HAZARDOUS LOCATION ELECTRICAL SYSTEMS WITH GROUNDING & BONDING WORKSHOP

Learn strong grounding and bonding fundamentals and performance requirements essential for electrical installation, design and inspection, while maintaining the highest level of electrical safety for persons and property.

Learn about grounding requirements as they relate to Article 250 and other articles of the National Electrical Code® (NEC). Installation, testing and inspection procedures for industrial, commercial, institutional and residential power systems are covered. Learn the rules to minimize the risk of electricity as a source of electric shock, and as an ignition source of fires and explosions. Also learn about design issues, proper grounding and bonding, safe wiring methods and maintenance techniques.

Articles 500 through 504, and 510 through 513 provide classification and installation standards for the use of electrical equipment in the three classified hazardous locations: type, condition and nature.

CLASS FORMAT:

Classroom

STANDARD CLASS SIZE:

NTT recommends a class of no more than 35 participants to obtain the best results.

NTT TO PROVIDE:

- Four-days (32 contact hours) of on-site instruction
- Day 1 & 2—Hazardous Location Electrical Systems
- Day 3 & 4—Grounding and Bonding
- Textbooks
- Classroom consumables
- Completion certificates
- Shipping and instructor travel logistics

CLIENT PROVIDES:

- Classroom of 500 square feet or greater
- Projection screen, white board and/or flip chart(s)

WHO SHOULD ATTEND:

- Engineers
- Linemen
- Communications workers
- Safety personnel
- Inspectors

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COURSE AGENDA | DAY 1 & 2

FUNDAMENTALS OF GROUNDING (EARTHING) AND BONDING

WHEN TO GROUND (EARTH), WHEN NOT TO GROUNDS (EARTH)

GROUNDING (EARTHING) OF ELECTRICAL SYSTEMS

SEPARATELY DERIVED SYSTEM EQUIPMENT AND MAN BONDING JUMPERS

GROUNDING (EARTHING) ELECTRODES AND AN ELECTRODE SYSTEM

GROUNDING (EARTHING) ELECTRODE CONDUCTORS

BONDING ENCLOSURES AND EQUIPMENT

EQUIPMENT GROUNDING (BONDING CONDUCTORS)

ENCLOSURE AND EQUIPMENT GROUNDING (BONDING)

CLEARING GROUND (EARTH) FAULTS AND SHORT CIRCUITS

GROUNDING (EARTHING) SEPARATELY DERIVED SYSTEMS

GROUNDING (EARTHING) AT (FEEDER SUPPLIED)SEPARATE STRUCTURES

GROUND-FAULT PROTECTION FOR EQUIPMENT

GROUNDING (EARTHING) AND BONDING FOR HAZARDOUS LOCATIONS

LOW-VOLTAGE AND INTERSYSTEM GROUNDING (EARTHING) AND BONDING

GROUNDING (EARTHING) AND BONDING FOR OVER 600-VOLT SYSTEMS

GROUNDING (EARTHING) CATHODIC PROTECTION SYSTEMS

GROUNDING (EARTHING) AND LIGHTNING.CONSIDERATIONS

COURSE AGENDA | DAY 3 & 4

WHAT IS A CLASSIFIED LOCATION

- Classification of area locations—Class I, II, III
- Division and zone systems, IEC
- Groups within class, division and zone

RULES

- National Electrical Code and other related standards

HAZARDOUS TRIANGLE

- Air, fuel and ignition sources

COMPARISON OF DIFFERENT AREAS AND THEIR CLASSIFICATIONS

- Classification of area locations—Class I, II, III
- Multiple classifications

WIRING METHODS AND EQUIPMENT PROTECTION SYSTEMS

- General information
- Division and zone systems
- Conduits and cables

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HAZARDOUS LOCATION ELECTRICAL SYSTEMS WITH GROUNDING & BONDING WORKSHOP

- Seals
- Explosion and flame proof
- Intrinsically safe and nonincendive circuits
- Oil immersion, sealed, purged and pressurized systems

HAZARDOUS LOCATION IDENTIFICATION

- Determining the presence and quantity
  - Requirements for combustion
  - Vapor density
  - Flashpoint
  - Auto ignition temperatures
  - Upper and lower flammable limits
- Class, division and zones
- Gas groups

COURSE AGENDA | DAY 3 & 4, CONTINUED

- "T" codes
- Ingress protection and NEMA ratings
- Area classification diagram development
- Classroom exercises
  - Determine classified areas from drawings
  - Select proper equipment for hazardous area

DESIGNING TO AVOID ELECTRICAL EQUIPMENT IN CLASSIFIED AREAS

- Purged, pressurized and ventilated equipment and spaces, AEx "p"
- Symbols AEx, EEx and Ex
- Explosion proof and flame proof AEx "d"
- Increased safety AEx "e"
- Non-incendiary AEx "n", "nA", "nC" ,"nR"
- Intrinsically safe AEx "ia" and "ib"
- Dielectric filled or encapsulated AEx "m", "ma", "mb", "o" or "q"
- Equipment with special protection AEx "s"
- Combined or hybrid protection
- Understanding equipment markings

WIRING METHODS IN CLASSIFIED AREAS

- Conduit seals
- Wiring methods
  - Flexible cords and cables
  - Conduits and wire ways
- Equipment in class/division
  - Transformers and capacitors
  - Motors and generators
  - Light fixtures
  - Heaters
- Wiring methods in zone system
  - Disconnect requirements
  - Supports
  - Cable transits, multi-cable and parallel single conductors

BASIC REQUIREMENTS FOR ELECTRICAL INSTALLATIONS IN CLASSIFIED AND NON-CLASSIFIED AREAS

- Conductors
- Over-current devices
- Conductors operation temperatures
- Conductor and equipment for different applications
  - Armored, unarmored
  - Fire retarded, fire resistant
  - IS cables
- Equipment's ability to interrupt normal and fault currents
- Coordination of Over Current Protective Devices (OCPD) and other circuit components
- Termination requirements for temperature, clearances and voltage
- Mechanical execution of work
- Clearance requirements

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HAZARDOUS LOCATION ELECTRICAL SYSTEMS WITH GROUNDING & BONDING WORKSHOP

MAINTENANCE OF ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS

- Universal issues
  - Documentation
  - Inspections
  - Confined entry
- Local issues