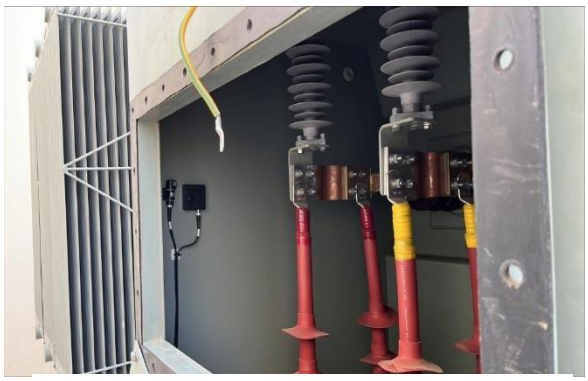
Transformer Testing Services

Comprehensive Testing for Transformers

Condition Based Maintenance (CBM) is a set of activities that detect changes in the physical condition of equipment. By carrying out testing on equipment during its service life, signs of damage can be detected and repaired before failure occurs, improving both the safety and reliability of a network. Effective CBM means asset managers can avoid early life failure and extend operational life of asset.

Transformers

Transformers are some of the most important and expensive equipment in any network. Due to complexity of the internals of a transformer there is no single test that can give overall health. Tests will generally focus on specific components within the transformer therefore a combination of tests is required to comprehensively understand the health of an asset. IPEC can help asset managers understand and plan the most effective testing schedule for each individual asset. Some tests can be carried out while the transformer is live, others require a shutdown therefore performing multiple tests together can significantly reduce downtime.



Ultrasonic and UHF sensor installed on Transformer

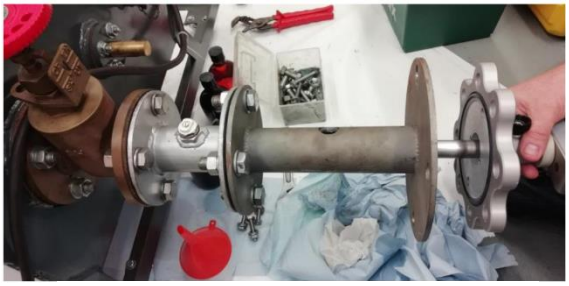
Test Methods

On-Line

- Partial Discharge Monitoring (Continuous and Periodic)
- Infrared Thermography

Off-Line

- Insulation Resistance and Polarization Index
- Tan Delta and Capacitance Measurement
- Winding resistance
- Turn Ratio
- SFRA (Sweep Frequency Response Analysis)
- Oil Tests (Dissolved gases and other parameters)
- DC Hipot Testing



Drain valve sensor installed on Transformer

IPEC Services

IPEC Services can offer any combination of the above tests, however in few cases are all required, and in some cases certain tests are not possible or useful. Basic details of each test and some requirements are listed below. For more detail on each test type, the requirements and detailed outputs please contact IPEC sales team at sales@ipec.co.uk.

Test Details

On-Line tests – Done while the transformer is live

Partial Discharge	
Testing for	Voids within insulation which eventually develop into flashovers
Test Requirements	Sensor Installation (on-line) and access to Transformer
Time	Continuous or spot test
Suggested Regularity	Continuous or condition dependent
Infrared Thermography	
Testing For	Mechanical connection quality
Test Requirements	Camera positioning, test done online
Time	Continuous or spot test
Suggested Regularity	Continuous or condition dependent

Off-Line tests – Requires a shutdown to perform test

Insulation Resistance and Polarization Index	
Component Tested	Abnormalities in resistance to ground of insulation (IR) & winding contamination (PI)
Test Requirements	Off-line tests commonly conducted together. PI requires an overvoltage test
Time	30 minutes per transformer
Suggested Regularity	1 per year or condition dependent
Tan Delta	
Component Tested	Insulation condition – water tree defects etc. (not PD)
Test Requirements	Off-line test, measures current flow through oil
Time	2 hours per transformer
Suggested Regularity	1 per year or condition dependent
Winding Resistance	
Component Tested	Checks for loose connections or defects on conductive components. Often used to check for transportation damage or after maintenance.
Test Requirements	Off-line test. Compares electrical properties on each phase
Time	1 hour per transformer
Suggested Regularity	1 per year or condition dependent
Transformer Turns Ratio	
Component Tested	Winding and core condition
Test Requirements	Off-line test. Requires baseline test to compare results. This is often completed at end user handover and displayed on nameplate
Time	1 hour per transformer
Suggested Regularity	1 per year or condition dependent
Sweep Frequency Response Analysis	
Component Tested	Winding condition. Checks for fault paths from winding to core
Test Requirements	Off-line test. Requires expert analysis and previous test reports to draw conclusions
Time	2 hours per transformer
Suggested Regularity	1 per year or condition dependent
Oil Tests (DGA)	
Component Tested	Overheating of components and evidence of arcing (PD)
Test Requirements	Off-line test. Requires careful extraction of oil from transformer and laboratory testing
Time	2 hours per transformer
Suggested Regularity	1 per year or condition dependent
DC Hipot	
Component Tested	Insulation faults
Test Requirements	Off-line test. Measures leakage current between isolated components to find weak points
Time	2 hours per transformer
Suggested Regularity	1 per year or condition dependent