Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

ENERGY FACILITY CONTRACTORS GROUP (EFGOG)
ENVIRONMENTAL HEALTH AND SAFETY WORKING GROUP
ELECTRICAL SAFETY SUBGROUP

GAP ANALYSIS NFPA 70E VERSIONS 2004 & 2009

ISSUED MAY 22, 2009

This document provides a line by line gap analysis of the 2004 and 2009 NFPA 70E *Standard for Electrical Safety in the Workplace* editions. The analysis was performed by Savannah River Site Electrical Safety Subject Matter Experts and has been reviewed and endorsed by the EFCOG Electrical Safety Subgroup. NFPA 70E® – 2009 is recommended for approval across the DOE Complex as an upgrade to NFPA 70E® – 2004.

SIGNATURES:

Authors: _____ **Date:** 3/9/2010
David Mills SRS

Authors: _____ **Date:** 3-9-2010
John McAlhaney SRS

Peer Review: _____ **Date:** 3-4-2010
Mark McNellis SNL

Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

Code/Standard Title: **NFPA 70E® – "Standard for Electrical Safety in the Workplace®"**

10CFR851 UPGRADE EVALUATION

TITLE: Technical Evaluation of the Changes in NFPA 70E® - 2004 Edition to the new NFPA 70E® - 2009 Edition

---

DESCRIPTION:

10CFR 851 - "DOE Worker Health and Safety Program" requires that the 2004 edition of NFPA 70E - "Standard for Electrical Safety in the Workplace®" be utilized. The purpose of this evaluation is to document the acceptance of the 2009 edition of NFPA 70E® and to identify and evaluate the impact of the changes to the safety and health of workers. Fine Print Notes (FPN) were not evaluated as they are not part of the standard text and have no enforceable meaning.

TECHNICAL JUSTIFICATION:

No detrimental impacts to worker safety and health were identified. The use of the 2009 edition of NFPA 70E® is at least as protective as the 2004 edition, and even more protective in some areas, such that the new edition should be considered for DOE Complex wide acceptance.

NFPA 70E® – 2009 is recommended for approval across the DOE Complex as an upgrade to NFPA 70E® – 2004.

REFERENCES:

10 CFR 851, Worker Safety and Health Program
NFPA 70E®, Standard for Electrical Safety in the Workplace® (2004 and 2009 editions)

GENERAL NOTES:

None

ATTACHMENTS:

Comparison table summary

Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Electrical Safety in the Workplace Article 90 Introduction		
	90.1 Purpose. The purpose of this standard is to provide a practical safe working area for employees relative to the hazards arising from the use of electricity.	Explanatory material. No negative impact.
90.1 Scope. (A) Covered. This standard addresses those electrical safety requirements for employee workplaces that are necessary for the practical safeguarding of employees in their pursuit of gainful employment. This standard covers the installation of electric conductors, electric equipment, signaling and communications conductors and equipment, and raceways for the following:	90.2 Scope. (A) Covered. 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, electric equipment, signaling and communications conductors and equipment, and raceways for the following:	Expanded scope to specifically cover more than just installation activities. Increases worker safety during all types of interfaces with electrical equipment.
	90.3 Standard Arrangement. This standard is divided into the introduction and three chapters, as shown in Figure 90.3. Chapter 1 applies generally for safety-related work practices; Chapter 3 supplements or modifies Chapter 1 with safety requirements for special equipment. Chapter 2 applies to safety-related maintenance requirements for electrical equipment and installations in workplaces.	Explanatory material. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	Annexes are not part of the requirements of this standard but are included for informational purposes only.	
90.2 Organization. This standard is divided into the following four chapters and thirteen annexes: (1) Chapter 1, Safety-Related Work Practices (2) Chapter 2, Safety-Related Maintenance Requirements (3) Chapter 3, Safety Requirements for Special Equipment (4) Chapter 4, Installation Safety Requirements (5) Annex A, Referenced Publications (6) Annex B, Informational Publications (7) Annex C, Limits of Approach (8) Annex D, Sample Calculation of Flash Protection Boundary (9) Annex E, Electrical Safety Program (10) Annex F, Hazard/Risk Evaluation Procedure (11) Annex G, Sample Lockout/Tagout Procedure (12) Annex H, Simplified, Two-Category, Flame-Resistant (FR) Clothing System (13) Annex I, Job Briefing and Planning Checklist (14) Annex J, Energized Electrical Work Permit (15) Annex K, General	90.4 Organization. This standard is divided into the following three chapters and fifteen annexes: (1) Chapter 1, Safety-Related Work Practices (2) Chapter 2, Safety-Related Maintenance Requirements (3) Chapter 3, Safety Requirements for Special Equipment (4) Annex A, Referenced Publications (5) Annex B, Informational References (6) Annex C, Limits of Approach (7) Annex D, Incident Energy and Flash Protection Boundary Calculation Methods (8) Annex E, Electrical Safety Program (9) Annex F, Hazard/Risk Evaluation Procedure (10) Annex G, Sample Lockout/Tagout Procedure (11) Annex H, Simplified, Two-Category, Flame-Resistant (FR) Clothing System (12) Annex I, Job Briefing and Planning Checklist (13) Annex J, Energized Electrical Work Permit (14) Annex K, General Categories of Electrical	Explanatory material. No negative impact.

Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Categories of Electrical Hazards (16) Annex L, Typical Application of Safeguards in the Cell Line Working Zone (17) Annex M, Cross-Reference Tables	Hazards (15) Annex L, Typical Application of Safeguards in the Cell Line Working Zone (16) Annex M, Layering of Protective Clothing and Total System Arc Rating (17) Annex N, Example Industrial Procedures and Policies for Working Near Overhead Electrical Lines and Equipment (18) Annex O, Safety-Related Design Requirements	
	90.5 Mandatory Rules, Permissive Rules, and Explanatory Material. (A) Mandatory Rules. Mandatory rules of this standard are those that identify actions that are specifically required or prohibited and are characterized by the use of the terms shall or shall not. (B) Permissive Rules. Permissive rules of this standard are those that identify actions that are allowed but not required, are normally used to describe options or alternative methods, and are characterized by the use of the terms shall be permitted or shall not be required. (C) Explanatory Material. Explanatory material, such as references to other standards, references to related sections of this	Explanatory material. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	standard, or information related to a Code rule, is included in this standard in the form of fine print notes (FPNs). Fine print notes are informational only and are not enforceable as requirements of this standard. Brackets containing section references to another NFPA document are for informational purposes only and are provided as a guide to indicate the source of the extracted text. These bracketed references immediately follow the extracted text. 90.6 Formal Interpretations. To promote uniformity of interpretation and application of the provisions of this standard, formal interpretation procedures have been established and are found in the NFPA Regulations Governing Committee Projects.	Explanatory material. No negative impact.
Chapter 1 Safety-Related Work Practices Article 100 Definitions		
Scope. This article contains only those definitions essential to the proper application of this standard. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in	Scope. This article contains only those definitions essential to the proper application of this standard. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. In general, only those terms that are used in two or more articles are defined in	Deleted reference to Parts I and II as they no longer exist. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100. Part I of this article contains definitions intended to apply wherever the terms are used throughout this standard. Part II contains definitions applicable only to the parts of articles specifically covering installations and equipment operating at over 600 volts, nominal. The definitions in this article shall apply wherever the terms are used throughout this standard.	Article 100. Other definitions are included in the article in which they are used but may be referenced in Article 100. • The definitions in this article shall apply wherever the terms are used throughout this standard.	
	Arc Flash Hazard. A dangerous condition associated with the possible release of energy caused by an electric arc.	Relocated definition for arc flash hazard previously defined as “flash hazard.” No negative impact.
	Arc Flash Hazard Analysis. A study investigating a worker’s potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash protection boundary, and the appropriate levels of PPE.	Relocated definition for arc flash hazard analysis previously defined as “flash hazard analysis.” No negative impact.
	Arc Flash Suit. A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and	Relocated definition for arc flash suit previously defined as “flash suit.” No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	beekeeper-type hood fitted with a face shield.	
Arc Rating. The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to breakopen or at the onset of a second-degree skin burn. Arc rating is normally expressed in cal/cm^2.	Arc Rating. The value attributed to materials that describes their performance to exposure to an electrical arc discharge. The arc rating is expressed in cal/cm^2 and is derived from the determined value of the arc thermal performance value (ATPV) or energy of breakopen threshold (E_{BT}) (should a material system exhibit a breakopen response below the ATPV value) derived from the determined value of ATPV or E_{BT}.	Expanded definition to clarify and to identify alternative values to use to determine proper performance of protective clothing. Provides worker with more information about protective clothing.
Armored Cable. A fabricated assembly of insulated conductors in a metallic enclosure.		Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard."
	Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or approving equipment, materials, an installation, or a procedure.	No negative impact. Added definition for authority having jurisdiction (AHJ) previously not defined. Improves safety by clarifying just what entity is considered an authority having jurisdiction.
	Balaclava (Sock Hood). An arc-rated FR hood that protects the neck and head except for facial area of the eyes and nose.	Added definition for balaclava previously not defined. Improves safety by clarifying just what is considered a balaclava and its intended use.
Bare Hand Work. A	Bare-Hand Work. A	Part of an effort to reduce

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
technique of performing work on live parts, after the employee has been raised to the potential of the live part.	technique of performing work on energized electrical conductors or circuit parts, after the employee has been raised to the potential of the conductor or circuit part.	slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
Barrier. A physical obstruction that is intended to prevent contact with equipment or live parts or to prevent unauthorized access to a work area.	Barrier. A physical obstruction that is intended to prevent contact with equipment or energized electrical conductors and circuit parts or to prevent unauthorized access to a work area.	Part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
Bathroom. An area including a basin with one or more of the following: a toilet, a tub, or a shower.		Deleted definition as part of the scope to include only “definitions essential to the proper application of this standard.” No negative impact.
	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.	Relocated definition for arc flash protection boundary previously defined as “flash protection boundary” to a grouping for boundaries. No negative impact.
	Boundary, Limited Approach. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.	Relocated definition previously defined as “limited approach boundary” to a grouping for boundaries. Also part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
	Boundary, Prohibited	Relocated definition for

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	Approach. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which work is considered the same as making contact with the electrical conductor or circuit part.	prohibited approach boundary previously defined as “prohibited approach boundary” to a grouping for boundaries. Also part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.”
	Boundary, Restricted Approach. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.	No negative impact. Relocated definition for restricted approach boundary previously defined as “restricted approach boundary” to a grouping for boundaries. Also part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
	Branch-Circuit Overcurrent Device. A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Branch-circuit overcurrent protective devices are provided with interrupting ratings appropriate for the intended use but no less than 5,000 amperes.	Added definition for Branch-Circuit Overcurrent Device previously not defined. Improves safety by clarifying just what is considered a Branch-Circuit Overcurrent Device.
Cablebus. An assembly of insulated conductors with fittings and conductor		Deleted definition as part of the scope to include only “definitions essential to the

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
terminations in a completely enclosed, ventilated protective metal housing.		proper application of this standard." No negative impact.
Cablebus is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer in accordance with instructions for the specific job. This assembly is designed to carry fault current and to withstand the magnetic forces of such current.		
Class I Locations. Class I, Zone 0, 1, and 2 Locations. Class II Locations. Class III Locations.	•	Deleted definitions for the NEC® Classified locations as part of the scope to include only "definitions essential to the proper application of this standard" since these definitions are included in the NEC®. No negative impact.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.
Conduit Body. A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Cooking Unit, Counter-Mounted. A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls.	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.
	Coordination (Selective). Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the choice of overcurrent protective devices and their ratings or settings.	Added definition for selective coordination previously not defined. Improves safety by clarifying just what is considered selective coordination.
	Current-Limiting Overcurrent Protective Device. A device that, when interrupting currents in its current-limiting range, reduces the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance.	Added definition for Current-Limiting Overcurrent Protective Device previously not defined. Improves safety by clarifying just what is considered a Current-Limiting Overcurrent Protective Device.
	Cutout. An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link), or may act as the disconnecting blade by the inclusion of a nonfusible member.	Added definition for a cutout previously not defined. Improves safety by clarifying just what is considered a cutout.
Dead Front. Without live parts exposed to a person on the operating side of the equipment.	•	Part of an effort to reduce slang terms such as "live" in deference to terms such as "energized" and "circuit" as

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
		well as part of the scope to include only "definitions essential to the proper application of this standard."
Device. A unit of an electrical system that is intended to carry but not utilize electric energy.	Device. A unit of an electrical system that carries or controls electric energy as its principal function.	No negative impact. Clarified definition to properly identify the function performed by an electrical device.
Dielectric Heating. Heating of a nominally insulating material due to its own dielectric losses when the material is placed in a varying electric field.	•	No negative impact. Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard."
	Disconnecting (or Isolating) Switch (Disconnector, Isolator). A mechanical switching device used for isolating a circuit or equipment from a source of power.	No negative impact. Added definition for a disconnecting (or isolating) switch previously not defined. Improves safety by clarifying just what is considered a disconnecting (or isolating) switch.
Effective Ground-Fault Current Path. An intentionally constructed, permanent, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground-fault on a wiring system to the electrical supply source.	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.
Electric Sign. A fixed, stationary, or portable self-contained, electrically illuminated utilization	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
equipment with words or symbols designed to convey information or attract attention.		standard." No negative impact.
Electrical Single-Line Diagram. A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or system.	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.
Electrically Safe Work Condition. A state in which the conductor or circuit part to be worked on or near has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.	Electrically Safe Work Condition. A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.	Clarified definition by inserting "electrical" ahead of conductor to make the point that is specifically electrical conductors that are affected during the establishment of an electrically safe work condition. No negative impact.
Enclosed. Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts.	Enclosed. Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized electrical conductors or circuit parts.	Inserted "electrical conductors or circuit" ahead of "parts" to clarify that it is the electrical circuit parts that are enclosed. No negative impact.
Enclosure. The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts, or to protect the equipment from physical damage.	Enclosure. The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized electrical conductors or circuit parts or to protect the equipment from physical damage.	Inserted "electrical conductors or circuit" ahead of "parts" to clarify that it is the electrical circuit parts that are enclosed within the enclosure. No negative impact.
Equipment. A general term	Equipment. A general term,	Added "machinery" to the

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
including material, fittings, devices, appliances, luminaires (fixtures), apparatus, and the like used as a part of, or in connection with, an electrical installation.	including material, fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.	definition of equipment to eliminate confusion and misunderstanding of what should be included as "equipment." No negative impact.
Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated.	Exposed (as applied to energized electrical conductors or circuit parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.	Part of an effort to reduce slang terms such as "live" in deference to terms such as "energized" and "circuit" as well as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.
Exposed. For the purposes of Article 450, the word exposed means that the circuit is in such a position that, in case of failure of supports or insulation, contact with another circuit may result.	•	Deleted definition as part of the scope to include only "definitions essential to the proper application of this standard" and the two previously modified definitions pertaining to "exposed" adequately cover the topic. No negative impact.
Externally Operable. Capable of being operated without exposing the operator to contact with live parts.	Externally Operable. Capable of being operated without exposing the operator to contact with energized electrical conductors or circuit parts.	Part of an effort to reduce slang terms such as "live" in deference to terms such as "energized" and "circuit" as well as part of the scope to include only "definitions essential to the proper application of this standard." No negative impact.
Flash Hazard. A dangerous condition associated with	•	Relocated to "Arc Flash Hazard."

