THE NEW ARC FLASH STANDARD
Some things you need to know

NFPA 70E - 2012

Presented by:
Robert Kellogg, MS, CSP, CHST, CSSM
Director of Safety
Associated Builders and Contractors, Inc.
ARC FLASH/BLAST

- A rapid heating and vaporization of conducting materials, which occurs when electrical insulation or isolation between conductors. This occurs either during a phase to phase, or phase to ground contact, and is broken, or can no longer withstand the applied voltage.

- Types
  - Bolted (touching)
  - Arc (air gap)
Article 90
Introduction

Section 90.2(A) (Revision)

- This section now uses a very important word: “inspection.”
- Electrical inspectors also can be exposed to hazards during inspections of installations, and this standard will now cover them as well as the technicians.
Article 90
Introduction

- Section 90.2(A)(4) (Revision)
  - The words at the end of this section, “… that are not an integral part of a generating plant, substation or control center …” were deleted, and this section now reads: “Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops and recreational buildings.” This deletion clarifies that NFPA 70E applies to these areas, even if they are part of a generating plant, substation or control center.
Article 100
Definitions

- Incident Energy Analysis (New Definition)
  - The 2012 edition features a new informational note added to the existing arc flash hazard analysis definition. It defines the term “incident energy analysis” as “a method used to predict the incident energy of an arc flash for a specified set of conditions.”

- Arc Flash Boundary (Revision)
  - Previous editions referred to the arc flash protection boundary. The 2012 edition will use the term “arc flash boundary” (AFB). The word “protection” has been deleted.
Article 110
General Requirements for Electrical Safety-Related Work Practices

- **Section 110.5(C) (New)**
  - This section is new to the code and will require a documented meeting between the host employer and contract employer

- **Section 110.2(C) Emergency Procedures (Revision)**
  - The 2012 edition will require the use of an automatic external defibrillator (AED) in addition to the existing requirement of training and with an **annual certification** of cardiopulmonary resuscitation (CPR) and AED, versus the CPR qualification requirement in the 2009 edition.
Article 110
General Requirements for Electrical Safety-Related Work Practices

- **110.2(D)(3) Retraining (New)** Retraining shall be performed at intervals not to exceed three years.

- **Section 110.2(E) Training Documentation (Revision)**
  - Language will be added that requires training content documentation in addition to the section’s existing requirements.

- **Section 110.7(E) Electrical Safety Program Procedures (Revision)**
  - The 2012 edition will incorporate language to include working within the AFB in addition to the existing requirement for working within the limited approach boundary (LAB). It is possible that the AFB could be greater than the LAB and vice versa.
Article 110
General Requirements for Electrical Safety-Related Work Practices

 Section 110.3(F) (Hazard/Risk Evaluation Procedure) (Revision)
  • This section’s requirements will apply to work within the AFB in addition to the existing language regarding work within the limited approach boundary.

 Section 110.5 (Underground Electrical Lines and Equipment) (New)
  • This section’s requirements will apply to work during excavation operations and the potential for utility line contact. A hazard analysis will need to be performed to identify the safe work practices during the operation.
Article 120
Establishing an Electrically Safe Work Condition

- Section 120.2(C)(2) (Form of Control) (Revision)
  - The 2012 edition will remove individual employee control as one of three forms of control of hazardous electrical energy, leaving the two methods: simple and complex lockout/tagout.
Article 130
Work Involving Electrical Hazards

- Section 130.1 (Relocation and New Section)
  - The 2012 edition features Section 130.1 with the language stating: “All requirements of this article shall apply whether an incident energy analysis is completed or if the tables 130.7(C)(15)(a) Table 130.7(C)(15)(b), and Table 130.7(C)(16) are utilized in lieu of incident energy analysis IAW 130.5.” The new language is intended to help clarify that, when the table method is used, the other requirements of this section, such as providing proper justification and completing the energized work permit, still apply.
Section 130.2 Electrically Safe Working Condition (Revision)

- The 2009 edition requires that energized conductors or circuit parts be placed into an electrically safe working condition before an employee works within the LAB. New language expands this requirement to apply if any of the following conditions exist:
  - The employee is within the LAB (same as before)
  - The employee is within the AFB
  - The employee interacts with equipment where conductors or circuit parts are not exposed, but an increased risk of arc flash hazard exists
  - An informational note is added that refers to the definition of “arc flash hazard” in Article 100.
Article 130
Work Involving Electrical Hazards

- Section 130.2(B)(1) When Required (Revision)
  - The text changes and additions include “When working within the limited approach boundary or the arc flash boundary of exposed energized electrical parts … .” This language is intended to help clarify when the code requires an energized work permit.
Article 130
Work Involving Electrical Hazards

Section 130.2(B)(2) (Elements of the Work Permit) (Revision)

