TRANSFORMER TESTING & MAINTENANCE

MAESTRO CONSULTANTS

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TRAINING TITLE

TRANSFORMER TESTING & MAINTENANCE

VENUE

Dubai, UAE

DURATION

5 Days

DATES

07 - 11 November 2021

PRICE

US$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.

TRAINING INTRODUCTION

Electrical Transformer Basics discusses how units are used to reduce voltage for various day-to-day electrical applications. More than 50 million electrical distribution transformers are located on different fields covering oil and gas fields, Electrical Distribution utilities…etc. Electrical Transformers serve the crucial function of transforming voltage potential to a higher or lower value to meet the appliances and machinery voltage level requirements. Improper use, maintenance and neglect can cause heavy losses to businesses as well as to the environment. This electrical transformer training course introduces basic safe operational and field diagnostics of transformers with the focus on safe operation, testing and preventive maintenance of the distribution transformers normally installed in substations and on poles.

Attendees will learn Electrical Transformer Basics – safe, types, maintenance and testing procedures on power transformers. The course covers transformers used in commercial and industrial power distribution systems, including oil and dry-type units. Larger power transformers used in utility applications are also covered.

TRAINING OBJECTIVES

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

- Understand the basic theory, operation of a transformer.

- Transformer types, applications, components, indicators, nameplate data and safety procedures.
- Understand turns ratios and calculate terminal voltage and current.
- Understand terminal markings and various single phases and three phase wiring schemes. (WYE vs. DELTA) as well as on /off load tap changer.
- Understand how to perform a polarity test on a potential transformer.
- Different protection system
- Power Transformer Sizing Approach
- Understand the electrical testing methods performed on transformers such as insulation resistance testing, excitation and power factor testing.
- Understand the various tests performed on insulating oil.
- Applicable safety & Precautions procedures
- Understand how to Perform visual and mechanical inspections
- Understand how to perform AC and DC testing including insulation resistance, winding resistance and transformer turns ratio (TTR)
- Different maintenance philosophies applied covering Visual and diagnostic inspections with trouble shooting

TRAINING AUDIENCE

Field and shop technicians, field engineers, supervisors and others responsible for the testing and maintenance of power & Distribution transformers

TRAINING OUTLINE

Day-1

1.1. Transformers Basic Theory

- Introduction
- Transformer common features
- Electromagnetic Induction
- Faradays low and conducting loop
- Sinsousidal excitation
- Hysteresis Losses
- Transformer and inductance
- The ideal transformer

1.2. Transformers main Component & Functions

- Windings
- Tanks
- Core

Day-2

1.1. Selection of transformers

- Single phase load
  - Determination of the electrical loads
  - Determination of the Supply voltage
  - Single phase example
- Three phase load
  - Determination of the electrical loads
  - Determination of the Supply voltage
  - three phase example

1.2. Transformer types

- Distribution transformers
  - ANSI Liquid filled
  - Unit and substations transformers
  - Pad Mounted transformers
- Single and three phases
- Power transformers ;large , medium and small transformers
- Voltage Transformer (VT) and current transformers (CT's)

Day-3

1.3. General Consideration of the transformers

- Transformer service and operating condition
- Cooling methods for the transformer
- Older class type of transformer cooling
- New class of cooling and cross reference with old type
- Example

1.4. on /off Load taps changers (LTC's)

- components and operation for off load tap changer
- components, power and control operation for on load tap changer
- tapping range

1.5. Name plate data & verification

- Frequency
- Phase
- Class

- Insulating Medium
- Voltage Ratings
- Temperature Rise
- kVA Capacity
- Fluid Capacities
- Impedance
- Basic Impulse Level (BIL)
- Weights
- Connection Diagram
- Vector Diagram
- Tap Changer Voltage Charts
- Liquid Level
- Vacuum Filling
- Operating Pressure
- Instrument Transformers
- Special Notes and Warnings

1.6. Connections of three phase transformers

- Polarity and angular displacement
- Y – Y, Δ – Δ , Y – Δ and Δ – Y connections
- Phase shifting
- Connections and Vector groups
- Example for transformer designation

1.7. Paralleling transformers

- Condition for parallel operation of transformers
- Example

Day-4

1.8. Accessories & Protective Devices

- Double Float Buchholz relay
- Dial Type Contact Thermometer
- Magnetic oil –Level Indicator
- Protective devices for hermetically sealed transformers
- Pressure Relief device
- Dehydrating Breather
- Bushing Current transformer
- Additional accessories
- Protective relaying

1.9. General diagnostic and Testing

- Insulation Resistance and Polarization Index
- Turns Ratio and Excitation Current
- Winding Resistance
- Voltage Measurement
- Frequency Response Analysis
- Interpretation of test results

Day-5

1.10. Preventive Maintenance Instructions For Power Transformer

- Preventative Maintenance Programme
- Periodic Inspection
- Making Transformer Inspections
- Transformer Liquids
- Dielectric test
- General Testing
- Electrical Tests
- Disassembly and Inspection

1.11. Failure Investigation, Documentation & Analysis

- Terminology
- Failure
- Cases of transformer failure
- Lesson learned
- Internal Faults
- External Faults
- Insulation Damage
- Component Failures
- Transformer failure statistics

1.12. Online monitoring

- Oil Quality Analysis
- Dissolved Gas Analysis

1.13. Open session for questions, answers and case studies

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations.
The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.