

DESIGN OF GENERATOR ROOM AS A SOURCE BACKUP POWER SOURCE AT THE BOGOR ACADEMY OF TECHNOLOGY

Arie Sakti^{1*}, Lilis Cucu Sumartini², Wijaya³

^{1,2,3} Program Studi Teknik Listrik, Akademi Teknologi Bogor

ABSTRACT

*Bogor Academy of Technology in fulfilling the supply of electricity from PLN Bogor City. In carrying out activities only get one source of electricity, because it does not yet have another backup source. So that lecture activities and office services will take place if PLN is still alive. If PLN dies, then activities on the Bogor Academy of Technology campus will be hampered as well. On the campus of the Bogor Academy of Technology requires electrical energy which is Mainly for lighting certain rooms and some office equipment. Therefore, so that the room gets lighting and some office equipment can operate, a backup supply is needed, namely in the form of a genset. operate, a backup supply is needed in the form of a generator. The generator power (rating) adjusted to the minimum needs of the campus. The generator will turn on if the PLN is off. Genset (generator set) is a device that can convert mechanical energy into electrical energy by setting on off. by setting it on off. When the generator operates it will cause pollution, both sound and air around the campus, therefore the need for space planning special generator to muffle the sound and air pollution caused by the operation of the generator. the generator.***Keywords:** Generator, Technology, backup supply

Corresponding author: arisaktiwibowo@gmail.com

History of Article: Received: July 2022. Revision: August 2022. Published: September 2022.

Introduction

Electric power is one of the vital needs for modern society today to support human life. Electrical energy is used in households, businesses, offices and in industry, it can be said that electrical energy is currently a basic need to support personal and business activities, the provision of electrical energy in Indonesia is currently carried out by PT PLN. PLN's electrical energy supply is needed in providing electrical energy for building routines and office drivers. Electrical energy from PLN, is not always continuous in its distribution, one day there can be a blackout from PLN.

Additional electrical power reserves for agency buildings have become a primary need, especially for the generator. Genset is an acronym for Generator set, which is a machine or device consisting of a power plant (generator) with a driving machine arranged into one unit to produce an electric power of a certain magnitude. It is necessary to do careful planning for the installation of generators, including maintenance and alternative actions to overcome various obstacles that arise in its operation. There are many cases where the installation of generators is only installed, ignoring various aspects and important factors, both in the form of noise, vibration and exhaust emissions from gasoline as well as safety from short circuit and electric shock hazards.

This Akatek campus has three floors and will later use a generator system for backup power supply so that the building's supply is available continuously. With the generator system, Akatek Academy can still operate even though there is a power outage from PLN. The occurrence of PLN electricity is often interrupted and dead, which causes administrative work to be disrupted, so it is necessary to have backup electricity (Genset) stored in a special storage room. Therefore, for the storage of generators, it is necessary to plan the generator room as a source of backup electricity at the Bogor Academy of Technology Campus,

The formulation of the problem "How to design a generator room that suits the standard installation of generators on the campus of the Bogor Academy of Technology?" Based on the above uraooan, the purpose of the study is to determine the design of the generator room that matches the standard installation of generators on the campus of the Bogor Academy of Technology.

The generator is a machine that can convert mechanical power into electrical power through the process of electromagnetic induction. This generator obtains mechanical energy from the prime mover. Alternating current (AC) generators are known as alternators. Generators are expected to supply electrical power when there is a disturbance. disturbance, where the supply is used for priority loads.

The basic principle of a generator engine is to convert kinetic energy (motion) through an engine drive device into electrical energy produced by a generator. So that the generator set or generator can be said to be a source of electrical energy or a power generation machine.

The basic principle of a generator engine is to convert kinetic energy (motion) through an engine drive device into electrical energy produced by a generator. So that the generator set or generator can be said to be a source of electrical energy or a power generation machine.

