Types Of Materials Used In A Grid Substation And Cause Of Being Used, As Well As The Type Of Data Collected From A Substation

Submission of A Field Study Paper

Department of Electrical and Electronic Engineering

For Partial fulfillment of the requirements for a Bachelor of Science

In Electrical and Electronics Engineering

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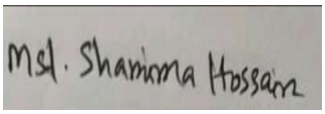
APPROVAL

This field study titled **"Types of materials are used in a grid substation and cause of being used, as well as the type of data collected from a substation ",** submitted by Md. Al Mamun Rauf Sovan in the Department of Electrical and Electronic Engineering, Daffodil International University, has been accepted as satisfactory for partial fulfillment of BSc degree requirements and its style and content have been approved.

co-supervisor



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DECLARATION

I hereby declare that this field study paper has been supervised by us

Dr. M. Shamsul Alam, Dean, Faculty of Engineering, Daffodil International University. I further declare that there is no part of this field study paper or this field study paper Submitted elsewhere for any degree or diploma award.

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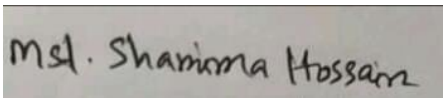

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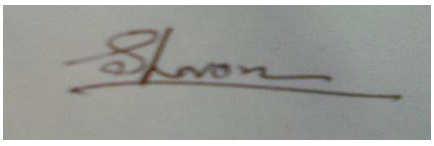

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First of all, I would like to express my sincere thanks and gratitude to Almighty God for the successful completion of this paper of mine.Thank you to my Field Supervisor Sir, Prof. Dr. M. Shamsul Alam, Dean, Faculty of Engineering Daffodil International University (DIU), to involve me in such an important field study paper. Many more thanks to my co-supervisor madam, Ms. Mst. Shamima Hossain for supporting me regularly. Also thanks to Md. Marzan-al-Zannat, Assistant Engineer of Chuadanga PGCB Grid Substation for his Supervision, helpful advice, constructive criticism. I would like to thank our full course partners at Daffodil International University.I would like to at last thank those who have supported me directly or indirectly.Finally, I apologize if anything is left out or mistaken unknowingly.

Dedication

My internship paper dedicated for my “ Mother and Father ’’

Abstract

In today's Bangladesh, the growing demand for electricity is increasing. To meet this demand, power generation capacity is also increasing. And PGCB is playing a special role in this power supply. The Engineers of Power Grid Company of Bangladesh - PGCB are working tirelessly to maintain the uninterrupted power supply to the national grid in case of emergency.

Due to the relentless efforts of the employees of the power department, electricity is being supplied to different parts of the country even during the general holidays.

Thanks to all the officers and employees of the power department whose tireless work is the reason for uninterrupted electricity service.

CONTENTS

Chapter: 1

INTRODUCTION

1.1 Introduction

Chuadanga electrical substation is an auxiliary station with a power distribution system where high voltage is stepped down to low. Voltage is converted to contrast using transformers. Due to voltage changes at different stages, electricity flows through several substations between the generating company and the customer. In a substation, the step-up transformer is used for household and commercial distribution.

The power system is a component of the power generation and distribution system. For the operation of all electrical systems, the need for substations for their operation is noteworthy.

Substations with electrical equipment supply electrical power to the customer from their production centers. The voltage level or frequency or any other aspect of the substations is changed to supply the customer with the required quality of electricity.

1.2 Electrical substations are classified into different types based on the application of electricity:

1. Generation substation
2. Indoor substation
3. Outdoor substation
4. Polar mounted substation
5. Substation switching
6. Conversion substation
7. Converter substation
8. Distribution substation.

In some cases, however, multiple hydroelectric, wind farm power generation systems, and thermal power plants can observe substations that collect electricity from multiple turbines. It is used to transfer to a transmission unit.

A substation usually consists of one or more transformers, protection, and control equipment, and switching. Overload circuit breakers are used to prevent any short circuit current in a large substation network. Circuit breakers or fuses are used to secure small distribution centers in the distribution circuit. Generators are not usually required at substations. Other devices such as voltage regulators, rectification capacitors, and power factors may be located at a substation.

