

Improved Fire-Proof Installation Security Technology

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ABSTRACT

In this study conducted a discussion of electrical installation of buildings as electrical equipment assemblies in buildings related to each other, to meet certain purposes or intentions and have coordinated characteristics, what is already stated in the General Requirements of Electrical Installation (PUIL 2000). The purpose and purpose of the electrical installation is for the business of electrical installations to be held properly, to ensure human safety from the dangers of electric shock, the safety of electrical installations and their equipment, the security of buildings and their contents from fires caused by electricity, and environmental protection. Things that have been considered trivial by the community, unwittingly have been the trigger for the high number of fire cases. Fires can occur if there are three elements, namely flammable materials, oxygen and sparks. Short circuit of electric current or (electrical short circuit) that causes flame catches to flammable materials, is still the trigger for high fire rates.

Keywords : *New Technology, Application of new installations, Anti-fire.*

INTRODUCTION

Please note that electricity is not to be feared but to be accompanied, because electricity has a very vital function and benefits and strategies in people's lives and is a daily basic necessity in encouraging national development in all fields (Ngafifi & Ngafifi, n.d.). There are still many people who do not know about the requirements of the installation system of electrical installation and durability of the use of equipment / equipment, as well as electrical installations that have been installed long ago in houses and buildings, which should meet the applicable regulations and regulations, where the installation of electricity that has long been installed should be carried out re-theft that is not on track against the utilization of electric current whose installation does not meet the standards (Aryza et al., 2018).

If you look at the location of fires that mostly occur in housing and buildings where businesses, means that the fire can be caused by human error factors, this is because the public's public knowledge about the use of electricity so often act recklessly or teledor in using electric current or do not follow the procedures and methods correctly according to the applicable rules, so that there was a fire that did little to cause it (Choudhuri & Agrawal, 2015).

While one of the efforts that can be done to suppress the occurrence of fires is to raise awareness of contractors and installers authorized in the installation of electrical installations, which must really pay attention to the use of standard electrical installation equipment and the correct connection system, must follow the regulations set by the government, following the age of the installation is very long , if we analyze the electrical installation of a residential house or building has not been much or has not been reviewed the installation after installation by the contractor (Instalatur), or the installation after the age of 10 years or 15 years, there are already 30 years of electrical installation has never been evaluated or replaced (Miller et al., 2012).

There are other possible causes of fire, such as the community of electricity users for daily purposes, when utilizing the electric current divides it by using a branch outlet, done at will as long as the need is met do not think about the risks that will occur later, which should be done according to the regulations so as not to cause a fire, meaning that if the number of outlets installed on a contact box exceeds the limit of electric current capability it will cause the power outlet and the contact box will become hot. Please note that inserting a power outlet into the contact box is a temporary electrical current connection, if between the power outlet and the contact box is shaken, let's say the connection is not sturdy, it can result in a spark or high heat (solly Aryza, 2017).

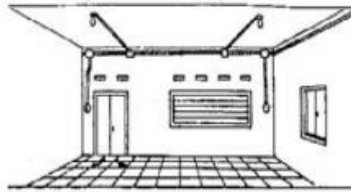
If the heat occurs for a relatively long time, then this will cause melting of the power box or contact box box or installation cable and finally slowly there will be sparks that will propagate along the cable and if the insulator is unable to withstand the heat then there will be a fire. Short circuit (electrical short circuit) occurs due to the connection of positip wire and negatip wire that is electrical, or it can also occur due to leakage of cable insulation. This is because the connection system is not good or not sturdy, the insulation of the cable is damaged the feasibility of installation. If the eligibility has not met the requirements of use must be replaced, this feasibility check must be done by the designated agency at least once every 10 years, so that the possibility of accidents and fires due to electrical installations can be avoided (Sergaki et al., 2010).

Most of the cases of fire the main cause is still visible to human resources factors, especially in the case of installation and caused carelessness during installation, due to animal bites, old equipment and poor quality of equipment and cables, a cross-section of cables too small that does not correspond to the electrical load flowing through it. Then in the vicinity there will be heat and sparks, if the cable insulation has reached the burn point, the insulation temperature of the cable can reach the burn point because the electric current passing through the cable is much greater than the ability of the cable, for example the cable for the size of 12 ampere is supplied with an electric current of 16 ampere, because the cable is used to connect many electrical equipment, as a result of which the insulation of the cable and equipment becomes hot.

