

EFFECTS OF SUB-STANDARD ELECTRICAL INSTALLATIONS OF BUILDINGS, CONSEQUENCIES AND REMEDIES

Shuaibu Ibrahim Gangara

Department of Electrical and Electronic Engineering
Umaru Ali Shinkafi Polytechnic Sokoto State, Nigeria.
esgangara@gmail.com

ABSTRACT

Electrical installation is the path through which Electricity passes to power electrical/ electronic appliances in our respective homes, offices factories schools, hospitals etc. standard electrical installations are efficient and safe in operation, and this is because both their design and installation are in conformity with IEEE (Institute of Electrical and Electronic Engineers). The design should be provided by electrical power system Engineer, while the installation by well-trained electrical technician under supervision of the Engineer. Substandard electrical installations lead to loss of lives and properties. Some causes of Sub-standard electrical installations are: wrong selection and use of electrical materials, poor inspection and lack of enforcing government policies regarding electrical installations of buildings. In most countries, electrical installations shall comply with more than one set of regulations, issued by National Authorities or by recognized private bodies. It is essential to take into account these local constraints before starting the design. These regulations may be based on national standard derived from institute of engineering electrical and electronic engineering or IEC (International Electro Technical Commission) 60364: Low-voltage regulations. The regulations are based on relevant IEC standards. The IEC regulations have been established by engineering experts of all countries in the world comparing their experience at an international level. Currently, safety standard of IEC series are the fundamental of most electrical standard in the world. To overcome the problems of substandard electrical installations, standard should be maintained for all electrical installations right from design to installation stage. As usual, maintenance is required for any operating system, it should therefore be carried out once the need arises, and preferably the maintenance should be preventive type. Likewise, government should not leave any stone unturned on enforcement of its policies regarding electrical installations and services. This will no doubt improve safety, security, economy and standard of living.

Key words: Electrical, installation, standard, safety, regulations, maintenance.

INTRODUCTION

The standard of any electrical installation is determined by being it efficient and safe in operation at the same time. These can only be achieved if the installation is in conformity with IEEE/IEC standard. It is unfortunate that substandard electrical installations are in use despite the fact that they lead to loss of lives and properties through electrocution and fire outbreak. Most of the electrical materials being used for sub-standard electrical installations are either under or



oversized in addition to lack of certainty in their quality. Specification of electrical installation materials are determined through electrical installation design which should be provided by electrical Engineer.

If under sized electrical installation materials are used, there is going to be rise in temperature of the cable due to over current drawn by electrical load which is beyond the cable carrying capacity which can make the cable to burn and this will eventually cause fire outbreak if there is presence of any combustible material around the cables.

If oversized electrical installation materials (for example over size circuit breakers/fuse element) are used, the breaker/fuse element cannot disconnect the electrical supply in the event of fault. The function of circuit breaker/fuse element is to protect electrical circuits by disconnecting it from the supply in the event of short circuit fault or overload which is accompanied by excessive current flow through the circuit which when not protected using accurate circuit breaker/fuses element will eventually cause fire outbreak if there is presence of any combustible material around the electrical circuit.

Each circuit breaker/fuses element has current specification, *if under sized* circuit breaker/fuse element is used, the breaker/fuse element will keep tripping/melting because circuit breaker/fuse element cannot accommodate/ carry the current i.e. the circuit will remain open as such the electrical appliances connected to the that circuit will remain off. *If oversized* circuit breaker/fuse element is used, in the event of short circuit fault or overload the breaker/fuse element will sense the fault current as normal current, therefore the circuit breaker/fuse element will maintain the flow of the current to the circuit despite the fact that the current is faulty (excess).

Fault current has the effect of raising the temperature of the cable, this will make the cable/accessories to burn and this will eventually cause fire outbreak if there is presence of any combustible material around the cables/accessories. Sometimes cheap labour or poor workmanship results in substandard electrical installation.

Lack of due process is a major challenge here. The approval system sometimes has some faulty elements that allow people go ahead with their building construction in place of monetary compensation to bypass the necessary process. Also at other times, they may be selective approval process, whereby the structural components are checked while electrical and mechanical are bypassed. The danger of faulty electrical installation may be very severe which may result to electrocution or fire incidence. To do the right things provide a safer environment for all.

METHODOLOGY

Some installed substandard electrical installations were visited around the state where some pictures were snapped as shown on figures 1 to 16. Figure 1 and 2 is the same market shops where different petrol electric generators were used to supply the shops. The shops are located at different locations in the market. Figure 3 shows 415volt service cables supported by galvanized

iron overhead tank support which can conduct electricity once the insulation of the cable damaged.



Figure 1. Electric generators under sun supplying Cables exposed to Shops in a market



Figure 2. Improperly arrange PVC to sun.



Figure 3. Low tension service cables supported and nest directly by galvanized iron overhead tank stand.

