Significant Changes to NFPA 70E -2009 Edition

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Repeat Presentation

- This has been previously presented
  - 2008 IEEE Electrical Safety Workshop
  - 2008 NFPA WSCE
- Material was originally developed prior to the 2009 NFPA 70E being available.

Introduction

- ~ 580 Proposals
- ~ 800 Comments
- The Report on Proposals (ROP) and Report on Comments (ROC) are available at NFPA.org - Codes and Standards Tab
- Changes in the Standard are identified using gray highlighted text, section numbers are added to top corners of pages

More Introduction

- In this presentation:
- P 70E-XX indicates a proposal number from the ROP
- C 70E-XX indicates a comment from the ROC
- TCC indicates the Technical Correlating Committee
- [Bracketed information is author's explanation]

Last of Introduction

- "WPTG" indicates comments submitted by the Word and Phrase Task Group.
- It was established to deal with terms such as "exposed", "energized", "live parts", "where equipment is interacted with", "working on", "working near", "where an electrical hazard exists", and related terms
- P 70E-244

90.2 (A) Covered [was 90.1(A)]

- This standard addresses electrical safety requirements for employee workplaces that are necessary for the practical safeguarding of employees during activities such as the installation, operation, maintenance, and demolition of electric conductors, electrical equipment, signaling and communications conductors and equipment, and raceways for the following....

90.2 (A) Continued

- [TCC clarifies that the document does not apply to the installation of systems, but to the electrical safety work practices that are related to an electrical system.]
- C 70E-6a, C 70E-7, C 70E-13, C 70E-15
- P 70E-4, 70E-8

90.2(B) Not Covered [was 90.1(B)

- [Exclusions for railways, communications utilities and electric utilities to NFPA 70E to remain. Scope to remain within the NEC scope. NEC Technical Correlating Committee (TCC) established a Task Group to study the issue.]
- P, 70E-7, 70E-9, 70E-10, 70E-12, 70E-13, 70E-14
- C, 70E-31, 70E-65, 70E-112

90.2(B)(5) [was 90.1(A)(5)]

- (5) Installations under the exclusive control of an electric utility where such installations
- a. Consist of service drops or service laterals, and associated metering, or

90.2(B)(5) Continued

- b. Are located in legally established easements or rights-of-way designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or

90.2(B)(5) Continued

- c. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.
- [Matches 2008 NEC Language where "by other agreements was deleted".]
- P 70E-7, 70E-10,
- C70E-31

Article 100 Definitions

- Updated definitions to match 2008 NEC
- C 70E-191a
- P 70E-59a

Article 100 Definitions

- "live parts" was changed to "energized electrical conductors or circuit parts" throughout the standard.
- C 70E-191b WPTG
- P 70E-1

Article 100 Definitions

- Arc Flash Hazard. A dangerous condition associated with the possible release of energy caused by an electric arc.

Arc Flash Hazard Continued

- FPN No. 1: A flash hazard may exist when energized electrical conductors or circuit parts are exposed or when they are within equipment in a guarded or enclosed condition, provided a person is interacting with the equipment in such a manner that could cause an electric arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose a flash hazard.

Arc Flash Hazard Continued

- FPN No. 2: See Table 130.7(C)(9) for examples of activities that could pose a flash hazard.
- FPN No. 3: See 130.3 for flash hazard analysis information.

- C 70E-207 WPTG
- P 70E-244

Article 100 Definitions

- Arc Rating. Value attributed to materials that describes their performance to exposure to an electrical arc discharge. The arc rating is expressed in cal/cm2 and is derived from the determined value of the arc thermal performance value (ATPV) or energy of breakopen threshold (EBT).
- C 70E-192
- P 70E-16

Article 100 Definitions

- New
- Balaclava (Sock Hood). An arc-rated FR hood that protects the neck and head except for facial area of the eyes and nose.

- P 70E-50

Article 100 Definitions

- Boundary, Arc Flash Protection. When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.
- C 70E-212 WPTG
- P 70E-36

Article 100 Definitions

- New
- Switchgear, Arc-Resistant
- Switchgear, Metal-Clad.
- Metal-Enclosed Power Switchgear.
- C 70E-230
- P 70E-50a

Article 100 Definitions

- Deleted
- ~~Working Near (Live Parts) Any activity inside a Limited Approach Boundary~~
- [LAB only applies to shock hazard,
- - use within LAB or within FPB or both, or other electrical hazards in the standard.]
- C 70E-232 WPTG
- P 70E-244

Article 100 Definitions

- Working On (~~live parts~~ energized electrical conductors or circuit parts). Coming in contact with ~~live~~ energized electrical conductors or circuit parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing.
- C 70E-241 P 70E-244, 70E-58

110.1 Scope.

- Chapter one covers electrical safety-related work practices and procedures for employees who are exposed to an electrical hazard in workplaces covered in the scope of this standard. …..
- C 70E-258 P 70E-63
- 2008 NFPA WSCE Motion

110.5 Relationships With Contractors (Outside service personnel, etc.)

- (A) Host Employer Responsibilities
- (B) Contract Employer Responsibilities.

