

Portable Induced Voltage Testing

GE's portable induced test trailers can confirm that a customer's transformer is suitable for service without the need to remove the unit from site, avoiding extensive outage time and shipping expense. They can also locate potential problems caused by corona. One key quality of the induced test is the ability to stress a transformer insulation—turn-to-turn, high-to-low, phase-to-phase, phase-to-ground, and bushing insulation—without damage. Another is that the test can locate the source of corona for an in-tank repair at much less cost than a shop repair.

Corona

The presence of corona in a transformer can lead to solid insulation becoming brittle and the chemical decomposition of transformer oil, which can contribute to premature failure. The existence of corona in a power transformer is an indication that some portion of the insulation system is overstressed. Conversely, the absence of corona is an important factor in assuring long transformer service life.

The Induced Test

Voltage is applied to the transformer across the lowest voltage winding. The test voltage induces a voltage in the HV windings. Corona is monitored using the bushing capacitance taps of the HV bushings. This signal is fed into sensitive metering designed to measure corona. Radio Influence Voltage (RIV) and Partial Discharge (PD) are industry terms used when measuring corona. New power transformers under factory testing are expected to measure less than 100 microvolts of RIV per ANSI C57. During field tests, the results of the three phases are compared to one another.

A problem phase will typically have much higher RIV/PD. Therefore the magnitude and the relative value of each phase are important for evaluation.



Acoustic Testing

Once GE determines that partial discharge is found, we can employ acoustic testing to pinpoint the location of that PD. It is difficult, if not impossible, to locate PD with pinpoint accuracy without utilizing an outside voltage source such as the induced test because once PD begins, the noise reflects and refracts in the oil making the source difficult to determine. However, if the source of PD can be measured instantaneously as it occurs, that source can be located, often within one cubic foot or better. Recent tests were able to pinpoint the location of a known PD source in a transformer to two inches. Using both tools together can help you find and potentially repair the problem in the field; minimizing outage time and repair cost.



Applications

Any large, critical high-voltage transformer that has seen one of the following situations:

- A system disturbance such as a transient
- An unexplained trip
- Shipping damage
- Sitting in extended storage
- In-service gassing

Industries

Utilities, Independent Power Producers (IPP), municipals, large metals

GE Trailer Capabilities

GE's induced trailers are located in the following cities: Los Angeles, California and Stoney Creek, Ontario. Test capabilities include virtually any transformer manufactured with no theoretical limit.

These trailers, in conjunction with additional equipment, are capable of providing the following additional tests:

- No load loss at rated voltage, 60 Hz
- Load loss and temperature rise tests at rated current

This is just one of the offerings in the GE transformer fleet management toolkit.



PD and RIV instrumentation

Experience

Arizona Utility 500 kV, 500 MVA GSU – Internal inspection of unit found aluminum chips inside the tank as a result of not using filter during filling operation. GE performed clean-up and proved effectiveness of clean-up via induced voltage test at site. Cost to replace unit would have been \$3 million.

California Utility 500 kV, 300 MVA Auto – Customer purchased seven identical units from an overseas manufacturer. One failed catastrophically during warranty and another unit was gassing. Induced voltage test located the source of gassing to enable a field repair. Cost to replace unit would have been \$4 million.

California Utility 230 kV, 160 MVA Auto – A 38-year old GE transformer started gassing. The portable induced-voltage test pinpointed the gassing to a Thyrite stack. GE replaced the failed Thyrite in a simple field repair. Cost to replace unit would have been \$2.5 million.

Nevada Casino – During construction of the casino, a dry type transformer installed inside the building was extensively damaged by vandalism. Removing the unit would have cost far more than a new unit. GE performed a major repair on site, but the casino wanted confirmation of the quality of the repair. GE mobilized one of our induced trailers to the site. Due to logistics, cables had to be run over 300 feet from the trailer to the transformer. Public and employee safety required an army of security guards; however, the test was performed successfully at a savings of \$1 million compared to installing a new unit.

For more information, call 24/7
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GEA17945A (12/2012)

