engineers' Association
Member	One representative from KEB SC/ST Welfare Association

Safety Wing and Safety Committees in BESCOM

Chapter - IV

8. Safety Committees shall review the identification of hazardous and dangerous installations, Division wise and rectification works carried out as per the corporate letter No BESCOM BC-9/317/2002-03 dated 7th August 2008
9. The Central Committee shall hold discussion with the Employees Union for adoption of 100% cotton uniform for the Linemen and ensure 100% cotton uniform is made available
10. Safety Audit Officers shall ensure inspection of safety equipment / tools available with the Linemen / Section Officers for up keeping working condition of the same.
11. Safety Audit Officer shall maintain an "Accident Register" and enter the details of accidents as and when takes place in the division duly formatting to enter, containing the details such as
 - i. Serial Number
 - ii. Date of Accident/Time
 - iii. Person involved
 - iv. Electrical / Mechanical
 - v. Fatal / Non fatal
 - vi. Departmental / Non departmental
 - vii. Cause of accident
 - viii. Report sent on etc.
12. And responsibilities entrusted to the safety wing vide BESCOM order No. BESCOM / BC-BC-19/F-1029/CYS-50, dated 7th June 2008 shall be adhered strictly by all the Safety Commissioners, Safety Audit Officers and Safety Officers
13. The respective General Managers (Elec) C, O & M shall ensure procurement of safety equipment/tools as prescribed within 2 months.
14. The Zonal Chief Engineer (Elec) Com. O&M shall send monthly report to the Central Committee, Member Convener, about the number of accidents occurred in his Zone, Division wise duly analyzed and causes for the accident and the remedial measures taken to avoid reoccurrence of such accidents.
15. However, the present system of statutory reporting of the accidents in accordance with the regulations shall continue within stipulated time followed by detailed report.



Chapter - V

Accidents

Accidents begin where safety ends.



Accidents

5.1 Definition:

An accident may be defined as a sudden mishap that interrupts the operation of an activity. It is an unplanned and irreversible event.

5.2 Classifications:

5.2.1 Electrical:

Resulting generally from any of the following causes:

1. Any person or animal coming in accidental contact with snapped overhead conductor.
2. Any person or animal coming in contact with a metallic line support, stay wire, unauthorized energisation of fencing, frame of electrical apparatus, etc. through which there is leakage of current due to failure of insulation damaged insulators etc.
3. Coming in contact with live overhead conductors during renewal of blown out fuses, replacing street lamps, cutting across live underground cable or touching live overhead conductors with metallic rods etc.
4. Climbing up poles or towers and coming in contact with live overhead electrical conductors, maliciously, out of ignorance or with the deliberate intention of committing suicide.

5.2.2 Mechanical:

Mechanical injury resulting from an electrical shock, such as person being thrown off line support due to electrical shock sustained.

5.2.3 Non electrical:

Non Electrical injury due to reasons as fall from a pole structure, tower or roof trusses, etc., hurt caused while handling heavy machinery, while driving vehicles etc.

5.2.4 Miscellaneous:

Other causes such as fires, drowning, explosions, etc.

5.3 Causes of accidents:

1. Those over which we have little control like floods, landslides, earthquakes, fires, lightning and other act of nature.
2. Those due to improper or defective equipment and failure to provide adequate protective devices.
3. The human elements or 'Human Factor' is by and far the greatest cause for serious accidents.

Statistics prove that more than ninety percent of industrial accidents are not due to defective equipment but due to failure on the part of workmen and those in authority to observe safety rules and adopt safety devices for accident prevention.

Failure under Human Factor can be more clearly divided into the following classification:

1. Failure on the part of workmen to observe safety rules made for their protection.
2. Failure on the part of Section Officer (AE/JE) or others, having responsibility over workmen to properly instruct those under their supervision as to their duties and insistence upon workmen to observe safety rules.

5.4 Accident Reports, records and Investigations:

1. Accident records are essential aids to the prevention of accidents. They show the type of accidents most frequently encountered, where they occur and their relative severity. A study of these records will emphasize common hazards and permits a better understanding of the causes of accidents and most effective methods of preventing them.

Accidents

2. All accidents which result in injury or not, shall promptly be reported to the Section Officer (AE/JE). Many injury free accidents, which are not reported, recur with serious consequences.
3. Every accident should be investigated to determine the cause and what steps are needed to prevent recurrence. It shall be the responsibility of the person in charge of the job to get a complete detailed cause of the accident as soon as possible after its occurrence.

5.5 Reporting of Accidents:

Every employee should report to the officer about the accidents, however minor it is, including the 'near miss' cases.

Chapter - V

This is required to take preventive measures and corrective actions and also to render suitable medical aid to the patient depending on the seriousness of the situation.

5.5.1 Non - Electrical Accidents:

Section Officer (AE/JE) in charge of work should furnish immediate information to proper authorities on the occasion of every serious accident and in the case of death on the spot they should not allow the body to be removed till an enquiry has been held. Fatal accidents to departmental workmen should be reported promptly by the Assistant Executive Engineer / Executive Engineer to the Chief General Manager (Technical) and a copy of the report should be sent to the Superintending Engineer and the Zonal Chief Engineer. Information should also be immediately furnished to the District Superintendent of Police and concerned Inspector or Sub Inspector of Police.

Non Fatal accidents should also be reported to the Superintending Engineer, the Zonal Chief Engineer, Chief General Manager (Technical) duly indicating the circumstances leading to the accident.

5.5.2 Electrical Accidents:

Under Section 33 of the Indian Electricity (Amendment) act, 1992, all electrical accidents including mechanical injury caused due to electrical shock should be reported by the concerned, within 24 hours to the Electrical Inspector and in case of death, the notice should be sent by telegram or telephone confirmed on the same day in writing. The telephone message should be in the standard form as under Appendix I. The telephone message should also be conveyed to the Superintending Engineer and the Chief Engineer of the zone and the Chief General Manager (Technical) also on the same day. A detailed report shall be submitted to the Chief Electrical Inspector as in Appendix II within 48 hours. Information should be furnished to the District Superintendent of Police and concerned Inspector or Sub Inspector of Police

5.6 Reporting of Hazardous Conditions:

When a hazardous condition that likely to cause injury or damage to property or interfere with services is observed, regardless of the department in which the condition exists, the employee shall report it promptly to a proper authority and, when necessary, guard the area.

An employee who receives a report of any hazardous /emergency condition shall obtain the name of the informant, the exact location, and the nature of the trouble. The employee shall immediately refer this information to the person having responsibility for such matters.

Note:

- 1) Correspondence regarding compensation payable and wages due will be dealt at Corporate Office of BESCOM.
- 2) Failure to comply with the above instruction regarding accidents, electrical or non electrical, fatal and non fatal is an offence punishable under the Indian Electricity Act of 1910 and Workmen's Compensation Act and the Act makes no distinction between the Corporation and a Private Employer.

Chapter - VI

First Aid

Act at once-- delay is fatal



First Aid

6.1 Treatment for electric shock, asphyxiation (Suffocation) and drowning

The most of the cases of electric shock and collapse, it is the lungs and the diaphragm (the thin sheet of muscles which lies below the lungs) that have stopped working and there is a very good chance of revival by applying artificial respiration quickly.

In case of severe shock, respiration is seldom established less than one hour while three to four hours or more might be found necessary to restore normal breathing. It is therefore essential that in all cases of electric shock where the condition of the patient is doubtful or the patient is unconscious or not breathing, artificial resuscitation should be continued until the patient breathes normally or until the doctor has pronounced life extinct.

Chapter - VI

6.2 Resuscitation Drill:

Every employee shall qualify himself by practical study and drill in the treatment for electrical shock according to the instructions contained in this Chapter, and those given in the Resuscitation Cards exhibited at all the Receiving Stations, Sub stations, Switching Stations etc. of the Corporations.

6.3 Removal from Contact:

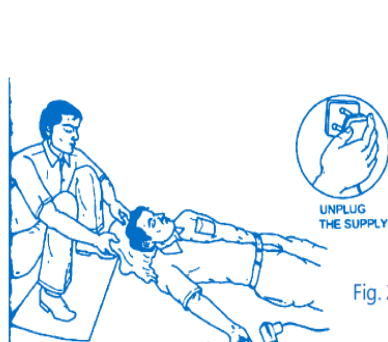
If the person is still in contact with the apparatus that

has given the shock, switch off the electric circuit at once if there is a switch, fuse or circuit breaker close at hand, if not, lose no time from proceeding to remove the body from contact with the live conductor.

Do not touch the victim's body with bare hands, but if rubber gloves are not at hand, pull him off the live conductor by his coat, shirt, etc., if they are not wet or fold your coat, or some dry article such as a news paper into three or more folds/thickness, and using this as a pad, take hold of the body and pull it away from the circuit. An operating rod or a broom handle may be used to raise the body or to detach the wires from it. A good plan is to stand on a dry board or stool or on a few layers of thick newspaper or bundle of dry sacking and remove the victim away from the live apparatus. Dried wooden sticks or rods can be used without any risk of shock. (Fig.1&2). If the victim is at a height, efforts must be taken to prevent him from falling, or to make him fall safe.

If the casualty is unconscious, but is breathing, loosen the clothing around the neck, chest and waist (fig 3) and place the casualty in the recovery position.

Extinguish any sparks if the patient's clothes are smouldering. Send for bringing a doctor while simultaneously keeping watch on victim on his breathing and heart beat. If apparently not breathing, proceed as detailed hereunder:

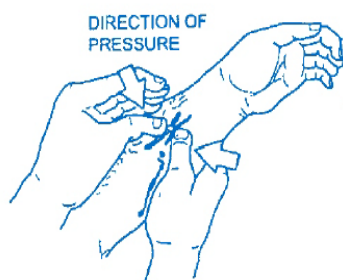


First Aid

In case of severe bleeding, especially wrist, hand or fingers it must be considered serious and should be given serious attention.

- Make the patient to lie down and rest.
- If possible raise the injured part above the level of the body/heart.
- Apply pressure to the wound

Call for medical assistance.



Chapter - VI

6.4 Immediate Action to Recover the Patient:

When a man has received a severe electric shock or been subjected to poisonous gases, or has been removed from the water in a drowning condition, his breathing is usually stopped. In accidents of this kind, speed may save the injured man's life; hence do not waste a second. Send for a doctor at once but do not neglect the patient in doing so.

The first thing to do is to get the injured man to a suitable place where you can work on him. This may necessitate lowering from a pole, or raising him from a manhole. This work usually involves considerable danger to the rescuer, because a manhole may be full of poisonous gases, or the injured man may be in contact with the dangerous circuit on the pole. You must, therefore, work very carefully.

Avoid so placing the patient as to bring pressure on the burns he has sustained, if any. Do not expose the patient to cold. Stimulants should not be administered unless recommended by a doctor. Cold water may be given in small quantities in cases of electric fire or asphyxiation cases and smelling salts may also be administered in moderation.

Continue artificial respiration without interruption until breathing is restored. Cases of success are on record after resorting for artificial respiration for more than 3 hours. Ordinary tests for death are inconclusive in cases of electric shocks and Doctor's pointed attention must be drawn to this when necessary.

Resuscitation should be carried on at the nearest possible place where the patient received his injuries. He should not be removed from this place until he is found breathing normally and then also should be moved only in lying position. Should it be necessary due to extreme weather conditions, etc. to move the patient before the victim starts breathing normally, he should be kept in a Prone position and placed on the hard surface (door or shutter) or on the floor of a conveyance, resuscitation being carried on during the time that he is being removed.

