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TROUBLESHOOTING & MAINTENANCE OF POWER TRANSFORMER.

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Abstract

A power transformer is most important and expensive equipment of an electrical transformer. Therefore for acquiring high performance and more operational life of the transformer, there is need to perform various maintenance tasks. And in case of power transformer, there are three types of maintenances of power transformer as preventive maintenance, predictive maintenance and corrective maintenance. Not only it limits up to requirements of various maintenance activities but also a power transformer requires multiple maintenance actions, Such as measurement and testing of different parameters of the power transformer. But if one performance of routine maintenance is done correctly, then he may not any presentation for any action of emergency maintenance. The daily maintenance and checking of power transformer is called as condition maintenance. Therefore by regular condition maintenance we can avoid breakdown and emergency maintenance. That's why one technical person should mainly focus on condition maintenance; because of 100% condition maintenance 0% breakdown of equipment occurs. For transmission of electricity the main equipment is power transformer, the transformer having rating more than 200KVA such transformers are known as power transformer, which are use in generating stations and also used in substations of bigger factories, as it is very expensive therefore we must need to check its performance time to time such as daily, weekly, monthly, quarterly, half yearly and yearly for its proper working, such operations is scheduled in preventive maintenance, if by any reason the performance of power transformer is changed then we must need to perform some maintenance operation to avoid the damage of transformer.

Index Terms: Power Transformer.

INTRODUCTION

A transformer is a static device used for the transformation of power from one circuit to another without change in a frequency. This is a very basic definition of transformer. Since there is no moving or rotating part so it is a static device. Power Transformer operates on the principle of the mutual induction gives by faradays law of electromagnetic induction and its working in A.C supply only



Fig1: Power Transformer

If we want to know about the transformer then we have to go some long year back about in 1880s. About 50 years ago in 1830, the property of induction was discovered and this is the working principle of transformer. Then after few years later transformer's design was improved resulting in greater efficiency and lesser in size. In a gradual way the higher capacity of transformer in the range of several KVA, MVA came into existence. In the year 1950, 400KV electrical power transformer was introduced in higher voltage electrical power system. Later different type of manufacturers manufactured 800KV and even higher KV class transformers in the year 1980.

The transformer which having rating more than 200KVA such transformers are known as power transformer. They are used in generating stations and for industrial purpose. They can be of single phase and three phase also. This type of transformer are turned on when load increases and when the load is low then it is turned off, There for it is being designed in such a manner that at any load it can give higher efficiency. On the basis of types of winding it is classified into two categories such as primary winding and secondary winding and on the basis of voltage range it is high voltage (H.V), low voltage (L.V) and tertiary voltage (T.V). The part of the transformer is laminated core, windings, insulating material, pressure relief valve, tap changer, conservator tank, buchholz relay, bushing, breather, silica gel, cooling tubes etc.

corrosion due to vibration, moisture and dust respectively, to avoid such types of problem we have to perform routine maintenance of power transformer



Fig2: Cleaning of Transformer

In this type of maintenance we have to perform some common operations daily instructed as follows:

- Clean all stationary part of transformer from moisture and dust to avoid corrosion.
- Monitor the readings of different electrical parameters of transformer such as load, current and voltage.
- It also includes checking of earth connection, temperature, etc.

❖ **Preventive Maintenance:**

Preventive maintenance of power transformer includes daily basis, monthly basis, quarterly basis, half yearly basis, yearly basis maintenance of power transformer etc. These methods are given as follows:

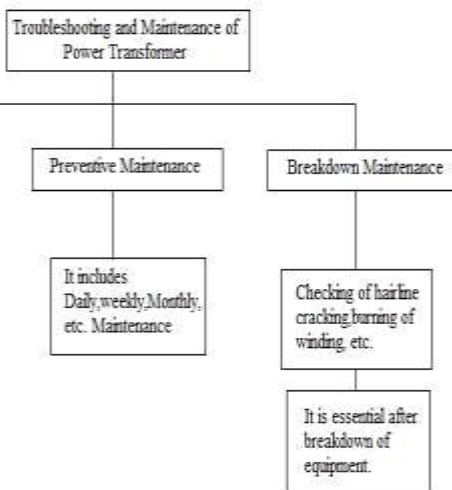
1. Maintenance of Transformer on Daily Basis:

