



Transformer Maintenance Training - Testing and Diagnostics

[View Course Details](#)

COURSE DATES AND TIMES

February 2-3 , 2026

10:00 am - 4:30 pm ET

November 2-3 , 2026

10:00 am - 4:30 pm ET

Transformer Maintenance Training Overview

This course is ideal for technicians and engineers who need a sound understanding of power transformer operation and maintenance. The course covers transformers used in industrial power distribution systems. Larger power transformers used in utility applications are also covered. The course concludes with in-depth discussions on transformer testing techniques.

Transformer Maintenance Training provides a comprehensive foundation in the inspection, testing, diagnostics, and maintenance of oil-filled and dry-type power transformers used in industrial and utility environments. This course is designed for electrical technicians, engineers, maintenance personnel, and safety professionals responsible for transformer reliability, performance, and lifecycle management.

Participants learn how transformer design, construction, and operating conditions influence maintenance requirements and long-term reliability. The training explores core maintenance tasks alongside diagnostic testing methods used to assess insulation condition, oil quality, tap-changer performance, cooling systems, and transformer health. Emphasis is placed on identifying early warning signs of deterioration and preventing failures before they result in outages or equipment damage.

The course covers practical testing techniques such as insulation resistance, winding resistance, transformer ratio testing, and oil diagnostics—including dissolved gas analysis—along with interpretation of test results and common fault patterns. Participants

also gain insight into preventive and condition-based maintenance strategies that extend transformer life and support safe, cost-effective operation.

By the end of this training, participants will understand how to plan, execute, and document transformer maintenance activities that improve reliability, enhance safety, and align with industry best practices for industrial power systems and utility infrastructure.

Learn the Following Transformer Maintenance Testing Procedures

- WINDING RESISTANCE
- TRANSFORMER RATIO/POLARITY
- EXCITATION CURRENT MEASUREMENT
- SHORT CIRCUIT IMPEDANCE MEASUREMENT
- SWEEP FREQUENCY RESPONSE ANALYSIS
- INSULATION RESISTANCE
- INSULATION CAPACITANCE AND POWER FACTOR
- PARTIAL DISCHARGE MEASUREMENT
- TRANSFORMER CORE TESTING
- INSULATING OIL
- BUSHING VISUAL CHECK
- TAP CHANGERS Maintenance
- TRANSFORMER TANK INSPECTIONS

Learning Outcomes

- Students will learn the causes of failures and how to assess the risk of failures.
- Develop or improve a risk-based asset management program for your company.
- Assess and implement maintenance practices to prevent unplanned outages.
- Understand test results and perform an analysis of your company's electrical system to improve operating conditions.
- Students will be able to perform a transformer assessment to determine the condition and risk of their transformer investment.
- Testing Dry Type Power Transformers
- Testing Oil-Cooled Power Transformers

WHO SHOULD ATTEND

- Electrical maintenance technicians and electricians
- Electrical and power engineers
- Utility and substation personnel
- Industrial maintenance and reliability professionals
- Field service and testing technicians
- Maintenance supervisors and managers

- Safety and compliance personnel
- Facility and plant engineers

STUDENTS RECEIVE

- This Course Includes Our Latest Electrical Transformer Digital Handbook!! (Value \$20)
- **\$100 Coupon** Toward Any Future Electricity Forum Event (Restrictions Apply)
- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- **FREE** Magazine Subscription (Value \$50.00)
- Course Materials In PDF Format

COURSE OUTLINE

Power Transformer Maintenance Training Course Outline

DAY ONE

Part 1. Risk Assessment & Asset Management

This presentation will show how to identify, assess and mitigate the risks associated with distribution and power transformers. Transformers and other electrical equipment are assets with ongoing maintenance needs or at risk of failure. The presentation will assist participants in developing an intelligent maintenance program that evaluates the risks and consequences of failure and prioritizes maintenance needs based on our data, industry standards, and best engineering practices.

- Learn how to develop or improve a risk-based asset management program.
- Identify categories of assets within an organization.
- Define risk-based asset management and why it is important in managing the life cycle.
- Perform an analysis of electrical system equipment with an emphasis on transformers.
- Identify the advantages of various maintenance programs and the benefits of online monitors.
- Students will learn the causes of failures and how to assess the risk of failures.
- Develop or improve a risk-based asset management program for your company.
- Assess and implement maintenance practices to prevent unplanned outages.
- Understand test results and perform an analysis of your company's electrical system to improve operating conditions.
- Students will be able to perform a transformer assessment to determine the condition and risk of your transformer investment.