A brief return of spontaneous respiration is not a certain indication for terminating the treatment. Not infrequently, the patient, after a temporary recovery of respiration stops breathing again. The patient must be watched and if normal breathing stops, artificial respiration should be resumed at once.

6.5 Upon Recovery:

When the patient revives, he should be kept lying down and not allowed to get up or be raised under any circumstances, unless on the advice of a doctor. If the Doctor has not arrived by the time the patient has revived, he should be given some stimulant, or a drink of hot ginger, tea or coffee. The patient should then have any other injuries attended to and be kept warm, being placed in the most comfortable position.

First Aid

6.6 First Care of Burns:

Burns, if serious, should be treated with a proper dressing. A raw or blistered surface should be protected from the air. If clothing sticks, do not peel it off but cut around it. The adherent cloth or a dressing of cotton or other soft material applied to burnt surface should be saturated with picric acid (0.5%). If this is not at hand, use a solution of baking soda (one teaspoonful to a pint of water), or the wound may be coated with a paste of flour and water, or it may be protected with Vaseline, carron oil, olive oil, castor oil or machine oil, if clean. Cover the dressing with cotton gauze, linen, clean waste, handkerchief, or other soft cloth, held tightly in place by bandage. The same coverings should be tightly bandaged over a dry, charred burn, but without wetting the burnt region or by applying oil to it. Do not open blisters.

Chapter - VI

6.7 Treatment for electric burn:

If, as a result of electric shock the patient is suffering from burns, the following treatment should be given without hindrance to artificial respiration:



- Remove clothing locally to enable the burn to be treated but do not break blisters.
- Saturate burns with warm solution of one dessert spoonful of bicarbonate of soda to a pint of warm water or a teaspoonful of salt to a pint of warm water.
- Cover with lint soaked in a similar solution and bandage (lightly if blisters have formed)
- If the above solutions are not available, cover with sterile dressing.
- Warm, weak sweet tea may be given when the patient is able to swallow.

6.8 Artificial Respiration:

6.8.1 Nelson's 'Arm lift back pressure' method:

Place the victim prone face down with his arms folded with the palms one over the other and the head resting on his cheek over the palm. Kneel on one or both knees near the victim's hand. Place your hands on the victim's back beyond the line of the armpits, with your fingers spread outwards and down wards thumbs just touching each other as in the figure.



First Aid

Gently rock forward keeping the arms straight until they are nearly vertical and thus steadily pressing the victim's back to force the air out of the victim's lungs.

Synchronizing the above movement rock backwards, slide your hands downwards along the victim's arms and grasp his upper arm just above the elbows as shown.

As you rock back, gently raise and pull the victims arms towards you until you feel tension in his shoulders. To complete the cycle, lower the victim's arms and move your hands up to the initial position. This method should not be used if there are injuries on the chest and belly of the victims.

Schafer's method:

Chapter - VI

Lay the victim on his belly, one arm extended directly forward the other arm bent at the elbow and with the face turned sideward and resting on the hand or fore arm.

Kneel astride the victim, so that his thighs are between your knees and with your fingers and thumbs positioned as shown.



With the arms held straight swing forward slowly so that the weight of your body is gradually brought to bear upon the lower ribs of the victim to force the air out of the victim's lungs



Now swing backward immediately removing all pressure from the victim's body as shown



After two seconds, swing forward again and repeat the cycle twelve to fifteen times a minute.

However, this method cannot be adopted if there are injuries on the chest and belly of the victim.

6.8.2 Direct Artificial Respiration:

Direct artificial respiration is the method whereby a person ventilates the lungs of an unconscious non-breathing victim by blowing his own breath directly into the mouth or nose of the victim

Expired air is not dead air. It has been proved more than adequate for artificial respiration. The atmosphere contains 21% oxygen while expired air contains 14-18% oxygen.

Direct mouth-to-mouth breathing is by far the most effective method of artificial respiration, as proven by comparative studies conducted by research groups in the United States.

"The studies have indicated the unequivocal superiority of the mouth-to-mouth resuscitation over all manual methods in all age groups. Mouth-to-mouth breathing is the only technique which assures adequate ventilation in all cases. With the manual push-pull methods and manual rocking, complete obstruction of the airway occurred in a significant number of subject; partial airway obstruction was noted in all of the other cases".

Direct Artificial Respiration is approved as a standard for resuscitation by the National Academy of Sciences (U.S), the National Research Council (U.S.) and the American Medical Association, and has been adopted

First Aid

by the American National Red Cross and U.S Army.

It has been clearly established that direct artificial respiration is superior to indirect artificial respiration (manual methods), in all age groups and in all situations.

Indirect manual methods of artificial respiration cannot be applied in many situations when emergency resuscitation is urgently required.

For example, in case of severe chest and spinal injuries, indirect manual methods cannot be used. Furthermore, a victim may be partially buried in a cave or trapped behind a steering wheel or located in cramped quarters as would be the case in small craft, aero planes and other places.

In all these instances, the patient's survival will depend on direct artificial respiration.

Procedure for Direct Artificial Respiration (mouth-to-mouth method):

- Place the victim on back immediately.
- Clear throat of water, mucus, toys, coins, or food
- Tilt head back as far as possible
- Lift jaw up to keep tongue out of air passage.
- Pinch nostrils to prevent air leakage when you blow
- Blow until you see the chest rise.
- Listen for snoring and gurgling signs of throat obstruction
- Repeat blowing 10-20 times a minute.

In case of infants and small children tilt the head fully back, surround the mouth and nose completely with your mouth. Blow with only enough force to produce a visible rise in the victim's chest and no more. Repeat every 3 seconds

Continue direct artificial respiration until victim breathes for himself, or until expert help is obtained.

The method is fully described hereunder;

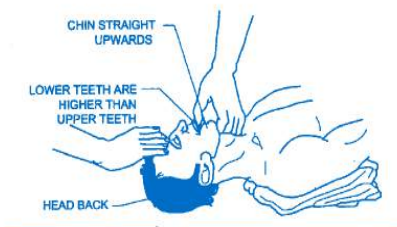
Step (1)

Lay the victim flat on his/her back and place a roll of clothing under the shoulders to ensure that his head is thrown well back. Tilt the victim's head back so that the chin points straight upward.



Step (2)

Grasp the victim's jaw as in the Figure and raise it upward until the lower teeth are higher than the upper teeth; or place finger on both sides of the jaw, near the ear lobes, and pull upward. Maintain jaw position throughout artificial respiration to prevent the tongue from blocking the air passage.



Step (3)

Take a deep breath and place your mouth over the victim's mouth as in Figure 1A. Making airtight contact, pinch the victim's nose shut with thumb and forefinger. If you dislike direct contact, place a porous cloth between you and the victim's mouth. For an infant, place your mouth over its mouth and nose.



Chapter - VI

First Aid

Step (4)

Blow into the victim's mouth (gently in the case of an infant) until his chest rises. Remove your mouth, & release the hold on his nose, to let him exhale, turning your head to hear the out rush of air. The first eight to ten breaths should be as rapid as the victim responds. Thereafter the rate should be slowed to about 12 times a minute (20 times for an infant)

Mouth to nose method:

If the victim's mouth will not open, or has a blockage which cannot be cleared, use the fingers of one hand to keep the victim's lips firmly shut and seal your lips round the victim's nostrils and breathe into him. Check to see if the victim's chest is rising and falling.

Chapter - VI



Note:

1. If air cannot be blown in, check the position of the victim's head and jaw and recheck the mouth for obstructions then try again more forcefully. If the chest still does not rise, turn the victim's face down and strike his back sharply to dislodge obstructions.
2. Sometimes air enters the victim's stomach, as evidenced by a swelling stomach. Expel air by gently pressing the stomach during the exhalation period:

In any case where external cardiac compression and artificial respiration are being administered Pressure - Cycling mechanical resuscitators shall not be used in lieu of mouth- to- mouth or other approved artificial respiration, because they may not be effective in adequately ventilating the lungs with air (oxygen).

Medical research has shown that properly administered mouth- to- mouth resuscitation is at least as effective as mechanical resuscitator; also MMR can be performed effectively without the use of airways of any kind. The time delay in waiting for a mechanical resuscitator or an airway to be made available and place them in operation could materially reduce or preclude the victim's chance of recovery.

6.9 Care for the Unconscious:

Oxygen is the element most vital for survival. Permanent brain damage or death may result within a few minutes from lack of air or oxygen. Therefore a victim's breathing requirements must receive your first attention.

The case of unconsciousness may be obvious, as in the case of drowning, electric shock, smoke or gas inhalation, strangulation, severe injuries etc.

The cause of unconsciousness may be obscure, as in the case of poisoning, overdose of drugs, alcoholism, heart disease, brain disease, diabetes, uremia, epilepsy etc. An unconscious person may be breathing or not breathing.

In either case an open air passage to the lungs must be maintained. The human tongue is as large as a quarter pound beefsteak. The muscles of the tongue relax with loss of consciousness. In certain positions the tongue may fall back, obstructing the throat and cutting off the air passage.

6.9.1 Unconscious person who is breathing:

Many accident victims, especially those sustaining head injuries (common in home and traffic accidents) suffer temporary shock and loss of consciousness. This may lead to death by suffocation.

Accidental death may be avoided in such cases by first taking a simple precaution:

1. Place the victim on his side or abdomen with his head turned to one side, and tilted back.

First Aid

2. In this position there is less danger of obstruction by the tongue or aspiration of vomitus into the lungs.

6.9.2 The unconscious person who is not breathing:

In such cases the unconscious victim requires immediate artificial respiration. Direct artificial respiration is the most positive and efficient means of ventilating his lungs.

The indirect or manual chest compressing methods of artificial respiration (Holger Nielsen, Schafer etc.,) depend on negative pressure, and are unsatisfactory unless provision has been made to establish and maintain an open air passage to the lungs.

6.9.3 Unconscious person whose breathing is very slow or shallow:

The victim may be assisted by direct artificial respiration, timing the air inflation with the patient's breathing efforts.

6.10 Situations requiring Special Care:

6.10.1 Drowning:

1. Direct artificial respiration must be started as soon as the victim's head can be kept above the water.
2. Do not waste valuable time waiting to bring the victim ashore or by attempting to drain the stomach or throat before hand. This may be done after artificial respiration has been started.

3. If the stomach is distended, lower and turn the victims head to the side and then apply moderate pressure with the palm of the hand over the distended stomach. Any air or water in the stomach will be then belched up.

6.10.2 Inhalation of foreign bodies:

If the victim is a child, turn him over your knees in the spanking position with his head lower than his hips, slap, him between shoulder blades in an attempt to dislodge the foreign body by causing him to cough it out. If the object is not dislodged and the child is in distress, quickly clean the throat with the fingers and begin direct artificial respiration.

6.10.3 Infant and child victims:

The technique of direct artificial respiration is essentially the same in cases involving children and adults. However, in the case of infants and children only a small volume of air is required to inflate the lungs. Over - inflation may produce damage. Short puffs of air are all that are required, sufficient to produce a noticeable rise in the infant's chest with each inflation. The inflation rate should be at least every 3 seconds - twenty times per minute.

An over-distended stomach in infants interferes with ventilation as well as normal heart action. This may be reduced by applying pressure over the infant's abdomen, care being taken to avoid aspiration of the fluid brought up in this manner by turning the head to one side.

Permit to Work

Provide safe working conditions, protect precious lives.