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
the release of energy caused by an electric arc.		No negative impact.
Flash Hazard Analysis. A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices and the appropriate levels of PPE.	•	Relocated to "Arc Flash Hazard Analysis." No negative impact.
Flash Protection Boundary. An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.	•	Relocated to "Boundary, Arc Flash Protection." No negative impact.
Flash Suit. A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and bee-keeper-type hood fitted with a face shield.	•	Relocated to "Arc Flash Suit." No negative impact.
Ground. A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth or to some conducting body that serves in place of the earth.	Ground. The earth.	Modified to coincide with the NEC® definition of "ground." No negative impact.
Grounded. Connected to earth or to some conducting body that serves in place of the earth.	Grounded (Grounding). Connected (connecting) to ground or to a conductive body that extends the ground connection.	Modified to coincide with the NEC® definition of "ground." No negative impact.
	Grounded, Solidly. Connected to ground without inserting any resistor or impedance	Added definition to coincide with the NEC® definition of "solidly grounded."

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	device.	No negative impact.
Grounded, Effectively. Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazards to connected equipment or to persons.	•	Deleted to defer to "Grounded, Solidly" to better align with the NEC® definitions. No negative impact.
Grounding Conductor. A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.	•	Deleted to defer to specific conductor types to better align with the NEC® definitions. No negative impact.
Grounding Conductor, Equipment. The conductor used to connect the non–current-carrying metal parts of equipment, raceways, and other enclosures to the system grounded conductor, the grounding electrode conductor, or both, at the service equipment or at the source of a separately derived system.	Grounding Conductor, Equipment (EGC). The conductive path installed to connect normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.	Modified definition to introduce the acronym EGC and to broaden the definition beyond just equipment, raceways and enclosures to all normally non-current-carrying parts, regardless of location. No negative impact.
	Grounding Electrode. A conducting object through which a direct connection to earth is established.	Added definition of the electrode apart from the conductor. No negative impact.
Grounding Electrode Conductor. The conductor used to connect the grounding electrode(s) to the equipment grounding conductor, to the grounded	Grounding Electrode Conductor. A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on	Simplified definition to align with the NEC® definitions regardless of location. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
conductor, or to both, at each service, at each building or structure where supplied from a common service, or at the source of a separately derived system.	the grounding electrode system.	
Ground-Fault Current Path. An electrically conductive path from the point of a ground fault on a wiring system through normally non–current-carrying conductors, equipment, or the earth to the electrical supply source.	•	Deleted to align with the NEC® definitions. No negative impact.
Health Care Facilities. Buildings or portions of buildings in which medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided. Health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory care centers, whether permanent or movable.	•	Deleted to align with the NEC® definitions. No negative impact.
Heating Equipment. For the purposes of Article 430, the term includes any equipment used for heating purposes whose heat is generated by induction or dielectric methods.	•	Deleted to align with the NEC® definitions. No negative impact.
Hoistway. Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate.	•	Deleted to align with the NEC® definitions. No negative impact.

Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Identified (as applied to equipment). Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular code or standard requirement.	•	Deleted to align with the NEC® definitions. No negative impact.
Induction Heating. The heating of a nominally conductive material due to its own I^2R losses when the material is placed in a varying electromagnetic field.	•	Deleted to align with the NEC® definitions. No negative impact.
	Interrupter Switch. A switch capable of making, carrying, and interrupting specified currents.	Added to align with the NEC® definitions. No negative impact.
	Interrupting Rating. The highest current at rated voltage that a device is intended to interrupt under standard test conditions.	Added to align with the NEC® definitions. No negative impact.
Irrigation Machine. An electrically driven or controlled machine, with one or more motors, not hand portable, and used primarily to transport and distribute water for agricultural purposes.	•	Deleted to align with the NEC® definitions. No negative impact.
Lighting Outlet. An outlet intended for the direct connection of a lampholder, a luminaire (lighting fixture), or a pendant cord terminating in a lampholder.	•	Deleted to align with the NEC® definitions. No negative impact.
Limited Approach Boundary. An approach limit at a distance from an exposed live part within	•	Relocated definition to a grouping for boundaries as “Boundary, Limited Approach” and as part of an

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
which a shock hazard exists.		effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
Location, Damp. Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.	•	Deleted to align with the NEC® definitions. No negative impact.
Location, Dry. A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness and wetness, as in the case of a building under construction.	•	Deleted to align with the NEC® definitions. No negative impact.
Location, Wet. Installations under ground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.	•	Deleted to align with the NEC® definitions. No negative impact.
	Luminaire. A complete lighting unit consisting of a	Revised to align with the NEC® definitions.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	lamp or lamps, together with the parts designed to distribute the light, to position and protect the lamps and ballast (where applicable), and to connect the lamps to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder is not a luminaire.	No negative impact.
Medium Voltage Cable. A single or multiconductor solid dielectric insulated cable rated 2001 volts or higher.	•	Deleted to align with the NEC® definitions. No negative impact.
Metal-Clad Cable. A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath.	•	Deleted to align with the NEC® definitions. No negative impact.
Metal Wireways. Sheet metal troughs with hinged or removable covers for housing and protecting electric wires and cable and in which conductors are laid in place after the wireway has been installed as a complete system.	•	Deleted to align with the NEC® definitions. No negative impact.
Mineral-Insulated Metal-Sheathed Cable. A factory assembly of one or more conductors insulated with a highly compressed refractory mineral insulation and enclosed in a liquidtight and gastight continuous	•	Deleted to align with the NEC® definitions. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
copper or alloy steel sheath.		
Mobile X-Ray. X-ray equipment mounted on a permanent base with wheels, casters, or a combination of both to facilitate moving the equipment while completely assembled.	•	Deleted to align with the NEC® definitions. No negative impact.
	Neutral Conductor. The conductor connected to the neutral point of a system that is intended to carry current under normal conditions.	Added to align with the NEC® definitions. No negative impact.
	Neutral Point. The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, direct-current system.	Added to align with the NEC® definitions. No negative impact.
Nonmetallic-Sheathed Cable. A factory assembly of two or more insulated conductors having an outer sheath of nonmetallic material.	•	Deleted to align with the NEC® definitions. No negative impact.
Nonmetallic Wireways. Flame-retardant, nonmetallic troughs with removable covers for housing and protecting electric wires and cables in which conductors are laid in place after the wireway has been installed as a complete system.	•	Deleted to align with the NEC® definitions. No negative impact.
Outline Lighting. An arrangement of	•	Deleted to align with the NEC® definitions.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
incandescent lamps or electric discharge lighting to outline or call attention to certain features such as the shape of a building or the decoration of a window.		No negative impact.
Oven, Wall-Mounted. An oven for cooking purposes and consisting of one or more heating elements, internal wiring, and built-in or separately mountable controls.	•	Deleted to align with the NEC® definitions. No negative impact.
Power and Control Tray Cable. A factory assembly of two or more insulated conductors, with or without associated bare or covered grounding conductors under a nonmetallic jacket, for installation in cable trays, in raceways, or where supported by a messenger wire.	•	Deleted to align with the NEC® definitions. No negative impact.
Power-Limited Tray Cable. Type PLTC nonmetallic sheathed cable is a factory assembly of two or more insulated conductors under a nonmetallic jacket.	•	Deleted to align with the NEC® definitions. No negative impact.
Premises Wiring (System). That interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed, that extends from the service point or source of power, such as a battery, a solar	Premises Wiring (System). Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes: (a) wiring from the service point or power source to the outlets; or (b) wiring from and including	Modified to align with the NEC® definitions. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
photovoltaic system, or a generator, transformer, or converter windings, to the outlet(s). Such wiring does not include wiring internal to appliances, luminaires (fixtures), motors, controllers, motor control centers, and similar equipment.	the power source to the outlets where there is no service point. Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment.	
Prohibited Approach Boundary. An approach limit at a distance from an exposed live part within which work is considered the same as making contact with the live part.	•	Relocated definition to a grouping for boundaries as “Boundary, Prohibited Approach” and as part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
Qualified Person. One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved.	Qualified Person. One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.	Modified to clarify that the training required needs to include methods to recognize and avoid hazards. No negative impact.
Receptacle Outlet. An outlet where one or more receptacles are installed.	•	Deleted to align with the NEC® definitions. No negative impact.
Restricted Approach Boundary. An approach limit at a distance from an exposed live part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity	•	Relocated definition to a grouping for boundaries as “Boundary, Restricted Approach” and as part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
to the live part.		
Separately Derived System. A premises wiring system whose power is derived from a battery, from a solar photovoltaic system, or from a generator, transformer, or converter windings, and that has no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system.	Separately Derived System. A premises wiring system whose power is derived from a source of electric energy or equipment other than a service. Such systems have no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system.	Modified to align with the NEC® definitions. No negative impact.
Service Cable. Service conductors made up in the form of a cable.	•	Deleted to align with the NEC® definitions. No negative impact.
Service-Entrance Cable. A single conductor or multiconductor assembly provided with or without an overall covering, primarily used for services, and of the following types: Type SE. Service-entrance cable having a flame-retardant, moisture-resistant covering. Type USE. Service-entrance cable, identified for underground use, having a moisture-resistant covering, but not required to have a flame-retardant covering.	•	Deleted to align with the NEC® definitions. No negative impact.
	Service Lateral. The underground service conductors between the street main, including any risers at a pole or other structure or from	Added to align with the NEC® definitions. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	transformers, and the first point of connection to the service-entrance conductors in a terminal box or meter or other enclosure, inside or outside the building wall. Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.	
Shock Hazard. A dangerous condition associated with the possible release of energy caused by contact or approach to live parts.	Shock Hazard. A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.	Modified as part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit.” No negative impact.
	Short-Circuit Current Rating. The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria.	Added to align with the NEC® definitions. No negative impact.
Show Window. Any window used or designed to be used for the display of goods or advertising material, whether it is fully or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the street floor level.	•	Deleted to align with the NEC® definitions. No negative impact.
Signaling Circuit. Any electric circuit that energizes signaling	•	Deleted to align with the NEC® definitions.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
equipment.		No negative impact.
	Single-Line Diagram. A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or system.	Added to align with the NEC® definitions. No negative impact.
	Structure. That which is built or constructed.	Added to align with the NEC® definitions. No negative impact.
	Switchgear, Arc-Resistant. Equipment designed to withstand the effects of an internal arcing fault and that directs the internally released energy away from the employee.	Added to clarify definitions for terms used in the standard. No negative impact.
	Switchgear, Metal-Clad. A switchgear assembly completely enclosed on all sides and top with sheet metal, having drawout switching and interrupting devices, and all live parts enclosed within grounded metal compartments.	Added to clarify definitions for terms used in the standard. No negative impact.
	Switchgear, Metal-Enclosed. A switchgear assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows), containing primary power circuit switching, interrupting devices, or both, with buses and connections. This assembly may include	Added to clarify definitions for terms used in the standard. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both. Metal-enclosed switchgear is available in non-arc-resistant or arc-resistant constructions.	
Switch, Motor Circuit. A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.	•	Deleted to align with the NEC® definitions. No negative impact.
	Switching Device. A device designed to close, open, or both, one or more electric circuits.	Added to clarify definitions for terms used in the standard. No negative impact.
Touch Potential. A ground potential gradient difference that can cause current flow from hand to hand or hand to foot through the body.	Touch Potential. A ground potential gradient difference that can cause current flow from hand to hand, hand to foot, or another path, other than foot to foot, through the body.	Modified to clarify that touch potential can be any two body points other than “foot to foot” which is step potential. No negative impact.
	Ungrounded. Not connected to ground or to a conductive body that extends the ground connection.	Added to align with the NEC® definitions. No negative impact.
Volatile Flammable Liquid. A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and	•	Deleted to align with the NEC® definitions. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
whose temperature is above its flash point.		
Watertight. Constructed so that moisture will not enter the enclosure under specified test conditions.	•	Deleted to align with the NEC® definitions. No negative impact.
Weatherproof. Constructed or protected so that exposure to the weather will not interfere with successful operation.	•	Deleted to align with the NEC® definitions. No negative impact.
Working Near (live parts). Any activity inside a Limited Approach Boundary.	•	Deleted in deference to the definitions of working within specific boundaries such as Limited, Restricted, etc. **Reduction** in safety, this definition is used by 70E-2004 to incorporate an EEWP when working near energized parts as well as on.No negative impact.
Working On (live parts). Coming in contact with live 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.	Working On (energized electrical conductors or circuit parts). Coming in contact with 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. There are two categories of “working on”: Diagnostic (testing) is taking readings or measurements of electrical equipment with approved test equipment that does not require making any physical change to the equipment; repair is any physical alteration of	Modified as part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit” and to further define two types of work addressed by the definition. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	electrical equipment (such as making or tightening connections, removing or replacing components, etc.).	
ARTICLE 110 General Requirements for Electrical Safety-Related Work Practices		
110.1 Scope. Chapter 1 covers electrical safety-related work practices and procedures for employees who work on or near exposed energized electrical conductors or circuit parts in workplaces that are included in the scope of this standard. Electric circuits and equipment not included in the scope of this standard might present a hazard to employees not qualified to work near such facilities. Requirements have been included in Chapter 1 to protect unqualified employees from such hazards.	110.1 Scope. Chapter 1 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. Electric circuits and equipment not included in the scope of this standard might present a hazard to employees not qualified to work near such facilities. Requirements have been included in Chapter 1 to protect unqualified employees from such hazards.	Clarifies that all workers who may be exposed to electrical hazards are covered by the scope of the standard, not just those who work on electrical equipment. Actually increases worker safety by covering all workers exposed to electrical hazards.
110.5 Organization. Chapter 1 of this standard is divided into three articles. Article 110 provides general requirements regarding the preparation for, and conduct of, work performed on or near electrical components regardless of whether such components are energized or not. Article 120 emphasizes working deenergized and describes the work practices used to deenergize electrical	110.4 Organization. Chapter 1 of this standard is divided into four articles. Article 100 provides definitions for terms used in one or more of the chapters of this document. Article 110 provides general requirements for electrical safety related work practices. Article 120 provides requirements for establishing an electrically safe work condition. Article 130 provides requirements	Increased articles to four to accommodate all of the definitions into the new Article 100; redefined Article 110 to simply cover electrical safety related work practices, broadening the application to other than electrical workers; modified Article 120 definition to simply state that establishing an electrically safe work condition is the required method of performing electrical work;