The location of the generator placement is one of the important things to consider when you buy a generator. A good generator location certainly has an impact on the performance of the generator and certainly has an impact on the comfort of the environment around the generator is placed. Here are some good generator placement tips: 1) Placement of generators should have its own generator room, the generator room must have good air circulation. The generator room must have ventilation or with exhaust so that air circulation becomes smooth. The generator room with good circulation makes the generator does not heat up quickly. The special room of the generator must also pay attention to the exhaust gas, make sure the gas is wasted in an open room so as not to disturb the comfort of people - people around the placement of the generator. In addition, it is good that we choose a generator whose exhaust gas is environmentally friendly. 2) If it requires placing the generator in the outdoor, at least the generator is protected from the heat of the sun and rain, this aims to prevent the generator canopy from rusting. If placing the generator outdoors, the generator may also be placed in an iron frame so that the generator is protected from collisions and to minimize the occurrence of theft. 3) If the location of the generator placement is very close to the house, it is better to place the generator in a generator room that can minimize the sound produced, or a generator with a silent type may be the right choice because a generator with a silent type can reduce the sound of the generator which is quite significant so as not to disturb activities around the location of the generator placement. 4) If you must require the generator to be moved periodically, the generator should be placed in a trailer, the trailer serves to move the generator considering that the generator has a heavy mass and dimensions are quite large. 5) We recommend that the location of the generator set placement is not too far from the electrical panel so as not to require a long cable. Cables with a fairly expensive price. Make sure the cable is neatly organized to maintain aesthetics. 6) Placement of generators with underground rooms must require attention in terms of air circulation considering that underground rooms lack oxygen which can make the generator engine become hot and go out. In addition, make sure the generator room underground has a spare place to make it easier for technicians to perform generator maintenance and repair if the generator has trouble. Placement of generators away from sources of fire and the reach of children. Place the generator away from the source of fire to avoid fire and keep out of reach of children - children to avoid unwanted things. Space / home generator consists of various types, namely: Full roof design, Black iron generator house, Concrete generator house, Minimalist fitting design

Research Method

To design a generator room there are several things that need to be considered in determining the needs of the generator room, which include: 1) Determine the capacity of the generator that will be used. 2) Determine the location / where the generator room will wake up. 3) Determine the size of the generator room in accordance with the standard.

The generator room is built for the safety and comfort of the environment around the generator is operated. Almost everyone complains about the noisy performance of this machine that is a variety of resources. Especially if the generator is installed in the wrong location, without special knowledge so that it disturbs comfort and also affects the performance and service life of the generator.

There are several things that should be considered before or after having a generator room for various purposes. Before the generator room is built it must pay attention to the size of the generator, the contours of the land, the materials that will be used. After the generator room is built, it is necessary to pay attention to air ventilation so that the air in the room is not hot, the strength of the building / wall, the resistance of the building to fire, earthquake, to water etc.

The tools used to make the generator storage room with generator set size 68 cm x 55 cm x 55 cm, and generator capacity 3500 watts for ukuarn space 1.5 x 3 meters then required the following tools: Drill, Hand Girinda, Hammer, Aluminum Folding Ladder, Saw, Screwdriver, Pliers, Shovel, Cement scoop, Iron Saw Blade, Hoe, Meter. While the materials used can be seen in the following table:

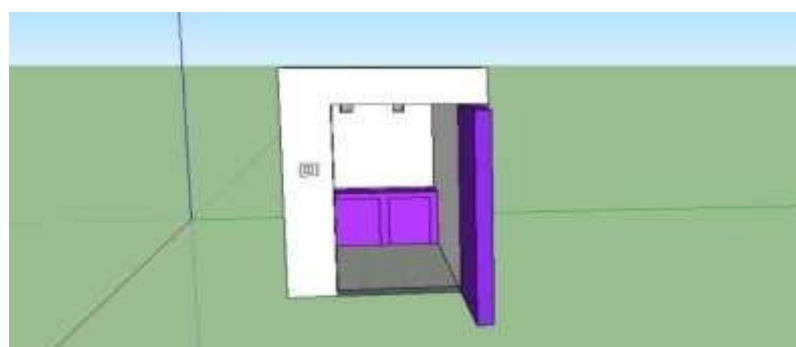
Table 2. Materials Used

No	Nama Bahan	Satuan	Jumlah
1	Hebel	buah	120
2	Pasir	kubik	1,5
3	Semen	zak	5
4	Kawat Ayam	m	3
5	Cat	galon	4
6	Kramik	dus	6
7	Triplek	lembar	2
8	Besi Holo	batang	4
9	Baja Ringan	batang	3
10	Slot pintu	unit	4
11	Engsel	unit	6
12	Kunci	unit	1
13	Slang water pass	meter	5

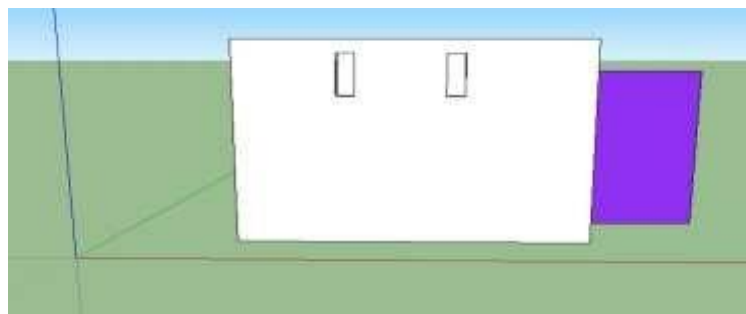
The generator storage room is designed with reference to the design of generator storage in accordance with the conditions and conditions of the generator and taking into account the available space to be built. The design of the generator storage area can be seen in the picture below.