Permit to Work

7.1 Work on live Apparatus and Mains:

No employee shall carry out or attempt any work on live apparatus and mains except under authorization from the Asst. Executive Engineer, Asst. Engineer, Junior Engineer, who is on duty in Power Station /Sub Station or in-charge of the overhead or under ground distribution line taken on a 'Permit to work' form vide Appendix II and under the direct supervision of an authorized person termed 'Supervisor'.

Where in the interest of continuity of supply it is necessary after taking due precautions, to work on live electrical equipment for cleaning and repair work, particularly in Receiving Stations and Sub Stations, such work shall be carried out only under the personal supervision of concerned Officer.

Chapter - VII

7.2 Application for Pre-arranged shutdown:

Except for emergencies, all work for repairs, maintenance and construction on or in close proximity to live apparatus and mains shall be prearranged and programmed. Accordingly, applications for prearranged shutdowns shall be submitted by the Supervisor to the Officer in charge, in the prescribed form, vide Appendix IV which when duly approved, will be presented to the concerned Permit Issuing Officer for switching out the apparatus and issue of 'Permit to work'. These applications shall be made sufficiently in advance to enable the 'Permit Issuing Officer' to carry out necessary load transfers, if any, and other operations in connection with the work. The duration and nature of work must be clearly explained to the 'Permit Issuing Officer' before getting a permit.

7.3 Authorization:

An Authorized person shall be:

A 'Permit Issuing Officer' not below the rank of a Section Officer (AE/JE). A competent employee authorized in writing by a responsible Officer not

below the rank of an Executive Engineer / Assistant Executive Engineer, to carry out specific duties incidental to the position held by him.

No person shall be deemed to be authorized unless the same has been entered in the list maintained at the Office of the authorizing Officer and the entry has been attested by the person so authorized.

A list of Authorized Persons shall be maintained at the office of the respective Executive Engineers (Elec) and at each center of activity by the respective Assistant Executive Engineers (Elec). The list shall clearly define the extent of all such authorization. Such list shall be furnished to respective Deputy Electrical Inspector.

7.4 Duties to be performed only by an Authorized person are:

Following duties are to be performed only by an Authorized person.

1. Issue and receipt of permit for working on transmission lines, distribution lines, service lines, underground cables and all equipment installed in the Generating Stations, Receiving Stations, Sub stations, Distribution System etc.
2. Discharge permits issued under (1) above.
3. Operating Air break switches when alive.
4. Renewal of fuses on HT sides of transformers
5. Work on live equipments or live lines, where the voltage to earth does not exceed 250 volts AC or DC, like renewal of street light bulb, renewal of aerial fuse, cut outs, fuses and consumer fuses, renewal of LT fuses of transformer and LT feeders.
6. Testing consumer's installations and effecting service of LV installations.
7. Repairing or connecting LT equipment such as meters, time switches etc.
8. Possession of keys of switches/ kiosks / RMU / Isolators and equipment
9. Inspection, testing and maintenance work,

Permit to Work

7.5 Issue of 'Permit to work':

1. Before any work or testing is carried out on live mains and apparatus connected to distribution system, a "Permit to work" in the prescribed form covering the apparatus and mains to be worked on or tested must be issued, except in extenuating circumstances such as for the purpose of saving life or plant in the event of any emergency. In such cases, the action taken be reported to the concerned Power Station or the Executive Engineer without any delay.
2. The staff authorizing the work shall issue to the Section Officer (AE/JE) necessary authorization in the prescribed form and this will only become valid after the Permit Issuing Officer, who is responsible for the power supply to the Distribution system has signed on the form and returned it to the Section Officer (AE/JE).
3. The issue of 'Permit to work' form by the 'Permit Issuing Officer' to the authorized person gives the line clear and authority for the Section Officer (AE/JE) to proceed with the work. The Section Officer (AE/JE) shall keep in his possession the 'Permit to Work' form throughout the duration of the work.
4. If, for any reasons, the pre arranged shutdown work cannot be completed within the period applied for, intimation will be given to the Permit Issuing Officer and duration of permit extended suitably on the Permit Form.
5. In the case of work on consumer's installation, the consumers should be advised of such extensions, sufficiently in advance to avoid inconvenience.
6. When written permits cannot be given, line clear should be given and taken over the Phone. In such cases substances thereof shall be repeated by the person who receives the Line Clear request message and shall be confirmed by the sender to ensure that both parties are quite clear as to its purpose. Such

instructions shall be recorded, only in the Line Clear Permit books at both sending and receiving ends. The issue of Line Clear over phone should be confirmed by some other Board employee to the Section Officer (AE/JE) over phone and the name of the person who confirms issue of Line Clear /Permit to work should be recorded in the Line Clear Permit Book.

7. Duplicate copies of the Line Clear should be sent by post as soon as possible for record at either end after duly canceling the same.

7.8 Special Instructions to Permit Issuing Officers

The Permit Issuing Officer shall not issue the permit before:-

1. The switches/ circuit breakers/ isolators or switches have been opened and are completely isolated on both sides; links and fuses opened, apparatus and mains discharged and earthed, and all adjacent live parts adequately protected. Wherever possible the switches/ isolators shall be locked out and keys kept in safe custody. Isolators/switches at control panels shall also be fixed with "HOLD", "LINE CLEAR ISSUED", "MEN ON LINE" boards.
2. "HOLD BOARDS" and "MEN ON LINE" boards should be attached to apparatus.
3. An entry is made in the log sheet or Register to the effect that the apparatus and mains under the permit have been made dead and on no account shall the apparatus and mains again be made alive until the return by the Section Officer (AE/JE) of the "Permit-to- Work".
4. Where Sub permits are issued by the Section Officer (AE/JE) to competent persons working in different sections, such Sub permits should be accepted for cancellation only by the Section Officer (AE/JE) and under no circumstances should the Permit Issuing Office of the original permit, accept Sub permit for cancellation.

Permit to Work

5. The Permit Issuing Officer shall, take necessary steps in the circumstances, to ensure that in the event of any tripping of automatic switch/circuit breaker, when the section is switched in such switch/circuit breaker shall not be re-closed until the section /apparatus is thoroughly checked.

7.9 Special Instructions to Section Officers (AE/JE):

- a) No employee shall be ordered or permitted to carry out any work, other than that for which he is specially authorized in writing by the Executive Engineer Elec., Assistant Executive Engineer Elec. /Section Officer.
- b) The authorized person, termed as the Section Officer (AE/JE) of a working party (employees) shall keep with him a complete list of all persons who are detailed to work on the particular job. All other persons shall be warned to keep away from the area and no one shall be allowed to enter the area unless under a permit. This list shall be kept on record for any further reference.
- c) The Section Officer (AE/JE), before allowing any Workmen to commence work on the lines, mains or apparatus shall:
 1. Explain to the workmen the nature of work and the precautions taken by the Permit Issuing Office, to ensure the safety of the workmen and also the precautions to be taken by them during the whole time, when the work is in progress.
 2. Satisfy himself that the switch/switches/Isolators controlling the mains and apparatus have been isolated, discharged, properly earthed wherever possible and tested for pressure with a discharge rod and that Caution or Danger Notice have been placed at conspicuous places.
 3. Warn the workmen and the public of the danger that exist in the vicinity of the area covered by the "Permit to work".

4. Create a Safety Zone by short circuiting together all the conductors and adequately earthing on either sides of the place of work.

7.10 Transfer of Permit to Work Form:

- a) Transfer of Permit to work from one Supervisor to another, is strictly prohibited. If there is more than one working party, separate permits should be issued to the Supervisor in charge of each working party and a written record should be kept of the number of such permits issued for each work.
- b) If work is of such a nature and duration, that it has to be carried out continuously, but under the supervision of more than one Supervisor on shift duty, the "Permit to work" form shall be endorsed by the Permit Issuing Officer canceling the name of the supervisor to whom it was originally issued and substituting the name of the second or subsequent Supervisor to whom the permit will now become valid. The time of each endorsement should be noted on the "Permit to work" form and its duplicate.

7.11 Issue and Receipt of "Permit to Work" by the same person.

In cases where the same person who has to issue the permit, has also to carry out the work covered by the permit, a "Permit to Work" form shall be issued on himself before he undertakes the work and the form should be subsequently cancelled after the work is completed.

7.12 Cancellation of "Permit to Work Forms"

1. "Permit to Work" form issued to the Section Officer (AE/JE) shall be returned to Permit Issuing Officer only after all the works are complete, and earth removed so that the apparatus, mains and overhead lines are safe in all respects for charging and after all the workmen are withdrawn from the working area and are suitably warned that it is no longer safe to

Permit to Work

touch or approach the apparatus within the said area.

2. Under no circumstances shall any work be attempted after the return of the "Permit to work" form duly discharged. A fresh permit shall be obtained for completing the balance of work, if any, subsequently.
3. The return of the "Permit to work" form duly discharged will authorize the Permit Issuing Officer to resume normal operation.
4. The Section Officer (AE/JE) will not allow his staff to disperse before the Permit Issuing Officer has tested the apparatus and advise the Section Officer (AE/JE) that he has found the apparatus/ line is satisfactory for commissioning, so as to avoid any unforeseen difficulties in re-commissioning the apparatus and lines.

Chapter - VII

Maintenance of "Permit to work" and "Application for Pre-arranged Shut down" Books:

1. A duplicate of every "Permit to work" and application for "Pre-arranged shutdown" shall be retained in the Office of the Permit Issuing Officer for at least three months after issue.
2. The books should be treated as important record. The sheet and the books themselves should be serially numbered. No page should be detached or used for any but bonafide work.

3. If any paper is inadvertently detached or found to be missing, a detailed and initialed statement must be then and there recorded in the book by the Permit Issuing Officer.

7.14 Register of Messages:

1. All messages and instructions to issue of Permit to Work, the operation of switches, and other important communication shall be recorded in the strict sequence in the log sheet and Register of messages maintained by the person responsible for the operation of power supply to the transmission or distribution system.
2. The Section Officer (AE/JE) responsible for the execution of the work shall also likewise record all messages and instruction relating to the operation of switches/circuit breakers/isolators and other important communication concerning the work, in a 'Register of Messages' maintained by him for the purpose.
3. The final issue or return of Permit shall be logged in the book in ink underlined. When change of shift occurs during the pendency of permit, the outgoing permit issuing officer shall inform his reliever about the existence of all Permits, and show him the relevant entries. The incoming Permit Issuing Officer shall also sign in the log book while taking over charge to acknowledge that he has noted the pendency of the Permits.

Chapter - VIII

Safety Precautions

Prevention of accidents call for extreme discipline.



Safety Precautions

This is divided into four groups:

- General Safety Precautions
- Safety precautions for work on overhead lines, mains, service lines and Telephone lines.
- Safety precautions for work on underground mains/ cables.
- Temporary earthing.

8.1 General Safety Precautions:

1. All voltages shall be considered dangerous even though it may not be high enough to produce serious shock.
2. All electrical circuits are to be treated as live and no work (maintenance, repairs, cleaning) is to be carried out on any part of electrical apparatus or circuit unless such parts are:
 - I. Dead
 - II. Isolated and all practicable steps taken to lock off from live conductors.
 - III. Efficiently connected to earth between such points and points of work.
 - IV. Released for work by issue of permit
 - V. By checking that equipment for its de-energized condition.
3. Working conditions requiring more than one workman
 - I. On some hazardous work it is not desirable for one man to work alone. The Section Officer (AE/JE) shall determine when additional men are needed to protect workmen against accidents or to render assistance in case of unforeseen circumstances.
 - II. On especially hazardous jobs where close clearance or difficult working conditions are encountered, an observer may be required. On any job which in the opinion of the Section

Officer (AE/JE), requires an observer, the Section Officer (AE/JE) or a man appointed by him will act as an observer. The observer should not engage in any activity that the Section Officer (AE/JE) considers will interfere with the duty of the observer.

