MINUTES

NFPA Technical Committee on Electrical Safety in the Workplace (EEW-AAA)
NFPA 70E Second Draft Meeting (A2026)

August 19-21, 2025
8:00 AM – 5:00 PM (ET)

Indianapolis, Indiana

1. **Call to order.** Louis Barrios, Chair, called the meeting to order at 8:00 AM on August 19.
2. **Introductions.** Attendees introduced themselves and identified their affiliation and NFPA staff took attendance.
3. **Chair report.** Louis Barrios welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Christopher Coache provided an overview of the standards development process and the revision cycle schedule.

   a. There were no declarations of a committee member representing another company, organization, or interest category.
5. **Previous meeting minutes.** The minutes from July 30 - August 2, 2024, Memphis, TN meeting were approved without revision.
6. **NFPA 70E Second Draft.**

   a. **Review of Public Comment.** The Technical Committee reviewed the Public Comments and developed Second Revisions and Committee Comments as necessary. These will be available in the Second Draft Report at www.nfpa.org/70Enext.

   b. **Task group reports.** The following task groups provided their reports and recommendations. Task group reports attached.

      i. **TG 1 Articles 90/110**. Rodney West, Chair. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

      ii. **TG 2 Article 105/110**. Mark McNellis, Chair. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

      iii. **TG 3 Article 120**. Tom Norwood and Jason Wolfe, Chairs. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

      iv. **TG 4 Article 130**. Greg Steinman, Chair. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

v. **TG 5 Article 130 Sections 130.5, 130.7 and ac Tables**. Jim Dollard, Chair. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

vi. **TG 6 Chapter 2**. Ron Widup, Chair. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

vii. **TG 7 Chapter 3 and dc Tables**. Bobby Gray and Heath Garrison, Chairs. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

viii. **TG 8 Annexes**. Mark Hilbert, Chair. The task group provided a report, and revisions were made accordingly. The task group has been discharged with thanks.

c. **Presentation.** The committee heard an oral presentation from the following individual.

i. **Additional Person for Energized Work.** Kyle Krueger, NECA.

Other Business. None.

7. **Future meetings.** This was the final meeting for the revision cycle. The next committee First Draft meeting will be scheduled in Fall 2027 for the 2030 edition. A meeting notification will be posted at www.nfpa.org/70Enext when the meeting is scheduled.

8. **Adjournment.** The meeting was adjourned at 3:25 PM on August 21.

Attendees

√	**Barrios, Louis**	Chair	American Petroleum Institute
√	**Barnhart, Paul**	Principal	UL Solutions
	Conkwright, Jeffrey	Principal	Eastern Kentucky University
√	**Crow, Daryld**	Principal	The Aluminum Association, Inc.
√	**Dollard, James**	Principal	Self
	Dyson, Thomas	Principal	Edison Electric Institute
*	**Gallo, Ernest**	Principal	Alliance for Telecommunications Industry
√	**Gray, Bobby**	Principal	Hoydar/Buck, Inc.
√	**Guier, Jarod**	Principal	Cintas Corporation
√	**Hacke, Donald**	Principal	National Elevator Industry Inc.
√	**Harris, William**	Principal	Barton Malow Company
√	**Hickman, Palmer**	Principal	International Brotherhood of Electrical
√	**Hilbert, Mark**	Principal	International Association of Electrical
	Katekar, Chaitanya	Principal	Intertek Testing Services

√	**Lubaczewski, Scott**	Principal	International Union, United Automobile,
*	**McKinch, Terrance**	Principal	Nexamp
*	**McNellis, Mark**	Principal	Sandia National Laboratories
√	**Miller, Charles**	Principal	Lighthouse Educational Services
√	**Mohla, Daleep**	Principal	IEEE-IAS/PES JTCC
√	**Niemira, James**	Principal	S&C Electric Company
*	**Norwood, Thomas**	Principal	Cadick Corporation
√	**Pace, David**	Principal	American Chemistry Council
√	**Schamel, Duke**	Principal	Independent Electrical Contractors, Inc.
	Stallcup, James	Principal	Grayboy, Inc.
√	**Steinman, Gregory**	Principal	National Electrical Manufacturers
	Stonerock, Samuel	Principal	ASTM International
	Tobias, John	Principal	US Department of the Army
√	**West, Rodney**	Principal	Schneider Electric
√	**Widup, Ron**	Principal	InterNational Electrical Testing Association
√	**Wolf, Jason**	Principal	National Electrical Contractor Association
√	**Alamprese, Michael**	Alternate	International Brotherhood of Electrical
√	**Caldwell, Bradley**	Alternate	National Electrical Contractor Association
√	**Carney, Dawn**	Alternate	US Army Corps of Engineers
√	**Cavanaugh, Scott**	Alternate	Schneider Electric
√	**Cunningham, Karl**	Alternate	The Aluminum Association, Inc.
√	**Della Croce, Vincent**	Alternate	National Electrical Manufacturers
√	**Dobrowsky, Paul**	Alternate	IEEE-IAS/PES JTCC
	Garrison, Heath	Alternate	National Renewable Energy Laboratory
√	**Glaude, Eric**	Alternate	American Petroleum Institute
√	**Holton, James**	Alternate	International Union, United Automobile,
√	**Hook, Daniel**	Alternate	InterNational Electrical Testing Association
	Kalola, Sunny	Alternate	National Elevator Industry Inc.
√	**Newsom, Amanda**	Alternate	UL Solutions
	Perkins, Larry	Alternate	US Department of Energy
*	**Phillips, Jim**	Alternate	Brainfiller, Inc.
√	**Simmons, Eric**	Alternate	Independent Electrical Contractors, Inc.

