DOBLE TRAINING & EDUCATION COURSES

Transformer Fundamentals

Overview:

This interactive 3-day course combines theoretical background with practical field experience to provide engineers, managers and technicians with fundamental knowledge regarding how transformers are designed and manufactured, major transformer components, installation and commissioning, in-service and off-line electrical testing and insulating oil laboratory diagnostic testing. Doble specialists will train you to review test results so that they are clear and easy to understand. Doble encourages participants to bring their unique real-world problems for discussion.

Learn from Doble's collection experience from working with 1000's of transmission, distribution, generation and industrial clients globally.

Learning Outcomes:

Upon completion of this course, the participant will be able to:

- Understand transformer design and manufacturing process.
- Learn about major transformer components such as insulating material, bushings, cooling systems, tap changers and controls.
- Understand when to perform specific electrical off-line routine tests, off-line diagnostic tests and in-service diagnostic tests (factory acceptance, transportation, installation and over asset life-cycle).
- Establish benchmark results to significantly increase diagnostic value of future tests.
- Understand how to determine the condition of electrical apparatus using laboratory tests.
- Learn how to take oil samples, avoid common pitfalls and save time and money by sampling only once.
- Correlate electrical test result with insulating test results.
- Interpret test results, case studies and numerous field examples.

Course Audience:

Electrical engineers, managers and technicians working in operations, maintenance, engineering, or other service field in which knowledge of diagnostic testing methods and evaluation is required part of job responsibility.

Duration:

Three Days

Class Size:

8 - 15 Attendees

Credits:

Up to 2.4 CEUs or 24 Professional Development Hours

COURSE OUTLINE

Transformer Fundamentals

The course program contains the following training outline:

Day 1

- Transformer Fundamentals
- Transformer Design
- Transformer Manufacturing
- Factory Acceptance Testing
- Major Components
    - o Insulating Materials
    - o Bushings
    - o Cooling Systems
    - o Tap Changers
    - o Controls

Day 2

- Dielectric Theory & Application
- Safety During Testing
- Off-line Electrical Testing
    - o Bushing Testing
    - o Power Factor & Capacitance Measurements
    - o Turns Ratio
    - o Leakage Reactance
    - o SFRA
- Interactive Case Studies

Day 3

- Insulating Fluid Basics and How to Take a Proper Oil Sample
- Dissolved Gases in Oil
- Explosive Gas Concentrations
- Oil Quality
- Water in Oil
- Aging Characteristics of Cellulosic Insulating Materials
- Interactive Case Studies

Presenter(s):

Experienced Doble Client Service Engineer, Technical Application Engineer and/or Laboratory Specialist

Division of Responsibilities:

If the course is hosted at a customer location, to ensure smooth training course delivery, Doble requests the following division of responsibilities:

Doble will provide:

- Confirmed training dates upon receipt of a purchase order.
- Technical agenda for program.
- One experienced instructor including their travel/living expenses.
- Training manual (soft copy) to each participant.
- If applicable, all required measurement test equipment and tools for class and site training.
- All personnel safety equipment for Doble instructor.

Customer will provide:

- Confirmed training schedule at least 60 days in advance.
- Training coordinator through whom all contractor requests will be coordinated.
- Training facility, AV equipment, whiteboard and pens.
- Printing hard copy training material as required.
- If applicable, site access for any areas of the program outlined above for practical on-site training. Responsible for all safety issues before, during, and after the field demonstration.