4. Under no circumstance shall an employee hurry or take unnecessary chances when working under hazardous conditions, neither shall he attempt to perform hazardous work when extremely tired or exhausted
5. Employee must use the standard protective equipment intended for each job.
6. Only experienced persons shall be permitted to go behind guardrails or to clean around energized or moving equipment.
7. Employees working in an elevated position should use a suitable safety belt or other adequate means to guard against falling.
8. Circuits should be tagged, marked or lettered unless clear identification by other means exist.
9. As per IE Rules 1956, the minimum clearance required between a live and section for safe working is 2.6 mtrs. for 11 kV.
10. However no employee should go or take any conduction objects within the distance given from any exposed live part at the voltages specified. For 11 kV - 2.6 mtrs.
11. Telephone conductors and ground wires of lightning arresters though they may be at or near ground potential are liable to develop high induced voltage under fault conditions. Suitable precautions should be taken when working on or near such circuits.
12. When fighting fires near exposed live parts, employees should avoid using fire extinguishing liquids, which are not insulating. If necessary, all neighboring equipment may be killed or made dead.

Safety Precautions

Chapter - VIII

13. Do not depend upon ripping of circuit breaker for isolation of lines and equipment for supply mains. The isolation must be in air media by an air break switch or isolator preferably visible.
14. No signal system like waving hands, flags and whistle should be resorted to communicate intelligence or convey instructions.
15. Insulation - Adequate isolation should be provided where any part of the body is likely to come in contact with.
 - I. Live lines or equipment.
 - II. Part of equipment or apparatus, which may develop dangerous potential due to surges, arcs or insulation failure though such parts may normally be at or near ground potential.
16. Do not use bare fingers or hands to determine whether a circuit is live.
17. Do not depend upon insulation of cables for safe working.
18. In handling portable apparatus or lamps, first make sure that the extended metal frame is not live by contact with or leakage from live parts within. Have such portable equipment inspected at least once daily during the period of their use. Do not attempt to make any alterations or adjustments in portable equipment without cutting off supply.
19. Guards:
 - I. The guards are provided for the safety of the personnel and also of the equipment. At no occasion it shall be removed from any machine or piece of equipment except to performing maintenance activities.
 - II. Immediately after the maintenance activities the guards shall be replaced immediately, before handing over the equipment for regular use and the equipment shall not be operated while the guards are removed.

20. Lockout-Tag out:

- I. Before starting work on any circuit or equipment, including that is supposed to be dead, employees shall assure themselves that the apparatus is physically rendered inoperative and that a standard Warning Board/Hold Card/ Tag/ Danger Board and/or lockout device is properly attached to the equipment control.
 - II. No switch, or any other device used to put a circuit into service shall be operated while such a danger board/ warning board/Hold Card or similar device is attached to it.
 - III. A Hold Card/danger board/warning board or similar device, that has been placed for the protection of workers shall be removed only by authorization of the person in whose name it was placed, and then only after the work has been completed and workers and tools are cleared.
21. Warnings:
- I. Any warning signs from anybody around the work spot shall be heeded and attended.
 - II. When the persons are seen in a dangerous situation they shall be warned without creating panic to the person leading to accident.
 - III. Unconcerned employees who are not required to be near potentially dangerous places shall keep away from them.

8.2 Safety precautions for work on overhead mains, service lines and telephone lines:

8.2.1 Working on Dead line and equipment:

No person shall work on line supports or conductors unless they are discharged and earthed as follows:

1. The circuit or conductor to be worked on shall be made dead by switching off or opening the isolator links or fuses and by locking isolator/links in the off

Safety Precautions

position. A danger notice board with the works "DO NOT CLOSE" "MEN ON LINE" should be fixed securely, below the switch or links/isolators.

2. After switching off the supply before touching the lines, every one of the conductors shall be tested for pressure (voltage) by discharge rod. The discharge wires should be kept at least two feet away from the body. The procedure is necessary in order to make sure that the line to be worked on is actually the line that has been isolated. Rubber gloves or preferably gauntlets should be used on both hands.

3. All the conductors shall then be short circuited together and adequately earthed; this shall be done at the points on each side of the place thereby creating a safety zone where the work is carried out.

Rubber gloves or gauntlets shall be used while doing this work. Poles on which work is actually to be carried out should also be earthed.

Chapter - VIII

4. A working section at either end of which the conductors are earthed shall not exceed 1.5 km in length.
5. In the case of lines meeting or crossing at any pole which forms the site of work, all the lines crossing or ending at that pole shall be earthed as stated above unless work on the one line with any or all the remaining lines alive is otherwise permissible and so specified in the permit to work.
6. Ensure that there is no possibility of back feed.
7. All phases shall be earthed even if work is to be carried out on one phase only.
8. When work is to be carried out on lines of all insulated conductors where grounding points are not provided at point of work, temporary grounds shall be connected at point of work to an efficient portable earth straight driven into the ground. The line shall also be grounded at the nearest line grounding point on either side of the point of work.
9. Where two or more crews are working independently on the same line or equipment, each

crew shall properly be protected themselves by placing their own temporary grounds.

8.2.2 Working on Capacitors:

While dealing with capacitors extra care should be exercised. They must be treated as live till they are disconnected from the line and terminals are discharged to ground. The discharging of capacitors should be carried out using hand gloves. No person shall touch the capacitor terminals with bare hands. The terminals of the capacitors should be shorted while storing them.

8.2.3 Working on lines and equipment adjacent to live equipment or lines:

1. When working near live lines or apparatus, each man should plan his moves and take extreme care in moving from one position to another
2. Where impractical to erect barriers between men at work and live parts within reach of their hands and objects being handled, continuous watch shall be kept by the Section Officer (AE/JE) or someone specifically designated by him for that purpose.
3. When a truck is used near live parts, all workmen, except the driver, should stay away from the truck, Driver should see that truck is clear from live lines before leaving and entering the truck.
4. Work on Double Circuit Overhead lines with one circuit alive shall not be carried out:

8.2.4 Repair work on HT lines and equipment:

1. Handling and working on live electric circuits are hazardous occupations and shall be done only by workmen who are qualified by training and experience to do the work safely and only after authorization.
2. Repair work on HT lines on poles where LT is also running under HT should be carried out only after switching off the LT effectively. Work on the LT line should not be carried out unless there is an efficient

Safety Precautions

earth screen between HT and LT lines or in the absence of such a screen, unless the HT line is switched off or in the opinion of the Section Officer (AE/JE), the work is otherwise safe.

3. Any line wherein the pressure does not exceed 250V to earth may be worked on live line by an authorized person provided the person
 - i. Uses a safety belt.
 - ii. Wears rubber gloves or gauntlets
 - iii. Has not to push any part of the body, except that portion of the arms protected by the gauntlets or gloves through any conductor other than that worked upon.
 - iv. Is accompanied by an assistant with an effective torch light if working at night
 - v. Before a lineman undertakes any work on a pole or any other line support, he should first make a complete inspection from the ground of the position of all live wires, in order to determine the amount of precautions to be adopted and should inspect his insulating equipment and operating tools and tackles for their good condition before he attempts to do the actual work.

Chapter - VIII

8.2.5 Telephone lines:

Work on telephone lines whether run on same supports as HT lines or on separate supports should be carried out only after taking necessary permits and discharging and earthing the same as per regulations for HT Lines.

8.2.6 Work on Poles, Towers and construction work on lines:

1. Before climbing an elevated structure every employee shall first assure himself that the structure is strong enough to sustain his weight safely.

2. If poles or cross arms are apparently unsafe because of decay or unbalanced tensions of wires on them, they shall be properly braced or guyed before they are climbed.
3. In choosing the climbing side, the side of the pole where the ground wire is attached should not be used.
4. The workman should avoid using conductor, insulators, pins and so forth as hand holds and should not rest on street light fixtures or other apparatus on the poles or structures.
5. Linemen shall wear their safety belts while working on the poles and towers.
6. Wire hooks shall not be attached to linemen's belts or safety straps
7. Safety straps should be placed above the top cross arm when it is at the top of the pole.
8. When two or more men are ascending a pole the second man should not start climbing until the first man is in a safe position or when descending until the first man is on the ground.
9. On arriving at the working position, the lineman should put his safety belt around the pole or some other suitable supports and make sure that the belt is properly secured. Care should be taken to prevent the straps on safety belt coming in contact with anything that may open the snap and thus release the safety belt. Safety belts should not be attached to insulator pins, span wires, guy wires etc.
10. Linemen's tools should be so secured that they will not fall out of the tool belts. A lineman should carry only the minimum number tools in his belt. All other tools should be kept on the ground until they are required and then raised by means of a material bag attached to a hand line
11. Ordinarily no lineman should work vertically below another lineman on the same pole except under emergencies. When this condition is necessary, extreme care should be taken to prevent

Safety Precautions

tools or other objects being dropped upon the man below.

12. When transferring wires and equipment from an old pole to a new pole, the old pole should either be locked to the new pole or guyed or both, as the condition may demand.

13. Before a lineman cuts an overhead conductor he should make sure that it will fall clear. Where there is a possibility of the falling line coming in contact with another wire or doing other damage it should be lowered with a rope.

14. All light equipment and tools to be used aloft should be raised and lowered by means of a hand line and canvas bucket, or other suitable container. Men on the ground should stand clear of overhead work to prevent being struck by falling objects.

Chapter - VIII

15. Tools and materials should not be thrown from the ground to a lineman working aloft, nor should lineman throw tools and materials from working place to the ground

16. Nobody shall work in such a manner that his arms or any tools extend beyond the body of tower when working on the live side.

17. Broken insulators or other sharp edged material shall not be left in vacant lots, along the right of way or in the location where the hazard of cutting feet could be caused for men or animals.

18. When stringing wires across streets and highways, avoid interfering with traffic or causing injury to workmen or pedestrians. Danger signs should be erected on both sides of the work location and where conditions warrant, flag-men should be stationed.

19. Hand line, materials, tools or equipment must not be scattered around streets, side walks, highways, etc. but must be kept in a neat and orderly manner where they will not be liable to cause accidents.

20. In handling wires on a pole, they should be raised or lowered with a dry hand line and extreme care should be exercised.

21. A leather belt should be used when working on overhead locations. In its absence, belts of flexible hemp or manila rope may be permitted round the waists of the workman and tied to cross arm or pole as an alternative to the use of leather belt, under exceptional circumstances. The ropes should be kept in good condition and scrapped when not safe. It is necessary that the rope is twisted round the pole once or twice in order that release of tension on the pole may not cause it to slip down the pole.

22. Use ladders of suitable lengths to go up the poles to renew fuses or to carry out other minor works on feeders and wherever possible or necessary dry hickory rod should also be used.

23. Hauling Poles:

- I. Poles must be securely held on trucks to assure that the binders will not be released in rough going.

- II. The speed of trucks hauling poles must be restricted to a point assuring safety to the operators of trucks and the traveling public.

- III. A red flag by day and red light by night must be attached to the end of poles being hauled. The red light must be visible in any direction.

24. Pole storage:

- I. When poles are stored on pole racks they shall be properly blocked to keep them intact on the rack.

- II. Poles of different sizes should not be mixed but stored separately.

- III. When poles are stacked temporarily near a road, they should be placed as close as possible to the edge of road.

- IV. Poles should not be stored at points in the road where there are short turns.

Safety Precautions

V. Poles stored on the high ways should not have cross arms attached.

25. Excavation of Pole Pits:

I. The pole pits should not be excavated much in advance of erection as the pits cannot be left without being back-filled immediately.