- C 70E-273
- P 70E-67

110.6(C) Emergency Procedures.

- Employees ~~working on or near exposed energized electrical conductors or circuit parts~~ exposed to shock hazards shall be trained in methods of release of victims from contact with exposed energized electrical conductors or circuit parts.
- C 70E-294 WPTG, 70E-288
- P 70E-244, 70E 78

110.6(C)

- Added a new last sentence:
- Training of employees in approved methods of resuscitation, including cardiopulmonary resuscitation, shall be certified by the employer annually.
- P 70E-249
- C 70E-281, etc.

110.6(D)(1)(d)

- Tasks that are performed less often than once per year shall require retraining before the performance of the work practices involved.
- P 70E-82

110.6(D)(1)(e)

- Employees shall be trained to select an appropriate voltage-detector and shall demonstrate how to use a device to verify the absence of voltage, including interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each specific voltage-detector that may be used.
- P 70E-74 C 70E-282

110.6(D)(3) Retraining. New

- An employee shall receive additional training (or retraining) under any of the following conditions:
- (a) If the supervision or annual inspections indicate that the employee is not complying with the safety-related work practices

110.6(D)(3) Continued

- (b) If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those which the employee would normally use, or
- (c) If he or she must employ safety related work practices that are not normally used during his or her regular job duties".
- C 70E-299 P 70E-80

110.6 (E) Training Documentation

- The employer shall document that each employee has received the training required by paragraph 11 0.6(D) of this section. This documentation shall be made when the employee demonstrates proficiency in the work practices involved and shall be maintained for the duration of the employee's employment. The documentation shall contain each employee's name and dates of training.

110.6 (E) Continued

- FPN: Employment records that indicate that an employee has received the required training are an acceptable means of meeting this requirement.
- P 70E-73

110.7 Electrical Safety Program.

- (A) General. The employer shall implement and document an overall electrical safety program that directs activity appropriate for the voltage, energy level, and circuit conditions.
- P 70E-92

110.7(B) Awareness and Self-Discipline.

- ..... The program shall be developed to provide the required self-discipline for employees who occasionally must perform work ~~on or near exposed energized electrical conductors and circuit parts~~ that may involve electrical hazards. .....
- C 70E-322 WTPG
- P 70E-93

110.7(F) Hazard/Risk Evaluation Procedure

- Added an additional last sentence.
- The procedure shall identify the hazard/risk process that shall be used by employees to evaluate tasks before work is started.
- P 70E-95

110.7(F)

- FPN The hazard/risk evaluation procedure may include identifying when a second person could be required and the training and equipment that person should have.
- C 70E-432
- P 70E-193

110.7 (H) Electrical Safety Auditing.

- [New] An electrical safety program shall require auditing of the work being performed of an identified frequency to help assure that the principles and procedures of electrical safety program are being followed. All electrical safety procedures shall be reviewed and revised, based upon the auditing findings, of frequency determined by the employer based on the complexity of the procedures and the type of work being covered.
- C 70E-328 P 70E-100

110.8

- Working ~~On or Near Electrical Conductors or Circuit Parts~~ <u>While Exposed to Electrical Hazards</u>
- C 70E-334 WPTG
- P 70E-101

110.8(A)

- Safety-related work practices shall be used to safeguard employees from injury while they are ~~working on or near~~ exposed <u>to electrical hazards from</u> electrical conductors or circuit parts that are or can become energized. ....
- C 70E-341 WPTG, 70E-343
- P 70E-101, 70E-60

110.8(B)(2)

- When working on energized electrical conductors or circuit parts that ~~if live part~~s are not placed in an electrically safe work condition (i.e., for the reasons of increased or additional hazards or infeasibility per 130.1), work to be performed shall be considered energized electrical work and shall be performed by written permit only.
- C 70E-363 P 70E-108

110.9(A)(1) [New]

- FPN: See ANSI/ISA-61010-1 (82.02.01)/UL 61010-1Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements" for rating and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000V and below.
- C 70E-367 P 70E-114, 70E-115

120.2(F)(1)(b)

120 Establishing an Electrically Safe Work Condition

- (1) Planning
- (b) Exposed Persons. The plan shall identify persons who might be exposed to an electrical hazard and the personal protective equipment required during the execution of the job or task.