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
components to put them into an electrically safe work condition before attempting work on or near them. Article 130 provides requirements for working on or near electrical components that have not been placed into an electrically safe work condition.	for work involving electrical hazards.	and simplifying Article 130 definition to any work involving electrical hazards. May actually improve worker safety.
110.4 Multiemployer Relationship. (A) Safe Work Practices. On multiemployer worksites (in all industry sectors), more than one employer may be responsible for hazardous conditions that violate safe work practices. (B) Outside Personnel (Contractors, etc.). Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer(s) shall inform each other of existing hazards, personal protective equipment/clothing requirements, safe work practice procedures, and emergency/evacuation procedures applicable to the work to be performed. This coordination shall include a meeting and documentation.	110.5 Relationships with Contractors (Outside Service Personnel, etc.). (A) Host Employer Responsibilities. (1) The host employer shall inform contract employers of: a. Known hazards that are covered by this standard, that are related to the contract employer's work, and that might not be recognized by the contract employer or its employees b. Information about the employer's installation that the contract employer needs to make the assessments required by Chapter 1 (2) The host employer shall report observed contract employer-related violations of this standard to the contract employer. (B) Contract Employer Responsibilities. (1) The contract employer shall ensure that each of	Expanded the old multiemployer relationship section to better define the responsibilities of both the host and the contract employer and clarify the requirements. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	his or her employees is instructed in the hazards communicated to the contract employer by the host employer. This instruction is in addition to the basic training required by this standard. (2) The contract employer shall ensure that each of his or her employees follows the work practices required by this standard and safety-related work rules required by the host employer. (3) The contract employer shall advise the host employer of: a. Any unique hazards presented by the contract employer's work, b. Any unanticipated hazards found during the contract employer's work that the host employer did not mention, and c. The measures the contractor took to correct any violations reported by the host employer under paragraph (A)(2) of this section and to prevent such violation from recurring in the future.	
110.6 Training Requirements. (A) Safety Training. The training requirements contained in this section shall apply to employees who face a risk of electrical	110.6 Training Requirements. (A) Safety Training. The training requirements contained in this section shall apply to employees who face a risk of electrical	With the removal of Chapter 4, which was copied from the NEC, insertion of "applicable" was necessary to refer to it as the installation requirements.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
hazard that is not reduced to a safe level by the electrical installation requirements of Chapter 4.	hazard that is not reduced to a safe level by the applicable electrical installation requirements.	No negative impact.
	……..	
110.6 Training Requirements. (C) Emergency Procedures. Employees working on or near exposed energized electrical conductors or circuit parts shall be trained in methods of release of victims from contact with exposed energized conductors or circuit parts. Employees shall be regularly instructed in methods of first aid and emergency procedures, such as approved methods of resuscitation, if their duties warrant such training.	110.6 Training Requirements. (C) Emergency Procedures. Employees exposed to shock hazards shall be trained in methods of release of victims from contact with exposed energized electrical conductors or circuit parts. Employees shall be regularly instructed in methods of first aid and emergency procedures, such as approved methods of resuscitation, if their duties warrant such training. Training of employees in approved methods of resuscitation, including cardiopulmonary resuscitation, shall be certified by the employer annually.	Clarifies that all workers who may be exposed to electrical hazards are required to be trained, not just those who work on electrical equipment. Adds the requirement to be certified in CPR by the employer annually. Actually increases worker safety by requiring all workers exposed to electrical hazards to be trained.
110.6 Training Requirements. (D) Employee Training. (1) Qualified Person. (c) 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: (1) The skills and techniques necessary to distinguish exposed	110.6 Training Requirements. (D) Employee Training. (1) Qualified Person. (b) Such persons permitted to work within the Limited Approach Boundary of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following: (1) The skills and	Modified as part of an effort to reduce slang terms such as “live” in deference to terms such as “energized” and “circuit” and to further define two types of work addressed by the definition. Relocated (c) and (b) for clarity. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
energized parts from other parts of electrical equipment (2) The skills and techniques necessary to determine the nominal voltage of exposed live parts	techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment (2) The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts	
110.6 Training Requirements. (D) Employee Training. (1) Qualified Person. (b) An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those duties.	110.6 Training Requirements. (D) Employee Training. (1) Qualified Person. (c) An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those duties.	Relocated (c) and (b) for clarity. No negative impact.
	110.6 Training Requirements. (D) Employee Training. (1) Qualified Person. (d) Tasks that are performed less often than once per year shall require retraining before the performance of the work practices involved. (e) Employees shall be trained to select an appropriate voltage detector and shall demonstrate how to use a	Sections (d) and (e) added to reinforce the requirements for training for voltage tester identification and proper use. Actually increases worker safety by requiring all workers using voltage testers to be trained.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	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.	
	110.6 Training Requirements. (D) Employee Training. (3) Retraining. 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 (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 that the employee would normally use (c) If he or she must employ safety-related work practices that are not normally used during his or her regular job duties	New section added to identify additional training requirements as well as retraining requirements. May actually improve worker safety.
	110.6 Training Requirements. (E) Training Documentation. The employer shall document	New section added to make the documentation requirements for training records clear.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	that each employee has received the training required by paragraph 110.6(D). 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.	No negative impact.
110.7 Electrical Safety Program. (A) General. The employer shall implement an overall electrical safety program that directs activity appropriate for the voltage, energy level, and circuit conditions.	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.	Now requires documentation of the overall electrical safety program. No negative impact.
110.7 Electrical Safety Program. (B) Awareness and Self-Discipline. The electrical safety program shall be designed to provide an awareness of the potential electrical hazards to employees who might from time to time work in an environment influenced by the presence of electrical energy. 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	110.7 Electrical Safety Program. (B) Awareness and Self-Discipline. The electrical safety program shall be designed to provide an awareness of the potential electrical hazards to employees who might from time to time work in an environment influenced by the presence of electrical energy. The program shall be developed to provide the required self-discipline for employees who occasionally must perform work that may involve electrical hazards. The program shall instill safety	Modified as part of an effort to eliminate the phrase "on or near" and to broaden applicability to any electrical hazard exposure. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
parts. The program shall instill safety principles and controls.	principles and controls.	
110.7 Electrical Safety Program. (E) Electrical Safety Program Procedures. An electrical safety program shall identify the procedures for working on or near live parts operating at 50 volts or more or where an electrical hazard exists before work is started.	110.7 Electrical Safety Program. (E) Electrical Safety Program Procedures. An electrical safety program shall identify the procedures for working within the Limited Approach Boundary of energized electrical conductors and circuit parts operating at 50 volts or more or where an electrical hazard exists before work is started.	Modified as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. No negative impact.
110.7 Electrical Safety Program. (F) Hazard/Risk Evaluation Procedure. An electrical safety program shall identify a hazard/risk evaluation procedure to be used before work is started on or near live parts operating at 50 volts or more or where an electrical hazard exists.	110.7 Electrical Safety Program. (F) Hazard/Risk Evaluation Procedure. An electrical safety program shall identify a hazard/risk evaluation procedure to be used before work is started within the Limited Approach Boundary of energized electrical conductors and circuit parts operating at 50 volts or more or where an electrical hazard exists. The procedure shall identify the hazard/risk process that shall be used by employees to evaluate tasks before work is started.	Modified as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. Adds identification requirements for hazard/risk process. No negative impact.
	110.7 Electrical Safety Program. (H) Electrical Safety Auditing. An electrical safety program shall be audited to help ensure that the principles and procedures of the electrical	New section added to address the auditing requirements for a complete electrical safety program. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	safety program are being followed. The frequency of audit shall be determined by the employer, based on the complexity of the procedures and the type of work being covered. Where the audit determines that the principles and procedures of the electrical safety program are not being followed, appropriate revisions shall be made.	
110.8 Working On or Near Electrical Conductors or Circuit Parts. (A) General. Safety-related work practices shall be used to safeguard employees from injury while they are working on or near exposed electric conductors or circuit parts that are or can become energized. The specific safety-related work practice shall be consistent with the nature and extent of the associated electric hazards.	110.8 Working While Exposed to Electrical Hazards. (A) General. Safety-related work practices shall be used to safeguard employees from injury while they are exposed to electrical hazards from electrical conductors or circuit parts that are or can become energized. The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.	Modified as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. Adds identification requirements for hazard/risk process. **Reduction** in safety, allows work near to be conducted without an EEWPNo negative impact.
110.8 Working On or Near Electrical Conductors or Circuit Parts. (A) General. (1) Live Parts—Safe Work Condition. Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them, unless work on energized components can	110.8 Working While Exposed to Electrical Hazards. (A) General. (1) Energized Electrical Conductors and Circuit Parts — Safe Work Condition. Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work	Modified as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
be justified according to 130.1.	condition before an employee works within the Limited Approach Boundary of those conductors or parts, unless work on energized components can be justified according to 130.1.	
110.8 Working On or Near Electrical Conductors or Circuit Parts. (A) General. (2) Live Parts—Unsafe Work Condition. Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into an electrically safe work condition.	110.8 Working While Exposed to Electrical Hazards. (A) General. (2) Energized Electrical Conductors and Circuit Parts — Unsafe Work Condition. Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into an electrically safe work condition.	Modified as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit.” No negative impact.
110.8 Working On or Near Electrical Conductors or Circuit Parts. (B) Working On or Near Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized. Prior to working on or near exposed electrical conductors and circuit parts operating at 50 volts or more…..	110.8 Working While Exposed to Electrical Hazards. (B) Working Within the Limited Approach Boundary of Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized. Prior to working within the Limited Approach Boundary of exposed electrical conductors and circuit parts operating at 50 volts or more…….	Modified as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. No negative impact.
110.8 Working On or Near Electrical Conductors or Circuit Parts. (B) Working On or Near Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized.	110.8 Working While Exposed to Electrical Hazards. (B) Working Within the Limited Approach Boundary of Exposed Electrical Conductors or Circuit Parts that Are or Might Become	Modified in multiple parts of this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
(1) Electrical Hazard Analysis.	Energized. (1) Electrical Hazard Analysis.	No negative impact.
110.8 Working On or Near Electrical Conductors or Circuit Parts.	110.8 Working While Exposed to Electrical Hazards.	Clarifies that it is specifically the arc flash hazard analysis referenced here.
(B) Working On or Near Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized.	(B) Working Within the Limited Approach Boundary of Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized.	No negative impact.
(1) Electrical Hazard Analysis.	(1) Electrical Hazard Analysis.	
(b) Flash Hazard Analysis. A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the Flash Protection Boundary and the personal protective equipment that people within the Flash Protection Boundary shall use.	(b) Arc Flash Hazard Analysis. An arc flash hazard analysis shall determine the Arc Flash Protection Boundary and the personal protective equipment that people within the Arc Flash Protection Boundary shall use.	
110.8 Working On or Near Electrical Conductors or Circuit Parts.	110.8 Working While Exposed to Electrical Hazards.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit.”
(B) Working On or Near Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized.	(B) Working Within the Limited Approach Boundary of Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized.	No negative impact.
(2) Energized Electrical Work Permit. If live parts are not placed in an electrically safe work condition……..	(2) Energized Electrical Work Permit. When working on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition……	
110.9 Use of Equipment. (A) Test Instruments and Equipment.	110.9 Use of Equipment. (A) Test Instruments and Equipment. (4) Operation Verification.	New section added to specifically address the methodology to assure functionality of test devices

