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ELECTRICAL ACCIDENTS PREVENTION IN CONSTRUCTION SITES

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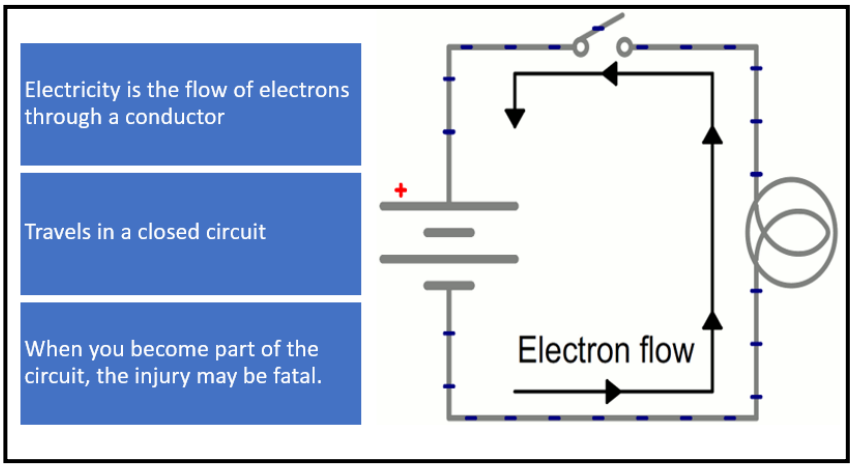
ABSTRACT

Electricity brings great benefits to the population, but when misused can pose a great danger especially with regard to safety. Despite several safety standards and standards in place to ensure safety in work involving electricity, there are still many accidents that range from minor injuries to fatalities. The present work aims to propose preventive measures for the risks existing in building electrical installations, in order to guarantee the safety and health of workers who perform activities and services of electrical installations, by explaining the origin of the causes of accidents in buildings. electrical installations, workers' awareness of the importance of safety and the main risks in electrical services. Subsequent to this, preventive and corrective measures will be suggested to reduce work accidents in building electrical installations. In the development of this study, a direct observation field research was carried out in three construction sites of Bangalore, where relevant aspects related to work safety were observed, with works involving electricity. Therefore, although companies have accident prevention measures, it is confirmed that the maximum of protective measures has their flaws. There is no work environment completely free of hazards and risks. Risks will always exist, even if in minimal proportions. Most workers have positive conceptions of improvements and benefits from the prevention of accidents in electricity.

Keywords: Electrical Installations, Dynamic, work safety and Accident Prevention

1.INTRODUCTION

Electricity brings great benefits to the population, but when misused can pose a great danger especially about safety. Despite several safety standards and standards in place to ensure safety in work involving electricity, there are still many accidents that range from minor injuries to fatalities. The present work aims to propose preventive measures for the risks existing in building electrical installations, in order to guarantee the safety and health of workers who perform activities and services of electrical installations, by explaining the origin of the causes of accidents in buildings. electrical installations, workers' awareness of the importance of safety and the main risks in electrical services. Subsequent to this, preventive and corrective measures will be suggested to reduce work accidents in building electrical installations. In the development of this study, a direct observation field research was carried out in three construction sites of Bangalore, where relevant aspects related to work safety were observed, with works involving electricity. Therefore, although companies have accident prevention measures, it is confirmed that the maximum of protective measures has their flaws. There is no work environment completely free of hazards and risks. Risks will always exist, even if in minimal proportions. Most workers have positive conceptions of improvements and benefits from the prevention of accidents in electricity.



2. PRINCIPLES OF ELECTRICITY

Electricity is a form of energy when properly controlled, it can do much of the work required to keep our society going. Electricity has become so must a part of our daily living that we tend to take it for granted, as well as the hazards associated with electricity. There are two types of electricity: Static (stationary) and Dynamic (moving). Our primary concern when working with electricity is the Dynamic type; therefore, we will focus on the flow of electrons through a conductor. However, first we will need to review some basic chemistry regarding electricity. Chemistry has taught us that all matter (solid, liquid, or gas) is composed of elements. Each of these elements is unique to itself because of the basic assembly of their atoms. Atoms that go into the building of matter also contain structures which make them unique to them. Atoms are composed of a nucleus (protons and neutrons) the inner core and are orbited by negative charged electrons. These electrons that orbit the nucleus of an atom can be removed from the atom, some more easily than others. When an electron has been removed from its orbit, they are called free electrons. Thus, by directing the movement of these free electrons, we therefore, have a flow of electrons. Thus, by removing electrons from the orbit of an atom and controlling the direction of its flow (through a conductor) we have established electricity. A conductor is used to control the direction of free electrons, therefore a conductor is any material that contains many free electrons and is capable of carrying an electric current. This generally means metals and water can be conductors of electricity. Examples of conductors are:

Good - Gold, Silver, Aluminium and Copper.
Fair - Human body, Earth and Concrete.
Poor - Wood, Rubber, Glass, and Mica

Electricity can be produced by magnetism (most inexpensive means). This is accomplished by either moving a magnet past a piece of wire or passing a wire through a magnetic field. The wire serves as a conductor and thus we have a movement of free electrons. The force of movement of free electrons in the conductor (wire) is called the electromotive force (EMF), more commonly referred to as Voltage, which is measured in Volts (V). Voltage provides the force for movement of the free electrons and when given a potential difference in the conductor, we acquire a continuous movement of electrons past a given point, resulting in a Current, which is measured in amperes (A). As electrons flow through a conductor, they meet opposition, this opposition is called Resistance, which is measured in Ohm's (□). It is through resistance that we can control the current flow and voltage. However, this same resistance also generates heat. This control of electricity by resistance can be achieved through:

Material of the Conductor
Length of the Conductor
Cross Sectional Area
Temperature of the Conductor.