120.2(F)(2)(f)(1)

- (2)Elements of Control
- (f)(1) What voltage detector will be used, the required personal protective equipment, and who will use it to verify proper operation of the voltage detector before and after use.
- P 70E-160

Article 130

- Work ~~ing On or Near Live Parts~~ Involving Electrical Hazards
- C 70E-397 WPTG
- P 70E-166

130.1(B)(3)

- New last sentence.
- If the purpose of crossing the Limited Approach Boundary is only for visual inspection and the Restricted Approach boundary will not be crossed, then an energized electrical work permit shall not be required.
- C 70E-412 P 70E-181

Table 130.2(C)

- Exposed Movable Conductor
- Table Note 2 A condition in which the distance between a conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles.
- C 70E-203 P 70E-3

130.3

- New Last Sentence and exception
- The Flash Hazard Analysis shall be updated when a major modification or renovation takes place. It shall be reviewed periodically, not to exceed five years to account for changes in the electrical distribution system that could affect the results of the analysis.

130.3 Exception [New]

- Exception No. 1 An arc flash hazard analysis shall not be required where all of the following conditions exist:
  - (1) Circuit is rated 240 V or less
  - Circuit supplied by one transformer
  - Supply transformer is rated less than 125 kVA

C 70E-444

130.3 Continued

- Exception No. 2 The requirements of Sections 130.7(C)(9); 130.7(C)(10), and 30.7(C)(11) shall be permitted to be used in lieu of a detailed incident energy analysis.
- C 70E-440
- P 70E-203

130.3 FPN [New]

- FPN No. 1: Improper or inadequate maintenance can result in increased opening time of the overcurrent protective device, thus increasing the incident energy.
- P 70E-204
- C 70E-451

130.3(A)

- Changed the 4 foot Flash Protection Boundary to be based on 2 cycle clearing time and 50kA fault current, or 100kA cycles.
  (1667 ampere seconds)
- [Existing is 6 cycles and 50kA, or 300 kA cycles.]
- P 70E-218

130.3(A)

- Equations for calculating the Flash Protection Boundary have been relocated to Annex D. A FPN has been added directing the user to Annex D.
- P 70E-208

130.3(B)

- The language is to modified so that when work is performed within the Flash Protection Boundary, one of two methods are to be used for selecting protective clothing and other PPE.
.
- --1) Incident Energy Analysis
- --2) Hazard Risk Categories (Tables)
- P 70E-226 C 70E-486, 70E-488

130.3(C) [New]

- Equipment Labeling. Equipment shall be field marked with a label containing the available incident energy or required level of PPE.
- P 70E-237,, 70E-300
- C 70E-494, 70E-497

130.6(A) [New]

- (3) Changes in Scope. Employees shall be instructed to be alert for changes in the job or task that may lead the person outside of the electrically safe work condition or expose the person to additional hazards that were not part of the original plan.
- C 70E-516 P 70E-243

130.7(C)(1)

- New Last Sentence
- All parts of the body inside the Arc Flash Protection Boundary shall be protected.
- P 70E-261
- C 70E-533

130.7(C)(5)

- The exception that permitted non-melting flammable clothing to be used up to a 2 cal/cm2 level has been deleted.
- P 70E-274
- C 70E-542

130.7(C)(6)(c) & Table 130.7(C)(6)(c)

- Specific use and testing details were added for rubber insulating equipment. The Table provides testing intervals for rubber goods.
- C 70E-543a
- P 70E-282

130.7(C)(9) FPN No. 1

- Added information that helps explain the background behind the tables development.
  - based on Task Groups collective experience
  - estimated exposure levels
  - reduction of HRC No. due to low risk
  - closed doors don't provide enough protection to eliminate PPE in all cases
  - full committee consensus

P 70E-351 C 70E-573, 70E-574

Table 130.7(C)(9)

- Added the words “or other equipment” to “Panelboards Rated 240 V and below in the table.
- [This expands the application of the table to other types of equipment not specifically included]
- P 70E-341

Table 130.7(C)(9)

- Hazard Risk Categories for work on equipment that is “fed directly” by a branch circuit of panelboards, switchboards, and motor control centers were added.
- P 70E-307

Table 130.7(C)(9)

- Hazard risk Categories for infrared thermography and other non-contact inspections were added to the table.
- P 70E-329

Table 130.7(C)(9)

- Modified the table to TIA 70E-04-01
- This TIA was included after the index in the second printing of the 2004 edition.
- It reduces the short circuit values and clearing times for some of the table notes.
- P 70E-348

Table 130.7(C)(9)

- Notes 3 and 6 have been deleted.
- [The notes permitted an “automatic” reduction of one hazard/risk category for lower short circuit currents.]
- P 70E-349
- C 70E-571

Table 130.7(C)(10)

- Usability of the table was improved by providing the Hazard Risk Categories in one column and the required items to be used in a second column.