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	When test instruments are used for the testing for the absence of voltage on conductors or circuit parts operating at 50 volts or more, the operation of the test instrument shall be verified before and after an absence of voltage test is performed.	for absence of voltage. May actually improve worker safety.
110.9 Use of Equipment. (B) Portable Electric Equipment. (2) Grounding-Type Equipment. (b) Attachment plugs and receptacles shall not be connected or altered in a manner that would interrupt continuity of the equipment grounding conductor at the point where plugs are attached to receptacles. Additionally, these devices shall not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current-carrying conductors.	110.9 Use of Equipment. (B) Portable Electric Equipment. (2) Grounding-Type Equipment. (b) Attachment plugs and receptacles shall not be connected or altered in a manner that would interrupt continuity of the equipment grounding conductor. Additionally, these devices shall not be altered in order to allow use in a manner that was not intended by the manufacturer.	Broadened the application of this section by deleting “at the point where plugs are attached to receptacles” and by simply referring to the manufacturer intended use. May actually improve worker safety.
110.9 Use of Equipment. (B) Portable Electric Equipment. (3) Visual Inspection of Portable Cord-and-Plug-Connected Equipment and Flexible Cord Sets. (a) Frequency of Inspection. Before use on any shift, portable cord-and-plug-connected equipment shall be visually inspected for external defects (such as loose	110.9 Use of Equipment. (B) Portable Electric Equipment. (3) Visual Inspection of Portable Cord-and-Plug-Connected Equipment and Flexible Cord Sets. (a) Frequency of Inspection. Before each use, portable cord-and-plug-connected equipment shall be visually inspected for external defects (such as loose parts or deformed	Clarified the frequency of inspection to indicate that it is before each use, not just each shift. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
parts, deformed and missing pins) and for evidence of possible internal damage (such as pinched or crushed outer jacket).	and missing pins) and for evidence of possible internal damage (such as a pinched or crushed outer jacket).	
110.9 Use of Equipment. (D) Overcurrent Protection Modification. Overcurrent protection of circuits and conductors shall not be modified, even on a temporary basis, beyond that permitted by 410.9(A) and 410.9(B).	110.9 Use of Equipment. (D) Overcurrent Protection Modification. Overcurrent protection of circuits and conductors shall not be modified, even on a temporary basis, beyond that permitted by applicable portions of electrical codes and standards dealing with overcurrent protection.	Broadened the application of the section by referencing "applicable portions of electrical codes and standards dealing with overcurrent protection" instead of now non-existent sections of NFPA 70E. No negative impact.
ARTICLE 120 Establishing an Electrically Safe Work Condition		
120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (A) General. All electrical circuit conductors and circuit parts shall be considered energized until the source(s) of energy is (are) removed, at which time they shall be considered deenergized. All electrical circuit conductors and circuit parts shall not be considered to be in an electrically safe condition until all sources of energy are removed, the disconnecting means is under lockout/tagout, the absence of voltage is verified by an approved voltage testing device, and,	120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (A) General. All electrical circuit conductors and circuit parts shall be considered energized until the source(s) of energy is (are) removed, at which time they shall be considered deenergized. All electrical conductors and circuit parts shall not be considered to be in an electrically safe work condition until all of the applicable requirements of Article 120 have been met.	Shortened the section by deleting the specific items mentioned previously for satisfying that a safe condition exists in lieu of requiring all of Article 120 for assuring that a safe work condition exists. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
where exposure to energized facilities exists, are temporarily grounded.		
120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (D) Hazardous Electrical Energy Control Procedure. (2) Simple Lockout/Tagout Procedure. All lockout/tagout procedures that are not under individual qualified employee control [see 120.2(D)(1)] or complex lockout/tagout [see 120.2(D)(3)] shall be considered to be simple lockout/tagout procedures. All lockout/tagout procedures that involve only a qualified person(s) deenergizing one set of conductors or circuit part source for the sole purpose of performing work on or near electrical equipment shall be considered to be a simple lockout/tagout. Simple lockout/tagout plans shall not be required to be written for each application. Each worker shall be responsible for his or her own lockout/tagout.	120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (D) Hazardous Electrical Energy Control Procedure. (2) Simple Lockout/Tagout Procedure. All lockout/tagout procedures that are not under individual qualified employee control according to 120.2(D)(1) or complex lockout/tagout according to 120.2(D)(3) shall be considered to be simple lockout/tagout procedures. All lockout/tagout procedures that involve only a qualified person(s) deenergizing one set of conductors or circuit part source for the sole purpose of performing work within the Limited Approach Boundary electrical equipment shall be considered to be a simple lockout/tagout. Simple lockout/tagout plans shall not be required to be written for each application. Each worker shall be responsible for his or her own lockout/tagout.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. No negative impact.
120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (D) Hazardous Electrical	120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (D) Hazardous Electrical	Simplifies the section regarding the complex lockout/tagout procedure requirements including the responsibilities of the person in charge and

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Energy Control Procedure. (3) Complex Lockout/Tagout Procedure. (b) A person shall be in charge of a complex lockout/tagout procedure. Such person shall be a qualified individual who is specifically appointed with overall responsibility to ensure that all energy sources are under lockout/tagout and to account for all persons working on the job/task. (c) The complex lockout/tagout procedure shall identify the person in charge. In this (these) instance(s), the person in charge shall be permitted to install locks/tags, or direct their installation, on behalf of other employees. The person-in-charge shall be held accountable for safe execution of the complex lockout/tagout. The complex lockout/tagout procedure shall address all the concerns of employees who might be exposed. All complex lockout/tagout procedures shall require a written plan of execution that identifies the person in charge. All complex lockout/tagout plans shall identify the method to account for all persons who might be exposed to electrical hazards in the course of the lockout/tagout.	Energy Control Procedure. (3) Complex Lockout/Tagout Procedure. (b) All complex lockout/tagout procedures shall require a written plan of execution that identifies the person in charge. (c) The complex lockout/tagout procedure shall vest primary responsibility in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operation lock). The person in charge shall be held accountable for safe execution of the complex lockout/tagout. (d) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.	specifically requiring each worker to hang a lock (or tag) when working under the lockout/tagout. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (E) Equipment. (3) Lockout Device. (e) The tag used in conjunction with a lockout device shall contain a statement prohibiting unauthorized operation of the disconnecting means or unauthorized removal of the device.	120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (E) Equipment. (3) Lockout Device. (e) Where a tag is used in conjunction with a lockout device, the tag shall contain a statement prohibiting unauthorized operation of the disconnecting means or unauthorized removal of the device.	Minimal change, but allows for a different scenario to be prescribed for situations where a tag is not used in conjunction with a lockout device or for when a lockout device is used without a tag. No negative impact.
120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (F) Procedures. (1) Planning. (b) Exposed Persons. The plan shall identify persons who might be exposed to an electrical hazard during the execution of the job or task.	120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (F) Procedures. (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.	Adds the requirement for the plan to include PPE for the exposed workers. May actually improve worker safety.
120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (F) Procedures. (2) Elements of Control. (f) Testing. The procedure shall establish the following: (1) What voltage detector will be used and who will use it to verify proper operation of the voltage	120.2 Deenergized Electrical Conductors or Circuit Parts That Have Lockout/Tagout Devices Applied. (F) Procedures. (2) Elements of Control. (f) Testing. The procedure shall establish the following: (1) What voltage detector will be used, the required personal protective	Adds the requirement for the testing procedure to include PPE for the workers involved. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
detector before and after use	equipment, and who will use it to verify proper operation of the voltage detector before and after use	
ARTICLE 130 Work Involving Electrical Hazards		
130.1 Justification for Work. Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Energized parts that operate at less than 50 volts to ground shall not be not required to be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.	130.1 Justification for Work. (A) General. Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works within the Limited Approach Boundary of those conductors or parts. (1) Greater Hazard. Energized work shall be permitted where the employer can demonstrate that deenergizing introduces additional or increased hazards. (2) Infeasibility. Energized work shall be permitted where the employer can demonstrate that the task to be performed is infeasible in a deenergized state due to equipment design or operational limitations. (3) Less Than 50 Volts. Energized electrical conductors and circuit parts that operate at less than 50 volts to ground shall not be required to be deenergized where the capacity of the source and any overcurrent protection between the	Significantly improves the clarity of this section by specifically itemizing the criteria for allowing work on energized electrical conductors and circuit parts and provides specific guidance for less than 50 volts scenarios. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	energy source and the worker are considered and it is determined that there will be no increased exposure to electrical burns or to explosion due to electric arcs.	
130.1 Justification for Work. (A) Energized Electrical Work Permit. (1) Where Required. If live parts 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.	130.1 Justification for Work. (B) Energized Electrical Work Permit. (1) Where Required. When working on energized electrical conductors or circuit parts that 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.	Clarifies the intent that the permit is required for work actually performed on energized parts. **Reduction** in safety, allows work near to be conducted without an EEWP No negative impact.
130.1 Justification for Work. (A) Energized Electrical Work Permit. (3) Exemptions to Work Permit. Work performed on or near live parts by qualified persons related to tasks such as testing, troubleshooting, voltage measuring, etc., shall be permitted to be performed without an energized electrical work permit, provided appropriate safe work practices and personal protective equipment in accordance with Chapter 1 are provided and used.	130.1 Justification for Work. (B) Energized Electrical Work Permit. (3) Exemptions to Work Permit. Work performed within the Limited Approach Boundary of energized electrical conductors or circuit parts by qualified persons related to tasks such as testing, troubleshooting, voltage measuring, etc., shall be permitted to be performed without an energized electrical work permit, provided appropriate safe work practices and personal protective equipment in accordance	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. Adds the allowance for visual inspection without a permit. **Reduction** in safety, allows work near to be conducted without an EEWP

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	with Chapter 1 are provided and used. 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.	
130.2 Approach Boundaries to Live Parts. (B) Shock Protection Boundaries. The shock protection boundaries identified as Limited, Restricted, and Prohibited Approach Boundaries are applicable to the situation in which approaching personnel are exposed to live parts. See Table 130.2(C) for the distances associated with various system voltages.	130.2 Approach Boundaries to Energized Electrical Conductors or Circuit Parts. (B) Shock Protection Boundaries. The shock protection boundaries identified as Limited, Restricted, and Prohibited Approach Boundaries are applicable to the situation in which approaching personnel are exposed to energized electrical conductors or circuit parts. See Table 130.2(C) for the distances associated with various system voltages.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to refer to the boundary limits. No negative impact.
130.2 Approach Boundaries to Live Parts. (C) Approach to Exposed Live Parts Operating at 50 Volts or More. No qualified person shall approach or take any conductive object closer to exposed live parts operating at 50 volts or more than the Restricted Approach Boundary set forth in Table 130.2(C), unless any of the following apply: (1) The qualified person is insulated or guarded from	130.2 Approach Boundaries to Energized Electrical Conductors or Circuit Parts. (C) Approach to Exposed Energized Electrical Conductors or Circuit Parts Operating at 50 Volts or More. No qualified person shall approach or take any conductive object closer to exposed energized electrical conductors or circuit parts operating at 50 volts or more than the	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit” and to identify section 130.2(C) as providing the protective measures for the worker. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
the live parts operating at 50 volts or more (insulating gloves or insulating gloves and sleeves are considered insulation only with regard to the energized parts upon which work is being performed), and no uninsulated part of the qualified person's body crosses the Prohibited Approach Boundary set forth in Table 130.2(C). (2) The live part operating at 50 volts or more is insulated from the qualified person and from any other conductive object at a different potential.	Restricted Approach Boundary set forth in Table 130.2(C), unless any of the following apply: (1) The qualified person is insulated or guarded from the energized electrical conductors or circuit parts operating at 50 volts or more and no uninsulated part of the qualified person's body crosses the Prohibited Approach Boundary set forth in Table 130.2(C). Insulating gloves or insulating gloves and sleeves are considered insulation only with regard to the energized parts upon which work is being performed. If there is a need for an uninsulated part of the qualified person's body to cross the Prohibited Approach Boundary, a combination of Sections 130.2(C)(1), 130.2(C)(2), and 130.2(C)(3) shall be used to protect the uninsulated body parts. (2) The energized electrical conductors or circuit part operating at 50 volts or more are insulated from the qualified person and from any other conductive object at a different potential.	
Table 130.2(C) Approach Boundaries to Live Parts for Shock Protection. (All dimensions are distance	Table 130.2(C) Approach Boundaries to Energized Electrical Conductors or Circuit Parts for Shock	Modifies Table 130.2(C) as part of an effort to reduce slang terms such as "live" and "on or near" in

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
from live part to employee.)	Protection (All dimensions are distance from energized electrical conductor or circuit part to employee.) [Footnotes] Phase to Phase[2] [2] For single-phase systems, select the range that is equal to the system's maximum phase-to-ground voltage multiplied by 1.732. Exposed Movable Conductor[3] [3] A condition in which the distance between the conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles.	deference to terms such as "energized" and "circuit" and to refer to the boundary limits. Added explanatory footnotes for "Phase-to-Phase" and "Exposed Movable Conductor." Higher voltage system distances were increased. No negative impact.
130.3 Flash Hazard Analysis. A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the Flash Protection Boundary and the personal protective equipment that people within the Flash Protection Boundary shall use.	130.3 Arc Flash Hazard Analysis. An arc flash hazard analysis shall determine the Arc Flash Protection Boundary and the personal protective equipment that people within the Arc Flash Protection Boundary shall use. The arc 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	The addition of Exception No. 1 provides some relief for the lower voltage situations utilizing small transformers (<125kVA) and Exception No. 2 continues the use of the tables as an alternative to incident energy analysis. No negative impact to worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	distribution system that could affect the results of the arc flash hazard analysis. The arc flash hazard analysis shall take into consideration the design of the overcurrent protective device and its opening time, including its condition of maintenance. *Exception No. 1: An arc flash hazard analysis shall not be required where all of the following conditions exist:* *(1) The circuit is rated 240 volts or less.* *(2) The circuit is supplied by one transformer.* *(3) The transformer supplying the circuit is rated less than 125 kVA.* *Exception No. 2: The requirements of 130.7(C)(9), 130.7(C)(10), and 130.7(C)(11) shall be permitted to be used in lieu of a detailed incident energy analysis.*	
130.3 Flash Hazard Analysis. (A) Flash Protection Boundary. For systems that are 600 volts or less, the Flash Protection Boundary shall be 4.0 ft, based on the product of clearing times of 6 cycles (0.1 second) and the available bolted fault current of 50 kA or any	130.3 Arc Flash Hazard Analysis. (A) Arc Flash Protection Boundary. (1) Voltage Levels Between 50 Volts and 600 Volts. In those cases where detailed arc flash hazard analysis calculations are not performed for systems that are between 50 volts and 600 volts, the Arc Flash	Completely rewritten section which incorporates the TIA 04-1, deletes the formula (moving it to Annex D) and corrects “600 volts or less” to “between 50 volts and 600 volts.” Places more restrictions on the use of the tables and tightens the requirements for required calculations.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
combination not exceeding 300 kA cycles (5000 ampere seconds). For clearing times and bolted fault currents other than 300 kA cycles, or under engineering supervision, the Flash Protection Boundary shall alternatively be permitted to be calculated in accordance with the following general formula: [Formula and Terms]	Protection Boundary shall be 4.0 ft, based on the product of clearing time of 2 cycles (0.033 sec) and the available bolted fault current of 50 kA or any combination not exceeding 100 kA cycles (1667 ampere seconds). When the product of clearing times and bolted fault current exceeds 100 kA cycles, the Arc Flash Protection Boundary shall be calculated.	No negative impact to worker safety.
At voltage levels above 600 volts, the Flash Protection Boundary is the distance at which the incident energy equals 5 J/cm2(1.2 cal/cm2). For situations where fault-clearing time is 0.1 second (or faster), the Flash Protection Boundary is the distance at which the incident energy level equals 6.24 J/cm2(1.5 cal/cm2).	(2) Voltage Levels Above 600 Volts. At voltage levels above 600 volts, the Arc Flash Protection Boundary shall be the distance at which the incident energy equals 5 J/cm2 (1.2 cal/cm2). For situations where fault-clearing time is equal to or less than 0.1 sec, the Arc Flash Protection Boundary shall be the distance at which the incident energy level equals 6.24 J/cm2 (1.5 cal/cm2).	
130.3 Flash Hazard Analysis. (B) Protective Clothing and Personal Protective Equipment for Application with a Flash Hazard Analysis. Where it has been determined that work will be performed within the Flash Protection Boundary by 130.3(A), the flash hazard	130.3 Arc Flash Hazard Analysis. (B) Protective Clothing and Other Personal Protective Equipment (PPE) for Application with an Arc Flash Hazard Analysis. Where it has been determined that work will be performed within the Arc Flash Protection Boundary identified by 130.3(A), one	Clarifies the requirements for the determination of the PPE to be used to perform work and reorganizes the section. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
analysis shall determine, and the employer shall document, the incident energy exposure of the worker (in calories per square centimeter). The incident energy exposure level shall be based on the working distance of the employee's face and chest areas from a prospective arc source for the specific task to be performed. Flame-resistant (FR) clothing and personal protective equipment (PPE) shall be used by the employee based on the incident energy exposure associated with the specific task. Recognizing that incident energy increases as the distance from the arc flash decreases, additional PPE shall be used for any parts of the body that are closer than the distance at which the incident energy was determined As an alternative, the PPE requirements of 130.7(C)(9) shall be permitted to be used in lieu of the detailed flash hazard analysis approach described in 130.3(A).	of the following methods shall be used for the selection of protective clothing and other personal protective equipment: (1) Incident Energy Analysis. The incident energy analysis shall determine, and the employer shall document, the incident energy exposure of the worker (in calories per square centimeter). The incident energy exposure level shall be based on the working distance of the employee's face and chest areas from a prospective arc source for the specific task to be performed. Arc-Rated FR clothing and other personal protective equipment (PPE) shall be used by the employee based on the incident energy exposure associated with the specific task. Recognizing that incident energy increases as the distance from the arc flash decreases, additional PPE shall be used for any parts of the body that are closer than the distance at which the incident energy was determined. (2) Hazard/Risk Categories. The requirements of 130.7(C)(9), 130.7(C)(10), and 130.7(C)(11) shall be permitted to be used for the selection and use of	