If at the maximum temperature of insulation and equipment that is being supplied with electricity is high, then there will be sparks so it is likely that the insulation materials and equipment will be able to burn (MENTERI et al., 2015). For certain insulation materials and equipment melting the burning insulation will fall and will not be extinguished immediately, and if the flames long enough to occur can burn around it, this is most likely the cause of the fire (Bobade et al., 2015).

METHODS

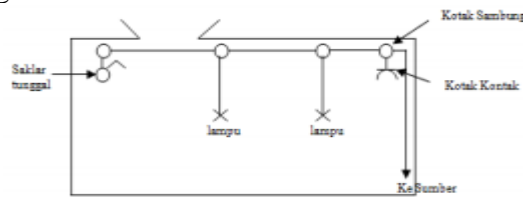
If you want to install an electrical installation, it must know in advance the general picture of the state of a building to be installed electrical installation. This will be easier in arranging the layout of components and equipment as well as determining the points of light according to the needs of the room.



Gambar 1. Sketsa Instalasi Listrik pada Ruangan Rumah atau Gedung

Figure 1. Sketch of Electrical Installation In A Room Of A House Or Building

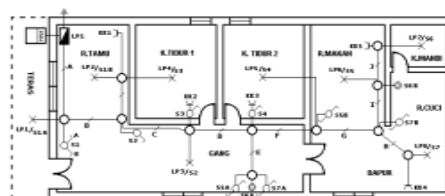
Figure 1 shows a sketch of the room seen by us the layout of the lights, switches, contact boxes, pipelines and connecting boxes. To be able to install the installation of the house we must understand how the cable connections from the KWH supply meter, the power panel to the switch and continue to the lamp load. If we simplify into the form of electrical installation drawings set by PLN will be a form of pipe / cable groove drawings against the load of lights and switches and contact boxes, which are seen from the top view of the sketch image of the room, as can be seen in Figure 2.



Gambar 2. Perencanaan Instalasi Listrik Sederhana

Figure 2. Simple Electrical Installation Planning

From the simplification of the sketch drawings, this kind of illustration will help us a lot in making electrical installation planning, from simple to more complete. For a building with very complete spaces, if the depiction is done like Figure 1 is certainly very complicated and unlikely to be depicted into a dimensional form such as Figure 1. Therefore, with the System Figure 2 electrical installation planning will be answered the problem, more concise and simple, as shown in Figure 3.



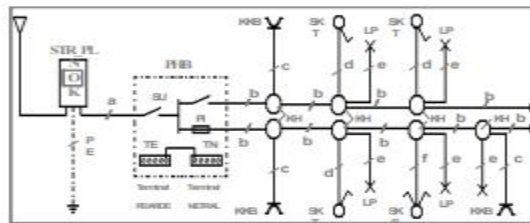
Gambar 3. Perencanaan Instalasi Listrik Komplit

Figure 3. Complete Electrical Installation Planning

From Figure 3 it can be stated that electrical installation is a knowledge and type of special work that is quite complicated, and must be studied, so it must be handled specifically.

Furthermore, In Figure 4 can explain in more detail the form of electrical installation grooves divided into two final circuits that are more complete against switches, lights, and contact boxes. Each must be secured by the MCB/fuse branch safety, then given the main switch to connect to the low voltage line power source (PLN's KWH Meter). Electrical installation safety is one type of equipment that serves to secure electrical equipment from short circuit interference and over load. The use of safety equipment (protection) in electrical installations is very important, because it is directly related to the safety and security for electric users from the danger of electric shock or damage to installations and electrical equipment used. Installation of electrical safety equipment must take into account the amount of electric current from the load of electrical installation load or the amount of current and voltage that can still be borne in a while, if an installation or electrical equipment used is impaired.

Disruptions that occur in electrical installations include (PUIL 2000, point 4.2.7.2, page 112): a) more load current, b) short circuit current (short circuit current), c) leaking current to the earth. Thus, the selection and use of appropriate electrical safety equipment will support the obtaining of a safe and reliable electrical installation system. Electrical installation components are the most basic equipment in a series of electrical installations, in the installation of electrical installation electrical installation components that will be installed in electrical installations, must meet the requirements and laid out so that they are met their needs. Standardization of electrical equipment serves to regulate the uniformity, capability and reliability of electrical equipment by adopting the standards of the IEC (International Electrotechnical Commission), whose members include a number of countries including Indonesia. IEC member states have their own testing bodies for electrical equipment.



