Power and Instrument Transformer Diagnostics

Power transformer diagnostics

Power transformer diagnostics is an integral element of preventive maintenance, whose purpose is to determine the condition of main transformer parts: windings, core, bushings and insulation system.

On-site diagnostics – basic scope:

- measurement of insulation resistance
- measurement of $C$ & $\tan \delta$ of windings
- measurement of $C$ & $\tan \delta$ of bushings
- low voltage measurement of no-load current
- measurement of winding resistance
- measurement of leakage inductance ($L_x$)

On-site diagnostics – enhanced scope = basic scope + additional measurements:

- measurement of transformer insulation polarization spectrum – RVM method
- frequency response analysis (FRA)
- dielectric response analysis – NEW!!!

Special diagnostics methods

Special diagnostics methods are used to determine causes and locations of transformer faults/failures, or as a part of special investigations:

- PD testing – Acoustic Emission (AE) Method
- OLTC diagnostics – measuring of resistances with 200 Amps (R vs. I characteristics)
- thermovision

In the last more than 30 years, about 2700 power transformers were tested in Croatia, Albania, Austria, Bosnia and Herzegovina, Czech Republic, France, Macedonia, Montenegro, Serbia, Slovenia, Spain and UAE.
**PD acoustic emission detection**

This method is used to locate discharges (PD), bad contacts or localized hot regions in transformers (> 200 °C)

**Acoustics Emission (AE) method enables:**
- to locate the source of the potential problem on site
- assess the option for its elimination,
- assess risks of running problematic transformers

The accuracy of acoustic detection is equal to size of a soccer ball – approx ±15 cm.

PD acoustic detection method is not susceptible to electrical interference, what makes it applicable to transformers in service. PD can be detected at an early stage (~ 500 pC)

Transformer is on-line during preparation and measurement.

**Application of AE method:**
- when a potential problem is detected by another diagnostic method
- as a reference measurement (acoustics fingerprint)

**Instrument transformer diagnostics**

**On-site instrument transformer diagnostics:**
- measurement of insulation resistance
- measurement of C & tanδ of insulation
- PD measurement (acoustic method)
- accuracy class measurement

Certified according to HRN EN ISO/IEC 17025:2007