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	personal and other protective equipment.	
130.3 Flash Hazard Analysis.	130.3 Arc Flash Hazard Analysis. (C) Equipment Labeling. Equipment shall be field marked with a label containing the available incident energy or required level of PPE.	New section which requires specific information to be included on equipment arc flash labels and formally requires field labeling of equipment. No negative impact to worker safety, but will drastically change the policies and procedures for electrical equipment.
130.4 Test Instruments and Equipment Use. Only qualified persons shall perform testing work on or near live parts operating at 50 volts or more.	130.4 Test Instruments and Equipment Use. Only qualified persons shall perform testing work within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." No negative impact.
130.5 Work On or Near Uninsulated Overhead Lines. (D) Approach Distances for Unqualified Persons. When employees without electrical training are working on the ground or in an elevated position near overhead lines, the location shall be such that the employee and the longest conductive object the employee might contact cannot come closer to any unguarded, energized overhead power line than the Limited Approach Boundary. If the voltage on the line exceeds 50 kV, the	130.5 Work Within the Limited Approach Boundary of Uninsulated Overhead Lines. (D) Approach Distances for Unqualified Persons. When unqualified persons are working on the ground or in an elevated position near overhead lines, the location shall be such that the employee and the longest conductive object the employee might contact do not come closer to any unguarded, energized overhead power line than the Limited Approach Boundary in Table 130.2(C), Column 2.	Clarifies the intent of determining unqualified persons and instead of providing a formula, refers the user to Table 130.2(C). No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
distance shall be 3.04 m (10 ft) plus 100 mm (4 in.) for every 10 kV over 50 kV.		
130.6 Other Precautions for Personnel Activities. (A) Alertness. (1) When Hazardous. Employees shall be instructed to be alert at all times when they are working near live parts operating at 50 volts or more and in work situations where unexpected electrical hazards might exist. (2) When Impaired. Employees shall not knowingly be permitted to work in areas containing live parts parts operating at 50 volts or more or other electrical hazards while their alertness is recognizably impaired due to illness, fatigue, or other reasons.	130.6 Other Precautions for Personnel Activities. (A) Alertness. (1) When Hazardous. Employees shall be instructed to be alert at all times when they are working within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more and in work situations where electrical hazards might exist. (2) When Impaired. Employees shall not be permitted to work within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more, or where other electrical hazards exist, while their alertness is recognizably impaired due to illness, fatigue, or other reasons. (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.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." Added new section to address the real danger of job scope changes potentially taking the worker outside the bounds of the safe energy state. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
130.6 Other Precautions for Personnel Activities. (B) Blind Reaching. Employees shall be instructed not to reach blindly into areas that might contain exposed live parts where an electrical hazard exists.	130.6 Other Precautions for Personnel Activities. (B) Blind Reaching. Employees shall be instructed not to reach blindly into areas that might contain exposed energized electrical conductors or circuit parts where an electrical hazard exists.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." No negative impact.
130.6 Other Precautions for Personnel Activities. (C) Illumination. (1) General. Employees shall not enter spaces containing live parts unless illumination is provided that enables the employees to perform the work safely. (2) Obstructed View of Work Area. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task near live parts operating at 50 volts or more or where an electrical hazard exists.	130.6 Other Precautions for Personnel Activities. (C) Illumination. (1) General. Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely. (2) Obstructed View of Work Area. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." No negative impact.
130.6 Other Precautions for Personnel Activities. (D) Conductive Articles Being Worn. Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal	130.6 Other Precautions for Personnel Activities. (D) Conductive Articles Being Worn. Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed live parts.	headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed energized electrical conductors or circuit parts.	
130.6 Other Precautions for Personnel Activities. (E) Conductive Materials, Tools, and Equipment Being Handled. (1) General. Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with live parts. Such materials and equipment include, but are not limited to, long conductive objects, such as ducts, pipes and tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, bull floats, and chains. (2) Approach to Live Parts. Means shall be employed to ensure that conductive materials approach exposed live parts no closer than that permitted by Table 130.2(C).	130.6 Other Precautions for Personnel Activities. (E) Conductive Materials, Tools, and Equipment Being Handled. (1) General. Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with energized electrical conductors or circuit parts. Such materials and equipment include, but are not limited to, long conductive objects, such as ducts, pipes and tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, bull floats, and chains. (2) Approach to Energized Electrical Conductors and Circuit Parts. Means shall be employed to ensure that conductive materials approach exposed energized electrical conductors or circuit parts no closer than that permitted by 130.2.	Modified this section as part of an effort to reduce slang terms such as "live" and "on or near" in deference to terms such as "energized" and "circuit." No negative impact.
130.6 Other Precautions for Personnel Activities.	130.6 Other Precautions for Personnel Activities.	Modified this section as part of an effort to reduce slang

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
(F) Confined or Enclosed Work Spaces. When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed live parts operating at 50 volts or more or an electrical hazard exists, the employer shall provide, and the employee shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to contact exposed live parts operating at 50 volts or more or where an electrical hazard exists.	(F) Confined or Enclosed Work Spaces. When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists, the employer shall provide, and the employee shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts and the effects of the electrical hazards. Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to contact exposed energized electrical conductors or circuit parts rating at 50 volts or more or where an electrical hazard exists.	terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." No negative impact.
130.6 Other Precautions for Personnel Activities. (G) Housekeeping Duties. Where live parts present an electrical contact hazard, employees shall not perform housekeeping duties……	130.6 Other Precautions for Personnel Activities. (G) Housekeeping Duties. Where energized electrical conductors or circuit parts present an electrical contact hazard, employees shall not perform housekeeping duties……	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." No negative impact.
130.7 Personal and Other Protective Equipment. (B) Care of Equipment. Protective equipment shall be maintained in a safe,	130.7 Personal and Other Protective Equipment. (B) Care of Equipment. Protective equipment shall be maintained in a safe,	Adds storage requirements and precautions for PPE. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
reliable condition. The protective equipment shall be visually inspected before each use.	reliable condition. The protective equipment shall be visually inspected before each use. Protective equipment shall be stored in a manner to prevent damage from physically damaging conditions and from moisture, dust, or other deteriorating agents.	
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (1) General. When an employee is working within the Flash Protection Boundary he/she shall wear protective clothing and other personal protective equipment in accordance with 130.3.	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (1) General. When an employee is working within the Arc Flash Protection Boundary he or she shall wear protective clothing and other personal protective equipment in accordance with 130.3. All parts of the body inside the Arc Flash Protection Boundary shall be protected.	Adds new requirement that all body parts within the arc flash protection boundary must be protected. This requirement was inferred, but was often misinterpreted. May actually improve worker safety.
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (3) Head, Face, Neck, and Chin Protection. Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with live parts or from flying objects resulting from electrical explosion. Employees shall wear nonconductive protective equipment for the face, neck, and chin whenever	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (3) Head, Face, Neck, and Chin (Head Area) Protection. Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with energized electrical conductors or circuit parts or from flying objects resulting from electrical explosion. Employees shall wear nonconductive	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." Added requirements for hair nets and beard nets. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
there is a danger of injury from exposure to electric arcs or flashes or from flying objects resulting from electrical explosion.	protective equipment for the face, neck, and chin whenever there is a danger of injury from exposure to electric arcs or flashes or from flying objects resulting from electrical explosion. If employees use hairnets and/or beard nets, these items must be non-melting and flame resistant.	
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (5) Body Protection. Employees shall wear FR clothing wherever there is possible exposure to an electric arc flash above the threshold incident-energy level for a second degree burn, 5 J/cm2 (1.2 cal/cm2). *Exception: For incident-energy exposures 8.36 J/cm2 (2 cal/cm2) and below, employees may wear non-melting clothing described in Hazard/Risk Category 0 in Table 130.7(C)(11).*	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (5) Body Protection. Employees shall wear FR clothing wherever there is possible exposure to an electric arc flash above the threshold incident-energy level for a second degree burn, 5 J/cm2 (1.2 cal/cm2). •	Eliminates the exception which allowed Hazard Risk Category 0 clothing to be worn for exposures below 2 cal/cm^2. May actually improve worker safety.
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (6) Hand and Arm Protection. Employees shall wear rubber insulating gloves where there is danger of hand and arm injury from electric shock due to contact with live parts. Hand and arm	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (6) Hand and Arm Protection. Hand and arm protection shall be provided in accordance with (a), (b), and (c) below. (a) Shock Protection. Employees shall wear	Revised the entire section reorganizing it into three subsections that specifically address shock protective equipment, arc flash protective equipment and the maintenance of all protective equipment. Specific guidance is provided for testing equipment as well.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
protection shall be worn where there is possible exposure to arc flash burn. The apparel described in 130.7(C)(13)(c) shall be required for protection of hands from burns. Arm protection shall be accomplished by apparel described in 130.7(C)(5).	rubber insulating gloves with leather protectors where there is a danger of hand injury from electric shock due to contact with energized electrical conductors or circuit parts. Employees shall wear rubber insulating gloves with leather protectors and rubber insulating sleeves where there is a danger of hand and arm injury from electric shock due to contact with energized electrical conductors or circuit parts. Rubber insulating gloves shall be rated for the voltage for which the gloves will be exposed. *Exception: Where it is necessary to use rubber insulating gloves without leather protectors, the requirements of ASTM F 496, Standard Specification for In-Service Care of Insulating Gloves and Sleeves, shall be met.* (b) Arc Flash Protection. Hand and arm protection shall be worn where there is possible exposure to arc flash burn. The apparel described in 130.7(C)(13)(c) shall be required for protection of hands from burns. Arm protection shall be accomplished by the apparel described in	May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	130.7(C)(5). (c) Maintenance and Use. Electrical protective equipment shall be maintained in a safe, reliable condition. Insulating equipment shall be inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test, along with the inspection. Electrical protective equipment shall be subjected to periodic electrical tests. Test voltages and the maximum intervals between tests shall be in accordance with Table 130.7(C)(6)(c).	
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (9) Selection of Personal Protective Equipment. (a) When Required for Various Tasks. When selected in lieu of the flash hazard analysis of 130.3(A), Table 130.7(C)(9)(a) shall be used to determine the hazard/risk category for a task. The assumed short-circuit current capacities and fault clearing times for various tasks are listed in the text and notes to Table 130.7(C)(9)(a). For tasks	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (9) Selection of Personal Protective Equipment When Required for Various Tasks. Where selected in lieu of the incident energy analysis of 130.3(B)(1), Table 130.7(C)(9) shall be used to determine the hazard/risk category and requirements for use of rubber insulating gloves and insulated and insulating hand tools for a task. The assumed maximum short-circuit current capacities and	Adds reference to rubber insulating protective equipment to be used within the respective Hazard/Risk Category. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
not listed, or for power systems with greater than the assumed short-circuit current capacity or with longer than the assumed fault clearing times, a flash hazard analysis shall be required in accordance with 130.3.	maximum fault clearing times for various tasks are listed in the notes to Table 130.7(C)(9). For tasks not listed, or for power systems with greater than the assumed maximum short-circuit current capacity or with longer than the assumed maximum fault clearing times, an arc flash hazard analysis shall be required in accordance with 130.3.	
Table 130.7(C)(9)(a) Hazard/Risk Category Classifications Task (Assumes Equipment Is Energized, and Work Is Done Within the Flash Protection Boundary) V-rated Gloves V-rated Tools	Table 130.7(C)(9) Hazard/Risk Category Classifications and Use of Rubber Insulating Gloves and Insulated and Insulating Hand Tools Tasks Performed on Energized Equipment Rubber Insulating Gloves Insulated and Insulating Hand Tools	Changed table title to specifically address rubber glove and insulated tool use; changed task column title to indicate “work on”; changed V-Rated to specifically rubber insulated for gloves and tools column titles. Throughout table, changed “parts” to “electrical conductors or circuit parts” to be consistent with other wording changes in the standard. No negative impact.
Table 130.7(C)(9)(a) Panelboards Rated 240 V and Below — Notes 1 and 3	Table 130.7(C)(9) Panelboards or Other Equipment Rated 240 V and Below — Note 1 Perform infrared thermography and other non-contact inspections outside the restricted approach boundary Work on energized	Allows for other equipment similar to panelboards to be addressed by the section; deleted Note 3 reference as the original Note 3 was deleted; Added two tasks to address thermography and work downstream of the panel. Thermography addition was needed for that specific

