TRANSFORMER SERVICES

Preventive Maintenance

BENEFITS

Critical Electrical Asset Support

Electrical power is the pulse of your plant. It's vital to your operations, but it is also dangerous and costly.

While large power transformers are among the most reliable equipment used in electrical power systems, failures do occur. And with these failures, profits and people can suffer.

Replacing a transformer can take several weeks resulting in serious financial and productivity losses. In many cases, a transformer can be repaired but only if the problem is caught before it escalates.

Identifying and resolving problems starts with performing electrical testing, maintenance, and engineering services provided by Vertiv™. Proactive maintenance gives you the information you need about the performance of your transformer and related electrical assets. You'll be able to make smarter, more profitable decisions while protecting your people and operations.

Benefits

- Eliminate unplanned downtime through routine inspection and maintenance
- Avoid substantial financial loss associated with service disruptions
- Minimize emergency repairs
- Ensure ongoing reliability of electrical distribution systems

Ensure optimum system performance, efficiency, and safety with proactive preventive maintenance for your transformer

Proactive electrical testing and maintenance of your transformer performed on an annual basis by system experts can uncover a problem before a unit fails. This is the key to eliminating unscheduled outages.

Information accumulated through routine inspections and periodic testing will usually provide warning of impending service problems. Vertiv's Electrical Reliability Services team will help you recognize the signs of an impending failure with careful analysis of the records and identification of significant trends or unusual behavior. Our transformer services improve each aspect of system reliability. They ultimately ensure your company will have reliable power and avoid expensive outages related to transformer failure.

Our transformer services include:

- Substation maintenance
- Turnkey installation
- Commissioning and startup
- Preventive maintenance
- Online predictive maintenance
- Fluid/oil processing
- Oil analysis
- Emergency services

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Substation Maintenance

On-site transformer and substation services can be individually performed by the NETA-certified technicians of Vertiv™ or combined as a complete package to improve reliability. The services include:

- Transformer assembly, installation and removal
- On-site inspection and testing
- Insulation testing
- Fluid/oil analysis and condition trending
- Insulating fluid/oil reconditioning
- Failure/fault analysis
- Tap changer repair/replacement
- Leak repairs
- Gasket/bushing repair
- Substation grounding
- Cooling upgrades
- Emergency services 24x7

Turnkey Installation

Vertiv provides complete turnkey installation, replacement, upgrades, removal, and disposal of your electrical equipment. Our technical staff will provide complete design, installation, commissioning, and maintenance services for most transformers and related equipment.

Commissioning and Startup

The successful operation of a transformer is dependent on proper design, installation and startup. Our services will verify that equipment has been properly installed to ensure reliable operation. Highly qualified personnel will use technologies and tests including the following:

Function Testing of Protection Controls
Testing is performed to ensure all protective devices are operating within normal specifications.

Insulation Power Factor Testing
Used to measure dielectric losses, insulation power factor testing determines the overall insulation condition of the windings, barriers, tap changers, bushings, and oil.

Transformer Turns Ratio Testing
This testing measures the turns ratio of the transformer on the primary and secondary coils. It also verifies the actual voltage matches the specified voltage ratio from the initial design.

Insulation Resistance Testing
By applying voltage to the dielectric barrier and measuring against specifications, this testing verifies insulation integrity and proper installation.

Winding Resistance Testing
This type of testing ensures correct connections and that there are no severe mismatches or open connections.

Frequency Response Analysis
Frequency response analysis compares input voltages to output voltages in order to determine whether there is any damage to the transformer windings that may have occured during shipment or installation.

Preventive Maintenance

The ongoing efficiency of electrical systems requires proper analysis, interpretation, and service recommendations. Experienced Vertiv field technicians provide complete preventive maintenance testing services to ensure the reliable operation of new and existing transformers. Using the same technologies and techniques previously described, our experienced technicians will compare results against baseline measurements to determine overall transformer health.

Online Predictive Maintenance

Our online predictive maintenance services can be performed while your system remains energized, eliminating costly shutdowns. By performing the following services, we can help you identify when a failure may occur so you can plan an outage instead of dealing with an emergency:

Visual Inspections
Using visual inspections as part of your predictive maintenance program allows you to check cleanliness, as well as cracked insulators and bushings, condition of paint, oil levels, oil leaks, oil/winding temperature gauges, nitrogen pressures, relay targets, and condition of grounds.

Infrared Testing
Identifying precursors to failure is possible with infrared testing that detects heat buildup, loose connections, and defective surge arrestors.

Ultrasonic Detection
This type of testing identifies excessive corona which produces radio-frequency interference and may cause an insulator, bushing, or surge arrester to fail.

The key to eliminating unscheduled outages is proactive testing and maintenance. Information accumulated through routine inspections and periodic testing will usually provide warning of impending service problems. Recognizing the warnings of an impending failure requires careful analysis of the records to identify significant trends or unusual behavior.

Nitrogen Gas Tests

Two tests are performed on nitrogen gas blanketed transformers. After gas samples are taken, the Percent Total Combustible Gas (TCG) test is conducted to identify gas in the oil, often caused by hot spots or overloading. The Percent Oxygen test is also performed to identify high oxygen content in the transformer, which may indicate a "wet" atmosphere. This oxygen also accelerates the deterioration of oil.

Oil Analysis

Oil analysis is used to identify the properties essential to transformer oils and provides a more accurate assessment of their condition.

Partial Discharge Testing

Performed while equipment is online or offline, partial discharge testing is a reliable indicator of insulation quality, and its impact on overall transformer health and performance. It allows asset managers to prioritize capital, as well as maintenance, repair, operation (MRO) investments before an unexpected outage occurs.

Fluid/Oil Processing

Fluids and oils circulate in large power transformers to insulate them from high voltage stresses. They contaminate easily due to leaky seals and corrosion. Increased reliability and performance can result from a rigorous preventive maintenance program that purifies and filters these fluids over the life of the equipment. Advanced mobile oil processing equipment provides vacuum, filtration, degasification, and dehydration of fluids/oils to restore optimum dielectric strength, viscosity, and insulation characteristics.

Oil Analysis

When transformer oil deteriorates, sludge ultimately forms and coats the windings resulting in decreased cooling capacity and degradation of the solid insulation system. Proper oil analysis is critical in determining the operating efficiency of a transformer. Sample testing includes the following:

- Dielectric strength
- Acidity
- Interfacial tension
- Color
- Sediment
- Dissolved gas analysis
- Dissolved water in oil analysis
- Power factor analysis
- Oxygen inhibitor analysis
- Furan analysis

Emergency Services

To assist you in resolving emergency situations, Vertiv™ offers 24x7 on-site emergency service within specified service areas. Rely on us for critical emergency needs including:

- Transformer leak repair
- Complete transformer gasket replacement
- Spill cleanup/recovery
- Fault analysis

Summary

Large power transformers are some of the most reliable assets used in electrical power systems. Even so, they can and do fail. Transformer failure can cost you millions in lost production, income and customers.

Partnering with Vertiv™ gives you access to some of the industry's most skilled electrical testing, maintenance, and engineering experts. By relying on their knowledge during regular transformer testing and maintenance, you can uncover developing problems before they escalate. It's this proactive service or repair of your critical electrical assets that supports system reliability and business continuity.

Ordering Information

To learn more about this service and other Vertiv solutions, please contact your local sales representative office for Vertiv's Electrical Reliability Services or visit VertivCo.com. In the United States, call 1-877-468-6384.