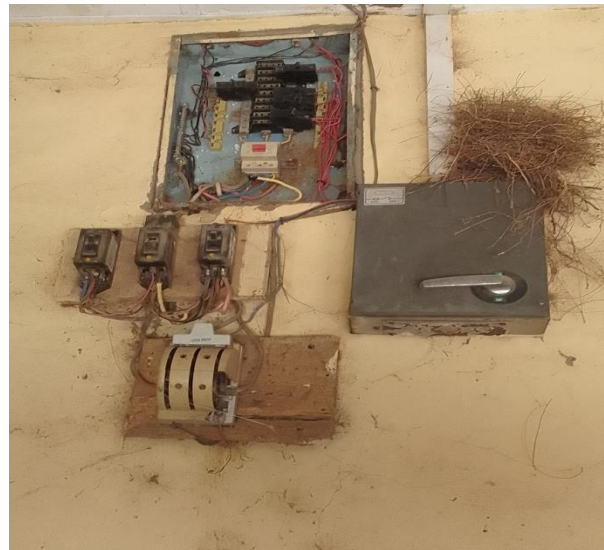


Figure 4. An opened distribution fuse box On gear switch.



Figure 5. 415volt service cable in contact roofing with zinc



Figure 6. Service cable dropped on zinc



Figure 7. Undersize 415 volt Service cable and Wooden pole.



Figure 8. Single core cabled used for surface wiring .instead of twin PVC Cable.



Figure 9. PVC Cables exposed to sun, rain and not exposed. Well arranged.



Figure 10. PVC Cables and control switch to sun and rain.



Figure 11. Exposed 1mm² single core cable used to on Power heating devices.



Figure 12. Consumer terminals suspended on Meter board



Figure 13.Exposed 1mm² cable supplying both
supplying
Socket and lightings.

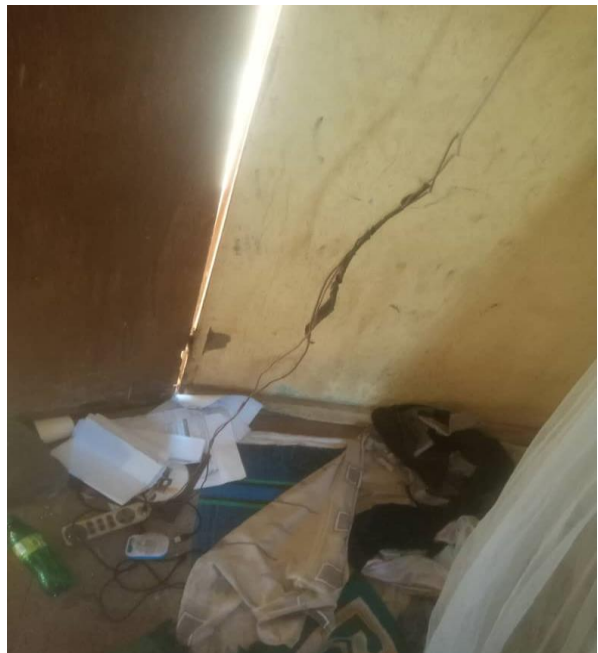


Figure 14.Exposed 1mm² cable directly
Extension socket placed closed papers/cloth.



Figure 14. Short circuit due to improper termination.



Figure 15. Improperly installed cables



Figure 16. Dismantled 415volt gear switch resting on Floor while in use.

Figure 1 to 16 are pictures of some substandard electrical installation of building

1. Fire outbreak: substandard electrical installation can overheat and ignite flammable materials which may eventually result to fire outbreak. Fire outbreak can occur due to partial contact of electrical component; at the initial time the Partial contact point will have risen in temperature followed by insulation damage/melt, in this Situation if there is any fire combustible material will serve as the starting point of the fire Outbreak. Fire outbreaks are sometimes accompanied by loss of properties, lives or both

2. Electrical shocks: Cable/wires that are not properly installed or insulated can cause electrical Shocks to anyone who comes in contact with them, this can eventually result death.

3. Power surges: substandard electrical installation can cause power surges, which can damage Appliances and electronics connected to the circuit.

Root causes of problems associated with substandard electrical installation of buildings:

1. Use of substandard cable and oversized breaker/fuse element.
2. Use of unqualified technician/electrician for cheap labour and Lack of electrical installation Design.
3. Lack of installation test (insulation, continuity and earth test) likewise use of inaccurate test Equipment, lack of effective earthing system.

Remedies

Electrical installation of building should only be carried out by authorized person/group using design produced by an engineer, likewise the installation should be supervised to ascertain whether it is in conformity with the design, if yes then conduct test on the installation, if the test result is at least good then issue test certificate. The certificate should be forwarded to the distribution power company for linking the installation to the electric supply system. Government/institution should leave no stone unturned in forcing policies regarding electrical installation of buildings so as to save lives and properties.

CONCLUSION AND RECOMMENDATION

Compromising electrical system standard is the direct invitation to fire outbreak and electrocution which may eventually result in loss of lives and properties. Therefore, standard should be given first priority when conducting both design and installation of electrical systems.

REFERENCES

- [1] Muktar Arubayi 2019: Solution to problems of electrical installations for Homes in Nigerian.
- [2] Shuaibu Ibrahim Gangara 2019: Electrical Installation of Building for Beginner.
- [3] Manitoba Hydro 2012: Residential Wiring Guide Eleventh Edition.
- [4] Trevor Linsley 2009: Advance Electrical Installation Work, Fifth Edition.
- [5] Design of Electrical Services for Buildings 2005: Barrie Rigby Fourth Edition.