1.3 The following main electrical equipment is used in a substation:

1. Bus bar
2. Circuit breaker
3. Relay
4. Power transformer
5. Disconnector
6. Insulator
7. Lightning arrester
8. Conductors and insulators
9. Capacitor bank and miscellaneous equipment

1.3.1 Transformer:

It can be divided into several parts to make the transfer issue neater. To divide it into several parts, it is essential to know what is happening first.

What is the transformer? How it works and why is it used? We will discuss various issues related to transformers in this section.

What we know as a transformer is a static electrical device that transfers electrical energy from one electrical circuit to another without changing the frequency in any way.

Working Mechanism:

We will now learn how a transformer works and why it is used:

A transformer basically works based on mutual inductions. When the power supply is supplied to the primary coil, a magnetic field is generated around it which is actually collected by the secondary coil. This results from the interconnection between the secondary and primary coils and the electric current secondary. The transformer has no moving parts so it works like a complete stationery device. Its structure is not so complicated. For example, two or more insulating copper wires surround an iron core or stainless steel.

We also know that the primary and secondary windings of the transformer have a combination of these two windings. When any kind of voltage is supplied to the primary air it is able to create a magnetic field and the second rotating magnetic field can pass through the iron core and it creates a magnetic field there. And that is why voltage secondary coils are available. Depending on the number of patches on the primary and secondary coils, the amount of power that will be supplied to the secondary side compared to the primary side is called the conversion ratio.

We now know the reasons why the transformer is actually used. Usually, transformers are used for voltage down and voltage up. For example, suppose the voltage of a substation is 11 kV but 400/220 volts are required at the consumer level will then lower the transformer voltage and convert it from 11 kV to 400/220 volts.

*** The transformer basically has two parts: -

1. Primary coil
2. Secondary coil

Primary coil: The side where the power supply is connected to the transformer is called primary coil.

Secondary coil: The direction from which we can collect the output from the transformer is called secondary

Power Transformer:

A static electronic machine used for switching power from one circuit to another is called a power transformer without any change in frequency. Transformers are commonly used to measure the voltage level of a system for the purpose of conduction and generation. These types of transformers are classified according to installation method, purpose of use, purpose of use, etc.

Two types of transformers are used in a substation:

1. Voltage transformer
2. Current transformer

Voltage and current transformers are also called instrument transformers.

Current Transformer:

The current transformer takes a sample of the higher current of the system for the current measurement option. Also the decreasing samples are in the correct ratio of the actual high current of

the system. These are used for current relay installation and storage and maintenance of substations that typically have low quality current ratings for their operation.

Voltage Transformer:

The voltage transformer is very similar to the current transformer, but it is a low rated meter for voltage measurement and it is used to supply low-voltage relays in the protection system and to take high voltage samples of any system. From these low-voltage measurements, the high voltage of the actual system is calculated without directly measuring the high voltages to avoid the cost of the measuring system.

1.3.2 Busbar: Generally we all know Busbar is a kind of hydraulic bar or hydraulic sheet made of aluminum or copper. The busbar collects and distributes electrical energy from a single electrical circuit.

Use of busbar for 132kv substation:

A busbar is used only when one of the substations of any size needs multiple power circuits to supply the same amount of volts.

It is not uncommon for a bus to have two lines, the reason for having a double line is that if for some reason there is a problem with one line, the other line can be made running. Since electricity plays a major role in a substation, it is better to connect two buses.

Busbar layout:

At present the various elements of auxiliary facilities required for a substation are one of the elements of the middle dwelling. In addition to a brief discussion on the busbar, we have tried to connect the basic requirements and the required chi, including the general layout for different types of bus systems, such as the busbar plays a special role in the maintenance of a substation.

Typically EHV substation layouts between housing systems are up to 400 kV. The supply conductor forms a critical element for the power system in a substation. It actually provides point-to-point control of power supply in different ways through different equipment. Many circuits are connected together in one substation with many busbars.

However, it is true that the bus system follows their specific rules, which is why there are limited opportunities to change this busbar. Different types of layouts are used in different countries for the design and operation of the same national bus, and it is generally seen differently in different power plants in India.

The layout of a substation is an example that should be mentioned first. Climate variations can be observed in different parts of Bangladesh at different times. The system voltage is usually 400 kV for the layout of the busbar system. One thing to keep in mind when planning a substation is that it can help financially. Which is actually the labor of an employee, an accurate assessment of the expenditure on land.

