

# Minimization of hazards due to Alternating Current

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**Abstract—** This paper is a detailed study about the electric safety features in homes, laboratories and industries. It also critically checks the lab safety measures in various labs on national and international standards. It also recommends proper safety and corrective actions that need to be taken. The report also contains the field work on the electronics laboratory and survey done among students on various aspects of electrical safety which provide a platform for further research.

## I. INTRODUCTION

Electrical safety has become a very generic term these days. Electrical shocks have become very common and we can refer to the revealing statistics of the shocks causing death in India as well as all over the world. The number of Indian people dying due to electrical accidents is more because of the incorrect installation and unsafe practices. Also the devices on which we people mostly work are old ones and thus have major chances of failures. The electric distribution sector is huge and covers most of the areas of the country. The safety break is very frequently encountered.

Since our country is still developing and there are economic and technical difficulties which aligned with lack of proper management of distribution, use of age old methods and non availability of safety measures pose a serious challenge for the safety of the people. This has time and again caused damage to life and property. We can see incorrect installation of electric cables on roads which many a times have caused serious problems. Old hanging wires, open conduits, switch boxes, damaged or worn connections have become some of the traits of potential electric hazard.

The given figure is a view of Paharganj area in New Delhi. Old live hanging wires can be seen. This shows the lack of awareness of common people to understand the seriousness of the problem. Every electrical installation has got some sort of rules and regulations to be followed in order to install the electrical machinery correctly.



Old hanging wires in Paharganj, New Delhi

Materials for wiring interior electrical systems in buildings vary depending on:

- The type of use and the demand of power in that area
- Size of the building and its capacity
- Following national and international regulations
- The local conditions of wiring

As we can see from here the terminologies used in electrical installations, these regulations when strictly followed reduce the percentage of electric hazards. Use of materials like aluminium, copper and modern wiring materials like non-metallic sheathed cables further enhance the systems. These norms are mostly properly followed in the developed countries which is a mix of several factors. The awareness about the electrical hazard, proper modern instruments, correct installations and meeting proper safety regulation measures are some of them.



Hanging wires with sufficient ground clearance

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Electrical hazards at home has also been increasing. These accidents are caused either by defective equipment, unsafe work practices or ignorance of the dangers of electricity. Most can be attributed to human error, such as casual attitude towards electric supply, not aware of the potential of accident at that place, experimenting, taking short cuts or ignorance.

### II. BACKGROUND

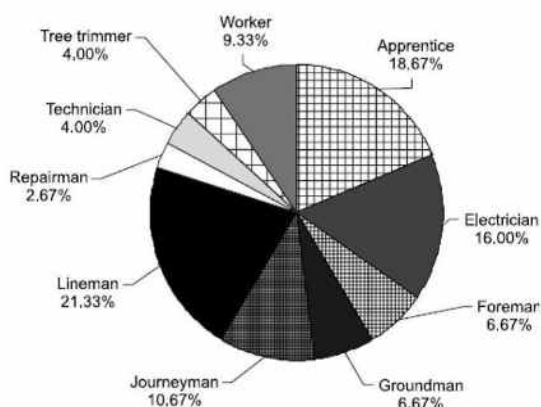
Most of the electrical mishappenings are caused by supply networks, motor-driven equipment, con, portable electric systems, and switches and panels.

Overloading of circuits or over-fusing circuits by using the wrong size or type of fuse is another common man-made electrical hazard. Fuses are designed to blow in the event of a short-circuit. Closing off switches and circuit breakers are one of the most common mistakes. Failure to use the right class of equipment for a hazardous location is another dangerous mistake.



*Spark due to overloading*

We do see that there is a certain class of workers and age group which are mostly affected by electrical accidents. These are mostly caused by lack of awareness and due to faulty techniques also. It has been found that medium age group people that is between 30 and 40 years of age are mostly affected by these electrical hazards while the lineman as expected have the most number of casualties. This shows that they do not take proper safety precautions while operating with electrical systems. Let us have some view of the statistics now.



*Statistics for electrocution*

As far as electrical hazards in industries are concerned it is mainly caused by the wrong connections and age old wiring techniques. In this regard we should take inspiration from the developed nations industries where rules and regulations are followed strictly.



*Electrical wiring with proper safety equipments in a developed nation*

Many of these hazards are caused by the overloading of electrical outlets, not placing of electrical cords under carpets at dense locations and using broken electric cords.

The use of metal ladders while working on electrical equipment is hazardous. Failure to adequately identify equipment and controls may also lead to accidents.

Devices are now readily available that can guarantee safety against electrocution or serious shock from defective equipment. Handling of equipment by untrained or unskilled personnel should be avoided. It is dangerous for a person who cannot operate equipment to attempt to maintain or repair it. I visited our electrical engineering lab for checking the safety measures taken over there. We found that the floor was covered with thick carpets to provide insulation from electric shocks. The wires are properly set for preventing any potential damage of electric accidents. But we do noticed some worn instruments still being used rigorously. Those instruments certainly need some uplift for protection of students. Though the brighter part is that every connection is grounded which adds to the security of the people there.

Here we can see the trend of level awareness among the common people. People in rural part of India are not much aware towards the potential hazards of electricity. The reasons for this can be the illiteracy prevailing there in villages and the lack of effort by the administration there to make the people aware about the electrical accidents.

With the increasing electrification in villages the number of electrical deaths has also increased. With making people aware of electric hazards and providing electricians with ad-equate safe instruments, the deaths can be certainly reduced

### III. DISCUSSION

Let us go in the depth of electrical hazards. It is not mere knowing of the facts but it depends on intentionally doing something which we know is unsafe. For example, we know that touching electrical appliances without slippers can cause accidents but then also we casually operate those instruments without protective gear. Here, there is no lack of awareness but certainly a lack of common sense. If we want to be hazard free at every step then we should apply preventive measures before it is too late.

We intentionally do avoid many things like:

Use of defective and unsafe tools

- Use of tools or equipment too close to energized parts
- Not draining off stored energy in capacitors
- Using 3-wire cord with a 2-wire plug
- Using too many applications at a time

Sometimes we do encounter unsafe instruments. These unsafe instruments range from very small to large level products used in industries. Mainly they are caused by loose connections and faulty installations. Also the use of homemade extension cords and defective parts enlarge the problem.

In homes, children are very vulnerable towards electrical accidents because they are ignorant towards the knowledge of electrical hazards. They can unknowingly touch live wires and unsafe electrical equipments which may cause damage. So, proper guarding of childrens activity around electric hotspots should be done and they should also be taught the ill effects of electric hazards.



*A child playing unaware of the electrical hazards*

Besides this there are other reasons too for increasing electric hazards. One of the reasons is uncovered junction box. Junction box is the one which houses the splices where wires are connected to one another, a person could inadvertently damage the wires or get a shock.



*Wires left hanging after renovation*

### CONCLUSION

The survey conducted by us which was participated by students mostly brought some striking features with regard to electrical accidents. Most of the students agreed on the fact that there is lack of awareness about electrical safety especially in rural areas.

There was also consensus about one thing that the administration is also lacking efficiency in this regard. In urban areas also, those industries which do not follow standard electrical practices should be penalised for that and safety traits should be enforced in them.

On being asked that whether the youth is participating well in the area of ensuring electric safety of people, the majority agreed that we need to do more in this regard in different fields for preventing these increasing electrical hazards. A need for dealing with this topic in school curriculum was also suggested in the survey. Keeping multiple fire extinguishers was also suggested. Thus we conclude that by keeping the above mentioned methods and suggestions in our mind, we can definitely reduce the electrical hazards and thus can enhance the culture of a safe society.

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