√	**Sparks, Roy**	Alternate	American Chemistry Council
√	**Winfield, Al**	Alternate	Cadick Corporation
√	**Roberts, Daniel**	Nonvoting Member	Canadian Standards Association
√	**Balitski, Virginia**	Alt. to Nonvoting	Canadian Standards Association
√	**Wallis, David**	Member Emeritus	Consultant
√	**Coache, Christopher**	Staff Liaison	National Fire Protection Association

GUESTS:

Al Havens – e-hazard
Alan Bond - Panduit
*Albert Marroquin – etap
*Brad Ruffkess
*Deckard, Brian - Siemens
*Jim Pollard - Surewerx
Jivko Danev - Panduit
*Klausing Stacy - Kinectrics
*Krueger, Kyle - NECA
*Lee, Wei-Jen - UTA
Lloyd Gordon - Specialized Electrical Safety Services
Phil Allen – Grace Technologies
*Raghu Veeraraghavan – etap
*Steve Edley – Atlas Power
Terry Becker – The Becker Electrical Safety Consulting, Inc.
*Troy Ruggiero – BoxLock
*Walter Gonzalez - etap
Wheeler, Wes - NECA
Zabel, Dave – S+C Electric Co.

*Participated by teleconference
Total number in attendance: 62

DOC #	NFPA 70E
TG #/NAME	Articles 90 and 100
TG CHAIR	Rod West
TG MEMBERS	* indicates non-committee member Louis Barrios, Tom Dyson, Ernest Gallo, Mark Hilbert, Jim Niemira, Vincent Della Croce, Sunny Kalola

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
90.2	77		☐ Create Second Revision ☐ Reject X Hold
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	90.2 Purpose. The purpose of this standard is to provide a practical safe working area for employees relative to ~~the hazards arisig from the use of electricity~~ employee exposure to electrical hazards.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	The content of this public comment was not included in the referenced first revision (FR-31) or in the voting ballot. As such, the concept has not had sufficient public review and is considered new material. In accordance with Section 4.4.8.1(d) of the NFPA Regulations Governing the Development of NFPA Standards the public comment will be rejected but held for processing as a public input for the next revision cycle.		
Proposed Second Revision Text (SR)	**Revision must be shown in track changes**.		
	90.2 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.		

Clean first revision text is provided to be revised. **Do not delete for a reject**	

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
90.3(B)	10		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. **(B)** Workplaces Not Covered. This standard does not cover safety-related work practices for the following: (1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles (2) Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes (3) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations (4) Installations not under the exclusive control of an electric utility, but are covered under OSHA 1910.269 (5) Installations under the exclusive control of an electric utility where such installations: (1) Consist of service drops or service laterals, and associated metering, or (2) Are located in legally established easements or rights-of-way designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or (3) Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or (4) Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the US Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.			
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		

Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed additional list item in the "workplaces not covered" was not included because NFPA 70E is used both in the US as well as globally. Inclusion of US specific regulations such as OSHA 1910.269 as a minimum mandatory provision within the standard could introduce confusion for global users of NFPA 70E.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**
	(B) Workplaces Not Covered. This standard does not cover safety-related work practices for the following: 1. Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles 2. Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes 3. Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations 4. Installations under the exclusive control of an electric utility where such installations: 1. Consist of service drops or service laterals, and associated metering, or 2. Are located in legally established easements or rights-of-way designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or 3. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy, or 4. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American

