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Electrical Commissioning In Industrial Power Systems

View Course Details

COURSE DATES AND TIMES

Electrical commissioning is one of the most critical phases of any power project. Incomplete testing, poor coordination, or inadequate planning during commissioning can delay startup, damage equipment, and introduce serious safety risks.

This training program explains the commissioning process from system documentation and protection studies through equipment testing, troubleshooting, startup procedures, and final system acceptance.

Participants learn how electrical commissioning integrates engineering design, testing, troubleshooting, and system verification to ensure power systems operate safely and reliably during first energization.

Why Electrical Commissioning Matters

Electrical commissioning verifies that electrical equipment and systems operate correctly before they are placed into service. During this phase, engineers and technicians confirm that equipment has been installed properly, protection systems operate as intended, and electrical systems can safely carry load.

Proper commissioning reduces the risk of equipment failure, startup delays, and safety incidents. It also ensures that electrical systems meet design specifications and perform reliably once energized.

Standards and Practices Referenced

• ANSI/NETA Acceptance Testing Specifications (ATS)
• ANSI/NETA Electrical Commissioning Specifications (ECS)

• IEEE electrical equipment testing guides
• NFPA electrical safety standards

Electrical Equipment Covered During Commissioning

The course explains commissioning procedures for a wide range of electrical equipment, including:

• Power transformers
• Switchgear and circuit breakers
• Instrument transformers and relays
• Motors and variable frequency drives (VFDs)
• Protection and control systems
• PLC and SCADA systems
• Substation equipment and grounding systems

Practical Electrical Commissioning Knowledge

Electrical commissioning requires coordination between engineering design, equipment testing, and operational readiness. This course provides practical knowledge that helps engineers and technicians safely energize electrical systems and ensure reliable power system operation from the first startup.

WHO SHOULD ATTEND

THIS COURSE IS IDEAL FOR:

This course is a must for electrical engineers, electrical maintenance personnel, plant electricians, electrical contractors, power specialists, maintenance managers, consultants and technologists responsible for the design, construction, installation, inspection, operation, or maintenance of electrical systems, electrical technicians, inspectors, safety personnel and other employees responsible for the operation and maintenance of electrical systems in a commercial, industrial, institutional setting.

- Industrial, Commercial, Institutional Electrical Industry Engineering and Maintenance Personnel
- Electrical Engineers
- Plant Electricians
- Qualified Electrical Workers
- Instrumentation Mechanics
- Electrical Technicians

STUDENTS RECEIVE

- Electrical Commissioning Course Certificate

- 1.2 CEU Credits (12 Professional Development Hours)
- 100+Page Electrical Maintenance Handbook
- A FREE Dgital Electricity Today T&D Magazine Subscription
- $100 Coupon Toward Any Future Electricity Forum Event (Restrictions Apply)
- Course Materials In Paper Format

COURSE OUTLINE

DAY ONE

Electrical System Documentation

- IEEE Device numbers
- Drawing Symbols
- Single lines drawings
- 3 line drawings
- AC/DC Trip & Control Schematics
- Electrical Wiring Diagrams & Connection Wiring Diagrams
- General System Design, Lay-out and Drawings
- Protection Relay Setting Sheets
- Manufacturer Manuals
- Warranty

Analysis and Design of Electrical Systems

- Time-Current Characteristics
- Ground Fault Systems
- Coordination studies
- Short Circuit Studies
- ARC Flash Calculation
- Dynamic Load Study –Motor starting
- Unbalance Load Study

Testing Procedures

- 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
- Power Transformer On Power and Off Power Testing
- Power Transformer Oil Testing

Electrical Safety Requirements during System installation and Equipment Maintenance

- Construction Site Considerations
- Safety during a start up project
- Temporary generators and construction power
- Personal Protective Equipment Voltage Detection

Equipment, Hot-sticks, Grounds

- Temporary Grounds
- Interlocking
- Tagging and Permits
- Qualified Electrical Personnel
- Roles and duty of Authorizing Personnel

Commissioning Electric Power Systems

- Management of Start Up & Commissioning Projects
- Turnover Packages
- Terminology
- Objectives
- Specifications
- Documentation
- Drawing control, field mark ups and“as built”

- Test sheet document control
- Keeping track of completed tasks
- Deficiency tracking

DAY TWO

Commissioning Electric Power Systems

Large Area System Commissioning

- Ensuring the system is working completely
- Using electrical drawings & flow-sheets
- Sensing Devices
- Isolating devices and isolating points

Transformer Commissioning

- General Construction, Operation & Safety
- Field Assembly and Vacuum Filling of Power Transformers
- Handling Transformer Oil, Tap-changers
- Transformer Protective Devices, Bushings, auxiliary devices alarms & trips
- Dry type transformers: inspection, acceptance tests
- Liquid type transformer: inspection, and acceptance tests
- Routine transformer tests: AC high potential testing, polarity test, induced potential test, polarization index test, and DC winding resistance tests
- Transformer Oil test, On Power and Off Power Expectation.

Circuit Breaker and Switchgear Commissioning

- General Construction, Operation & Safety
- Metal Clad Switchgear construction and safety features
- Commissioning Switchgear
- 600V Breaker construction and safety features

- Capacitors
- Current Transformers
- Instrument Transformers, Test switches, Metering and

Relaying Devices

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

Commissioning Control Systems and Instrumentation

- Field devices
- Input and outputs
- Program verification
- Power up and start-up
- Sensors
- PLC and PAC Based Systems
- Distributed Control Systems
- SCADA

Commissioning Motors and Drive Systems

- Motor checks and testing
- Wiring & cable Run
- VFD checkout and start-up
- Filters
- Servo Systems

Substation Equipment Commissioning

- Ground Grid Design, Grounding (Step & Touch Potentials, Earth Resistivity, Bonding Resistance)
- Testing ground grids and soil resistivity
- High voltage towers and switches
- Outdoor SF6 Breakers
- Other Breaker Types
- Other Substation Equipment

Plant Start Up Procedures

- Pre-energization checklists
- First energization procedures
- Phase rotation and other measured system parameter
- Systems and their integration
- Energizing sequence
- Safety considerations
- Load checks
- Documentation
- Correction of defects
- Spare parts
- Final acceptance

4:00 pm -- Day 2 Wrap Up

- Review Quiz
- Questions and Discussions