Particular importance should be given to the distribution facility and maintenance of the substation. At the same time, it is never right to operate the layout if the power supply to the substation is interrupted for any reason. Usually this type of problem is more dangerous than a line located away from a substation.

1.3.3 Circuit Breaker:

Typically, a circuit breaker is an automatic device for providing protection. It is a type of device that helps keep electrical and electronic equipment safe. A circuit breaker protects the line from accidents when excess current flows.

So a circuit breaker is a special kind of device in all situations to open or close the circuit. In other words, we can say that the circuit breaker is a special device that automatically disconnects the faulty line from the source.

Vacuum circuit test:

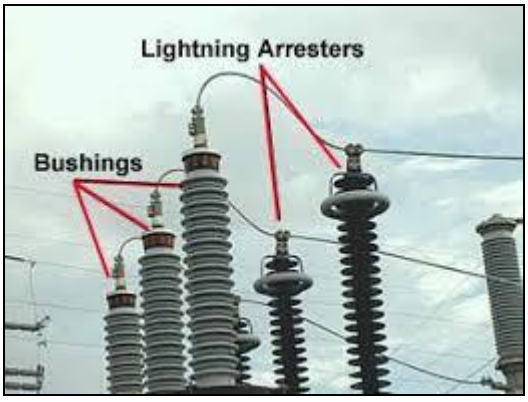
It is a circuit test that fires through a vacuum and completes the testing process. This circuit ranges from 11 to 33 kV of the rated voltage.

These circuit tests should not have:

1. Take a look at the pages viewed from something incredible, reliable and soon durable.
2. Don't shake the fire here.
3. The operation does not appear at home during the observation before or after you.

1.3.4 Lightning arrester :

The main type of device used to protect electrical lines, machinery and other equipment. This is called lightning. This type of device works automatically and spontaneously. The substation has many protective devices. This is extremely important.



1.3.5 Disconnector:

It is a mechanical switch method for loading and unloading. Isolation in line before operating the connected circuit breaker will be effective. So it basically operates without lead. Isolation is very important to automate electrical lines in a safe way.

1.3.6 Instrument Transformer:

An instrument transformer is a special type of transformer that it use to measure electrical amount of an AC system.

Instrument transformer is basically divided into two parts

1. Current transformer
2. Voltage transformer

1.3.7 Insulator:

The insulator of a substation is made of china clay for proper connection of busbar, squeegee gear and transformer. Disconnection is a manual mechanical switch that disconnects electrical components from the system as needed.

Isolation is usually conducted under any load condition or offline. It has special measures to increase the pressure such as disconnection to electrical sub-stations to disconnect various products such as transformers from the line under load or low load conditions.

Difference between disconnector and circuit breaker:

Disconnector and circuit breaker basically disconnect a part of the circuit from the switch or power system. Isolation is an off-load device where a circuit breaker is a load device. Thus, the circuit breaker works automatically if there is a fault in the system that cannot be worked isolated during the load. The circuit is disconnected from the load where work can be done in isolation. There is no way to relieve isolated stress.

Now there is a question in the minds of many

The circuit breaker automatically disconnects the line at any point under load. However, we do not see direct circuit breaker tripping or disconnection. Therefore, it is advisable not to touch any part of the

circuit after tripping or disconnection of the line. Many steps are required for good protection so that the circuit can be seen open and it touches any part before it is touched.

Use of disconnection:

The disconnection is used to disconnect the product from the main line and to close the current charging transmission line to repair the things connected to the main line.

1.4 Rules for opening and closing the connection circuit

In opened condition:

1. First you need to open the earthing switch
2. The isolation must open
3. The earthing switch must be turned off

In closed condition:

1. First you need to open the earthing switch.
2. The connection must be disconnected
3. The circuit breaker must be turned off

Circuit breakers are heated on both sides

When a low voltage line or bus is doing electrical work or maintenance, the electrician switches the main switch and opens the fuse bridge of the switch to stop the operation and that is the rule. Because if someone accidentally turns on the main switch, the line must be turned on.

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Similarly, when a circuit breaker is operated to fix a fault in a high voltage line, the line becomes completely disconnected from any connection. Most circuit breakers are remote controlled and anyone can turn on the line by mistake.

If a circuit breaker is installed between the two sides, it is easy to disconnect and bring the circuit breaker for repair. Therefore, for greater protection of electronics, system breakers are installed and installed separately.