Circuits serve as the pathway for electricity to travel and through the usage of Ohm's Law, we can calculate electrical quantities. Electrical quantities play a significant role in the operation of electrical products. Ohm's Law states "The current is directly proportional to the voltage and inversely proportional to the resistance." George Ohm, a German scientist, developed this into a mathematical expression. Direct Current (dc) flows continuously in one direction through a circuit because the polarity of the voltage source never

changes. Alternating Current (ac) changes rapidly in both directions and value. Current flows from the positive terminal to the negative terminal, but the polarity of the ac terminals reverses at regular intervals causing the direction of current flow to also reverse. Using alternating current generators, the power companies are able to transform the produced electrical energy into a high voltage, but low current, equivalent power. Transformers are used to raise or lower the voltage (force). Transformers perform two functions in the transmission of alternating current. They step up or step down the voltage, and they isolate the generating station from the load.

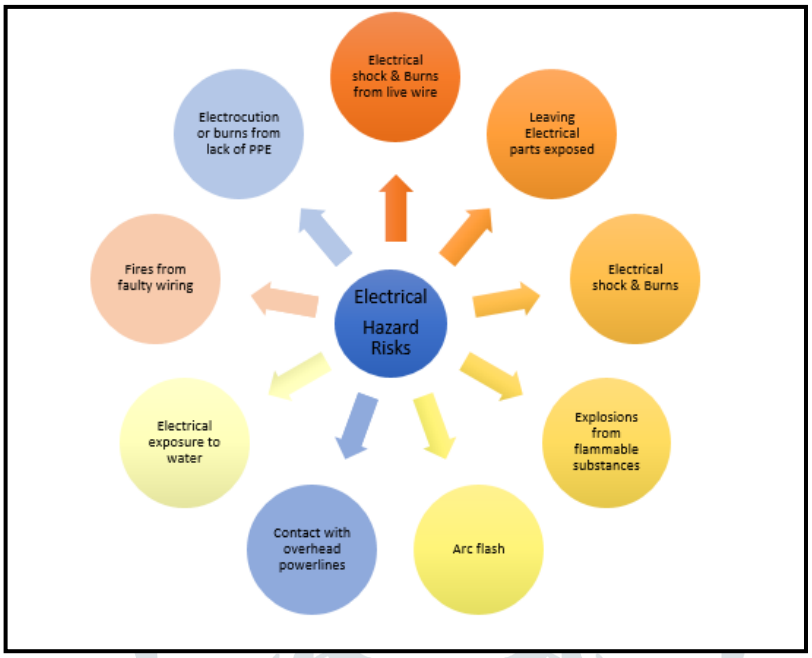


FIG: 2 ELECTRICAL HAZARDS

3. RISK ASSESSMENTS

Before work on a construction site begins the person in charge, by law, must carry out a risk assessment. The aim of this is to identify all of the potential electrical hazards and ensure that suitable control measures are in place to prevent them from causing harm to workers. If you are an employee about to start work on a construction site, then make sure you familiarise yourself with the results of the risk assessment, so you understand which hazards you need to look out for.

4. COMMON CAUSES OF ELECTRICAL ACCIDENTS AT CONSTRUCTION SITES

HIGH VOLTAGE POWER LINES: These are one of the most fatal threats at any site. Deadly electrocution can occur from touching high-voltage power lines. It is the duty of responsible parties to point out power lines and assist in prevention against contact with them.
POWER AND EXTENSION CORDS: Construction work is not easy on cords. Wear and tear can cause exposed wires, short circuits, or breaks, which can all cause serious electrical injuries. Responsible parties should check cords often to ensure they are safe.
POWER TOOLS: These must be inspected and properly maintained, as they can also cause electrical accidents. Workers are required to be trained on proper usage. Only specific power cords can be used on power tools, and ground plugs should never be bypassed.
LIGHTNING: Acts of nature can also cause serious electrical accidents at construction sites. This is especially true if the right precautions are not taken, or if workers are required to keep working during unsafe conditions.