Gambar 4. Diagram Alur Instalasi listrik



Gambar 5. MCB dan Fuse

Figure 4. Electrical Installation Flow Diagram and Fuse, MCB

In Indonesia, the institute of testing of electrical equipment is the Institute of Electrical Problems (LMK), and refers to the national standard namely the Indonesian National Standard (SNI) [6]. Good electrical equipment is equipment that has been tested and labeled in accordance with the signs in the country, for example: SNI (Indonesia), a sign from a country's testing agency called Safety Marks. The selection of electrical equipment according to outside

influences needs to be considered, during this time we choose new electrical equipment covering its functions only. To ensure the reliability of electrical equipment, IEC has organized and grouped with codes consisting of a set of uppercase letters and a number (protection index) so that it is easy to understand.



Gambar 6. Kotak Kontak Standar



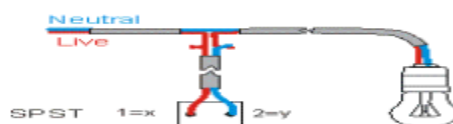
Gambar 7. Saklar Tidak Standar

Figure 5. Standard Plug Box and Unstandard Switch

RESULT AND DISCUSSION

Electrical installation is the connection or connection of an electrical equipment to other electrical equipment that must meet the standards set by puil in 2000. A connection system is a way of terminating the laying of equipment to be used in installation. In connecting things to be aware of, among others, are: the robustness of the connection that is free from mechanical and electrical tensile forces and chemicals, as well as the type of terminal connection, and the placement of the equipment in use that suits its usefulness. Twisting cable connection with lasdop.

Installation connections should not be carried out in the pipe, should be carried out in the connecting box, as well as against electrical fixtures, should be designed in such a way that under normal working conditions do not harm or damage, are well installed and resistant to mechanical, thermal and chemical damage. The connection in Figure 7, used to connect or tear one or more cables at a point, this connection is often found in the connect box and is generally isolated with duct tape insulation and installed "lasdop" or terminal as a binder and at the same time as isolation. Figure 7 shows how to connect two good cables. Twisting cable connection with duct tape.



Gambar 8. Alur Instalasi

Figure 7. Instalation Flow



Gambar 9. Sambungan Kabel dengan Lasdop



Gambar 10. Sambungan dengan Isolasi Lakban

Figure 8. Cable Connection With Lasdop and Duct Tape Isolation

Figure 8 shows the connection media of the twist cable, where the connecting box is a means for cable connection in an electrical installation, by using plastic insulation as a connection cover to avoid the occurrence of short electrical connections. This method is very often done at the location of electrical installation installation, especially in cable connections, it is necessary to take into account the number of connections in the connecting box. Cable connection with the terminal. Electrical installation cable connection using terminal system (Figure 8), is a form of connection that is very secure compared to connection systems such as Figure. The robustness obtained by the terminal connection system is quite high, has reliability in tensile force, and avoids shocks, thus avoiding the occurrence of short circuits. Cable connection with cable shoes. Cable shoes are used to connect nyaf fiber cables called NYAF.

The use of cable shoes in the connection system must be done, because if not done the core of the fiber cable will be easily scattered and touched, and the connection will not be sturdy against bolts or tool terminals. If the cable used in the connection system is a NYA or NYM cable, and at the end of the cable to be connected is not given cable shoes, then the end of the cable must be made ayelet (duck eye). The installation does not meet the standards for the installation of connections on the connecting box, if it exceeds the specified pipe or connect box filling factor. The default will be missed by the example of using the formula of the number of cable filling factors in the pipe or connecting box.

Example: cables used in home electrical installation lines, core diameter 2.5 mm and if insulated diameter 3.9 mm, the filling factor to the pipe used if more than 3 cables are filled to the diameter of the pipe is 35%, and the diameter of PVC pipe used in the installation is 5/8 inch (15,875 mm), then the number of cables that can be filled against the PVC pipe is 5.8 (rounded into 6 CABLE NYA diameter 3.9 mm).

CONCLUSION

From the results of research on the impact of losses, if the electrical installation of houses and buildings is not standard, then:

1. Real fires arising from negligence and incorrect use of electricity, which can result in considerable material damage and can also result in loss of life;
2. One of the abuses in the use of typical electrical installations is improper use of electricity installations, and is a common problem among electricity users in Indonesia
3. Electrical installation shall be conducted regular inspection and testing by the competent authorities against misuse, damage or implementation of non-standard installation;
4. Equipment selected for installation in electrical installation must meet the applicable standards and comply with the provisions of PUIL 2000, and must be suitable for its use to the environment, and follow the instructions of the manufacturer of such equipment;
5. To boost the vitality and strategic function and role of electricity, for those who provide and who make use of it, the availability must meet azaz reliable, safe and familiar environment.

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