II. Within town and village limits the pits excavated should be covered with planks so that no one accidentally falls into it.

III. Danger lamps should also be put up during night time surrounding the place.

IV. As far as possible, the pit is to be excavated without resorting to blasting as it is dangerous to the adjacent buildings and roads where there is traffic.

V. If blasting is un-avoidable, special precautions should be taken by covering the pit with bamboos and planks carrying out blasting at time when there is no traffic on the road.

26. Erection of Poles:

I. This should be done under direct supervision of Foreman/Supervisor.

II. Care should be taken to see that the ropes used are in sound condition and they are tied securely to the pole and tackle.

III. When side guys are used in the setting of poles or structures, they shall be attached to crow bars driven into the ground.

IV. The Supervisor shall not assist in the setting of poles, but must give his entire attention to the Supervision to assure that the work is being safely performed.

V. In obstructing a highway during the erection of poles, suitable signs or warnings shall be used on each side of the work to advise approaching traffic of the obstruction. Where traffic is heavy

flag men should be used for this purpose. Signs or signals must be moved along as the work progresses.

27. Installation of Guy Wires:

I. When insulators are used they should be connected into the guy wire line before the guy wire is set in place. Rubber gloves should be worn while installing guy wires through live circuits.

II. In new work, guys should generally be installed before line wires are strung. In reconstruction work guys should be installed before any changes are made in the line wires and care must be taken not to place excessive pulls on the pole and wires already in a position.

III. Guys should be so installed as not to interfere any more than necessary with the climbing space and should clear all high tension wires as far as practicable.

IV. Guy strain insulators should be provided wherever necessary to secure the required amount of insulation.

V. Guys should be carefully installed on poles to prevent them from becoming loose. Where necessary a guy hook may be used to prevent the guy from slipping down the pole. These hooks should not interfere with climbing and should be so placed that they will not be used as steps. Where guys are liable to cut into the surface of pole, the pole should be protected at the point where the guy is attached by a guy plate. The guy plate must be well secured to the pole to prevent the possibility of injury to a lineman climbing up or down the pole.

VI. All guys which are anchored should be installed so that the guy does not interfere with street or highway traffic. Where these guys are located near street or highway, they should be equipped with traffic guards (traffic guards are sometimes called anchor shields).

Safety Precautions

VII. Guy wire should be so installed that it will not rub against any messenger or signal cable carried under supply lines.

VIII. Guy wire, containing snarls or kinks should not be used for line work. Guy wires should not contain any more splices than absolutely necessary. Standard guy clamps or other positive clamping device should be used in making all stiff steel guy wire splices.

28. Removal of Guys:

- I. Before wires and guys are removed, the condition of the pole must be determined.
- II. If the pole is found to be weak, it should be securely braced before any changes in pole stain are made.

29. Foreign Wire attachments:

- I. Foreign wire attachments, such as signal lines, signal equipment and so forth, should be considered live and should be avoided at all times unless otherwise protected.

II. While a lineman is working on high tension lines, he should be careful not to disturb foreign lines and equipment which may be attached to the same pole.

30. Back Filling:

- I. Side guy, etc., should not be removed until sufficient stamping has been done to prevent the falling of the pole.

31. Dismantling Poles:

All poles must be guyed at least three ways by means of guy ropes before any other work proceeds on the pole. This can be done by:

- I. Make two turns around the pole with a sling and tie securely.
- II. Tie three guy lines around the sling at the proper angles

III. Insert a pike pole under two sides of the sling and work the sling well up the pole.

IV. Snub off securely by means of crow bars driven into solid ground on any other substantial snub.

V. Lineman may then climb up the pole safely and release all conductors and other equipment and the pole may then be slowly brought down.

32. Stringing Wires:

I. In stringing of wires care must be taken not to put kinks into any part. Kinks reduce the strength of the wire and may result in snapping of wire later on.

II. In handling and stringing of weather proof covered wires, care must be taken not to injure the weather proof covering.

III. A lineman must not change the strains on a pole by adding wires until he is satisfied that the poles will safely stand the altered strain.

33. Tree Trimming:

I. The public shall be protected against hazards of tree trimming along public street and highways by placing danger signals and signs

II. Before climbing, the limbs or branches should be carefully inspected to make sure that they will hold the trimmers weight.

III. Dead or decayed limbs are not safe to support any weight.

IV. Axes shall not be used aloft. Always use saws or bill hooks. Tools should be raised and lowered by hand line only.

V. Part of trees in contact with live wires should be handled as live wire.

VI. Before cutting down a tree, all limbs should be cut off for a sufficient height to avoid striking electric lines. Where there is danger that the tree may strike and damage property block and tackle should be used to control the direction of fall.

Safety Precautions

Chapter - VIII

VII. Felling operation, once started, should be finished before the crew leaves for the night or lunch hour.

34. Right of Way Clearing and Trimming:

I. When walking through slush, use ankle high canvas boots to prevent injury to feet from broken insulators thorny undergrowth, shells, etc.

II. Trees should be carefully felled to prevent them falling on transmission lines or adjacent buildings.

III. Avoid starting grass fires or forest fires.

35. Patrolling lines:

I. Emergency line patrol, trouble shooting on transmission lines and similar work should always be done with the greatest caution. Patrol men should be particularly alert at night to avoid walking into the fallen wires or metal fences which may be energized by fallen conductors.

II. Be careful with lighted cigarettes and matches, which may cause a fire along transmission line right of way. Break matches and crush cigarettes butts into earth on discarding.

III. Patrolmen should be alert from stumbling hazards and from poisonous plants and snakes.

36. Line Work under Adverse Weather Conditions:

I. In the event of the near approach of lightning storm all work on overhead lines shall cease immediately.

8.3 Safety Precautions for work on Underground Mains/Cables:

8.3.1 Work on live low voltage Mains:

Only, competent, experienced and authorized persons may work on live low voltage mains and testing apparatus.

8.3.2 Use of Insulating Guards:

Any employee shall not work on low voltage main with live conductors (UG Cable) alongside him until all those conductors are insulated for a distance at least 900 mm on each side of his body with the insulating hose or mats provided for the purpose.

The neutral shall be regarded as a live conductor.

8.3.3 Work on Dead Low Voltage Mains:

Unless an employee is authorized to work on live low voltage mains and testing apparatus, all low voltage mains testing apparatus to be worked upon, shall be isolated from all sources of supply, proved dead, and measures shall be taken against the inadvertent energizing of the mains and apparatus.

8.3.4 Testing Low Voltage:

An employee shall not apply low voltage, for test purpose, to any mains unless he has received a Permit to Work form and warned all persons working on the mains of the proposed applications of low voltage for test. Where any part of the mains which will then become live is posed, the Section Officer (AE/JE) of the test shall arrange for an employee to stand by at the exposed part during the whole period of the tests.

8.3.5 Work on High Voltage Mains:

While working on High Voltage underground mains, the following shall be complied with:

1. The dead cable should first be identified by approved means.
2. Before working on underground cable, all its conductors shall be effectively discharged and earthed at both ends and the earthing switches wherever installed shall be locked up.
3. The neighboring cables, if any, should be adequately protected.
4. Before cutting the dead cable, a steel wedge shall be carefully driven through it at the point where it is to be cut.

Safety Precautions

8.3.6 Minimum Working Distance:

No employee shall work within the minimum working distance, which is normally, 4' / 1.2 Mts. from the exposed live high voltage mains.

Under certain conditions, for special work and in an emergency, an employee may work within the minimum safe working distance where the work is directly and specifically sanctioned by the Supervisor responsible for the work and employee is fully experienced and aware of the dangers that exist.

In all such cases, the employee shall be accompanied by another employee who is also aware of the dangers which exist and who is capable of rendering First Aid and Artificial Respiration.

8.3.7 Devices for proving Dead High Voltage Mains:

Chapter - VIII

Only devices approved and issued for the purpose shall be used. The High Voltage Neon Lamp contact indicator rod may be used for proving dead exposed high voltage mains. Each rod is fitted with an indicating Neon tube which should glow when the contact end of the rod is applied to exposed live high voltage mains. Each rod is clearly marked for the maximum voltage on which it may be safely used and must not, under any circumstances, be used on higher voltages.

High Voltage contact phasing rods are provided for phasing and proving dead exposed high voltage mains. A set consists of two rods connected in series by a length of insulated cable. Both rods are fitted with contact tips and indicating tubes. When the contact tip of one rod is applied to exposed live high voltage mains and that of the other to earth or to other exposed live high voltage mains and when there is a sufficient difference of potential from that to which the first rod applied, the indicating tubes should glow.

Each set of rods is normally marked for the maximum voltage on which it may be used and must not, under any circumstances be used on higher voltages.

8.3.8 Use of high Voltage Contact Indicator and Phasing Rods:

While using the high voltage contact indicator and phasing rods, the following shall be complied with:

1. Ensure that the rod is clean and dry.
2. Check the rod by applying it to known live mains of the correct voltage - the indicating tube must glow.
3. Apply the rod to each phase of the mains to be proved dead. The indicating tube must not glow. Be very careful to be in the position to see the glow in the indicating tube. If any, should appear.
4. Again, check the rod by applying it to live mains as in (b) above, Again, the indicating tube must glow.

Note:

All the above operations shall be carried out, at the same place and time.

If no live high voltage mains or apparatus are available on the site, rods up to 11 kV may be tested by applying them to the top of a spark plug in running motor car engine. If the rod is in order, the indicating tube will glow each time the plug sparks. Therefore, the glow will be intermittent, but the indicating tube must glow on this test or the rod is useless as a means of proving dead. Remember, to test the Rod before and after use.

8.3.9 Work on Cubicle type High Voltage Panels:

If draw out cubicles are the switching off circuit breakers, and the draw out panels effectively discharged before any work is done over the same.

8.3.10 Safety Procedures to be observed while working on Ring Main Units (RMU):

1. While working on OD's (in comers), it has to be ensured that the OD cables are completely dead (isolated).
2. All the VL's (outgoing) are also to be kept in open condition.

Safety Precautions

Chapter - VIII

3. All the ODs and VL's shall be earthed and the cables are to be discharged using proper earthing device to avoid shock due to static charges in the cable.
4. The GOS provided for cable (if any) shall be kept open, duly ensuring that all the blades are opened out.
5. The conventional oil circuit breakers have been replaced by VCBs in most of the RMUs. If not, the operating handle of the oil switch shall be carefully used with all interlocks to avoid inadvertent operation.
6. While working on a VL, the concerned cable shall be isolated from the bus and shall be earthed after opening at either end of the cable.
7. After the OD/VL are opened for line clear purposes, the breaker of OD/VCL: shall be invariably locked and placed in earth position before any work is taken up on such cable or terminations

8.4 Temporary Earthing:

This covers the detailed procedures for providing temporary earths while carrying out operation and maintenance works on the already existing lines or construction of new lines for the protection of workmen and property

8.4.1 Temporary earths:

Temporary earths are those applied at the actual location of the work during repair or construction of installations for the protection of workmen and property.

Following features of temporary earthing equipment shall be kept in view by persons using it:

1. Earthing devices shall be of approved types, comprising properly designed clamps attached to insulated sticks of sufficient lengths to enable the clamps to be securely clamped to the conductors being earthed without an employee's hand approaching closer than the minimum safe working

distances. Each such line clamp is to be connected by a flexible copper earthing lead or of equivalent copper section of aluminium cable to an adequate earth clamp or other device for attaching to permanent connection or to a temporary earthing spike.