If your job requires you to work on scaffolding or cranes near electrical wires, the odds of you falling victim to an electrical accident are significantly increased, as reported by The Occupational Safety and Health Administration (OSHA). The severe power of an electric shock can cause you to fall, easily knocking you off your feet. Both construction accident falls and electric shocks can cause serious injury or death, but the combination of the two is even more deadly, especially with consideration to workers who work high off the ground. Electrical accidents happen at construction sites all too frequently. The Electrical Safety Foundation International reports that between 2003 and 2010, 2,610 construction workers suffered from electric shock, and 3,440 sustained electric burns. According to OSHA, electrical burns are some of the worst burns that anyone

can sustain, including severe entry and exit wounds. Internal organs can also become severely injured in electrical accidents, but injuries may not be readily apparent. It is very important that you seek medical attention immediately after any electrical accident or shock. If you or a loved one were injured or killed as a result of an electrical accident, you may be eligible for damages. let us review the facts to see if you have a personal injury case. If we decide to take your case, we work on a contingency fee basis, meaning we don't get paid unless there is a settlement or recovery of funds for you.

5. ELECTRICAL ACCIDENT PREVENTION

Insulation provides a non-conductive barrier. Some common electrical insulators include glass, mica, rubber, fibre and plastic. However, if an electrical circuit is overloaded, insulation can breakdown.

Protective Devices serve to interrupt current flow should it exceed the conductor's capacity, these include fuses and circuit breakers.

Ground Fault Circuit Interrupter monitors electrical flow and detects any difference from the electricity going and that returning.

Guarding is required for all energized electrical equipment over 50 volts. Guarding can be accomplished by room enclosure, screens or partitions, balcony or platform or elevated if at least 8 feet above the work area.

Grounding is a low-resistance path directly to the earth. This pathway has the capability of carrying enough current to prevent the build-up of voltage in equipment.

Personal Protective Equipment must be appropriate to protect from electrical hazards.

Fire Resistant Clothing is designed not to burn and melt.

Controlling hazardous energy through lockout / Tag out procedure - see page 5-5 for sample.

6. PERIODIC INSPECTIONS AND REVIEWS

Gleeds at a minimum of once a month, shall conduct a periodic Inspection of the energy control procedures to ensure that the procedures and the requirements comply.

The periodic inspection shall be performed by an authorized employee other.

Then the ones utilizing the energy control procedure.

The periodic inspection shall be conducted to identify any deviations or.

Non-compliance of the procedure.

Where lockout is used for energy control, the periodic inspection shall.

Include a review between the inspector and each authorized employee of that employee's responsibility under the energy control procedure.

Where tag out is used for energy control, the periodic inspection shall Include a review between the inspector and each authorized and affected employee of that employee's responsibility under the energy control procedure.

Gleeds shall certify and verify that the periodic inspections.

Have been performed, the date of the inspection, the employees included in the inspection and the person performing the inspection.

The Administrator shall periodically review and document (on a memo for Record) the project lockout/tag out protocol to ensure that all policies, procedures, work safe practices and OSHA regulations are being followed and comply.

7. EVERY CONSTRUCTION WORKER NEEDS TO KNOW ABOUT MACHINERY LOCKOUTS

In the construction industry, a lockout is defined as a physical barrier installed to protect against the activation of an energized piece of equipment. When discussing lockouts, tag outs are also important. Tag outs are simply defined as a tag placed on a piece of machinery that warns workers against activation. Normally occurring just after lockouts, Tag outs serve to notify anyone on the construction site that a certain piece of equipment should not be started. Often, this is because someone is actively working on that piece of machinery. Tag outs usually accompany lockouts, however, they do not serve as an appropriate substitute. Both should be used together. Construction workers run the risk of sustaining injuries while servicing and performing maintenance on machines, and the risk goes up significantly in the event of an unexpected start-up or release of stored energy. According to OSHA, proper lockout procedures protect construction workers from the sudden release of hazardous energy. Lockouts protect workers from the hazardous energy sources like:

Electrical
Mechanical
Hydraulic
Chemical
Thermal
Pneumatic

OSHA reports that close to 10% of all serious accidents among construction workers and other labour industries is a result of the failure to control hazardous energy. These accidents may have been preventable if the appropriate lockout/Tag out procedures had been followed. If hazardous energy is not properly controlled, construction workers who service or maintain machinery can sustain severe or even fatal injuries. Injuries from lockout failures can include:

Electrocution
Burns
Crushing
Cutting
Lacerating
Amputating
Fracturing body parts

OSHA estimates that about 3 million workers who perform maintenance on machines and equipment routinely face the highest threat of injury. OSHA has established a lockout/Tag out standard that explains the employer's responsibility to protect their workers against the threat of hazardous energy. In addition, OSHA has established that employers are required to train every worker on site appropriately, so that workers know and are able to follow the correct procedures for hazardous energy control.

8. CONCLUSION

Given the above, it confirms the importance of security when performing any activity, whether it is the electrical sector or any other. The electrical activity sector is one of the sectors with high hazard level. Hence the need to increasingly improve security measures. The prevention of accidents in low voltage electrical installations has to happen in a serious way and with the commitment and collaboration of all, so that we can preserve the life and integrity of all. Workers should increasingly have the preventive notion through the correct use of equipment, procedures, and safety standards. Companies in turn, besides having a preventive notion, also use the corrective notions. Preventive notions are to prevent an accident or incident. Corrective notions are to correct some erroneous safety procedure or measure. Therefore, the awareness and sensitivity of all is the way to draw a working environment with the least possible accidents and productive, thus guaranteeing benefits for both the worker and the company

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