1.5 sub-station Design:

1. First you have to select a good place.

2. Its safety must be ensured such as good maintenance system, change in case of any material problem, regular monitoring and testing as per standard, safe and related issues from fire related problems.

3. It should be easy to operate and maintain and should be monitored at minimum cost.

Substation Types:

Substations can be basically divided into different parts, here we will look at the types depending on two things:

1. On service.

2. On the structure characteristics.

1. On the service: Basically the voltage level works more or less, power factor improvement, conversion from AC power to DC power, all these things.

1. Transformer substation: To increase or decrease the voltage.

2. Switch substation for switching lines.

3. Power Factor Correction: To improve the power factor.

4. Converting substation: To convert from AC to DC.

5. Industrial sub-stations: To supply power to various industries.

6. Frequency substation.

2. On structural features:

1. Indoor substation: If the substation has various goods placed in the middle of a shave or building, it is called indoor substation. Its maximum voltage is 11 kV.

2. Outdoor substation: Use of substation If all the goods are placed in an open space, then it is called outdoor substation, these are basically above 6 KV.

3.Underground substation: This substation is built underground in crowded places.

4.Pole-mounted substation: It is a type of outdoor substation which is placed in the middle of H-pole or 4 pole.

1.6 Transmission overhead line:

How the overhead transmission line can carry electrical energy depends on the mechanical design of the line. Being liberal will make the point clear.

Suppose suddenly the weather gets bad and the storm starts and the power line breaks. If there is a problem in the line due to natural disaster or other reasons, it is very difficult to read. To deal with such situations, overhead transmission lines need to be very well designed to withstand adverse conditions.

1.6.1 Conductor:

Conductors are what we usually see hanging on the street or in different places. This conductor transmits electrical energy from the transmission station to the receiving station.

1.6.2 Support:

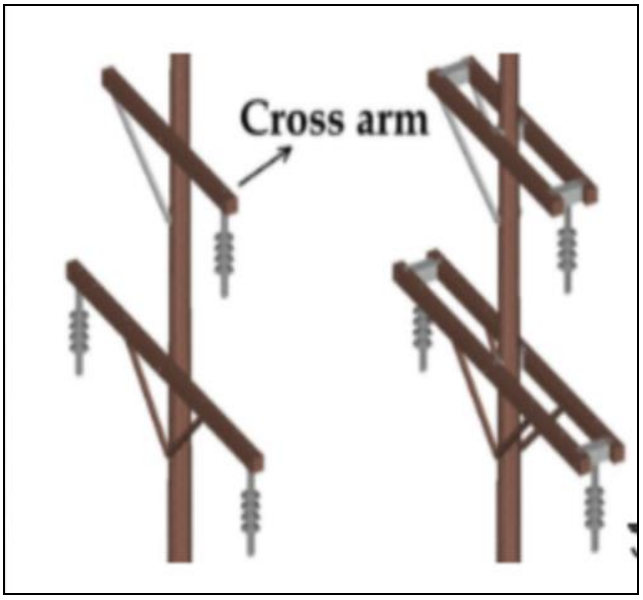
The pillars we see on the street or different places are called supports. Support or polar function to keep the conductive wire at a certain level in the ground. These are basically placed on the transmission line to go from one place to another.

1.6.3 Insulator:

The insulator is usually between the conductor and the support and connects the two. As a result, the current from the transmission line cannot go to the column. The support and transmission lines are connected through insulators so that the line does not flow directly into the support and the line is damaged.

1.6.4 Cross arm:

The cross arm basically supports the insulator. Also seen to use phase plates, illumination arsters, hazardous plates etc. The support head is fitted with a cross arm.



1.6.5 Circuit breakers:

Accidents often occur when excess current flows through the transmission line. When these excess currents flow, the circuit breaker and the disconnected sewer line become disconnected.

1.6.6 Illuminated shipping:

The word light means lightning and the word arrest means arrest. This means that if too much voltage goes through the line, there is a lot of corrosion damage. For this reason, lighting arresters are used to discharge excess voltage into the ground.

1.6.7 Guard Air:

Sometimes a telephone or broadband line goes below the transmission line. The guard is then used below the air transmission line.

1.7 Which of the overhead and underground power lines would be more convenient?

1.7.1 Installation cost:

First, I think you are using an underground line. Initially you will have to spend more to replace this line. It costs twice as much to install overhead lines. Many times this cost is 5-10 times higher. So it is very expensive for small countries.