- The 2012 edition features a renumbered and modified list of elements. Several items were combined under item (2):
  a. Results of the arc flash hazard analysis
  b. The arc flash boundary
  c. The necessary personal protective equipment to safely perform the assigned task
  d. The available incident energy or hazard risk category
  e. Justification for live work
  f. Evidence of completed job briefing
  g. Authorizing approval with signatures
Article 130
Work Involving Electrical Hazards

- Table 130.4(C) Approach Boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection (Revision)
  - The 2012 edition features a renumbered version of this table as Table 130.4(C)(a), and it will specifically apply to alternating current (AC) power systems. The new table, 130.4(C)(b) will apply to direct current (DC) power systems.
Article 130
Work Involving Electrical Hazards

Section 130.5 Arc Flash Hazard Analysis - Exception No. 1 (Revision)

- This exception is based on language found in Institute of Electrical and Electronics Engineers (IEEE) Std. 1584—Guide for Performing Arc-Flash Hazard Calculations. Exception 1 stated that an arc flash hazard analysis shall not be required on circuits rated 240 volts (V) or less and supplied by one transformer if the transformer is less than 125 kilovolt-amperes. This exception has been deleted. In addition, an informational note will state that an arc flash hazard analysis may not be necessary for some three-phase systems rated less than 240V. It will then reference the IEEE standard for more information.
Article 130
Work Involving Electrical Hazards

- Section 130.5(A) Arc Flash Boundary (Revision)
  - The 2012 edition does not feature the “four foot rule” in this section, and no longer is in separate sections for the AFB at voltage levels between 50V and 600V and voltage levels above 600V. The revised language states that the AFB for systems 50V and greater shall be the distance at which the incident energy is 1.2 calories per square centimeter. Instead of the “four foot rule,” AFB is located in Table 130.7(C)(15)(a) in note 5.
Section 130.5(C) Equipment Labeling (Revision)

This section provides more guidance on what equipment needs labeling based on language similar to the 2011 NEC. Electrical equipment—such as switchboards, panel boards, industrial control panels, meter socket enclosures and motor control centers—and that are likely to require examination, adjustment, servicing or maintenance while energized, shall be field-marked with a label containing all of the following information:

1. Only one of the following:
   a. Available incident energy
   b. Minimum arc rating of clothing
   c. Highest Hazard/Risk Category for the equipment

2. Nominal system voltage

3. Arc flash boundary

Exception: Labels applied prior to September 30, 2011, are acceptable if they contain the available incident energy or required level of PPE.
Article 130
Work Involving Electrical Hazards

Section 130.7(C)(5) (Hearing Protection) (New)
- Employees shall wear hearing protection whenever working within the AFB. Previous editions only listed hearing protection in Table 130.7(C)(10) Protective Clothing and Personal Protective Equipment and did not address it specifically. The new language clarifies that all personnel in the AFB will wear hearing protection.
Article 130
Work Involving Electrical Hazards

- Table 130.7(C)(16) Hazard/Risk Category Classifications (Revision)
  - DC Hazard/Risk Tables (New)
    Table 130.7(C)(9) will be renumbered as Table 130.7(C)(15)(b). The new table 130.7(C)(15)(b) features specifications for hazard/risk categories for DC systems.
  - Category 2* Deleted (Revision)
    The 2012 edition features an elimination of all references to hazard/risk category 2* in Table 130.7(C)(16), which was changed to HRC 2.
Article 130
Work Involving Electrical Hazards

- Table 130.7(C)(16) Protective Clothing and Personal Protective Equipment (Hazard/Risk Category 2 Balaclava Requirement) (Revision)
  - Category 2 will require a balaclava sock or an arc flash suit hood. There was an inconsistency with Section 130.7(C)(1), which required all parts of the body inside the AFB to be protected.
Article 130
Work Involving Electrical Hazards

- Section 130.7(C)(10)(b)(2) (Arc Flash Suits) (Revision)
  - Additional language will state: “When the incident energy exposure is greater than 12 cal/cm², a suitably rated arc flash suit hood shall be used.”
Article 130
Work Involving Electrical Hazards

- Section 130.7(C)(10)(c) (Face Protection) (Revision)
  - The 2012 edition will feature new language in this section, requiring face shields with a wraparound guarding to protect the face, chin, forehead, ears and neck to be used.
110.3(H)(1) The electrical safety program shall be audited to verify the principles and procedures of the electrical safety program are in compliance with this standard. The frequency of the audit shall not exceed 3 years.
Typical Electrical Safety Program Principles

- Safety program principles include, but are not limited to, the following:
  - (1) Inspect/evaluate the electrical equipment
  - (2) Maintain the electrical equipment’s insulation and enclosure integrity
  - (3) Plan every job and document first-time procedures
  - (4) De-energize, if possible (see 120.1)
  - (5) Anticipate unexpected events
Typical Electrical Safety Program Principles

- (6) Identify and minimize the hazard
- (7) Protect the employee from shock, burn, blast, and other hazards due to the working environment
- (8) Use the right tools for the job
- (9) Assess people’s abilities
- (10) Audit the principles
QUESTIONS?