Fig 1. Side View



Gambar 2. Inside View



Gambar 3. Rear View

Result

The generator room is where the main electrical equipment is stored. The storage room can be one part of the main building but there is also a separate building separated from the main building. In general, the generator storage building designed at the Bogor Academy of Technology utilizes a place with a size that is not too large, with a size of 1.5 x 3 meters. The building is made with attention to air circulation, security of tools / generators, mobility in the room and the electrical circuit installed.

The roof is made using open chicken wire so that air circulation when the generator is turned on can be maximized, so as not to cause excessive smoke. For circulation in the wall, holes are made with a size of 40 x 15 cm with a distance of 50 cm.

The walls use hebel pairs that are plastered both inside and outside and are painted with waterproof paint (aquaproof) to be resistant to weather changes. The room is also equipped with a locked wooden door for security. The storage room does not use soundproofing because the generator set is equipped with soundproof.

In the genset storage room is equipped with Affar fire extinguisher and temperature gauge (room thermometer). The results of the design of the building where the generator storage as follows.



Fig 4. Generator room building



Fig 5. Inside View of the generator storage room

Based on the picture above, the generator storage room has met the requirements for storage, namely having sufficient air ventilation and the room is not too narrow so that it is easy to carry out activities. Generator exhaust substances also go directly to the outside and do not cause smoke.

Testing of the generator set storage area is done by measuring the temperature of the storage room using a room thermometer. The temperature measurement is intended to determine the air temperature when the generator is turned on. This is done to determine the heat that occurs because the generator is turned on which can later cause an explosion or fire, if the temperature in the room is hot. A hot temperature can be a trigger for an explosion, besides that the temperature measurement is done to find out how well the air ventilation is made. The temperature measurement results are as follows:



Fig 6. Room temperature measuring thermometer

Table. 3. Room Temperature Measurement Results

No	Waktu Genset Nyala (menit)	Hasil pengukuran	Kenaikan Suhu (derajat Celsius)
1	0	30,60	-
2	30	30,76	0,16
3	60	30,91	0,31
4	90	33,61	3,01

Based on the results of temperature measurements, for safe generator storage, because the temperature that occurs is not hot, this shows that air ventilation works well, so the heat generated by the generator is not high, so it does not cause an explosion or fire. The generator storage room, needs maintenance, but maintenance does not require too much cost and time. Maintenance can be done by observing that the room does not leak, and is damaged. Maintenance is done by repainting the walls. The treatments that need to be considered include: 1. Treatment with painting is done twice a year using waterproof paint outside and inside. 2. The generator room must always be cleaned regularly. 3. Make sure the thermometer is working properly

Conclusion

Based on the above description, it can be concluded that: The generator storage room must be made of walls with hebel material. The generator storage room must have sufficient air ventilation / uadar circulation. The room must be watertight. The room must have a room thermometer to measure the room temperature when the genset is turned on.

Refrence

Awaludin. 2016. Pemeliharaan Generator Set (Genset) di Hotel arya duta Manado. Laporan tugas Akhir. Kementraian Riset Teknologi Dan Pendidikan Tinggi Politeknik Negeri Manado. Manado.
Ervianto, Wulfram. 2002. Manajemen Proyek Konstruksi, Andi, Yogyakarta Febyana Pangkey dan

Grace Y. Malingkas, D.O.R. Walangitan. 2012. Penerapan Sistem Manajemen Keselamatan Dan Kesehatan Kerja (SMK3) Pada Proyek Kontruksi Di Indonesia (Studi Kasus: Pembangunan Jembatan Dr. Ir. Soekarno-Manado). Jurnal Ilmiah MEDIA ENGINEERING Vol. 2, No. 2, Juli 2012 ISSN 2087-9334 (100-113).

Husein Abrar, MT. 2008. Manajemen Proyek, Andi, Yogyakarta. Mediastika CE. Akistika Bangunan. 1st ed. Jakarta: Erlangga; 2015.

Tarore, Huibert, dan Mandagi. Robert J M. 2006. Sistem Manajemen Proyek Konstruksi (SIMPROKON), Tim Penerbit JTS Fakultas Teknik Universitas Sam Ratulangi, Mana.

Ulvi Loly Amandaa, Nurhasanaha dan Dwiria Wahyunia. 2016. Rancang Bangun Kotak Peredam Generator Set (Genset) dengan Beberapa Variabel Bahan dalam Skala Rumah Tangga . PRISMA FISIKA, Vol. IV, No. 02 (2016), Hal. 73 – 79.