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panelboard	activity, but the work downstream task could be improperly interpreted and cause significant over dressing for the tasks performed. No negative impact to worker safety.
Table 130.7(C)(9)(a) Panelboards or Switchboards Rated >240 V and up to 600 V (with molded case or insulated case circuit breakers) — Notes 1 and 3	Table 130.7(C)(9) Panelboards or Switchboards Rated >240 V and up to 600 V (with molded case or insulated case circuit breakers) — Note 1	Deleted Note 3 reference as the original Note 3 was deleted. Added insulating rubber glove requirement for CB operation with covers off.
	Perform infrared thermography and other non-contact inspections outside the restricted approach boundary Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panelboard or switchboard	Thermography addition was needed for that specific activity, but the work downstream task could be improperly interpreted and cause significant over dressing for the tasks performed. No negative impact to worker safety.
Table 130.7(C)(9)(a) 600 V Class Motor Control Centers (MCCs) — Notes 2 (except as indicated) and 3	Table 130.7(C)(9) 600 V Class Motor Control Centers (MCCs) — Note 2 (except as indicated)	Deleted Note 3 reference as the original Note 3 was deleted.
	Perform infrared thermography and other non-contact inspections outside the restricted approach boundary	Increased Hazard/Risk Category (HRC) for insertion/removal of buckets from HRC 3 to HRC 4.
	Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a	Increased HRC for removal of bolted covers from HRC 2* to HRC 4. Thermography addition was

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	branch circuit of the motor control center	needed for that specific activity, but the work downstream task could be improperly interpreted and cause significant over dressing for the tasks performed. No negative impact to worker safety, but additional PPE requirements will mean modifications to existing arc flash labels will be necessary.
Table 130.7(C)(9)(a) 600 V Class Switchgear (with power circuit breakers or fused switches) — Notes 5 and 6	Table 130.7(C)(9) 600 V Class Switchgear (with power circuit breakers or fused switches) — Note 4	Deleted Note 6 reference as the original Note 6 was deleted. Original Note 5 becomes new Note 4.
	Perform infrared thermography and other non-contact inspections outside the restricted approach boundary	Thermography addition was needed for that specific activity. Increased HRC for insertion/removal of CB's to HRC 4 with doors open or closed. Increased HRC for removal of bolted covers from HRC 3 to HRC 4. No negative impact to worker safety, but additional PPE requirements will mean modifications to existing arc flash labels will be necessary.
Table 130.7(C)(9)(a) Other 600 V Class (277 V through 600 V, nominal)	Table 130.7(C)(9) Other 600 V Class (277 V through 600 V, nominal)	Deleted Note 3 reference as the original Note 3 was deleted. Added Note 2

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Equipment — Note 3	Equipment — Note 2 (except as indicated)	since it was determined to apply to this equipment.
	Insertion or removal of plug-in devices into or from busways	Realigned the task titles such that the confusion previously experienced will be reduced. Added busway plug-in device insertion/removal.
Table 130.7(C)(9)(a) NEMA E2 (fused contactor) Motor Starters, 2.3 kV Through 7.2 kV	Table 130.7(C)(9) NEMA E2 (fused contactor) Motor Starters, 2.3 kV Through 7.2 kV	No negative impact. Thermography addition was needed for that specific activity.
	Perform infrared thermography and other non-contact inspections outside the restricted approach boundary	"Work on energized electrical conductors and circuit parts, including voltage testing" – HRC increased from HRC 3 to HRC 4.
	Insertion or removal (racking) of starters from cubicles of arc-resistant construction, tested in accordance with IEEE C37.20.7, doors closed only	Increased HRC for insertion/removal of starters to HRC 4 with doors open or closed. Added task for arc-resistant equipment. No negative impact to worker safety, but additional PPE requirements will mean modifications to existing arc flash labels will be necessary.
Table 130.7(C)(9)(a) Metal Clad Switchgear, 1 kV and Above	Table 130.7(C)(9) Metal Clad Switchgear, 1 kV Through 38 kV	Changed task heading to limit applicability to 38kV maximum.
	Perform infrared thermography and other	Thermography addition was needed for that specific

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	non-contact inspections outside the restricted approach boundary	activity. Increased HRC for insertion/removal of CB's to HRC 4 with doors open or closed. No negative impact to worker safety, but additional PPE requirements will mean modifications to existing arc flash labels will be necessary.
Table 130.7(C)(9)(a)	Table 130.7(C)(9) Arc-Resistant Switchgear Type 1 or 2 (for clearing times of <0.5 sec with a perspective fault current not to exceed the arc resistant rating of the equipment)	Added new section to address tasks involving arc-resistant switchgear not previously addressed. Tasks are much the same as for other switchgear tasks, but the PPE is significantly reduced. No negative impact.
Table 130.7(C)(9)(a) Other Equipment 1 kV and Above	Table 130.7(C)(9) Other Equipment 1 kV Through 38 kV Switch operation of arc-resistant-type construction, tested in accordance with IEEE C37.20.7, doors closed only	Changed task heading to limit applicability to 38kV maximum. Realigned the task titles such that the confusion previously experienced will be reduced. Added arc-resistant reference. Added insulating rubber glove requirement for gang switch operation.
Table 130.7(C)(9)(a) Note: V-rated Gloves are gloves	Table 130.7(C)(9) General Notes (applicable to the entire table):	No negative impact. Revamped existing notes for gloves and tools; deleted 2* reference as it

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
rated and tested for the maximum line-to-line voltage upon which work will be done. V-rated Tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done. 2* means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard/Risk Category 2 requirements of Table 130.7(C)(10). Y = yes (required) N = no (not required)	(a) Rubber insulating gloves are gloves rated for the maximum line-to-line voltage upon which work will be done. (b) Insulated and insulating hand tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done, and are manufactured and tested in accordance with ASTM F 1505, Standard Specification for Insulated and Insulating Hand Tools. (c) Y = yes (required), N = no (not required). (d) For systems rated less than 1000 volts, the fault currents and upstream protective device clearing times are based on an 18 in. working distance. (e) For systems rated 1 kV and greater, the Hazard/Risk Categories are based on a 36 in. working distance. (f) For equipment protected by upstream current limiting fuses with arcing fault current in their current limiting range (1⁄2 cycle fault clearing time or less), the hazard/risk category required may be reduced by one number.	no longer is used; added specific tool testing standard requirement; makes statements for working distances based on voltage; adds reduction in HRC if current-limiting fuses applied. No negative impact.
Table 130.7(C)(9)(a)	Table 130.7(C)(9)	Deleted original notes 3

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
		and 6.
Notes: 1. 25 kA short circuit current available, 0.03 second (2 cycle) fault clearing time. 2. 65 kA short circuit current available, 0.03 second (2 cycle) fault clearing time. 3. For < 10 kA short circuit current available, the hazard/risk category required may be reduced by one number. 4. 65 kA short circuit current available, 0.33 second (20 cycle) fault clearing time. 5. 65 kA short circuit current available, up to 1.0 second (60 cycle) fault clearing time. 6. For < 25 kA short circuit current available, the hazard/risk category required may be reduced by one number.	Specific Notes (as referenced in the table): 1. Maximum of 25 kA short circuit current available; maximum of 0.03 sec (2 cycle) fault clearing time. 2. Maximum of 65 kA short circuit current available; maximum of 0.03 sec (2 cycle) fault clearing time. 3. Maximum of 42 kA short circuit current available; maximum of 0.33 sec (20 cycle) fault clearing time. 4. Maximum of 35 kA short circuit current available; maximum of up to 0.5 sec (30 cycle) fault clearing time.	Modified all notes to include “maximum of” to indicate an absolute limit. Reduced the maximum current for old notes 4 and 5. Reduced the maximum clearing time for old note 5 (new note 4). No negative impact to worker safety, but additional applicability requirements will mean modifications to existing arc flash labels will be necessary.
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (10) Protective Clothing and Personal Protective Equipment Matrix. Once the Hazard/Risk Category has been identified, Table 130.7(C)(10) shall be used to determine the required personal protective equipment (PPE)……	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (10) Protective Clothing and Personal Protective Equipment Matrix. Once the Hazard/Risk Category has been identified from Table 130.7(C)(9) (including associated notes) and the requirements of 130.7(C)(9), Table 130.7(C)(10) shall be used to determine the required PPE……..	Reworded to specifically indicate that the HRC needs to be identified using Table 130.7(C)(9) including the notes and all of the other requirements from section 130.7(C)(9). This change will clear up some of the confusion as to which section applies for various situations. No negative impact.

Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Table 130.7(C)(10) Protective Clothing and Personal Protective Equipment (PPE) Matrix	Table 130.7(C)(10) Protective Clothing and Personal Protective Equipment (PPE)	This table was rearranged for clarity and further expansion of coverage.
	Hazard/Risk Category 0	Each HRC now has a separate block that depicts in list form what the requirements and options are for the category. The HRC 2* was included as a category on its own instead of in a note.
	Hearing protection (ear canal inserts) Leather gloves (AN) (Note 2)	
	Hazard/Risk Category 1	HRC 3 and HRC 4 now require arc-rated gloves even though the insulated voltage rated gloves with leather protectors still satisfies the requirement.
	Arc-rated face shield or arc flash suit hood (Note 7) Hearing protection (ear canal inserts) Leather gloves (Note 2)	
	Hazard/Risk Category 2* FR Clothing, Minimum Arc Rating of 8 (Note 1)	Leather gloves are now required for HRC 0 and HRC 1.
	Hazard/Risk Category 3	All in all, the table includes more restrictive requirements for PPE and will affect what the worker will wear for a particular HRC designation and it appears that worker safety will be improved.
	Arc-rated gloves (Note 2)	
	Hazard/Risk Category 4	
AN = As needed AL = Select one in group AR = As required X = Minimum required Notes: 1. See Table 130.7(C)(11). Arc rating for a garment is expressed in cal/cm2.	Arc-rated gloves (Note 2)	
	AN = As needed (optional) AR = As required SR = Selection required	
	Notes: 1. See Table 130.7(C)(11). Arc rating for a garment or system of garments is expressed in cal/cm2.	
2. If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.	2. If rubber insulating gloves with leather	

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	protectors are required by Table 130.7(C)(9), additional leather or arc-rated gloves are not required. The combination of rubber insulating gloves with leather protectors satisfies the arc flash protection requirement.	
3. Hazard/Risk Category Number "−1" is only defined if determined by Notes 3 or 6 of Table 130.7(C)(9)(a).		
4. Regular weight (minimum 12 oz/yd2 fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum arc rating of 4.	•	
	•	
5. Alternate is to use FR coveralls (minimum arc rating of 4) instead of FR shirt and FR pants.	3. The FR shirt and pants used for Hazard/ Risk Category 1 shall have a minimum arc rating of 4.	
6. If the FR pants have a minimum arc rating of 8, long pants of non-melting or untreated natural fiber are not required beneath the FR pants.	4. Alternate is to use FR coveralls (minimum arc rating of 4) instead of FR shirt and FR pants.	
7. Alternate is to use FR coveralls (minimum arc rating of 4) over non-melting or untreated natural fiber pants and T-shirt.	5. FR shirt and FR pants used for Hazard/ Risk Category 2 shall have a minimum arc rating of 8.	
8. A faceshield with a minimum arc rating of 8, with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or, alternatively, a flash suit hood), is required.	6. Alternate is to use FR coveralls (minimum arc rating of 8) instead of FR shirt and FR pants.	
	7. A face shield with a minimum arc rating of 4 for Hazard/Risk Category 1 or a minimum arc rating of 8 for Hazard/Risk Category 2,	

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or, alternatively, an arc-rated arc flash suit hood), is required.	
9. Alternate is to use two sets of FR coveralls (the inner with a minimum arc rating of 4 and outer coverall with a minimum arc rating of 5) over non-melting or untreated natural fiber clothing, instead of FR coveralls over FR shirt and FR pants over non-melting or untreated natural fiber clothing.	8. An alternate is to use a total FR clothing system and hood, which shall have a minimum arc rating of 25 for Hazard/Risk Category 3.	
	9. The total clothing system consisting of FR shirt and pants and/or FR coveralls and/or arc flash coat and pants and hood shall have a minimum arc rating of 40 for Hazard/Risk Category 4.	
	10. Alternate is to use a face shield with a minimum arc rating of 8 and a balaclava (sock hood) with a minimum arc rating of 8 and which covers the face, head and neck except for the eye and nose areas.	
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (11) Protective Clothing Characteristics. Table 130.7(C)(11) lists examples of protective clothing systems and typical characteristics including the degree of protection for	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (11) Protective Clothing Characteristics. Table 130.7(C)(11) lists examples of protective clothing systems and typical characteristics, including the degree of protection, for various	Inserted “determined from Table 130.7(C)(9) (including associated notes) and the requirements of 130.7(C)(9)” to clearly identify the mechanism by which the user determines the HRC. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
various clothing. The protective clothing selected for the corresponding hazard/risk category number shall have an arc rating of at least the value listed in the last column of Table 130.7(C)(11).	clothing. The protective clothing selected for the corresponding Hazard/Risk Category number determined from Table 130.7(C)(9) (including associated notes) and the requirements of 130.7(C)(9) shall have an arc rating of at least the value listed in the last column of Table 130.7(C)(11).	
Table 130.7(C)(11) Protective Clothing Characteristics Clothing Description (Typical number of clothing layers is given in parentheses) HRC 1. FR shirt and FR pants or FR coverall (1) 2. Cotton underwear — conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2) 3. Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3) 4. Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more) Note: Arc rating is defined	Table 130.7(C)(11) Protective Clothing Characteristics Clothing Description HRC 1. Arc-rated FR shirt and FR pants or FR coverall 2. Arc-rated FR shirt and FR pants or FR coverall 3. Arc-rated FR shirt and pants or FR coverall, and arc flash suit selected so that the system arc rating meets the required minimum 4. Arc-rated FR shirt and pants or FR coverall, and arc flash suit selected so that the system arc rating meets the required minimum Note: Arc rating is defined in Article 100 and can be	Changes to the table were contained in the clothing descriptions and in the notes. Underwear requirements were deleted and further clarifications to the clothing descriptions should help the worker determine the clothing to wear for the particular HRC. The numerical rating values used for each HRC remain the same. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
in Article 100 and can be either ATPV or E_{BT}. ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve. E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.	either ATPV or E_{BT}. ATPV is defined in ASTM F 1959, Standard Test Method for Determining the Arc Thermal Performance Value of Materials for Clothing, as the incident energy on a material or a multilayer system of materials that results in a 50% probability that sufficient heat transfer through the tested specimen is predicted to cause the onset of a second degree skin burn injury based on the Stoll curve, cal/cm^2. E_{BT} is defined in ASTM F 1959 as the incident energy on a material or material system that results in a 50% probability of breakopen. Arc rating is reported as either ATPV or E_{BT}, whichever is the lower value.	
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (13) Arc Flash Protective Equipment. (d) Foot Protection. Heavy-duty leather work shoes provide some arc flash protection to the feet and shall be used in all tasks in Hazard/Risk Category 2 and higher.	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (13) Arc Flash Protective Equipment. (d) Foot Protection. Heavy-duty leather work shoes provide some arc flash protection to the feet and shall be used in all tasks in Hazard/Risk Category 2 and higher and in all exposures greater than 4 cal/cm^2.	Clarifies that anything greater than the HRC 1 rating level requires leather shoes. May actually improve worker safety.
130.7 Personal and Other Protective Equipment.	130.7 Personal and Other Protective Equipment.	Deleted part (b) of section (14). The intent of the