P 70E-403

Table 130.7(C)(10)

- The provision for using natural or non-melting clothing for increasing the "rating" of PPE or as a substitute for PPE has been deleted.
- C 70E-593, 70E-602
- P 70E-389, 70E-381

Table 130.7(C)(10)

- Hearing Protection requirement was aded to HRC's 0 and 1.
- [Substantiation provided indicated that several incidents with energy levels that would fall into the HRC 0 or HRC 1 PPE range have peak sound levels exceeding the OSHA impulse limit of 140dB]
- C 70E-609 P 70E-391

Table 130.7(C)(10)

- Requires the use of leather gloves for Hazard Risk Category 1 tasks.
- [For arc effects, not electrical shock]
- P 70E-384

Table 130.7(C)(10) Note 3

- 4. ~~Regular weight (minimum 12 oz/yd2 fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants.~~ The FR shirt and pants used for Hazard/ Risk Category 1 shall have a minimum arc rating of 4.
- C 70E-614
- P 70E-382

Table 130.7(C)(10)

- Added a requirement to use either face shield or flash hood for hazard risk category 1 with a minimum arc rating of 4.
- P 70E-399

Table 130.7(C)(10)

- Modifies the table so that the arc rating is the primary focus for meeting the requirements. Using a garment or system of garments is acceptable.
- P 70E-389

Table 130.7(C)(9)

- The 2* designation means that a flash suit hood or alternatively a face shield used in combination with a balaclava (sock hood) is required for this task…
- See Note 10
- P 70E-356

Table 130.7(C)(11)

- The committee concluded that the system arc rating should be based on FR clothing only and not on non-FR underlayers. Non-flame resistant underlayers cannot be used to achieve the desired system arc rating.
- C 70E-621
- P 70E-419

130.7(C)(11)

- Clarifies that that Table 130.7(C)(11) is to be used only after the hazard risk category is determined by using Table 130.7(C)(9)(a).
- [The tables are to be used as a “package”, and are not to be used individually as part of a hazard analysis method]
- P 70E-425 C 70E-620

130.7(C)(15) [New] Ex. No 2

- Where the work to be performed inside the Flash Protection Boundary exposes the worker to multiple hazards, such as airborne contaminants, under special permission by the authority having jurisdiction and where it can be shown that the level of protection is adequate to address the arc flash hazard, non-FR Personnel Protective Equipment shall be permitted. P 70E-440

130.7(E) Alerting Techniques

- (4) Look-Alike Equipment. Where work performed on equipment that is deenergized and placed in an electrically safe condition exists in a work area with other energized equipment that is similar in size, shape, and construction one of the altering methods in 130.7(E)(1), (2) or (3) shall be employed to prevent the employee from entering look-alike equipment. 70E-629 P 70E-448

205.3 [New]

- General Maintenance Requirements.
- Overcurrent protective devices shall be maintained in accordance with the manufacturers' instructions or industry consensus standards.
- C 70E-636
- P 70E-130

210.5 FPN [New]

- Failure to properly maintain protective devices can have an adverse effect on the flash hazard analysis incident energy values.
- P 70E-455
- C 70E-646

Article 320. Batteries and Battery Rooms

- 320.1 Scope. The requirements of this article shall apply to the safety requirements related to installations of stationary storage batteries and battery rooms with a stored capacity exceeding 1 kWh or a ~~floating~~ nominal voltage that exceeds ~~115~~ 50 volts but does not exceed 650 volts.
- C 70E-664, 70E-665 P 70E-471, 70E-472

New Article

- Article 350 Safety-Related Work Requirements: Research and Development Laboratories.
- 350.1 The requirements of this article shall apply to the electrical installations in those areas, with custom or special electrical equipment, designated by the facility management for research and development (R&D) as laboratories.

Article 350 Continued

- 350.2 Definitions
- 350.3 Applications of Other Articles.
- 350.5 Specific Measures and Controls for Personnel Safety.
- 350.6 Listing Requirements
- C 70E-718
- P 70E-519

Chapter 4

- Deleted Chapter 4 of NFPA 70E
- [Historically Chapter 4 contained extracted material from the NEC]
- C 70E-719
- P 70E-520

Annex O Safety Related Design Requirements [New]

- X.1 Introduction.
- [Facility owner, manager of employer responsibilities for hazard analysis during design.]
- X.2 General Design Considerations.
- C 70E-763
- P 70E-545

Any Parting Thoughts

Electrical Safety

Be part of it

?? Questions ??