1.7.2 Chances of accidents:

And the chances of accidents in underground lines are very low. It has a lot of protection from overhead lines.

1.7.3 Transformer installation:

The transformer is mounted on the H-type pole in the overhead distribution line. And in the underground line, the transformer is equipped with a separate platform room.

1.7.4 Expansion of line contraction:

Once the manholes, ducts are set up, this line cannot extend or contract. However, it is possible to extend or contract the overhead line as required.
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1.7.5 Line errors:

The errors in this line are much less. On the other hand, various types of defects are seen in the overhead line. However, there are many difficult situations to solve if there is an error in the underground line.

1.7.6 Maintenance costs:

Good for underground maintenance costs because it is protected from lightning, wind, ice.

1.7.7 Surge voltage protection:

Protection system is not required for increased voltage in the underground line.

1.7.8 Beauty enhancement:

Underground line helps to enhance the beauty of the environment. The benefits are immense. However, many countries do not want to accept this project due to high installation costs. This kind of line is extremely hot. It goes without saying that there is no possibility of an accident due to a short circuit. Work on the underground line has already started in Sylhet. We hope that one day the underground line will be launched all over Bangladesh. Natural beauty will increase manifold.

1.8 Automatic shutdown:

A special type of circuit breaker in the autoriclosor electrical distribution system. If there is a fault in the system, it opens the whole circuit and closes the whole circuit after a certain period of time. If the

system keeps repeating errors, the restorer will reopen after a very short time and shut down the system. The sub-station must have auto recloser.

If there is a fault in the system, an engineer will be able to determine the opening and closing times of the recombinant circuit.

For example: Suppose there is an error in the system, then open the recloser circuit and reopen it after a while. But the breaker realized that the error still existed and he re-opened the circuit and closed it again after some time. An engineer will determine how many times he will do this work. If there is no fault, the recovery circuit will open. However, if only circuit breakers are used in this system, the circuit breaker will open the system as soon as the fault is detected, but will not be able to reopen automatically.

1.9 Why stones are used in substations:

As soon as we hear the name of the substation, the image of transformer, circuit breaker, light arrest comes to our eyes. But there is one thing besides these that is known as the guard at the substation. Now surely everyone is interested to know about the subject? Let's talk about things without increasing curiosity. That protection stone. Now surely you are wondering how a stone can act as a guardian? Here's how substations work:

1.9.1 Protect from reptile attack:

Different types of reptiles such as lizards, chameleons, rats, snakes, etc. cannot move easily because they are difficult to move.

1.9.2 Protect from rain water:

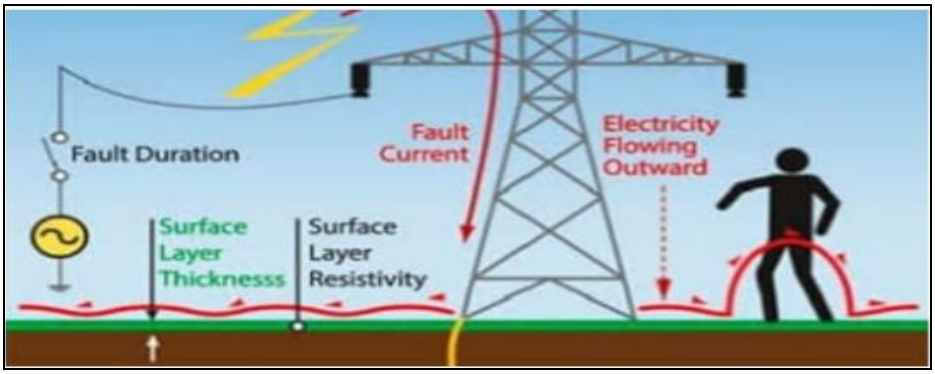
Acid rainwater is electrically conductive. So the stone is used to use the direct connection of water with the substation. As a result, the amount of resistance increases a lot and the electrical conductivity decreases.

1.9.3. Pylonol oil protects against fire:

Transformers used in substations are usually high rate power transformers. Transformers can range from about a few MVA to several hundred MVA. Transformers overheat when overloaded. Just as the elders used oil to cool the head, piling oil is used to cool the transformer when it is hot. It is also used for insulation. Sometimes after a few days of changing the oil, some of the oil leaks and falls to the ground. However, if it catches fire, it will not take long for the substation to burn to ashes. So the stone is used in such a way that it cannot go too far.