There are three important basic things which to be examined on power transformer in daily basis and they are:

- ↪ Leakage of oil from any point of a transformer.
 - ↪ Reading of MOG (Magnetic Oil gauge) of conservator tank and main tank.
 - ↪ Colour of silica gel in breather is changes to pink then it should be replaced.
- 2. Maintenance of Transformer on Monthly Basis:**
- ↪ Check the oil level present in oil cap within silica gel breather. If the level of oil in oil cap is less than the reference level, then it should be filled up to correct level.
 - ↪ The breathing holes which is present inside the breather it should also check every month and cleaned it, if it essential.
 - ↪ To check the oil level in bushing it is must be observable in the oil gauge attached to those bushing. If it is essential, then oil filling should be done when transformer is in shutdown condition.

3. Maintenance of Transformer on Half Yearly Basis:

- ↪ Checking of sludge content, water content, flash point, acidity and dielectric strength of transformer oil in every half year interval.



1. MAINTENANCE OF POWER TRANSFORMER

There are three methods of maintenance of power transformer namely as:

1. Routine Maintenance.
2. Preventive Maintenance.
3. Breakdown Maintenance.

❖ **Routine Maintenance:**

Every electrical equipments specially those equipments which having metallic body such equipments have common problem of damage and

4. Maintenance of Transformer on Yearly Basis:

- ↪ Cooling fans, oil pumps and other parts which is active in cooling system of power transformer, it is operate by remote control, auto control and manually control through its control circuit of transformer to be checked in the per one year interval.
- ↪ All the bushing of transformer to be cleaned by soft cotton clothes in every one year interval and during it checks any hairline crack.
- ↪ Mechanical investigations of buchholz relay to be carried out on yearly basis.
- ↪ Moisture content and dielectric strength (BDV) are tested from diverter tank. When dielectric strength is low and PPM for moisture is found high with respect to suggest value the oil inside the tap changer has to be filter.
- ↪ In R&C panel and RTCC all the relay, alarms and control switch have to be cleaned by suitable or proper cleaner.

Such type of maintenance we have to take in every one year interval.

❖ Breakdown Maintenance:

The maintenance which we have to perform on equipment after that has breakdown down and is unstable known as breakdown maintenance.

- ↪ When breakdown faults are occurs in power transformer then the respective maintenance is immediately carried out otherwise the transformer may be over damage.
- ↪ Such type of faults develops because of short circuit in the windings of power transformer.
- ↪ In this type of maintenance there is need of immediate action to be taken to repair the faults are develop in winding, if winding is burn out then it should be replace immediately.
- ↪ To avoid such type of breakdown we have to check some part which help to secure the life of transformer as follows:
 - I. Check the tightness of bolts and other stationary part.
 - II. Checks the moving parts are free to move and there is no damage in that.
 - III. Check the causes of breakdown takes place which can be eliminated.
 - IV. Check atmospheric condition and transformer has to work.

Advantages of Maintenance of Power Transformer:

- ↪ To keep the transformer in good working order it may be defined as Maintenance of power transformer.
- ↪ Good maintenance not only means that overcomes the problems develop in transformer but also it helps in increasing the life of equipment.
- ↪ Maintenance of equipment decreases the failures and breakdown; it reduces costly breaking of transformer.
- ↪ Maintenance of transformer increases the operational life and it decreases the downtime.

- ↪ Maintenance allows the scheduled breaking of transformer and for money the budgeted for repairs.
- ↪ Maintenance avoids the need of inventory of extensive part of transformer.

Conclusions:

- I. This paper gives the knowledge about the Troubleshooting and maintenance of power transformer.
- II. This system presents the development of transformer; it contains three main branches as routine, preventive and breakdown maintenance.
- III. It gives the knowledge which is not easily available at normal stage.
- IV. Maintenance of power transformer not only avoid financial loss but also keep power supply continues.

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