

MEDIUM AND HIGH VOLTAGE ELECTRICAL SAFETY

CLASS FORMAT:

Lecture

STANDARD CLASS SIZE:

NTT recommends a class of up to 35 participants to obtain the best results.

NTT PROVIDES:

- Three-days (24 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)

With Utilization of High Voltage

This course meets the safety training requirements for employees bound by OSHA rule 1910:331-335. Learn how current NFPA 70E standards apply to a facility, why safe electrical work practices are important, and what can be done to ensure your organization meets all government standards for electrical safety.

Electrical safety training provides you with the education needed to complete your job safely. Training is required for employees working with electricity and who face comparable risk of injury due to electric shock or other electrical hazards. The lack of proper training can be costly, and can result in damage to equipment and property. More importantly, proper training can reduce the risk of serious injury or loss of life.

OSHA's mandated training requirements apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements of 1910.302 through 1910.308. The rules also apply to utilization of electricity and are for any installation at any voltage in your facility, including high voltage.

THE DEFINITION OF A QUALIFIED PERSON FROM NFPA 70E:

A Qualified Person shall be trained and knowledgeable of the construction and operation of equipment or a specific work method, and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method. Such persons shall also be familiar with the proper use of the special precautionary techniques, personal protective equipment, including arc flash, insulating and shielding materials, insulated tools and test equipment. Such persons permitted to work within the Limited Approach Boundary of exposed live parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following:

- The skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- Approach distances and the corresponding voltages to which the Qualified Person will be exposed.



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- The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

COURSE AGENDA

HAZARDS OF ELECTRICITY

- Shock
 - Touch and step potential
 - Human body reactions to voltage levels
 - Shock magnitude scales
- Arc
 - Short circuits and ground faults conditions
 - Temperatures of the arc and the effects on bare exposed skin with the onset of a second degree burn
 - Required PPE
 - Fault current's direct relation to the size and magnitude of the arc
 - Short circuit current calculations
- Blast
 - Pressure wave effects on the face and chest cavity
 - Effects of pressures in the ear canal
 - Destruction of equipment from a blast

BOUNDARIES

- Shock Boundaries (at various voltage levels)
 - Limited, restricted prohibited
- Flash Boundaries
 - Engineering labels to determine the arc flash boundary
 - NFPA 70E tables
 - Calculation with mathematical formulas
 - How does fault current affect the boundary
 - What reduces the flash boundary
 - Who can be within an arc flash boundary

SELECTION AND USE OF SAFE WORK PRACTICES

- 3 options required by the employer to protect the worker
- Allowable options and infeasible options
- When can equipment be worked on hot
- Energized Electrical Work Permit
- Electrical safe work condition and LOTO
- Verification of the absence of voltage
- Use of locks and tags
- Authorized person vs. qualified person
- Conductive Objects and Apparel
 - Clearance to overhead or exposed conductors
 - Safe handling of conductive objects
 - Conductive jewelry and commutative devices

- Interlocks
- Portable Ladders
- Enclosed Spaces
 - Electrical components, protection of the worker
 - Equipment room protocol
 - Flammable vapors and liquids near electrical components and equipment
- Portable Tools and Equipment
 - Extension cords, GFCI protection for cords and tools
- Overcurrent Protective Devices
 - Short circuit current of a fuse
 - Types of fuses—rejection vs. non-rejection
 - RK type fuses function
 - Why a fuse blows—short, overload or fault
 - Proper handling, testing and replacement of fuses
- Circuit Breakers
 - Types and operation
 - What conditions cause a breaker to trip
 - SSC rating of breakers and clearing times
- Test Instruments and Tools
 - Who can use a test instrument and test meters
 - Standards and ratings of test instruments
 - Old style solenoid type vs. new Cat Rating type
 - Protection from transient voltage
 - Training requirements for test instruments
 - Documentation requirements for a qualified person
 - Voltage sensing devices, test meters & magic wands
 - Over voltage vs. transient voltage
 - Proper use and care of test instruments
 - Proper techniques in testing equipment for presence and absence of voltage
- Voltage Rated Tools and Equipment
 - Insulated vs. double insulated
 - How to recognize an insulated tool
 - Use and replacement
 - Hot sticks requirements
 - Grounding of equipment for personal protection
- Barricades and Guarding of Exposed Energized Electrical Equipment
- Selection of Shock Protection
 - Rubber glove identification, use, care and storage
 - Sizing for rubber gloves—hand fit or measuring tape
 - Testing rubber gloves & other protective requirements
 - Types of powder not allowed in rubber gloves

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COURSE AGENDA

SELECTION & USE OF SAFE WORK PRACTICES, CONTINUED

- Selection of Arc Flash Personal Protective Equipment
 - How is flash protection rated
 - FR vs. ATPV rating of protection
 - Simplified clothing method & protective clothing matrix
 - Layering effects of clothing
 - Use and care of ATPV clothing
 - Arc shields vs. flash hoods
 - Head coverings
 - Requirements for hair and beard nets
- Other Personal Protective Equipment
 - Safety glasses, arc goggles, non conductive and restrained eye wear
 - Steel toe, crush impact, dielectric & electrical rated boots
 - Hearing protection—foam vs. blast protection
 - Insulated and shielding materials
 - Personal protective grounds

RISK CATEGORIES TABLES

- Understanding the information on engineering labels
- Engineering studies, NFPA 70E Risk Categories Tables
- Warning labels
- Arc flash protection boundary & clearing time requirements

UTILIZATION OF HIGH VOLTAGE

- OSHA 1910.269 and 1910.302-308
 - Is the higher voltage distribution or utilization
 - Applying NFPA 70E to utilization of electricity
- OSHA Rule 1910.302 Electrical Utilization Systems
- OSHA Rule 1910.303 General Requirements
- OSHA Rule 1910.304 Wiring Design and Protection
- OSHA Rule 1910.305 Wiring Methods, Components and Equipment
- OSHA Rule 1910.306 Specific Purpose Equipment and Installations
- OSHA Rule 1910.307 Hazardous Locations
- OSHA Rule 1910.308 Special Systems
- Definitions that Apply to Utilization Equipment
 - Supervised industrial installations over 600 volts
 - Feeders over 600 Volts
 - Qualified persons
- OSHA 1910.302 and OSHA 1910.302—Working Clearances above Electrical Equipment
- Entrance and Egress to Electrical Equipment
 - Exit doors requirement
 - Direction of swinging doors
 - Distance from equipment to doors
- Enclosures for Electrical Installation
 - Vaults and rooms
 - Fences above equipment
 - Height of outside fences
 - Distance from equipment
- Posting of Signage
 - Danger requirements
 - Warning signs and identification
 - Caution signs
 - Accident prevention tags and usage
- Review of PPE for over 600 volts
- Review of High Voltage Live Line Tools