Part 2. Introduction to Transformer Testing

- Solid Insulation
- Transformer Oil

- Testing Transformer Oil
- Moisture in Transformers
- Dissolved Gas Analysis
- Analysis for Furanic Compounds and Non-Routine Oil Tests
- Electrical Testing Principles
- Interpreting Oil Test Results and Maintenance Options
- RECLAMATION of Transformer Oil
- Advanced DGA Testing
- Practical Example of a DGA Assessment

Part 3. Increase Transformer Reliability and Life Cycle Through Proper Maintenance of Load Tap Changers

- Brief History of Load Tap Changing
- Basic Electrical Theory
- Components and Configurations
- Operating Principles
- Monitoring and Testing
- Internal Inspections and Maintenance
- Developing a Detailed Maintenance Program

Part 4. Dissolved Gas Analysis (DGA)

How dissolved gas analysis (DGA) results are interpreted – an important tool in the overall transformer maintenance program. Includes hands-on breakout groups. This session is intended to identify fault gases and the factors that cause their formation, and to explain and provide examples of qualitative and quantitative interpretations of dissolved gases. This class will also evaluate the condition of cellulose insulation and other non-routine tests, determine whether a transformer is at risk of failure due to the presence of corrosive sulphur, and mitigate the risk.

- Maintenance and Sampling Oil
- Introduction to Oil Testing
- Dissolved Gas Analysis
- Non-Routine Oil Analysis
- DGA Case Studies

Part 5. In-Service Inspection & Sampling of Fluid-Filled Transformers

Learn how to properly inspect and safely obtain fluid samples from energized electrical transformers. This session is designed for substation personnel whose responsibilities include sampling and monitoring the overall condition of fluid filled transformers.

- Safety
- Special Care Transformers
- Transformer Part & Visual Inspection
- Inspection Forms/Nameplates/Gauges
- Sampling Containers
- Proper Sampling

- Nitrogen Blanket
- Packaging
- Why Oil Test
- The importance of monitoring the insulation

DAY TWO

Transformer Field Diagnostics Tests and Techniques

Part 6. Transformer Field Diagnostic Testing and Maintenance Techniques

WINDING RESISTANCE

- Testing techniques
- Voltmeter – Ammeter method
- Bridge technique
- Micro ohmmeter

TRANSFORMER RATIO/POLARITY

- Testing Techniques
- Inductive kick (DC method) polarity
- Alternative voltage (AC method) polarity
- Turn ratio test set
- Double voltage meters

EXCITATION CURRENT MEASUREMENT

- Hysteresis
- Eddy currents
- Copper losses

SHORT CIRCUIT IMPEDANCE MEASUREMENT

- Testing techniques
- Voltmeter – Ammeter method

SWEEP FREQUENCY RESPONSE ANALYSIS

- Testing techniques
- Problems detected
- Shifted winding/core

- Deformed windings
- Loose windings

INSULATION RESISTANCE

- Testing techniques
- Megger
- Polarization index test (PI)
- Can detect the following problems
- Insulation dryness
- Insulation contamination
- Sensitive to temperature

INSULATION CAPACITANCE AND POWER FACTOR

- Testing techniques
- Capacitance bridge method – DF
- AC Dielectric loss method - PF

PARTIAL DISCHARGE MEASUREMENT

- Can detect the following problems
- Insulation defects
- Insulation contamination
- Air bubbles trapped in insulation
- Localized high electrical stress
- PD is the "cancer" of insulation system
- PD detector
- RIV

TRANSFORMER CORE TESTING

- Problems
- Insulation resistance
- More grounding points
- Megger
- Separate external core ground lead from 250 resistor
- Measure core

INSULATING OIL

- Sulphur in transformer oil solutions
- Resolving moisture in transformer oil
- Proposed federal PCB transformer regulations
- Transformer on-line oil monitoring techniques

- Various tests performed on insulating oil
- Properties and parameters of insulating
- Why oil sample?
- Dielectric breakdown
- Water content
- Power factor
- DGA "key" fault gasses
- Benchmarks
- Rating system

BUSHING VISUAL CHECK

- Oil Level
- Leaking
- Chipped porcelain
- Fractured flange
- Poor gaskets
- Peeled painting
- Terminal connection
- Corrosion

TAP CHANGERS

- DETC
- Contact resistance increase
- Loose contact pressure
- Misalignment
- Electrical and mechanical centers
- LTC
- Contact continuity
- Arcing switch and tap selector
- Drive mechanism operation
- Motor
- Timing
- Oil compartment
- Protection and control

TRANSFORMER TANK

- Visual check
- Oil leaking
- Poor gaskets
- Peeled painting
- Rust/corrosion
- Temperature hot spot

COMPONENTS AND ACCESSORIES

- Visual check and function test
- Cooling system – radiators, fans or pumps
- Gauges and indicators – oil level, pressure and temperature
- Pressure relief device
- Gas relay
- Air breather
- Inert air system
- Oil filters

INFRARED TEMPERATURE MEASUREMENT

Review of expectations

Questions and Answers

COURSE SCHEDULE:

Both days:

Start: 10 a.m. Eastern Time

Finish: 4:30 p.m. Eastern Time

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