

DISTRIBUTION TRANSFORMER : ERECTION & COMMISSIONING CHECKPOINTS

Introduction

A **distribution transformer** is an important link between any utility's distribution network and the power supply delivered to customer. It is therefore most vital asset in any electrical distribution network and needs special attention right from erection, commissioning and maintenance of these transformers.

Let us examine some important aspects related to erection, commissioning of Distribution Transformer.

Checkpoints before Transformer installation

Before the transformer is lifted from the warehouse / maintenance workshop and taken to the site where it is to be installed, following physical inspection/checks should be done:

1. Check the transformer bushings thoroughly for any signs of cracks / damages
2. Check the oil level in the transformer and check for any signs of oil leakage through bushings, gaskets or welded joints
3. Test the Insulation Resistance (IR) values using a 1000 V Megger unit for various sections such as – HV to LV, LV to Earth, HV to Earth.
4. For a rated voltage of winding between 11 kV up to 6.6 kV the minimum safe IR value should be in the range of 200 mega Ohms to 400 mega Ohms
5. In case if the above values are not obtained then it is necessary to dry out the transformer completely by filtration procedure
6. Check whether tests are carried out for – Ratio Tests, % impedance voltage test and rate voltage withstand tests

Transformer Installation

During installation of Transformer on a Pole mounting structure, following checks should be made:

1. Ensure that the base channel of transformer is at height complying to IEC Standards:
 - a) Height of top of HV bushing from ground for pole mounted transformer should be 4.572 meters minimum (15 Ft)
 - b) Height of top of HV bushing from ground for plinth mounted transformer should be 2.75 meters minimum (8 Ft)
2. Ensure that base channel is horizontally leveled
3. Avoid jerky movement of the transformer while lifting it upwards during installation
4. During installation ensure that the HV bushings of the transformer are on the DO unit (or HG fuse unit) side of the structure
5. After installation of transformer, also check that other allied equipments such as AB switch, Horn Gap fuse units, DO Fuse sets, Lightning arrestor etc. are fitted at appropriate positions as per the applicable drawing issued by the utility.
6. Use PVC unarmoured cable (3 ½ core) of appropriate size and length for LV side. Ensure that the lugs are appropriately crimped at the ends.

Earthing of Distribution Transformer

Earthing of transformer is an important aspect of Distribution Transformer installation. As per IE rules: 61 (1) (a) and 61 (2), the neutral bushing of the transformer and the body of the transformer should be earthed by not less than two separate and distinct connections with a minimum of two different earth electrodes.

In order to comply with above rule it is a customary practice to excavate three earth pits (usually 8 feet deep) arranged to form an equilateral triangle. One pit is used for connecting lightning arrestors. The transformer neutral earthing is connected to another pit while the body earthing is connected to third pit.

These three earth electrodes are connected to each other to form earth bus at one feet below the ground. The earth resistance of these interconnected electrodes should not exceed 2.5 ohms.

Commissioning of Distribution Transformer

Before actually charging the transformer the following points should be checked:

1. Transformer should be inspected by authorized electrical inspector and get permission to energize the same
2. Insulation resistance and continuity of the winding should be checked by 1000V Megger
3. Check dielectric strength of the transformer oil by taking out sample
4. Check oil level in conservator tank, colour of silica gel in the breather and oil level at the bottom of the breather
5. Make MCCB/Main Switch in the distribution box OFF and charge the transformer on no load by using DO fuse elements of suitable capacity
6. Wait until noise of the transformer stabilizes then measure the secondary voltages phase to phase and phase to neutral
7. Apply load on the transformer (preferably a 3 phase motor) and check direction of rotation of motor. If the motor rotates in reverse direction, then the phase sequence of connections is wrong and needs to be rectified. To rectify this, interchange the cable connections at the MCCB / Main switch e.g. R&Y or Y&B or B&R phase connections. The phase sequence will then be rectified.

Source : <http://engineering.electrical-equipment.org/electrical-distribution/distribution-transformer-erection-commissioning-checkpoints.html>