2. All earthing jumpers shall be of annealed bare and stranded copper equivalent aluminium conductor. Earthing leads for use at substations and lines shall have a cross section of at least 0.645 sq. cm (0.1 sq. inch) copper equivalent.
3. Earthing connections shall be continuous.
4. Electrodes for installation of temporary earths shall be of iron or steel rods at least 1.905 cm (3/4") in diameter and 1.524 mtrs. / (5ft.) in length. These shall have clear metal surfaces free from rust or any coating of paint or any other poor conducting material and be driven to a depth of at least 0.914 metres (3ft) in a spot considered to give good earth.
5. Chain used for earthing shall be examined by the employees every time before use.

8.4.2 General Precautions to be taken in connection with the application of temporary earths:

1. No electric apparatus or line shall be earthed until all reasonable precautions have been taken to ensure that it has been disconnected from all sources of supply.
2. The connections for earthing of an apparatus or line shall be applied or removed only by competent persons.
3. Earthing leads shall be connected to the system before being secured to the conductors.
4. Earthing leads shall not be applied in any cell or compartment in which there is an exposed live conductor.
5. When it is necessary to cut a line, bus bar or loop or to repair a broken conductor or damaged loop, earths shall be placed on both sides of the work.



Safety Precautions

Chapter - VIII

6. Before working on underground cables, they shall be disconnected from the source of energy, discharged and then earthed. To discharge them use an earthed wire and make contact with it to each terminal in turn repeatedly.
7. When removing earthing leads they shall be disconnected from the line conductor first and the earth system last. The removal shall be carried out in a reverse order to that adopted for the connection of various conductors to earth.
8. All works on dead circuits shall be done between two sets of temporary earths.
9. Earths shall never be attached or removed with bare hands. Rubber gloves, gauntlets or approved protective equipment shall always be used.
10. In so far practicable, the person applying the earths on poles and structures shall maintain his position below the level of conductor to be earthed in order to keep the body away from any arc that may occur when the earthing device is applied.
11. Employees shall keep off the earth wire.
12. No temporary earths shall be removed from the equipment while the work is in progress.
13. Employees shall not touch any conductors from which protective earths have been removed.
14. Earthing of one conductor does not render other conductors safe for work. All phases shall be earthed even if work is to be carried out only on one phase.
15. Temporary earth connections should not be connected to neutral wire, guy stay wire or any other metal parts of the structure.
16. The meaning of temporary earth is that it is done for the purpose of carrying out the specific work by creating a safety zone for the protection of working personnel from electric shock.
17. The earthing connection to the lines should be as close to the point of work as possible.

Safety Devices

Do not take chances with your life use safety devices.



Safety Devices

Safety Devices and Tools that are to be available:

The following are the minimum requirements of safety devices and special tools:

1. Rubber Hand Gloves, Gauntlets (11 kV class)
2. Safety Belts
3. Leather Protective Gloves
4. Hand lines
5. Ropes
6. Helmet
7. GOS Rods (11 kV insulated)
8. Goggles

Chapter - IX

9. Fibre ladder
10. Rubber Mat
11. Telescopic earthing rods
12. Hand Tools

- I. Insulated Cutting Pliers
- II. Insulated Screw Drivers
- III. LT Line Tester
- IV. 11kV line tester
- V. Adjustable Screw spanner
- VI. Rain Coat
- VII. Chargeable Hand Torch

9.2 Workmen's Safety Devices:

1. Rubber gauntlets, gloves, mats boots and galoshes, insulated platforms and stools, safety belts, hand lines, tower wagons and other special insulated devices shall be used as required by employees working on electrical apparatus, underground mains and overhead lines as precaution against accidental electric shock.

2. Pliers and other tools insulated with brittle materials or otherwise liable to have the insulation damaged when in use, shall not be used.
3. The supervisor in charge of the work will be responsible to test and ensure proper use of the safety equipment, supplied to the gang of workmen under him and see that it is maintained at all times in efficient condition and must immediately bring to the notice of his superior officer any equipment which is liable to be broken in use, when arrangements will be made immediately for their replacement.

9.3 Lineman's, Fitter's or Cable Jointer's clothing:

Lineman while working on lines shall avoid wearing loose clothing, rings, metal chains, etc., which may contact a live portion and cause hazard. They shall use rubber gloves, safety shoes, head gear, goggles wherever available.

9.4 Inspection of Safety Equipment:

All safety equipment shall be thoroughly inspected:

1. Monthly, by the T&P holder
2. Quarterly, by the Assistant executive Engineer,
3. Once in six months, by the Division Officer for its being in good condition.

9.5 Responsibility in using Safety Devices:

It is the responsibility of the employee to make use of safety devices properly.

9.6 Rubber Gloves and Gauntlets:

Rubber gloves should not be rough handled as to be damaged. After the work they should be cleaned, and powdered with French chalk and stored in a safe place.

9.7 Testing Rubber Gloves and Gauntlets:

Before using the gloves should be checked for cut, weak spots, pin holes, by an Air Test. This is done by rolling the gloves tightly from the gauntlet and noticing if any air escapes. If air leaks, the gloves should be discarded. If the right hand glove, if found to be unserviceable, the pair itself should be discarded. A left hand glove should not be used on right hand.

9.8 Care of Rubber Equipment:

Rubber equipment should be kept clean and free from oil. They should not be stored near a source of heat, or exposed unnecessarily to sun's heat. They are best stored in protective container, and should not be tied by cords or threads which may cut it.

9.9 Use of rubber gloves should be insisted:

1. While inspecting the Transformer or its HT & LT leads
2. While connecting wire near a live conductor or equipment
3. While removing or replacing fuses of HT installations.
4. A combination of gloves and hickory rod or fuse pole rods should be used where the voltage exceeds 5000 Volts.
5. While opening and closing isolators.

9.10 Care of safety belts:

Safety belt should be properly handled, and periodically treated with oil to prevent its becoming hard. Care should be taken to see that sharp tools or edges do not cut dents and holes in it. Extra holes should not be punched as it weakens the belt. It is best preserved in a separate case.

9.11 Leather protecting gloves:

Protective leather gloves may be worn over rubber gauntlets when wires are being spliced or when solder or hot compound are being handled when it is necessary for the person to move about a lot during working, or when line wires are being tied on to insulators or when any other work is being done which might render the gauntlet liable to tear and consequent danger to the wearer.

9.12 Eye and Face Protection:

Necessary eye protection should be used while operating the switches on load to avoid injury to the eyes due to sparking.

The eye protection should be used during handling molten solder, handling the acids and electrolytes in the battery rooms

The eye and face protection should be inspected at frequent intervals by the user and also by the supervisor and should be replaced immediately when the first sign of damage is observed.

9.13 Head Protection:

Safety head gear shall be worn by the employees whenever there is a hazard of falling objects, or electrical contact or any other cause which may lead to head injury.

Hair should not pose any obstruction to work and also should not lead to any accident during the work.

Head protective gear should also be subjected for inspection very frequently and should be replaced immediately when the sign of damage or deterioration is noticed.

9.14 Hand lines:

Hand lines should be twice as the height where work is being done. They should always be kept clean and dry,

Safety Devices

free from grease, solder, oil, etc. Ends should be tied to prevent unraveling of the strands. Hand lines should not have metal reinforcement. When jointing the hand lines a splice should be made. No metallic clamps or wire should be used for joining. Hand line should be carried up a pole, uncoiled and attached to the body belt. The hand line must be strong enough to carry the weight of a person. Hand lines should not be allowed to become wet, and should be dried before being stored. A spare hand line should always be available in an emergency. Hand line should be kept away from street and vehicle traffic.

9.15 Ladders:

Chapter - IX

1. Ladders must be of strength to carry double the strain of the heaviest load that would be placed upon them.
2. Defective ladders must never be used.
3. Wooden ladders shall not be painted so as to obscure a defect in the wood; only a clear, nonconductive finish shall be used.
4. A clearance space of not less than 12" must be provided between ladder rungs. A minimum clearance space of 36" (90 cms) must be provided in front of ladders where space permits.
5. When straight portable ladders are used on hard surfaces, they must be held or firmly locked in addition, anti slip shoes must be used where provided.
6. A ladder shall not be placed against an unsafe support.
7. Ladders must be kept free from dirt, grease, and paint spots.
8. Ladders must be stored upon brackets and in sheltered locations.
9. Ladders should never be left in place when employees leave the worksite for an extended period of time. They shall be laid on the ground or

floor in a safe location or kept in the storage position.

10. Ladders must not be placed in front of doors opening towards the ladder or against window sashes unless the door is open, locked, or guarded.
11. Step ladders must be fully opened before being used.
12. Two ladders must not be spliced together.
13. Employees must face ladders when ascending or descending over the, and must have both hands free.
14. Employees must not slide down or try stunts on ladders.
15. Ladders must be periodically inspected; Ladders with weakened, broken, or missing steps, broken side rails, or other defects shall be repaired or removed from service.
16. Straight, portable ladders must be placed at safe angle about 75 degrees with the horizontal. In other words, place the foot of a 12'4 mtrs ladder 3'1 mtr from the object it leans against.
17. Straight ladders shall not be climbed beyond the third step from the top.
18. Employees shall use the safety belt tied to the ladder whenever both hands must be used for the job or a possibility of the employee falling from an elevated position exists.
19. As far as possible portable metal ladders shall not be used in the vicinity of exposed energized lines and equipment.
20. Only one employee shall work from a ladder at one time. If two employees are required, a second ladder shall be used.
21. Ladders are not meant to be used as scaffolding platforms.
22. Other makeshift arrangements for the purpose of ladders like using boxes, chairs, etc., shall not be resorted to.



Safety Devices

23. Use of step ladders above 20 feet is prohibited and the use of extension ladders above 24 feet is discouraged.
24. Step ladder legs shall be fully spread and the spreading bars locked in place.
25. Step ladders shall not be used as straight ladders.
26. When an employee is working on a step ladder more than 10 feet high the ladder shall be held by another person.

9.16 Ropes:

1. Fibre ropes are made principally of manila fibre, sisal fibre and hemp. Frequent inspections are required in the use of rope as the interior fibers may be broken or ground to powder, while the exterior fibres may indicate that the rope is little worn.
2. Pure manila rope is the strongest and most reliable of fibres ropes. It is of yellowish colour with silvery or pearlish luster and has a silky feel when drawn through the hand. Rope with brown or black fibre is of inferior grade.
3. Sisal rope has about 6.7% of the strength of manila rope. It is yellowish white, sometimes with a greenish tint. The fibres are hard and stiff, with a tendency to splinter.
4. Hemp rope is nearly as strong as manila and is slightly more resistant to atmospheric deterioration. It is of dark grey colour and is much softer than manila rope.
5. Rope must be so uncoiled as to avoid kinking, since even a moderate strain on a rope in which there is a kink may over stress the fibres at the kink.
6. Wet rope deteriorates rapidly unless dried properly. It should be hung up in loose coils so that dry air can be circulated through them. Heat should never be applied as it dries out the oil and thus shortens the life of the rope. Wet rope has a tendency to form

kinks. No load should be applied until all kinks are removed.

7. All ropes are easily damaged by acids alkalis. Any rope known to have been exposed to acids or alkalis (sometimes indicated by discoloration or strains) should be used with caution.
8. In making a rope fast, an object with a smooth round surface should be selected. When rope is running over a sheave or pulley internal wear is caused by friction. The life of the rope is greatly prolonged by using blocks with sheaves of large diameter.
9. Fibre rope should always be cleaned before being placed in storage and shall be stored in a dry, airy place. It should never be stored in the same room with acid or caustics.

