

# NFPA 70E ARC FLASH ELECTRICAL SAFETY WITH PRACTICAL SKILLS (MCC BUCKET)

## New Standard and Hands-on Equipment

This is NTT's foundational course for electrical qualification updated to the 2015 NFPA 70E.

This training instructs participants on the electrical safety skills needed to perform routine electrical maintenance tasks at less than 1000 volts just as they would in the field.

## COURSE RESULTS

At the end of this course you will be able to:

1. Inspect, use and maintain personal (PPE) and other protective equipment.
2. Understand the effect of maintenance on equipment and how it reduces injury.
3. Verify an electrically safe work condition.
4. Perform maintenance on 480 volt motor control equipment.
5. Perform Assured Equipment Grounding Conductor Program checks.



## CLASS FORMAT:

Lecture and Hands-on

## CLASS LENGTH:

The standard is three days (24 contact hours), however class content and length can be adjusted to meet client operational needs.

## STANDARD CLASS SIZE:

NTT recommends a class of no more than 12 participants to obtain the best results.

## NTT TO PROVIDE:

- 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)
- Student are encouraged to bring their own PPE to use in the class hands-on labs.
  - Meter
  - Gloves
  - Tools
  - Arc-rated Clothing (PPE Categories 2 and 4)

## WHO SHOULD ATTEND:

NTT's straightforward electrical safety training will benefit all workers as this course can be tailored. Maintenance, Operators, Supervisors, and non-qualified workers and those who work on and around industrial equipment will benefit from this course:

- Electricians
- Maintenance Techs
- Owners & managers
- Safety directors
- Electrical contractors

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## COURSE AGENDA

### OVERVIEW: NFPA 70E STANDARD

- Article 90 Introduction to NFPA 70E overview
- Key definitions in Article 100
- Determine the breakdown of responsibilities in your facility

### THE HAZARDS OF ELECTRICITY

- Basic of Electricity
- Arc Flash Hazard PPE Categories
- Electrical Hazards
  - o Shock
  - o Arc Flash
  - o Arc Blast

### GENERAL REQUIREMENTS FOR ELECTRICAL SAFETY-RELATED WORK PRACTICES (ARTICLE 110)

- The Electrical Safety Program
- Training Requirements
- Relationships with Contractors
- Use of Equipment
  - o Test Instruments
  - o Portable Electric Equipment
  - o Extension Cords
  - o GFCI's
- Underground Electrical Lines and Equipment

### ESTABLISHING AN ELECTRICALLY SAFE WORK CONDITION (ARTICLE 120)

- The six-step LOTO process

### WORK ON OR NEAR EXPOSED ENERGIZED PARTS (ARTICLE 130)

- Limitations for working when exposed to energized parts
- Hazard analysis

- Energized Electrical Work permit requirements
- Energized Electrical Work permit Approval process
- Description of Safe Work Practices to be employed
- Energized Electrical Work permit Exemptions

### SHOCK PROTECTION BOUNDARIES

- Shock Risk Assessment
- Establishing Shock Protection Boundaries
  - o Using the AC and DC tables
- Approach Requirements for Qualified Persons
- Approach requirements for Unqualified Persons

### ARC FLASH BOUNDARY

- The Arc Flash Risk Assessment
- Establishing the Arc Flash Boundary
- PPE within the Arc Flash Boundary
- Equipment labeling requirements

### OTHER PRECAUTIONS

- Alertness / Situational Awareness
- Blind Reaching
- Illumination
- Conductive articles being worn
- Conductive materials
- Confined or enclosed work space
- Doors or hinged panels
- Housekeeping duties
- Use of flammable materials
- Anticipating failure
- Routine opening and closing of circuits.
- Reclosing circuits after protective device operation

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## PERSONAL AND OTHER PROTECTIVE EQUIPMENT

- General: Responsibilities
- Care
- PPE Specifics
- Other PPE

## INTERPRETING EQUIPMENT LABELS

- Arc-flash information
- Shock protection information
- Selecting PPE
- Boundary Selection

## USING THE TABLES

- Identifying equipment and tasks
- Applicability of the tables
- Determining the table parameters
- Determining equipment meets installation requirements
- Determining equipment has been properly maintained
- Selecting PPE

## WORKING WITHIN THE LIMITED APPROACH BOUNDARIES TO OVERHEAD LINES

- Applicability
- Specific requirements
- Which rules apply: Applicability of other rules and standards
  - o 1910.269
  - o NESC

## SAFETY-RELATED MAINTENANCE REQUIREMENTS

- General maintenance requirements
- Substations, switchgear assemblies, switchboards, panelboards, motor control centers, and disconnect switches

- Premises wiring
- Controller equipment
- Fuses and circuit breakers
- Rotating equipment
- Hazardous (classified) locations
- Batteries and battery rooms
- Portable electric tools and equipment
- Personal safety and protective equipment

## SAFETY REQUIREMENTS FOR SPECIAL EQUIPMENT

- Electrolytic Cells
- Batteries and Battery Rooms
- Safety-Related Work Practices for Use of Lasers
- Power Electronic Equipment
- Research and Development Laboratories

## 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:

- Distinguish exposed energized parts
- Determine nominal voltage of exposed live parts
- Approach distances and the corresponding voltages
- 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

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## HANDS-ON DEMONSTRATION LABS

**PPE NOTE:** Students are encouraged to bring their own PPE to use in the class hands-on labs. Recommended items include:

- Meter
- Gloves
- Tools
- Arc-rated Clothing (PPE Categories 2 and 4)

Participants will not be required to don the NTT personal protective equipment (PPE) clothing for task performance. Participants are encouraged to bring their own electrical PPE to class. This provides an opportunity for participants to verify the ratings and conditions of the PPE they use in the field under the instructor's guidance.

All students are expected to use all other applicable items in the performance of their tasks.

**ACTIVITY DESCRIPTON:** Students will use the appropriate procedure checklist to perform each task. When student is not performing a task, they will use the appropriate checklist to audit the task performance of other personnel as assigned by the instructor. Students are to complete all assigned written exercises.

### Training Topics:

Discussion of OSHA and 70E requirements for demonstration of skills.

Overview of MCC Trainer, associated equipment and PPE.

### HANDS -ON LAB PROCEDURE OPTIONS:

- Inspect, Don, and Use Personal Protective Equipment (PPE)
- Verify an Electrically Safe Work Condition
- Troubleshoot Motor Control Center (MCC Bucket) Control Circuit

