Introduction

ABB’s latest development the TrafoSiteTesting™ mobile test unit is a mobile high-voltage test system for On-Site Testing of Power Transformers. Worldwide, it is the first 3-phase mobile high-voltage test system for Power Transformers based on a static frequency converter which is especially designed for performing routine and special tests according to standards as IEC 60060-3, IEC 60076 and IEEE Std. C57.12.00.

Supplemented by the most common diagnostic methods used under field conditions, the mobile high-voltage test system enables ABB to offer a full range of testing on all types and brands of transformers from small grid transformers up to the largest step up generator transformers.

Why should transformers be tested on site?

With TrafoSiteTesting™, ABB proves the proper condition of the equipment, giving accurate and reliable test results as is known from acceptance test in a static test field in a factory. As an enhancement of ABB’s TrafoSiteRepair™ concept, the mobile high-voltage test system opens new doors for condition assessment. Informed decision-making is fundamentally important.

Values measured with the mobile high-voltage test system and diagnosed and evaluated by ABB’s experts who have access to more than a century of knowledge in transformer manufacturing, is the basis for the optimal solution. Accurate information allows prioritizing service work in a way that ensures maximum economic benefit.

TrafoSiteTesting™ can be used

- After a TrafoSiteRepair of a transformer
- After a failure for diagnosis and fault detection
- For condition assessment on high-valued, important and critical units during maintenance shut-downs
- Before the commissioning and energizing of spare transformers
- After shipment of repaired or new transformers
Which tests can be applied?
To assess and verify that the overall condition of a transformer is reliable and fit for operation, several tests and diagnostic techniques can be applied:

- High-Voltage Tests
  - Applied Voltage Tests in a resonant circuit up to a test level of 500 kV
  - Induced Voltage Test (single- or three phase) up to a test level of 90 kV
- Electrical and Acoustical Partial Discharge (PD) Measurements
- Measurement of No Load losses
- Measurement of Load Losses with external compensation

- Electrical Routine Tests
  - Transformer Ratio Measurement
  - Winding Resistance
  - Short-Circuit impedance

- Dielectrical Tests
  - Insulation Resistances
  - Loss Dissipation Factor and Capacitance of transformer and bushings
  - Frequency Domain Spectroscopy (FDS)

- Additional Tests
  - Frequency Response Analysis (FRA)
  - Thermo vision scan
  - Sound measurements
  - Full range of oil testing in own laboratory

Which preparations are necessary?
To ensure a smooth workflow the following needs to be prepared prior to testing:

Test object
The transformer needs to be
- switched off
- completely disconnected
- fully assembled
- equipped with HV-bushings with measurement taps for the PD-measurement
- and located at a place with sufficient clearance e.g. transformer foundation

Dimensions and the storing position of the mobile test system
The mobile test system is installed in a modified 40-ft-container with the following standard dimensions:
- Length: 12, 19 m (16 m during testing)
- Width: 2.35 m
- Height: 2.59 m
- Total weight: 27 t

The transformer location must be accessible by truck. Maximum distance to the test object is 25 m. The mobile test system must be placed on suitable ground.

Power Supply
A stable 400 V/550 kVA supply is needed to operate the mobile high-voltage test system. The power can be supplied either from a diesel generator or a distribution network. The distance to the power supply must not exceed 100 m.

Tools and Equipment
A personnel hoist should be available to ensure safe access to the top of the bushings.

Customer Success Story
- A 30 year-old Generator Step-up Transformer (315 MVA, 400/21 kV) was kept as a spare unit, being out of operation for more than 5 years
- Owner needed to use the spare unit because existing transformer in service became critical due to an internal hotspot
- Owner did not know if he could rely on the condition of the spare
- The ABB Transformer Service Center serviced the transformer on-site and performed a high-voltage test to proof the condition prior to energizing

Recognized benefits
- ABB’s TrafoSiteTesting™ solution ensured that the owner would energize a transformer in good condition for safe and reliable operation
- Owner avoided having to pay penalties for non-delivery of energy due to failure of critical equipment
- Overall satisfaction of the owner and of the end-users

Conclusion
ABB is the global leader in TrafoSiteRepair™ and, with it’s globally coordinated and quality assured processes, the partner of choice when customers opt for quality-secured repairing and state-of-the-art testing of transformers on site using TrafoSiteTesting™.

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