

HAZARDOUS LOCATION ELECTRICAL SYSTEMS

CLASS FORMAT:

Classroom

STANDARD CLASS SIZE:

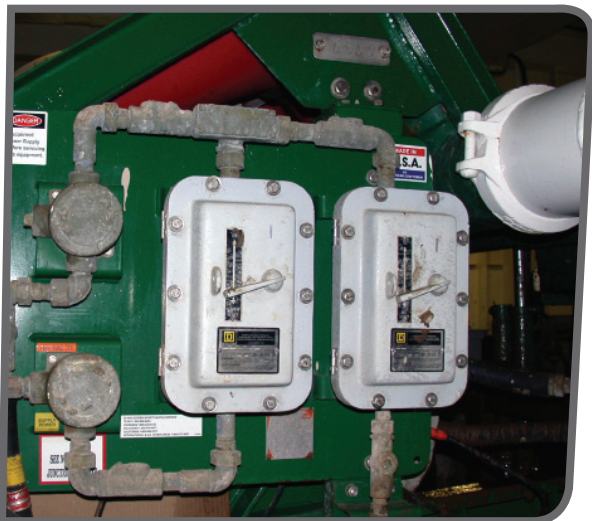
NTT recommends a class of no more than 35 participants to obtain the best results.

NTT PROVIDES:

- 2-day (16 contact hours) of on-site instruction
- 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)



Identify hazardous zones, learn codes, standards and certification requirements.

The National Electrical Code® (NEC) defines hazardous locations as those areas “where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings.”

Articles 500 through 504, and 510 through 517 provide classification and installation standards for the use of electrical equipment in the three classified hazardous locations: type, condition and nature.

Also learn about design issues, proper grounding and bonding, safe wiring methods and maintenance techniques.

COURSE AGENDA

INTRODUCTION AND GENERAL OVERVIEW

- Hazardous locations and areas

WHAT IS A CLASSIFIED LOCATION

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

RULES

- National Electrical Code and other related articles

HAZARDOUS TRIANGLE

- Air, fuel and ignition sources

GROUNDING AND BONDING

- Hazardous area
- Adjacent areas

CLASSIFICATION OF SPECIFIC PROCESSES AND SPECIFIC OCCUPANCIES

- Classify any area
- Normal and abnormal conditions

COMPARISON OF DIFFERENT AREAS AND THEIR CLASSIFICATIONS

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

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COURSE AGENDA, continued

WIRING METHODS AND EQUIPMENT PROTECTION SYSTEMS

- General information
- Specific information according to the class (I, II or III)
- Division and zone systems
- Conduits and cables
- Seals
- Explosion and flame proof
- Intrinsically safe and nonincendive circuits
- Oil immersion, sealed, purged and pressurized systems
- Labels

MAINTAINING AND INSPECTING FOR SAFETY

- Who requires maintenance
- Where do I find instructions

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

GROUNDING AND BONDING HAZARDOUS LOCATION EQUIPMENT CODES, STANDARDS, CERTIFICATION AND MARKING

- NFPA standards
- Nationally recognized testing labs
- European and IEC standards

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

WIRING METHODS IN CLASSIFIED AREAS, CONTINUED

- 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

- Circuits for imposed loads
- Conductors
- Over-current devices
- Conductors operation temperatures
- Conductor and equipment for different applications
 - Armored, unarmored
 - Fire retarded, fire resistant
 - IS cables
- Manufacturer's instructions.
- 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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COURSE AGENDA, continued

MAINTENANCE OF ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS

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

HANDS-ON EXERCISES THAT CAN BE ADDED TO COURSE:

- Cable and/or conduit penetrations between classified areas
- Proper pouring of seals
- Proper installation of cable glands for armored and un-armored cable