9.17 Hand Tools:

1. All tools shall be of an approved type
2. Tools shall be inspected at frequent intervals and disposed off as soon as the sign of damage is observed.
3. Using hand tools improperly, neglecting to keep them in safe working condition and carelessly leaving them around where they may endanger persons to trip or stumble are frequent causes of accidents. Proper tools should always be used for the work.
4. All tools shall be maintained in good working conditions. Burred heads shall be promptly redressed. Broken, cracked or otherwise damaged handles shall be replaced. All tools with sharp edges should be kept in sheaths, shields, tool chests or other containers, when not in actual use.
5. A screw driver should never be used as a chisel. Screw drivers with full length metal tong or shank through handle must not be used for electrical work. Other tools such as pliers, wrenches, etc. whether insulated or not insulated shall not be used without rubber gloves while working near live parts of any voltage.

Safety Devices

Chapter - IX

6. All files shall be fitted with substantial handle; workmen should keep files cleaned as this reduces the slipping hazard and prevents skinned hands.
7. Never use metal tapes, rulers, cloth tapes with metal strands, wood rulers with metal ferrules or joints near energized equipment.
8. Hammers with metal handles shall not be used on or near energized electrical circuits or equipment.
9. Avoid use of long saws among wires as a short circuit may be caused.
10. Belt tools must be well secured to the belt. Only pliers, hammers, wrench and connectors should be carried. All other tools should remain below until needed and then hoisted in bag/ tool buckets or firmly attached to hand lines.
11. Tools shall not be thrown from place to place or from person to person;
12. Tools shall never be placed unsecured on elevated places.
13. Chisels, drills, punches, ground rods, and pipes shall be held with suitable holders or tongs (not with the hands) while being struck by another employee.
14. Shims shall not be used to make a wrench fit.
15. Wrenches with sprung or damaged jaws shall not be used.
16. Pipe shall not be used to extend a wrench handle for added leverage unless the wrench was designed for such use.
17. Wooden handles that are loose, cracked, or splintered shall be replaced. The handle shall not be taped or lashed with wire.
18. All cutting tools such as saws, wood chisels, drawknives, or axes shall be kept in suitable guards or in special compartments.
19. The insulation on hand tools shall not be depended upon to protect users from electric shock.
20. When using such tools as screwdrivers and wrenches, employees should avoid using their wrists in a bent (flexed), extended, or twisted position for long periods of time. Employees should maintain their wrists in a neutral (straight) position.

9.18 Portable Electric Tools:

All portable electric power tools such as drills, saws, and grinders should have an earth conductor connected effectively with the earth when energized.

The power supply cord should be inspected at regular intervals.

They must be used to their capacity in accordance with the manufacturer's instructions.

Electric tools should not be used in areas where there is a flammable atmosphere.

All portable power supply systems like vehicle mounted generators shall be protected by an Earth Leakage protection.

Protective guards should be used wherever possible and provided.

Chapter - X

List of Safety Equipments to be maintained by Linemen and Section Officers

List of Safety Equipments to be maintained by Linemen and Section Officers

BANGALORE ELECTRICITY SUPPLY COMPANY LIMITED

(Wholly owned Government of Karnataka Undertaking)

To be maintained by Lineman					
Sl. No	Material Name	Quantity			
1	GOS Rod (11 kV insulated)	1 No.			
2	Rubber Hand Gloves (11 kV Class) Good quality suitable to work on live wire	1 pair			
3	Insulated Cutting Plier 12 "	1 No.			
4	Screw Driver Size 6" Size 12"	1 No. 1 No.			
5	LT Line Tester	1 No.	To be maintained by Section Officer		
6	Helmet	1 No.	Sl. No	Material Name	Quantity
7	Safety Belt	1 No.	1	Telescopic Earthing Rod	2 Sets (Or 6 Nos.)
8	Adjustable screw spanner	1 No.	2	Fibre ladder	2 Nos.
9	Rain Coat (light Weight)	1 No.	3	Chargeable hand torch	1 No.
10	Chargeable Hand Torch	1 No.	4	Rubber Hand Gloves (11 kV Class)	1 Pair
11	Goggles	1 No.	5	11 kV line tester	4 Nos.
			6	Helmet	1 No.
			7	Rain Coat (light Weight)	1 No.
			8	Rubber Mat Size 2' x 3'	2 Nos.

Chapter - XI

Accident Investigation System



Accident Investigation System

11.1 Investigating Procedures:

An accident is any unplanned event that results in personal injury or damage of property. The accidents result in loss of lives and/or damage of property apart from leading to loss of production hours and disruption of work and/or service. Many accidents occur almost every day for various reasons. The failure of people, equipment, supplies, or surroundings to behave or react as expected causes most of the accidents. Proper investigation of the accidents reveal the cause of such accidents and thereby helps to prevent similar or perhaps more disastrous accidents. The approach for accident investigation should be an effort of 'FACT FINDING', and not 'FAULT FINDING'. Generally the accidents require skilled investigations to arrive at the cause of accidents.

important items that are needed for successful investigation are as follows:

1. Camera
2. Tape recorder
3. Telephone or any other mode of communication
4. Codes/Standards for operation such as Indian Standards, Indian Electricity Rules, standard procedure laid down by the competent agencies engaged in such activities, International standards relevant to area of operation such as OSHA, NESC, NEC and also the Company's Safety Manual.
5. Personal protection equipment (PPE) (hard hat, safety glasses, hand gloves etc.)
6. Warning signs
7. Caution tapes/boards
8. Lighting (flashlight, portable lights, etc.)
9. Compass
10. Thermometer (inside & outside temps)
11. Anemometer (checking wind speed)
12. First Aid kits
13. General tools as needed
14. Measuring tapes Straight edge, protractor etc.
15. Various types of tapes like Flagging tape, masking tape
16. Marking paint/chalk
17. Evidence containers (small & large zip-lock bags and/or manila envelopes)
18. Identifying tags/stickers
19. Pens, pencils, markers pens, etc.
20. Clipboard(s)
21. Sketch pad (graph paper) & note pad
22. Company forms/letter heads
23. Reporting formats

Chapter - XI

11.2 Near Miss accidents:

These are accidents which could have caused serious damages but missed narrowly. Though there could be no damage as such, the potential for a serious accident is quite obvious and therefore calls for investigation and recommending remedial measures.

The main purpose of an Accident Investigation is to determine the CHANGE OR DEVIATION that produced an ERROR that in turn resulted in an accident. By uncovering the reasons for the accident, subsequent accidents of similar or more serious in nature may be prevented by improving the mechanical system, better supervision or employee training and public awareness programs.

11.3 Investigation Kit:

For investigating purpose the investigating person should have some basic equipment and facilities. The kit should contain the basic equipment required for carrying out an effective investigation. Additional equipment may be necessary based on the type and scope of the incident to be investigated. Some of the

Accident Investigation System

11.4 Investigation Steps:

11.4.1 Controlling the Scene

Generally when an accident takes place the area is crowded by the people who are unconcerned and this not only causes the hurdles in providing necessary assistance for the injured but also destroys the necessary data that may be available at accident site which are vital for accident investigation. As such the first and foremost job is to control the area and offer necessary medical aid for the suffering people. Therefore the activities can be grouped as follows:

1. First Aid
2. Transport for Medical Care
3. On Scene Evaluation
4. Control/contain existing hazards
5. Prevent further injuries
6. Get more help if needed
7. Preserve evidence

It should be ensured that it is safe for the Accident Investigating team to enter the accident scene. Necessary care should be availed if needed in such cases.

Next, isolate the scene by whatever means as necessary (signs, cones, barriers, caution tape, etc.) so that there is no entry of unauthorized persons and also there is no chance of destroying of evidences. When the scene is safe and isolated, begin with the basics of accident investigation. Preserve the accident scene site.

11.4.2 Gathering the Data

1. Photos of accident scene
2. Drawings & sketches & measurements
3. Data collection
4. Details of the Persons involved
5. Date, time, location

6. Activities at time of accident

7. Equipment involved

8. List of witnesses

The effects of following contributing factors also to be considered during investigation

1. Weather conditions
2. Noise levels,
3. Lighting,
4. Housekeeping,
5. Safety equipment used
6. Safety equipment not used.

The statements from the victims should be recorded and wherever possible necessary information and statements from witnesses are also should be recorded.

Close observations should be carried out on the parts, tools or equipments involved in the accident by looking for wear, missing pieces, misalignment or out of adjustment, or any previous damage.

All safety devices like guards etc. are to be observed whether they are in place and functional or not.

All loose evidences should be gathered and tagged. Date, time and location are to be recorded on the bag or tag.

Nothing should be thrown away and all the evidence should be kept in one location till the findings are made and concluded.

11.4.2.1 Important points while taking photographs:

Photographs should be taken from various positions and angles so as to cover entire scene and without leaving anything for assumptions on a later date. Photos should reveal and document the conditions. Photos of marks and debris are also should be taken. If possible, photo of the nearest sign/landmark etc. (street corner sign/house) is need to be taken to indicate location. It is better use a ruler, next to the

Accident Investigation System

object to provide an accurate scale for close-ups photographs. An explanatory note on each photograph indicating the details and also date and time would be helpful in future dates.

11.4.2.2 Sketches & Measurements

All measurements of essential information should be indicated in a sketch. Measurements are to be taken before any evidence is moved or removed. Sketches should be made indicating the location and position of people, equipment, materials and facilities

11.4.2.3 Paper Evidence

The following records will also give some insight into the reasons for accidents:

1. Training Records of the persons involved in the accident.
2. Maintenance Log books of the equipment where the person was engaged in the work and caused accidents.
3. Schedules for check up, maintenance etc.
4. Job Procedures, work instructions
5. Job Briefing records like work permits etc.
6. Inspection Reports of the equipment where the accident took place.

11.4.2.4 Information Interviews

This is the method of collecting the information directly from the persons who were available at the scene at the time of the accident. This information helps to pinpoint the cause of accidents.

Typical Questions to be asked to Supervisors would be as follows:

1. What is normal procedure for activities involved in the accident
2. What type of training persons involved in accident have had.

3. What, if anything was different today
4. What they think caused the accident
5. What could have prevented the accident
6. What did you see
7. What did you hear
8. Where were you standing/sitting

Certain Points should be borne in mind while conducting interviews as follows:

1. Gather just the facts. Make no judgments or statements
2. Conduct interviews one on one
3. Be friendly but professional
4. Conduct interviews near the scene in private
5. Interview all supervisors
6. The interviews with witnesses should be carried out as soon as possible, while the details of the incident are fresh in their minds.

11.4.2.5 Details of the witnesses

Name, address, phone numbers of all the witnesses should be noted down.

11.4.3 Analyzing the Data

The analysis of facts concerning accidents is the process of identifying the cause of an accident from the facts that have been gathered by the investigation. An analysis will then classify the accident facts (causal factors) and develop recommendations for changes of those causal factors in order to prevent re-occurrence of the accident in the future.

1. Gather all photos, drawings, interview material and other information collected at the scene.
2. Determine a clear picture of what happened
3. Formally document sequence of events

Accident Investigation System

11.4.3.1 Classification of data of Analysis and Causes

1. Unsafe Acts what activities contributed to the accident
2. Unsafe conditions what material conditions, environmental conditions and equipment conditions contributed to the accident

11.4.3.2 Analysis about the Contribution of Safety Controls:

1. Engineering Controls - machine guards, safety controls, isolation of hazardous areas, monitoring devices, etc.
2. Administrative Controls - procedures, assessments, inspection, records to monitor and ensure safe practices and environments are maintained.
3. Training Controls - initial new hire safety orientation, job specific safety training and periodic refresher training.