1.9.4 Protect from the possibility of action and touch:

This is a very familiar word to those who work at the substation. Because of these two possibilities, someone could die. Accidents always happen because many people are not aware of these technical problems. Those who work at the substation know how big it can be at any time. It is not at all advisable for many people to go around without hesitation because they do not know when a substation fault is seen or too much sparking starts. In this case, if you are not 10 meters away, you can fall into the lap of death. Substation grounding or eating defects or leaks can create huge electromagnetic fields there. At the moment, the range up to 10 meters is likely to be electrified. In this case, if you are in the middle of the range, your two legs will act as conductors. And the difference in voltage between the two legs is called the probability of action. Simply put, the potential difference between the two legs. Again, if you touch the device at that time, a voltage will be created between your hands and feet. Not just the substation, you may also suffer from electrical tower faults or tears in residential areas.



Ways to avoid it: If for some reason you are in that range and you can only protect yourself by jumping like a rabbit.

Rabbit jump:

Leave the range so that the feet and hands do not touch the substation defective area. Then the possibility of touch and action may be the cause of your death.

1.9.5 Grass cannot grow on rocks:

The substation used by the stone dries up. As a result, grass and weeds cannot grow.

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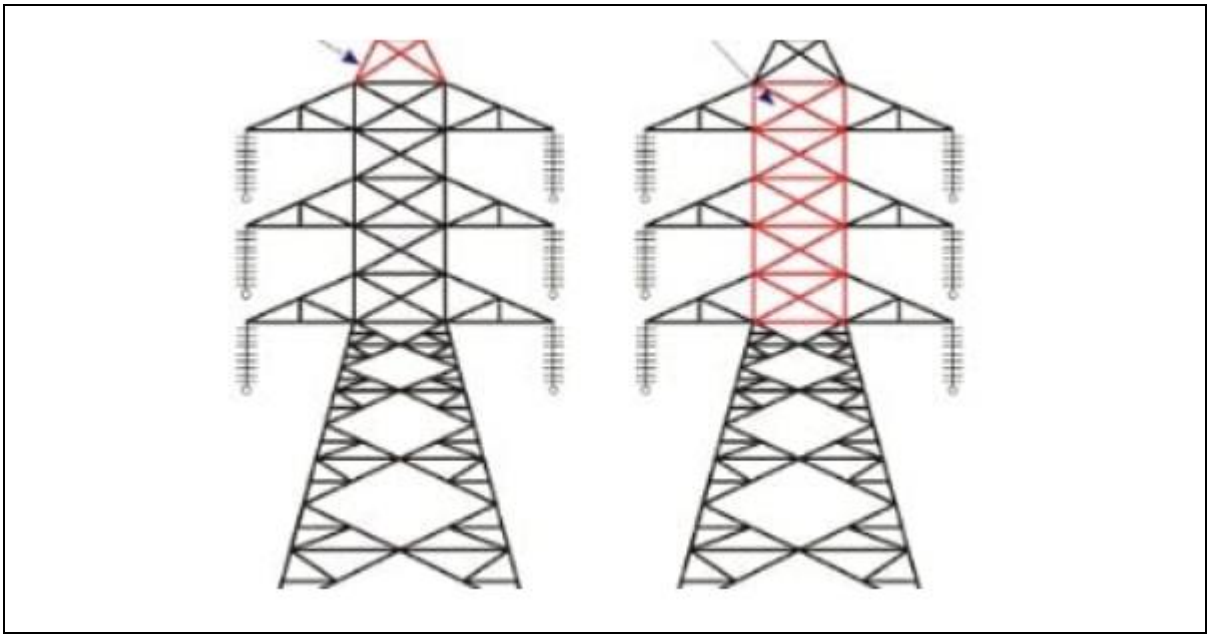
1.9.6 To absorb the heat coming out of the transformer radiator:

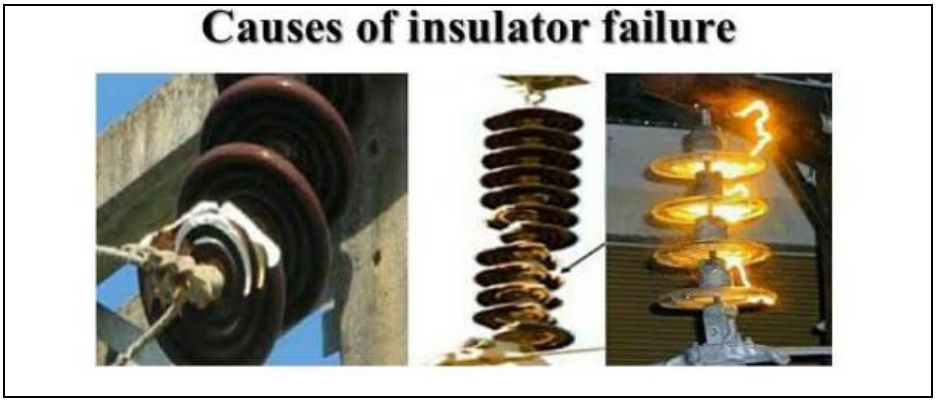
Since the stone can absorb heat very quickly, it easily absorbs the heat coming out of the transformer radiator. As a result, it is possible to get rid of unwanted accidents.

1.9.7 Tower helps to increase foot resistance:

The use of stone increases the resistance between the tower metal body and the soil. As a result the flow of electricity is much less and unwanted the accident was rescued.



1.10 Reasons why insulators are useless: In this article I will discuss in detail why insulators are useless.



** Usually an insulator can be useless for various possible reasons. Here are a few notable reasons

1. If the insulator breaks.
2. If you do not use insulating material properly.
3. In case of insulator flush over.
4. If the insulator is mechanical tight.
5. If the insulator is short circuit.
6. If the insulator collects dirt or dust.
7. If the insulation of the insulator is uneven and insufficiently glossy.

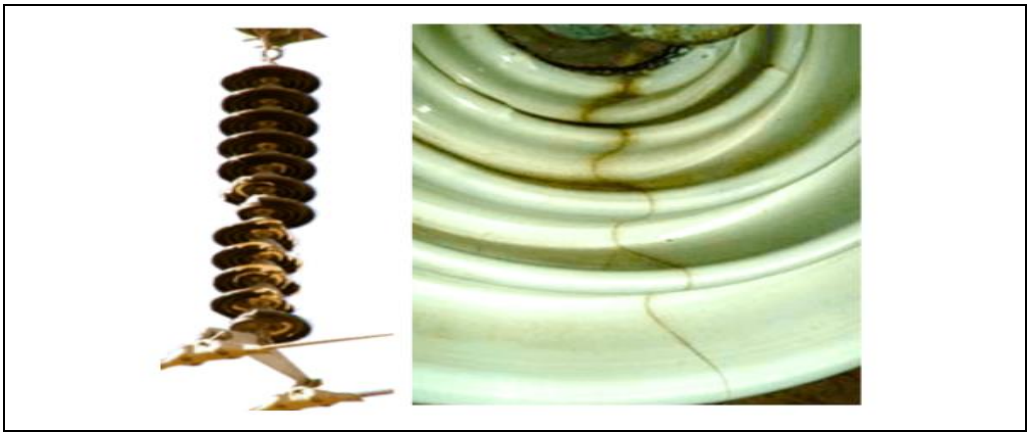
Learn more about now:

1.10.1 If the insulator is broken or cracked

One of the main reasons why insulators are useless is cracking or breaking. An insulator is usually made up of three components,

* Porcelain
* Steel layout
* Cement

Porcelain, cement and steel can expand into different winter tubes due to cold, heat or humidity. When these expand abnormally, the insulator cracks or breaks and becomes useless. Insulation cracks can also occur due to the contraction and expansion of the metal part of the insulation pin or the metal internal connection of the metal interior.



1.10.2 If you do not use insulators properly:

The insulator can easily become useless if the material used to make the insulator is adulterated. In addition, if the insulator is made with less firing time, even more small holes may appear in the insulator. Later, when rain or dew falls on it, these pores absorb water vapor and reduce the insulating resistance. This is why the current leak is insulating. At one time the effectiveness of the insulator decreases.

1.10.3 In case of insulator flash over

Even if the insulator is flush, the insulator can be useless. When the insulator heats abnormally, the ring is used to protect the insulator from flash over.

1.10.4 If the insulating mechanical pressure is high:

If the insulator has any structural defects or if the quality of the insulating components is low, those insulators cannot withstand too much mechanical stress. In addition, good insulators often increase the mechanical pressure due to the oscillating masses on the conductor, which can cause the insulator to break or rupture. Also, the insulating pin is bent under extra pressure.

