



Electrical Switchgear & Power Transformer Testing

Course Introduction:

This will provide you with practical knowledge (including tips, tricks and tools) covering the fundamentals of power transformers and switchgear. Due the critical importance of Switchgear in electricity distribution and how its performance significantly affects the overall performance of the system and failure efficiently disconnect faults elsewhere in the network or failure in switchgear itself is costly, resulting in additional loss of supply, damage equipment and possibly fatal injury personnel. It is therefore critically important that switchgear is operated and maintained correctly, within an overall asset management regime that is both economic and effective in securing a high level of system reliability. At the end of this workshop, participants will be familiar with the importance of transformer and switchgear inspection, installation and maintenance.

Course Objectives:

Upon the successful completion of this course, each participants will be able to:

- Apply and gain in-depth knowledge on MV & LV switchgears and transformers and explain switchgear in a network context as well as its perspective
- Discuss the switchgear details such as ratings, degree of protection, service conditions and ancillary equipment
- Identify the switchgear asset management, tripping devices, maintenance and testing and various switchgear diagnostic techniques
- List and employ the different types of circuit breaker techniques and determine the switchgear vital equipments including batteries condition and monitoring
- Acquire knowledge on the components, construction and operation of power transformer and its controls
- Identify the features and functions of instrument transformers
- Define substation maintenance techniques and be familiar with their description, structures, features and functions
- Recognize and apply the switchgear maintenance practices and review and improve maintenance and repair procedures

Who Should Attend?

This course provides an overview of all significant aspects and consideration of switchgear and transformer for engineers and other technical staff who need a sound understanding of low and medium voltage switchgear and transformer inspection, maintenance and repair.

Course Outline:

Transformers and Applications

- To understand the different types of transformer construction and components
 - Principle and functionalities of a basic transformer
 - Construction of a transformer
 - Transformation ratio, turns ratio, voltage and current relationships
 - Ratings and losses in a transformer
 - Voltage/potential transformer applications
 - Current transformer applications
 - Auto transformer applications
 - Distribution transformer applications
 - Power transformer applications
 - Three phase transformer winding connections and applications
 - Transformer cooling systems and index
 - Typical large power distribution transformer, construction and functionalities of each component, dielectric strength mineral oil test, and insulation resistance test for LV and HV and maintenance.
 - Relevant safety requirements and precautions

Electrical Switching for Medium Voltage and High Voltage Installation

- To understand MV/HV electrical components for electrical switching, testing and protection requirements.
 - Medium voltage and High voltage and system components with reference to the types of cable used, circuit breakers, transformers, instrument transformers, power capacitor, surge arresters, switchgears, protection and control devices
 - Electrical switching procedures for medium voltage and high voltage switchboard, switchgear and isolator switch
 - The Six-Step safety method for works at electrical switching
 - Safe switching of medium voltage and high voltage power system as to when to de-energize, operation of MV and HV switchgear, closed door operation
 - Lockout and tagout
 - When to use locks and tags
 - Locks without tags or tags without locks
 - Rules governing use of locks and tags
 - Removal of locks and tags
 - Risk management
 - Relevant safety requirements and precautions

Low Voltage Main Switchboard Requirements and Testing

- To understand the types of LV main switchboard, and the functionalities of each component associated with the LV main switchboard.

- Types of switchboard assemblies
- Detail requirements for LV switchboard
- Single line diagram of a LV switchboard
- Overcurrent protective devices, fuses, MCB and MCCB
- Protective relays, earth fault relay and over current relay
- Current transformers for metering , measuring and protecting
- Switching and isolation
- Overload protection devices, time current characteristics
- Protecting conductors
- Prospective short circuit current and operating time
- Testing and commissioning of LV switchboards, primary injection test and secondary injection test
- Instrumentation and test equipments
- Relevant safety requirements and precautions

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course locations. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session