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
(C) Personal Protective Equipment. (14) Clothing Material Characteristics. (b) Flammability. Clothing made from non-melting flammable natural materials, such as cotton, wool, rayon, or silk, shall be permitted for Hazard/Risk Categories 0 and −1 considered acceptable if it is determined by flash hazard analysis that the exposure level is 8.36 J/cm2 (2.0 cal/cm2) or less, and that the fabric will not ignite and continue to burn under the arc exposure hazard conditions to which it will be exposed (using data from tests done in accordance with ASTM F 1958.) See also 130.7(C)(12)(a) for layering requirements.	(C) Personal Protective Equipment. (14) Clothing Material Characteristics. •	deletion is to ensure that where persons could be exposed to an arc at voltage levels above 240V, FR clothing is to be worn. May actually improve worker safety.
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (15) Clothing Not Permitted. Clothing made from materials that do not meet the requirements of 130.7(C)(14)(a) regarding melting, or made from materials that do not meet the flammability requirements of 130.7(C)(14)(b), shall not be permitted to be worn.	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (15) Clothing and Other Apparel Not Permitted. Clothing and other apparel (such as hard hat liners and hair nets) made from materials that do not meet the requirements of 130.7(C)(14) regarding melting, or made from materials that do not meet the flammability requirements shall not be permitted to be worn. *Exception No. 2: Where the*	Clarifies the intent that no melting fiber apparel is to be worn, but adds the exception for AHJ approval as long as the arc flash protection is adequate. Provides needed flexibility while not sacrificing worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	work to be performed inside the Arc 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.	
130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (16) Care and Maintenance of FR Clothing and FR Flash Suits.	130.7 Personal and Other Protective Equipment. (C) Personal Protective Equipment. (16) Care and Maintenance of FR Clothing and FR Arc Flash Suits. (c) Storage. FR apparel shall be stored in a manner that prevents physical damage; damage from moisture, dust, or other deteriorating agents; or contamination from flammable or combustible materials. (d) Cleaning, Repairing, and Affixing Items. When FR clothing is cleaned, manufacturer's instructions shall be followed to avoid loss of protection. When FR clothing is repaired, the same FR materials used to manufacture the FR clothing shall be used to provide repairs. When, trim,	Adds two new sections for storage and cleaning, repairing, and affixing items for FR clothing. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	name tags, and/or logos are affixed to FR clothing, guidance in ASTM F 1506, Standard Performance Specification for Textile Material for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards, shall be followed [see Table 130.7(C)(8)].	
130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. Employees shall use insulated tools and/or handling equipment when working inside the Limited Approach Boundary of exposed live parts where tools or handling equipment might make accidental contact. Insulated tools shall be protected from damage to the insulating material.	130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. Employees shall use insulated tools and/or handling equipment when working inside the Limited Approach Boundary of exposed energized electrical conductors or circuit parts where tools or handling equipment might make accidental contact. Table 130.7(C)(9) provides further information for tasks that require insulated and insulating hand tools. Insulated tools shall be protected from damage to the insulating material.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit." Adds reference to Table 130.7(C)(9) for insulated tools. No negative impact.
130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (a) Requirements for Insulated Tools.	130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (a) Requirements for Insulated Tools. (3) Insulated tools and	Adds inspection requirement for insulated tool use. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	equipment shall be inspected prior to each use. The inspection shall look for damage to the insulation or damage that may limit the tool from performing its intended function or could increase the potential for an incident (e.g., damaged tip on a screwdriver).	
130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (c) Ropes and Handlines. Ropes and handlines used near exposed live parts operating at 50 volts or more, or used where an electrical hazard exists, shall be nonconductive.	130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (c) Ropes and Handlines. Ropes and handlines used within the Limited Approach Boundary of exposed energized electrical conductors or circuit parts operating at 50 volts or more, or used where an electrical hazard exists, shall be nonconductive.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit" and to identify the boundary requirement. No negative impact.
130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (d) Fiberglass-Reinforced Plastic Rods. Fiberglass-reinforced plastic rod and tube used for live line tools shall meet the requirements of ASTM F 711, Standard	130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (d) Fiberglass-Reinforced Plastic Rods. Fiberglass-reinforced plastic rod and tube used for live line tools shall meet the requirements of applicable portions of electrical codes and	Broadened the application of the section by referencing “applicable portions of electrical codes and standards dealing with electrical installation requirements.” No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used; in Live Line Tools, 1989 (R 1997).	standards dealing with electrical installation requirements.	
130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (e) Portable Ladders. (f) Protective Shields. (g) Rubber Insulating Equipment. (h) Voltage-Rated Plastic Guard Equipment. (i) Physical or Mechanical Barriers.	130.7 Personal and Other Protective Equipment. (D) Other Protective Equipment. (1) Insulated Tools and Equipment. (e) Portable Ladders. (f) Protective Shields. (g) Rubber Insulating Equipment. (h) Voltage-Rated Plastic Guard Equipment. (i) Physical or Mechanical Barriers.	Modified these sections as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit" and to identify the boundary requirements. No negative impact.
130.7 Personal and Other Protective Equipment. (E) Alerting Techniques.	130.7 Personal and Other Protective Equipment. (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.	Adds new section to address look-alike equipment to alleviate the problems encountered when several pieces of installed electrical equipment are very close to being identical in appearance. May actually improve worker safety.
Table 130.7(F) Standards on Other Protective Equipment	Table 130.7(F) Standards on Other Protective Equipment	Updated the publication dates for standards referenced in the table. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Chapter 2 Safety-Related Maintenance Requirements ARTICLE 205 General Maintenance Requirements		
	205.3 General Maintenance Requirements. Overcurrent protective devices shall be maintained in accordance with the manufacturers' instructions or industry consensus standards.	New section inserted between 205.2 and original 205.3 to address maintenance of overcurrent devices. No negative impact.
205.3 Spaces About Electrical Equipment. All working space and clearances required in Chapter 4 shall be maintained.	205.4 Spaces About Electrical Equipment. All working space and clearances required by electrical codes and standards shall be maintained.	Broadened the application of the section by referencing "electrical codes and standards" instead of now non-existent chapter of NFPA 70E. No negative impact.
205.5 Guarding of Live Parts. Enclosures shall be maintained to guard against accidental contact with live parts and other electrical hazards.	205.6 Guarding of Energized Conductors and Circuit Parts. Enclosures shall be maintained to guard against accidental contact with energized conductors and circuit parts and other electrical hazards.	Modified this section as part of an effort to reduce slang terms such as "live" and "on or near" in deference to terms such as "energized" and "circuit." No negative impact.
ARTICLE 210 Substations, Switchgear Assemblies, Switchboards, Panelboards, Motor Control Centers, and Disconnect Switches		
210.2 Area Enclosures. Fences, physical protection, enclosures, or other protective means, where required to guard against unauthorized access or accidental contact with exposed live parts, shall be maintained.	210.2 Area Enclosures. Fences, physical protection, enclosures, or other protective means, where required to guard against unauthorized access or accidental contact with exposed energized conductors and circuit parts, shall be maintained.	Modified this section as part of an effort to reduce slang terms such as "live" and "on or near" in deference to terms such as "energized" and "circuit." No negative impact.

Attachment to Best Practice #71
Gap analysis of NFPA 70E versions 2009 and 2004

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
ARTICLE 220 Controller Equipment		
220.2 Protection and Control Circuitry. Protection and control circuitry used to guard against accidental contact with live parts and to prevent other electrical or mechanical hazards shall be maintained.	220.2 Protection and Control Circuitry. Protection and control circuitry used to guard against accidental contact with energized conductors and circuit parts and to prevent other electrical or mechanical hazards shall be maintained.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit.” No negative impact.
ARTICLE 225 Fuses and Circuit Breakers		
225.1 Fuses. Fuses shall be maintained free of breaks or cracks in fuse cases, ferrules, and insulators. Fuse clips shall be maintained to provide adequate contact with fuses.	225.1 Fuses. Fuses shall be maintained free of breaks or cracks in fuse cases, ferrules, and insulators. Fuse clips shall be maintained to provide adequate contact with fuses. Fuseholders for current-limiting fuses shall not be modified to allow the insertion of fuses that are not current-limiting.	Adds the requirement that no modifications are allowed to fuse holders that would allow non-current-limiting fuses to be installed. May actually improve worker safety.
225.3 Circuit Breaker Testing. Circuit breakers that interrupt faults approaching their ratings shall be inspected and tested in accordance with the manufacturer’s instructions.	225.3 Circuit Breaker Testing. Circuit breakers that interrupt faults approaching their interrupting ratings shall be inspected and tested in accordance with the manufacturer’s instructions.	Clarifies that the interrupting rating is the rating previously implied by the text. No negative impact.
ARTICLE 230 Rotating Equipment		
230.1 Terminal Boxes. Terminal chambers, enclosures, and terminal boxes shall be maintained to guard against accidental contact with live parts and other electrical hazards.	230.1 Terminal Boxes. Terminal chambers, enclosures, and terminal boxes shall be maintained to guard against accidental contact with energized conductors and circuit parts	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit.”

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	and other electrical hazards.	No negative impact.
ARTICLE 245 Portable Electric Tools and Equipment		
245.1 Maintenance Requirements for Portable Electric Tools and Equipment. Attachment plugs, receptacles, cover plates, and cord connectors shall be maintained such that the following apply: (1) There are no breaks, damage, or cracks exposing live parts. (2) There are no missing cover plates. (3) Terminations have no stray strands or loose terminals. (4) There are no missing, loose, altered, or damaged blades, pins, or contacts. (5) Polarity is correct.	245.1 Maintenance Requirements for Portable Electric Tools and Equipment. Attachment plugs, receptacles, cover plates, and cord connectors shall be maintained such that the following apply: (1) There are no breaks, damage, or cracks exposing energized conductors and circuit parts. (2) There are no missing cover plates. (3) Terminations have no stray strands or loose terminals. (4) There are no missing, loose, altered, or damaged blades, pins, or contacts. (5) Polarity is correct.	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit.” No negative impact.
ARTICLE 250 Personal Safety and Protective Equipment		
250.1 Maintenance Requirements for Personal Safety and Protective Equipment. Personal safety and protective equipment such as the following shall be maintained in a safe working condition:	250.1 Maintenance Requirements for Personal Safety and Protective Equipment. Personal safety and protective equipment such as the following shall be maintained in a safe working condition: (13) Bypass jumpers (14) Insulated and insulating hand tools	Adds “bypass jumpers” and “insulated and insulating hand tools” to the list for protective equipment that must be maintained. No negative impact.
250.2 Inspection and Testing of Protective Equipment and Protective	250.2 Inspection and Testing of Protective Equipment and Protective	Adds the caveat that ASTM standards referenced for the purpose of inspection

