

# Fault Finding & Corrective Action in a Power Transformer

## Introduction:

A power transformer is a vital component in electrical power systems, responsible for transforming electrical energy between different voltage levels. However, like any other electrical equipment, power transformers are susceptible to faults that can disrupt their normal operation. Promptly identifying and rectifying these faults is crucial to ensure the reliable and efficient functioning of the transformer. This document aims to provide a descriptive guide on fault finding and corrective actions in a power transformer.

## I. Visual Inspection:

The first step in fault finding is a thorough visual inspection of the power transformer. This involves examining the external components, such as the bushings, cooling system, tap changer, and general condition of the transformer. Signs of overheating, oil leaks, loose connections, physical damage, or abnormal discoloration should be noted.

## II. Diagnostic Tests:

### Dissolved Gas Analysis (DGA):

Collect oil samples from the transformer and send them to a laboratory for analysis.

DGA helps identify the presence and concentration of combustible gases, indicating potential faults like overheating, arcing, or insulation degradation.

### Insulation Resistance Measurement:

Measure the insulation resistance between windings and between windings and ground using a high resistance meter.

Low insulation resistance indicates a possible insulation breakdown or moisture ingress.

### Power Factor Test:

Conduct a power factor test to evaluate the condition of the insulation system.

A low power factor may suggest insulation degradation or moisture content.

### Turns Ratio Test:

Measure the turns ratio between the primary and secondary windings using a turns ratio meter.

Significant deviations from the transformer's rated turns ratio may indicate winding faults or tap changer problems.

#### **Short Circuit Impedance Test:**

Perform a short circuit impedance test to determine the transformer's impedance values.

Deviations from the manufacturer's specifications may indicate internal winding faults or mechanical damage.

#### **III. Fault Analysis:**

Based on the diagnostic test results, it is crucial to analyze the obtained data to pinpoint the specific fault(s) in the power transformer. This analysis can involve comparing test values with standard values, consulting transformer manuals, and seeking expert opinions.

#### **IV. Corrective Actions:**

Once the fault(s) have been identified, appropriate corrective actions can be taken to rectify the issues. Some common corrective actions include:

##### **Cleaning and Tightening:**

Clean the transformer and remove any dust, debris, or contaminants.

Tighten loose connections to ensure proper electrical contact.

##### **Insulation Repair:**

If insulation degradation is detected, repair or replace the affected insulation materials.

Address moisture ingress issues and ensure proper sealing of the transformer.

##### **Winding Repair or Replacement:**

In case of winding faults, repair or replace the affected winding(s) as per manufacturer guidelines.

Conduct insulation resistance tests after repair to verify the effectiveness of the repair.

##### **Tap Changer Repair:**

If tap changer-related issues are found, inspect, clean, lubricate, or repair the tap changer mechanism.

Verify proper functioning of the tap changer through operational tests.

**Oil Treatment:**

Treat the transformer oil to remove moisture, impurities, or combustible gases if recommended by DGA results.

Replace the oil if it has exceeded its useful life or does not meet the required specifications.

**Conclusion:**

Fault finding and corrective actions in power transformers are crucial to maintain their reliable operation. Regular visual inspections, combined with diagnostic tests, help identify faults accurately. Through fault analysis and appropriate corrective actions, transformers can be restored to their optimal working condition, ensuring the stability and efficiency of electrical power systems.