



Continuing education for electrical workers to ensure and electrically safe work environment and work practices

I. Course Title:

NEC Hazardous Locations installations (Grounding and Bonding)

II. Course Objective:

At the end of this class attendees will show increased knowledge and awareness of NFPA 70 (NEC) updates and current regulations, standards and industry best practices.

III. Course Drivers:

NFPA 70, 2015 NFPA 70B

IV. Course Outcomes:

- a. Increased understanding of NFPA 70 (NEC) Chapter 5
- b. Awareness of error-traps in grounding and bonding hazardous locations installations that create unsafe conditions
- c. Show proficiency in navigating the NEC for hazardous locations requirements
- d. Appropriate maintenance techniques for hazardous locations equipment
- e. Understand repair guidelines for hazardous locations equipment

V. Specific Learning Objectives:

- a. Understand what is a classified location
 - i. Classification of area locations—Class I, II, III
 - ii. Division and zone systems, IEC
 - iii. Groups within class, division and zone
 - b. Selecting appropriate wiring methods and equipment for hazardous General information
 - i. Division and zone systems
 - ii. Conduits and cables
 - iii. Seals
 - iv. Explosion and flame proof
 - v. Intrinsically safe and nonincendive circuits
 - vi. Oil immersion, sealed, purged and pressurized systems
 - c. Appropriately identifying hazardous locations
 - i. Determining the presence and quantity of the hazardous element
 - a. Requirements for combustion
 - b. Vapor density
 - c. Flashpoint
 - d. Auto ignition temperatures
 - e. Upper and lower flammable limits in Class, Division and Zones
 - ii. Gas groups
 - iii. “T” codes
 - iv. Ingress protection and NEMA ratings
 - d. Identifying hazardous equipment markings
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- i. Purged, pressurized and ventilated equipment and spaces, AEx “p”
- ii. Symbols AEx, EEx and Ex
- iii. Explosion proof and flame proof AEx “d”
- iv. Increased safety AEx “e”
- v. Non-incendiary AEx “n”, “nA”, “nC”, “nR”
- vi. Intrinsically safe AEx “ia” and “ib”
- vii. Dielectric filled or encapsulated AEx “m”, “ma”, “mb”, “o” or “q”
- viii. Equipment with special protection AEx “s”
- ix. Combined or hybrid protection
- x. Understanding equipment markings
- e. Choosing wiring methods in classified locations
 - i. Conduit seal boundaries
 - ii. Wiring methods
 - a. Flexible cords and cables
 - b. Conduits and wire ways
 - iii. Equipment in class/division
 - a. Transformers and capacitors
 - b. Motors and generators
 - c. Light fixtures
 - d. Heaters
 - iv. Wiring methods in zone system
 - a. Disconnect requirements
 - b. Supports
 - c. Cable transits, multi-cable and parallel single conductors
- f. Understanding basic requirements for classified and non-classified Conductors
 - i. Over-current devices
 - ii. Conductors operation temperatures
 - iii. Conductor and equipment for different applications
 - a. Armored, unarmored
 - b. Fire retarded, fire resistant
 - c. IS cables
 - iv. Termination requirements for temperature, clearances and voltage
 - v. Mechanical execution of work
 - vi. Clearance requirements
- g. Understanding maintenance techniques for equipment in hazardous locations Universal issues
 - i. Documentation
 - ii. Inspections
 - iii. Confined entry
- h. Classroom exercises
 - i. Determine classified areas from drawings

VI. Target Audience:

- a. Electricians
- b. Instrumentation technicians
- c. Electrical Engineers
- d. Operators of Electrical Systems



VII. Activity description

- a. Attendees show proficiency through class activities in navigating the NEC and achieving a minimum of 80% on the course subject quizzes and tests

VIII. Course Length:

Course can be tailored to meet client needs. Outcomes and Learning Objectives are not reduced while depth of class activity times are modified to meet time constraints

- a. 8 CEUs
Eight (8) hours of instructional time and activities within a single day
Updates to NFPA 70 (NEC) Chapter are emphasized
- b. 16 CEUs
Sixteen (16) hours of instructional time and activities over two consecutive days
Updates to NFPA 70 (NEC), Chapter 5, Article 250 and electrical installation, maintenance and safety are emphasized

NOTE: Check with your licensing agency for acceptance of LEE/WESS issued CEU's in your state