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Tools. (A) Visual. Safety and protective equipment and protective tools shall be visually inspected for damage and defects before initial use and at intervals thereafter as service conditions require, but in no case shall the interval exceed 1 year.	Tools. (A) Visual. Safety and protective equipment and protective tools shall be visually inspected for damage and defects before initial use and at intervals thereafter, as service conditions require, but in no case shall the interval exceed 1 year, unless specified otherwise by the respective ASTM standards.	may specify intervals greater than 1 year. No negative impact.
250.2 Inspection and Testing of Protective Equipment and Protective Tools. (B) Testing. The insulation of protective equipment and protective tools, such as items (1) through (12) of 250.1, shall be verified by the appropriate test and visual inspection to ascertain that insulating capability has been retained before initial use, and at intervals thereafter as service conditions and applicable standards and instructions require, but in no case shall the interval exceed 3 years.	250.2 Inspection and Testing of Protective Equipment and Protective Tools. (B) Testing. The insulation of protective equipment and protective tools, such as items (1) through (14) of 250.1, shall be verified by the appropriate test and visual inspection to ascertain that insulating capability has been retained before initial use, and at intervals thereafter, as service conditions and applicable standards and instructions require, but in no case shall the interval exceed 3 years, unless specified otherwise by the respective ASTM standards.	Adds the caveat that ASTM standards referenced for the purpose of testing may specify intervals greater than 3 years. No negative impact.
250.3 Safety Grounding Equipment.	250.3 Safety Grounding Equipment. (C) Grounding and Testing Devices. Grounding and testing devices shall be stored in a clean and dry area. Grounding and	Adds “grounding and testing devices” to the list of safety grounding equipment to address the need for inspection and testing. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	testing devices shall be properly inspected and tested before each use.	
Chapter 3 Safety Requirements for Special Equipment ARTICLE 300 Introduction		
300.3 Organization. Chapter 3 of this standard is divided into articles. Article 300 applies generally. Article 310 applies to electrolytic cells as described in 430.8. Article 320 applies to batteries and battery rooms. Article 330 applies to lasers. Article 340 applies to power electronic equipment.	300.3 Organization. Chapter 3 of this standard is divided into articles. Article 300 applies generally. Article 310 applies to electrolytic cells. Article 320 applies to batteries and battery rooms. Article 330 applies to lasers. Article 340 applies to power electronic equipment. Article 350 applies to R&D laboratories.	Adds reference to new section for R&D Laboratories and deletes reference to now non-existent NFPA 70E article. No negative impact.
ARTICLE 310 Safety-Related Work Practices for Electrolytic Cells		
310.5 Safeguarding of Employees in the Cell Line Working Zone. (D) Safeguards. (2) Personal Protective Equipment. Personal protective equipment shall provide protection from hazardous electrical conditions. Personal protective equipment shall include one or more of the following as determined by authorized management: (1) Shoes, boots, or overshoes for wet service (2) Gloves for wet service	310.5 Safeguarding of Employees in the Cell Line Working Zone. (D) Safeguards. (2) Personal Protective Equipment. Personal protective equipment shall provide protection from hazardous electrical conditions. Personal protective equipment shall include one or more of the following as determined by authorized management: (1) Shoes, boots, or overshoes for wet service (2) Gloves for wet service	Clarifies the eye protection requirements and adds face shields. May actually improve worker safety.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
(3) Sleeves for wet service (4) Shoes for dry service (5) Gloves for dry service (6) Sleeves for dry service (7) Electrically insulated head protection (8) Protective clothing (9) Eye protection	(3) Sleeves for wet service (4) Shoes for dry service (5) Gloves for dry service (6) Sleeves for dry service (7) Electrically insulated head protection (8) Protective clothing (9) Eye protection with nonconductive frames (10) Faceshield (polycarbonate or similar nonmelting type)	
310.5 Safeguarding of Employees in the Cell Line Working Zone. (D) Safeguards. (4) Voltage Equalization. Voltage equalization shall exist where conductive surfaces are bonded to an energized surface, either directly or through a resistance, so that there is insufficient voltage between the surfaces to result in a hazardous electrical condition.	310.5 Safeguarding of Employees in the Cell Line Working Zone. (D) Safeguards. (4) Voltage Equalization. Voltage equalization shall be permitted by bonding a conductive surface to an electrically energized surface, either directly or through a resistance, so that there is insufficient voltage to create an electrical hazard.	Clarified intent by stating that no hazard is to be created by bonding. No negative impact.
ARTICLE 320 Safety Requirements Related to Batteries and Battery Rooms		
320.1 Scope. The requirements of this article shall apply to the safety requirements related to installations of batteries and battery rooms with a stored capacity exceeding 1 kWh or a floating voltage that exceeds 115 volts but does not exceed 650 volts.	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 nominal voltage that exceeds 50 volts but does not exceed 650 volts.	This change clears up much confusion as to the applicability of this article to various types of battery installations and clearly states that it is the nominal voltage that must be considered in the evaluation process. No negative impact.
320.2 Definitions. For the purposes of this chapter, the following definitions shall apply.	320.2 Definitions. For the purposes of this chapter, the following definitions shall apply.	Clarified definition of VLRA's. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
Valve Regulated Battery. A battery in which the venting of the products of electrolysis is controlled by a reclosing pressure-sensitive valve. VRLA. Valve-regulated lead-acid storage battery.	Valve-Regulated Lead Acid (VRLA) Battery. A battery that has no provision for the addition of water or electrolyte or for external measurement of electrolyte specific gravity.	
320.3 Battery Connections. (D) DC Switching Equipment. Switching equipment shall comply with the NEC.	320.3 Battery Connections. (D) DC Switching Equipment. Switching equipment shall comply with applicable installation requirements.	Broadens the applicability of this section by using the phrase “applicable installation requirements” in lieu of a particular reference.
320.4 Installations of Batteries. (A) Location. Batteries shall be installed in one of the following: (1) Dedicated battery rooms (2) An area accessible only to authorized personnel (3) An enclosure with lockable doors or a suitable housing that shall be lockable and provide protection against electrical contact and damage to the battery (B) Arrangement of Cells. The space between adjacent containers shall be at least 12.5 mm (1⁄2 in.) and meet the following requirements: (1) All cells shall be readily accessible for	320.4 Installations of Batteries. (A) Location. Batteries shall be installed in one of the following: (1) Dedicated battery rooms (2) An area accessible only to authorized personnel (3) An enclosure with lockable doors or a suitable housing that shall require a key or tool to gain access to the batteries and shall provide protection against electrical contact and damage to the battery (B) Arrangement of Cells. The arrangement of cells in a battery system shall meet the following requirements: (1) All cells shall be readily accessible for	No negative impact. Clarifies the intent that batteries shall not be readily accessible to the unqualified worker; points to the manufacturer for maintenance requirements; and only offers specific direction in absence of manufacturer information. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
examination of the electrolyte level, refilling, cleaning, or removal as applicable. (2) Each cell shall be readily accessible without having to reach over another cell or alternatively all exposed live surfaces shall be shrouded.	such inspection and maintenance as is required by the manufacturer. (2) The space between adjacent containers shall be no less than that recommended by the battery manufacturer or, where manufacturer guidance is not available, shall be at least 12.5 mm (1⁄2 in.). (3) Each cell shall be readily accessible without having to reach over another cell, or alternatively, all exposed energized surfaces shall be shrouded.	
320.4 Installations of Batteries. (D) Ventilation for VRLA Type. (1) Ventilation Requirements. Ventilation shall be provided so as to prevent liberated hydrogen gas from exceeding a 1 percent concentration. (a) Adequacy. Room ventilation shall be adequate to ensure that pockets of trapped hydrogen gas do not occur, particularly at the ceiling, to prevent the accumulation of an explosive mixture.	320.4 Installations of Batteries. (D) Ventilation for VRLA Type. (1) Ventilation Requirements. Ventilation shall be provided so as to prevent liberated hydrogen gas from exceeding a 1 percent concentration. (a) Adequacy. Ventilation shall be adequate to ensure that pockets of trapped hydrogen gas do not occur, particularly at the ceiling of a room or at the top of a cabinet, to prevent the accumulation of an explosive mixture.	Added “of a room or at the top of a cabinet” to assure that tops of cabinets are also ventilated in addition to room ceilings. May actually improve worker safety.
320.4 Installations of Batteries. (D) Ventilation for VRLA Type.	320.4 Installations of Batteries. (D) Ventilation for VRLA Type.	Modified to clarify that this requirement only applies to dedicated battery rooms.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
(2) Mechanical Ventilation. (2) Control equipment for the exhaust fan shall be located more than 1800 mm (6 ft) from the battery and a minimum of 100 mm (4 in.) below the lowest point of the highest ventilation opening.	(2) Mechanical Ventilation. (2) Control equipment for the exhaust fan in dedicated battery rooms shall be located more than 1.8 m (6 ft) from the battery and a minimum of 100 mm (4 in.) below the lowest point of the highest ventilation opening.	No negative impact.
320.4 Installations of Batteries. (D) Ventilation for VRLA Type. (3) Temperature Requirements. Ventilation shall be provided to maintain design temperature to prevent thermal runaway that can cause cell meltdown leading to a fire or explosion.	320.4 Installations of Batteries. (D) Ventilation for VRLA Type. (3) Temperature Requirements. Thermal management shall be provided to maintain battery design temperature to prevent thermal runaway that can cause cell meltdown, leading to a fire or explosion.	The critical temperature leading to thermal runaway is that of the electrolyte inside the cell. The temperature of the ambient air around the battery might or might not cause it. This change allows for management of the temperature without specifically requiring ventilation.
320.4 Installations of Batteries. (E) Ventilation for Sealed Gelled Electrolyte Type.	•	No negative impact. This section was deleted since sealed gelled electrolyte batteries are VRLA batteries and VRLA battery ventilation is already covered in 320.4(D).
(1) Temperature Requirements. Ventilation shall be provided to maintain design temperature to prevent thermal runaway that can cause cell meltdown leading to a fire or explosion. (2) Mechanical Ventilation. Where mechanical ventilation is installed, airflow sensors shall be installed to initiate an alarm if the ventilation fan		No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
becomes inoperative. 320.5 Battery Room Requirements. (A) General. The battery room shall be accessible only to authorized personnel and shall be locked when unoccupied. (1) Battery Rooms or Areas Restricted to Authorized Personnel. (a) Doors. The battery room and enclosure doors shall open outward. The doors shall be equipped with quick-release, quick-opening hardware. (b) Location. The battery room shall be located so that access to the batteries is unobstructed. Direct-current switching equipment, rotating machinery other than exhaust fans, and other equipment not directly part of the battery and charging facilities shall be external to the battery room. Alternatively, dc switching equipment shall be separated from the battery by a partition of a height no less than 2 m (6 ft 6 in.) and of sufficient length to prevent accidental contact with live surfaces. (c) Foreign Piping. Foreign piping shall not	320.5 Battery Room Requirements. (A) General. The battery room shall be accessible only to authorized personnel and shall be locked when unoccupied. (1) Battery Rooms or Areas Restricted to Authorized Personnel. (a) Doors. The battery room and enclosure doors shall open outward. The doors shall be equipped with quick-release, quick-opening hardware. • (b) Foreign Piping. Foreign piping that is not protected against corrosion shall not pass through the battery room.	Deletes original subsection “(b) Location” and inserts the caveat “that is not protected against corrosion” into original (c) now (b) to allow protected foreign piping to travel through the battery room. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
pass through the battery room.		
320.5 Battery Room Requirements. (A) General. (2) Battery Enclosures. All cells shall be readily accessible for examination of the electrolyte level, refilling, cleaning, and removal.	320.5 Battery Room Requirements. (A) General. (2) Battery Enclosures. All cells shall be readily accessible for inspection, cleaning, maintenance, and removal.	Modifies wording such that all maintenance activities appropriate to the type of battery can be safely performed. No negative impact.
320.5 Battery Room Requirements. (A) General. (4) Battery Room Floor Construction and Finish. Where the grading of the floor is not practicable, suitable drip trays or sumps shall be installed to restrict the spread of spilled electrolyte.	320.5 Battery Room Requirements. (A) General. (4) Battery Room Floor Construction and Finish. Battery systems containing free-flowing liquid electrolyte shall be provided with spill containment systems in accordance with the fire code.	Rewritten to address batteries containing “free-flowing liquid electrolyte” are the battery types requiring spill containment. No negative impact.
320.5 Battery Room Requirements. (C) Takeoff Battery Terminals and Outgoing Busbars and Cables. (1) Takeoff Battery Terminals.	320.5 Battery Room Requirements. (C) Takeoff Battery Terminals and Outgoing Busbars and Cables. (1) Takeoff Battery Terminals. (3) Prevent mechanical stress on the battery posts	New subsection adds requirement to prevent mechanical stress on battery posts. No negative impact.
320.5 Battery Room Requirements. (G) Location of Luminaires (Lighting Fixtures) and Switches. Luminaires (lighting fixtures) shall not be installed directly over cells or exposed live parts. Switches for the control of the luminaires (lighting	320.5 Battery Room Requirements. (G) Location of Luminaires and Switches. Luminaires shall not be installed directly over cells or exposed energized conductors and circuit parts. Switches for the controls of the luminaires	Modified this section as part of an effort to reduce slang terms such as “live” and “on or near” in deference to terms such as “energized” and “circuit.” No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
fixtures) shall be readily accessible.	shall be readily accessible.	
320.6 Battery Enclosure Requirements. (A) Enclosure Construction. (2) Ventilation. The ventilation openings for the compartments shall be spaced as far apart as practicable.	320.6 Battery Enclosure Requirements. (A) Enclosure Construction. (2) Ventilation. The ventilation openings for the battery compartment shall: (a) Prevent the exchange of air within compartments containing electrical equipment (b) Prevent accumulation of flammable gas in pockets exceeding 1 percent concentration	Expands the applicability of this section and relates to actual functional requirements for the ventilation openings. No negative impact.
320.6 Battery Enclosure Requirements. (B) Battery Takeoff Terminals and Outgoing Busbars and Cables. Outgoing busbars and cables shall be fully insulated, and the battery takeoff terminals shall comply with either of the following:	320.6 Battery Enclosure Requirements. (B) Battery Takeoff Terminals and Outgoing Busbars and Cables. Outgoing busbars and cables shall be fully insulated, and the battery takeoff terminals shall comply with the following: (1) Takeoff terminals shall prevent excessive mechanical stress on the battery posts. (2) Takeoff terminals shall comply with either of the following:	Inserts “Takeoff terminals shall prevent excessive mechanical stress on the battery posts” ahead of the original requirements to emphasize the need to protect the integrity of the battery terminal posts. No negative impact.
320.7 Protection. (A) General. (3) Protective Equipment. Protective equipment shall not be located in the battery compartment of the enclosure.	320.7 Protection. (A) General. (3) Protective Equipment. Protective equipment shall not be located in the battery compartment of the enclosure unless provided as part of a listed assembly.	Adds the caveat “unless provided as part of a listed assembly” to allow listed equipment to be installed and still meet the requirements of this section. No negative impact.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
320.7 Protection. (E) Section Isolating Equipment. Where the battery section exceeds 120 volts, the installation shall include an isolating switch, plugs, or links, as required, to isolate sections of the battery, or part of the battery for maintenance.	320.7 Protection. (E) Section Isolating Equipment. Where the battery section exceeds 250 volts, the installation shall include an isolating switch, plugs, or links, as required, to isolate sections of the battery, or part of the battery, for maintenance.	Increases the threshold for isolation device requirements to 250 volts, since for DC systems 250 volts is considered the acceptable working level and is consistent with Section 480.7 of the NEC®, which requires segmentation into groups not to exceed 250 Volts. **Reduction** in Safety, although consistent with NEC-2005/8, it doubles the voltage potential to which requirements apply
ARTICLE 350 Safety-Related Work Requirements: Research and Development Laboratories		
	350.1 Scope. 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) or as laboratories. 350.2 Definitions. For the purposes of this article, the following definitions shall apply. Competent Person. A person meeting all of the requirements of a qualified person, as defined in Article 100 in Chapter 1 of this document and, in addition, is responsible for all work	Totally new section added to provide for the specific work that is performed within research and development (R&D) laboratories. Improves worker safety within R&D laboratories.

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	activities or safety procedures related to custom or special equipment, and has detailed knowledge regarding the electrical hazard exposure, the appropriate controls for mitigating those hazards, and the implementation of those controls. Field Evaluated. A thorough evaluation of non-listed or modified equipment in the field that is performed by persons or parties acceptable to the authority having jurisdiction. The evaluation approval ensures that the equipment meets appropriate codes and standards, or is similarly found suitable for a specified purpose. Laboratory. A building, space, room, or group of rooms intended to serve activities involving procedures for investigation, diagnostics, product testing, or use of custom or special electrical components, systems, or equipment. Research and Development (R&D). An activity in an installation specifically designated for research or development conducted with custom or	

NFPA 70E® 2004	NFPA 70E® 2009	Change Description and Impact to Worker Safety
	special electrical equipment. 350.3 Applications of Other Articles. The electrical system for R&D and laboratory applications shall meet the requirements of the remainder of this document, except as amended by Article 350. 350.5 Specific Measures and Controls for Personnel Safety. Each laboratory or R&D system application shall be assigned a competent person as defined in this article to ensure the use of appropriate electrical safety-related work practices and controls. 350.6 Listing Requirements. The equipment or systems used in the R&D area or in the laboratory shall be listed or field evaluated prior to use.	
Chapter 4 Installation Safety Requirements		
	•	Deleted entire Chapter 4 as it is simply text inserted from NFPA 70 (NEC) and should not be repeated in NFPA 70E. No negative impact.