



Training Program:

**Testing, Commissioning & Maintenance Of Electrical
Systems**

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Introduction:

This course provides an understanding of the role of commissioning in a project of any size. Emphasis will be on the importance of project planning and preparation, from engineering to commissioning and start up. This course deals with safety considerations in maintenance and testing procedures for all electrical system components. It also discusses field testing of major components of an electrical system, including motors, generators, transformers, switchgear, protection and control, UPS and battery systems.

Main topics of the course are:

- AC & DC voltage testing techniques
- Motors & generators
- Transformers & switchgear
- Cables & accessories
- Battery system & protective relay system
- Power distribution system maintenance
- Grounding, ground resistance measurement
- Harmonics & predictive maintenance
- Electrical safety

Who Should Attend?

Electrical Engineers, Electrical Technicians, Electrical Inspectors, Electrical Professionals & Supervisors, Instrumentation and Design Engineers, Maintenance Engineers, Supervisors & Technicians, Energy Management Consultants, Control Engineers & Technicians, Automation & Process Engineers, Chemical & Mechanical Engineers, Consulting Engineers, Field Technicians, Graduate Engineers, Project and Production Managers, Project Engineers, Electronic Technicians, Plant Managers, Process Control Engineers, System Engineers, System Integrators, Testing Engineers & Technicians, Power System Engineers, Power System Technicians, Utility Engineers, Managers & Team Leaders of Engineering Departments, Safety Professionals, Plant Electricians, Facilities Engineers, Operations & Maintenance Engineers, Supervisors & Technicians, Project Engineers, Commissioning & Testing Engineers, Consulting Engineers, Electrical Technologists, Facility & Plant Managers

Training Objectives:

At the end of this course, participants will be able to:

- Describe how to plan and implement electrical system commissioning
- Pick out field tests for electrical distribution systems
- Select among corrective and preventive maintenance for electric power distribution systems
- Explain the AC and DC testing of electrical equipment
- Specify the handover, acceptance and transition to operations

Accreditation:

BTS attendance certificate will be issued to all attendees completing a minimum of 80% of the total course duration.

Daily Agenda:

Overview of Field Test Requirements

- Development of test regime
- Outline of typical tests
- Interpretation of test results
- Troubleshooting

Basic Electrical Theory

- DC circuits basics
- AC circuit laws
- Impedance and power factor
- Bridge methods

DC Voltage Testing Techniques

- Insulation resistance tests

- Step voltage and high voltage tests
- Testing power factor correcting capacitors

AC Voltage Testing Techniques

- Power factor and dissipation factor tests
- AC high potential test
- Safety precautions

Testing of Motors and Generators

- Insulation resistance
- High potential test
- Power factor test
- Dissipation factor
- Voltage surge comparison testing

Transformers

- Polarity, terminal markings and connections
- Dry type transformers: inspection, and acceptance tests
- Liquid type transformer: inspection, and acceptance tests

- Routine testing: AC high potential testing, TTR test, polarity test, induced potential test, polarization recovery voltage test, and DC winding resistance tests

Switchgear

- Insulation resistance measurement test
- DC or AC high potential testing
- Power factor or dielectric loss test
- Circuit breaker contact resistance test

Cables and Accessories

- Insulation resistance measurement test
- DC over potential testing
- Voltage versus leakage current
- Power factor test
- Cable fault locating

Battery System

- Tests for acceptance
- Performance
- Service

- Connection resistance
- Impedance tests

Protective Relay Systems

- Testing instrument transformers and protective relays
- Power Distribution System Maintenance
- Types of maintenance (corrective, preventive and predictive)
- Canadian Code requirements

Power System Grounding and Ground Resistance Measurement

- Solidly grounded, ungrounded and resistance grounded systems
- Grounding electrodes
- Factors affecting soil resistivity
- Methods of ground resistance measurement

Power Quality, Harmonics and Predictive Maintenance

- Effects of harmonics on equipment
- Power quality measurement

Electrical Safety, Arc flash Hazard, Switching Practices and Precautions

- Lock out and tag out
- Personal protective equipment

- Safety grounds

Overview of Commissioning

- Terminology
- Objectives
- Specifications
- Development of procedures, forms and documentation
- Interpretation of results