1.10.5 If the insulator is short circuit :

Many times large birds create a short circuit between the conductor and the cross arm tied to the insulator. This short circuit can damage the insulator. This phenomenon is more common for pin insulators. This can be done by installing bird guards near the insulator and cross arm.

1.10.6 Dirt accumulates on the insulator:

If the insulating coating is not very old or shiny, water, dust, dirt, etc. will accumulate in the heat, so sometimes you need to clean your dust while doing routine checks.

1.10.7 If the insulating book is insufficiently glossy and uneven:

If the insulation is insufficient, water vapor, dirt, salt etc. can accumulate in the insulators. Later all this dirt accumulates and makes the insulator useless by making a flash in the insulator.

1.11 What is bushing? A detailed discussion of bushing.

We've all seen transformers. One or three horn-like heads can be seen on the head of the transformer. It looks like the horn has grown on the head of the transformer. And this part is called bushing. This bushing is seen not only in transformers but also in high power circuit breakers. So let's talk about this bushing today.

What is bushing?

A bushing is a hollow insulator used in a power device that allows a conductive wire to enter the surface of a conductor without any electrical contact. It is usually made of porcelain. It can be made of other insulating materials.

Why and where is it used?

The connection between the primary and secondary windings of the transformer is provided by the bushing connection to the power line to the phase line. This bushing also connects the load circuit power to the circuit breaker. When a few thousand to millions of volts of electricity flows through a conductive line, a huge electromagnetic field is created around it.

So the phase lines of the power line are inserted into the transformer or circuit breaker through a bushing or insulating body to protect the area around it from this huge electromagnetic field.

Types of bushings

1.11.1 Porcelain: Bushing is first made of porcelain. One of the purposes of using porcelain in general is to protect it from moisture or to reduce the cost of ingredients. The only way to use porcelain is to use low cost flexible seals and metal fittings.

The interior of the porcelain bushing is emptied so that it can connect the incoming electrical line to a circuit breaker or transformer. This reduces the use of a type of semiconductor grading to maintain the potential gradient of the bushing. The verandah surface of the shrub is oiled for extra insulation. Bushings made of porcelain can be used for power lines up to a maximum of 36 kV.

পোর্সেলিন বুশিং

1.11.2 Paper bushing:

The use of paper bushing is quite affordable. Paper can easily absorb water vapor and the dialectic stress on paper is much higher. This type of bushing is usually built with SRBO. SRBP insulating bushings are most commonly used on devices used in 62 kV power lines.

However, when it is used in power lines above 12 kV it requires an insulation so that the dielectric properties remain intact. This is an inconvenient aspect.

1.11.3 Condenser bushing:

Metal foil is usually inserted in this type of bushing when the transformer is rotated to soothe the excess electromagnetic field between the phase line and earthing. It can also balance the electromagnetic force by creating a capacitive effect.

1.11.4 Resin insulated bushing:

This type of bushing has been used in transformers and various circuit breakers since 1985. This type of bushing is used in power lines up to 62 kV.

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However, one of the disadvantages of this type of bushing is its high sensitivity to a chemical electromagnetic field called resin. Therefore, additional insulating material is required to use power line bushing above 25 kV.

Bushing will be damaged: Just as each of us has a different label of endurance, the middle of the bushing has a certain ability to withstand the electromagnetic pressure. And this ability is called dielectric stress.

If this tolerance goes out, the bushing will suffer. Electrical accidents at various substations are often caused by shots fired by transformer circuit breakers.

সাবস্টেশনে অগ্নিকান্ড

1.12 The following are the observations made by the Control Board at Chuadanga Power Grid Sub-station.

LA: Counter reading

CB: 1. Gas pressure

2. Counter reading

Tx: 1. Oil temperature

2. Winding temperature

3. Oil level

CT: Oil level

DS: Visually inspectx

ES: Visually inspectx

1.13 The following is the report of one day observation of Chuadanga Power Grid Sub-station

Shift B (From 14.00 hr to 22.00 hr)

Transformer:

1. transformer cooling, fan, pump : Off mode

2. transformer oil and winding temperature :

Wind 47

Oil 45

3. Grid voltage 1.21 kv

4. transformer megawatt 28 MW

5. Amp Observation 130 amp

Circuit breaker :

1. Gas pressure 67

2. Air pressure (-)

Breaker cavinet : No

Relay : Ok

Busbar : Ok