11.4.3.3 Identification of the controls that have failed:

List the specific engineering, administrative and training controls that failed and how these failures contributed to the accident.

11.4.3.4 Identification of the controls that have worked properly:

List any controls that prevented a more serious accident or minimized collateral damage or injuries.

11.4.3.5 Determine:

1. What was not normal before the accident
2. Where the abnormality occurred
3. When it was first noted
4. How it occurred.

11.4.3.6 Conclude:

1. Unsafe Acts
2. Unsafe conditions

11.4.3.7 Final Analysis:

1. Define the problem (What happened?).
2. Establish the norm (What should have happened?).
3. Identify, locate, and describe the change than the ideal one (What, where, when, to what extent).
4. Specify what was and what was not affected.
5. Identify the distinctive features of the change.
6. List the possible causes.
7. Select the most likely causes.

11.4.3.8 Prevention

What needs to change or be improved to prevent similar accidents in the future?

1. Engineering Controls
2. Administrative Controls
3. Training Controls

11.4.4 Writing the Report

Final report should be precise and should contain every detail without giving room for any ambiguity or contradicting interpretation. It should highlight the pre and post activities of the accident also so that it will help to implement the preventive measures. The report should have clear recommendation for preventing the recurrence of similar accidents.

11.4.4.1 Final Report

1. Background Information where, when, who & what
2. List of those involved & other witnesses
3. Account of the Accident - sequence of events, extent of damage, accident type, source

Accident Investigation System

11.4.4.2 Identification of Causes

1. Analysis of the Accident HOW & WHY
2. Direct causes (energy sources; hazardous materials)
3. Indirect causes (unsafe acts and conditions)
4. Basic causes (management policies; personal or environmental factors)

11.4.4.3 Remedial actions

1. Basic causes
2. Indirect causes
3. Direct causes

11.4.4.4 Recommendations

As a result of the finding if there is a need to make changes to:

1. Employee training
2. Changes to be incorporated in the equipment/system/condition
3. Policies or procedures

After developing a formal report, forward it for review & action by the competent authorities.

Preserve the report and complete records/data/photographs/sketches pertaining to the investigation in a single file.

CEA Guidelines

CEA Guidelines

Some of the important recommendations of CEA on Safety:

- Formulation of Policy on Safety
- Defining and documenting responsibilities for all levels of functionaries
- Preparing safety manuals
- Establishing procedures to identify hazards
- Providing adequate resources
- Providing training for accident reporting, analysis, investigation and recommendation of corrective actions
- Establishing system for proper communication, documentation and record management
- Establishing procedure for auditing of safety system
- Establishing system for periodic monitoring and review of the safety system by the management
- Overseeing the performance of Contractors

Chapter - XII

Work Permit Form

BANGALORE ELECTRICITY SUPPLY COMPANY LIMITED

(Wholly owned Government of Karnataka Undertaking))

"WORK PERMIT" FORMAT

Form to be filled up by the linemen before commencing 11 kV work

Date:

Time:

O&M Unit:

Station:

Feeder No.:

DTC No.:	DTC Location:
Place of work:	
1 Status of work:	New / Emergency / Routine
2 Have the details about the work informed	Yes / No
3 Hazardous items about taking up the work	a) Double Circuit b) Near EHT line c) Close to building d) If Others (detail)
4 Method of execution of work	Opening of all sources of supply Grounding
5 Special safety precautions	Traffic Control Public Control Close to public places such as School Market etc
6 Energy Source Control	Line Clear Switching off the V.L Opening of GOS
7 Protective equipment given	a) Rubber hand Gloves b) Safety Belts c) Grounding set d) Ladder e) Shoes f) Cutting Pliers g) Helmet

Appendix - I

Signature of Employee

Signature of Co-workers

1.
2.
3.

Signature of Supervisor



A Sample Permit Form (Line Clear Form)

BANGALORE ELECTRICITY SUPPLY COMPANY LIMITED

(Wholly owned Government of Karnataka Undertaking)

Permit to work on 11 kV distribution systems.

I, hereby declare that the following Electrical Equipment/line are dead and isolated from conductors.

A caution notice has been affixed to the controlling Device.

Details of Electrical equipment /line on which it is safe to work:

Signature:

Date,

Time:

Designation

Appendix - II

Name of the authorized person at opposite end, if Line clear is issued over telephone, :

(Issuer)

(Receiver)

Serial Number of the permit:

(When permit is issued over phone)

(Sending end receiving end)

Note:

1. This card after being signed by an authorized person for the work to proceed is to be handed over to the person in charge of the work and retained by that person until the work is completed or stopped by an authorized person.
2. The Electrical equipment mentioned herein must not be again made live until this has been signed and returned by the person in charge of the work to an authorized person.





Return of Line Clear:

I hereby declare that all men, earthing and materials under charge have cleared the equipment /line and men have been warned that it is no longer safe to work on the electrical equipment specified on this card.

Signature of the person who returns the line clear

LC No. and date:

Signature of the person who receives the return of Line clear:

Date/Time



Bangalore Electricity Supply Company Ltd.

Application for Prearranged Shutdowns

1	Name of the Applicant	
2	Designation and address	
3	Section of line or feeder or equipment on which shutdown is required	
4	Time, date and duration of shutdown	
5	Purpose of shutdown	
6	Consumers affected by shutdown	
7	Whether concurrence of competent authority obtained or not	
8	Nearest contact telephone No.	

Appendix - III

Sign	Applicant	Recommending officer (BESCOM Officer)	Officer-in-charge Of Station
Date			
Designation			

Note:

1. The applicant shall not be below the rank of a Junior Engineer.
2. The application duly approved by Officer in - charge of Station will be forwarded to the concerned operator on duty for shutdown and this form will be retained by him as a record.

Telephone Message Accident Report.

Sl.No.	Particulars	Details
1	Name of the Section/Sub-section	
2	Date and time of occurrence	
3	Name of the casualty, address, sex and age	
4	Fatal/non Fatal (if non fatal state condition)	
5	Departmental or non departmental (if departmental, details of Ch. No. and designation etc., to be furnished)	
6	Voltage, name of the feeder and place of accident	
7	State of the occurrence if brief	
8	Date and time of reporting	

Appendix - IV

Form for reporting Electrical Accidents

1	Date and time of accident	
2	Place of accident (Village/town/taluk/District and state)	
3	System and voltage of supply, (Whether EHV/HV/LV line, Sub station / consumer's installation /service mains/ other installations)	
4	Designation of the officer in charge of the supplier in whose jurisdiction the accident occurred.	
5	Name of the owner/user of energy in whose premises the accident occurred	
6	Details of Victim(s):	

Appendix - V

(a) Human

Sl.No.	Name of the victims(s)	Father's name	Sex of the victim	Full Postal address	Approx age	Fatal/Non-fatal

(a) Animal

Sl.No.	Description of animal(s)	Numbers	Names of the owner(s)	Address of the owner(s)	Fatal/Non-fatal

1 In case of the victims(s) is / are employees(s) of supplier:

- Designation of such person(s):
- Brief description of the job undertaken, if any:
- Whether such person/ persons was/ were allowed to work on the job

2 In case the victim(s) is/are employees(s) of a licensed contractor

- Did the victim(s) possess any electrical workmen's permit(s) supervisor's certificate of competency issued under rule 45?

If yes give number and date of issue and the name of issuing authority.

- Name and designation of the person who assigned the duties of the victims(s).

Appendix - V

- 3 In case of accident in the supplier's system, was the permit to work (PT/W) taken?
 - a) Describe fully the nature and extent of injuries, e.g. Fatal/ disablement (permanent or temporary) or any portion of the body or burns or other injuries
 - b) In case of fatal accident, was the post mortem performed?
- 4 Detailed causes leading to the accident (to be given in a separate sheet annexed to this form)
- 5 Action taken regarding first aid, medical attendance etc, immediately after the occurrence of the accident (give details).
- 6 Whether District Magistrate and police station concerned have been notified of the accident (if so, give details)
- 7 Steps taken to preserve the evidence in connection with the accident to the extent possible.
- 8 Name and designation(s) of the person(s) assisting, supervising the person(s) killed or injured.
- 9 What safety equipment 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.)?
- 10 Whether isolating switches and other sectionalizing devices were employed to deaden the sections for working on the same? Whether working section was earthed at the site of work?
- 11 Whether the work on the live lines was undertaken by authorized person(s)? If so, the name and the designation of such person(s) may be given.
- 12 Whether artificial resuscitation treatment was given to the person(s) who met with the electrical accident? If yes, how long was it continued before its abandonment?
- 13 Name and designation of the persons present at and witnessed the accident.
- 14 Any other information/remarks.

Place:

Time:

Date:

Signature:

Name:

Designation:

Address of the person reporting:

Signature
(Date and time)

Designation

I hereby declare this card cancelled

Signature
(Date and time)

Designation

Electricity Safety Rules "Do's"

1. Do obey safety instructions given by the person in charge
2. Do insulate yourself from earth by standing on rubber mat while attempting to get the person who is in contact with live line or apparatus.
3. Do remove the casualty from the cause, render first aid and send for doctor or take the casualty to the nearest hospital.
4. Do break the circuit by opening the power switch and release the victim
5. Do preach and practice safety at all times
6. Do eliminate all short cuts while on duty
7. Do use correct size and quality of fuse wire while renewing the blown out fuse.
8. Do turn your face away whenever an arc or flash occurs
9. Do ensure controlling switches are opened & locked or fuse holders are withdrawn before working on lines.
10. Do disconnect the supply immediately in case of fire on or near electrical apparatus
11. Do keep away inflammables from electrical apparatus
12. Do report all accidents whether minor or major, fatal or non fatal departmental or non departmental immediately to the person in charge.

Appendix - VI
PART - I



Electricity Safety Rules "Don'ts"

Appendix - VI
PART - II

1. DO NOT renew a blown fuse until you are satisfied as to the cause and you have rectified the irregularity.
2. DO NOT disconnect a plug by pulling flexible cable when the switch is on.
3. DO NOT use wire with poor insulation.
4. DO NOT close any Switch /GOS /Breaker unless you are familiar with the circuit, which it controls and know the reason for its being kept open.
5. DO NOT work on energized circuits without taking extra precautions, such as use of rubber gloves and gauntlets.
6. DO NOT touch or tamper with any electrical equipment or conductor unless you have made sure that it is DEAD AND EARTHED.
7. DO NOT work on the live circuit without the specific orders of the supervisor and make certain that all safety precautions have been taken.
8. DO NOT disconnect earthing connection or render ineffective the safety gadgets installed on mains and apparatus.
9. DO NOT open or close switch or fuse slowly or hesitatingly.
10. DO NOT touch an electric circuit when your hands are wet or bleeding from a cut or an abrasion.
11. DO NOT use fire extinguisher on electrical equipment unless it is clearly marked for that purpose.
12. DO NOT throw water on live electrical equipment in case of fire.
13. DO NOT attempt to disengage a person in contact with a live apparatus, which you cannot switch off immediately.
14. DO NOT touch his body; push him with a piece of dry wood.
15. DO NOT discontinue artificial respiration until recovery or death is confirmed by the DOCTOR.
16. DO NOT allow visitors and unauthorized persons to touch or handle electrical apparatus or come within the danger zone of HV apparatus.
17. DO NOT test circuit with bare fingers.
18. DO NOT trust luck, but trust safety.
19. DO NOT joke, joke begins in fun, and ends in death.
20. DO NOT shorten your life, life is short and precious.