		reservations through the US Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Chapter 1 Title	123		☐ Create Second Revision ☐ Reject X Hold
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	Chapter 1 Definitions and Safety-Related Work Practices		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	The content of this public comment was not included in the referenced first revision (FR-4) or in the voting ballot. As such, the concept has not had sufficient public review and is considered new material. In accordance with Section 4.4.8.1(d) of the NFPA Regulations Governing the Development of NFPA Standards the public comment will be rejected but held for processing as a public input for the next revision cycle.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	Chapter 1 Safety-Related Work Practices		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100	74		☒ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	The Correlating Committee requests that the Technical Committee review the extracted definitions and requirements from the 2026 NEC for correlation. For example, the term "overcurrent protective device (OCPD)" has been revised in the 2026 NEC and this would impact the 70E extracted definition of "switchboard" which uses the revised term "overcurrent protective device". CDC NOTE: Here is the revised definition of OCPD. Overcurrent Protective Device (OCPD). A device capable of providing protection over the full range of overcurrent between its rated current and its interrupting rating. (CMP-10) Informational Note No. 1: In prior editions of this code, the term branch-circuit overcurrent protective device included devices suitable for providing protection for service, feeder, and branch circuits. The term has been revised to a more generalized overcurrent protective device (OCPD). The specific requirements using this term can include modifiers (e.g., branch OCPD, feeder OCPD, service OCPD) to specify location or application of the OCPD, or to specify variations (e.g., supplementary OCPD). Informational Note No. 2: See 240.7 for a list of OCPDs suitable for providing protection for service, feeder, branch circuits, and equipment.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** The Technical Committee has reviewed the definitions that were modified in the 2026 National Electrical Code and are extracted for use in NFPA 70E. The terms identified in this second revision are updated to match the 2026 National Electrical Code.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. **Accessible (as applied to equipment).** Capable of being reached for operation, renewal, and inspection.~~Admitting close approach; not guarded by locked doors, elevation, or other effective means~~. [70:100] **Bonding Conductor ~~or~~ (Bonding Jumper).** A ~~reliable~~ conductor ~~to~~ that ensures the required electrical conductivity between metal parts that are required to be electrically connected. [70:100] **Building.** A structure that stands alone or that is separated ~~cut off~~ from adjoining structures by fire walls ~~with all openings therein protected by approved fire doors~~. [70:100]

Ground.

The ~~earth~~Earth. [70:100]

Ground-Fault Circuit Interrupter (GFCI) (Class A GFCI).

A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device. [70:100]

Informational Note: See UL 943, Ground-Fault Circuit Interrupters, for further information. Class A ground-fault circuit interrupters trip when the ground-fault current is 6 mA or higher and does not trip when the ground-fault current is less than 4 mA.

Grounding Conductor, Equipment (EGC). (Equipment Grounding Conductor)

~~The~~ A conductive path(s) that is part of an effective ~~provides a~~ ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. [70:100]

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 of NFPA 70, National Electrical Code, for a list of acceptable equipment grounding conductors.

Grounding Electrode Conductor (GEC).

A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system. [70:100]

Luminaire.

~~A complete lighting unit consisting of a light source, such as a lamp or lamps, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light. A lampholder itself is not a luminaire~~.

Utilization equipment intended to illuminate a space or object(s), to facilitate visual tasks, activities, aesthetics, or security, or a similar purpose. Light-emitting devices such as lamps or LED modules could be removable or replaceable. The equipment can connect directly to the branch circuit (ac or dc) or be used with a separate power source that regulates the voltage, current, or both from the branch circuit.
[70:100]

Panelboard.

	A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent protective devices (OCPDs), and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front. [70:100] **Raceway.** An enclosed channel ~~of metal or nonmetallic materials~~ designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this standard. [70:100] **Service Drop.** The overhead conductors between the serving utility ~~electric supply system~~ and the service point. [70:100] **Short-Circuit Current Rating.** The prospective symmetrical fault current at a nominal voltage to which ~~an apparatus or system~~ ~~equimment~~equipment is able to be connected without sustaining damage exceeding defined acceptance criteria. [70:100] **Switchboard.** A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent protective devices (OCPDs) and other protective devices, buses, and usually instruments. Informational Note: These assemblies are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets. [70:100]

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (new def)	19		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Avoid Contact Means taking the necessary actions, such as using PPE, placing adequately rated insulating materials over or guarding the exposed energized conductors or circuit parts, to reduce the risk and likelihood of making inadvertent contact.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		

Statement	**Technical reason for revision.**

Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Per Section 2.1.2.5 of the 2023 National Electrical Code Style Manual definitions shall not contain requirements or recommendations. Workers can utilize one or more methods to comply with this approach limit requirement as clearly presented in 130.4(G).

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (new def)	18		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	Recommend adding a new definition to Article 100, defining and clarifying what 'Avoid Contact' means in context to the Restricted Approach Boundary. The 2024 version of NFPA 70E uses the phrase 'Avoid Contact' as the Restricted Approach Boundary (RAB) for the ac voltage range of 50 vac to 150 vac in Table 130.4(E)(a) and in Table 130.4(E)(b) for dc voltages from 50 vdc to 300 vdc. Unlike the other ac and dc voltage ranges listed in Table 130.4(E)(a) and Table 130.4(E)(b) respectively, which all contain a physical distance shown in metric and imperial measurements, the term 'Avoid Contact' is used in place of an actual measurement from the exposed energized part(s) at lower, albeit hazardous voltages. The use of 'Avoid Contact' as an electric shock protection boundary is extremely subjective and is often misunderstood by safety professionals and electrical workers alike to mean "Don't touch it" which is essentially nothing more than a warning to "Be Careful". However, section 130.4(G) titled Restricted Approach Boundary , establishes two mandatory conditions before a qualified person is permitted to approach or take a conductive object closer to exposed energized parts than the RAB for voltages greater than 50 vac or 50 vdc, unless one of the two following conditions are met: 1. The qualified person is insulated or guarded from the energized conductors or circuit parts or 2. The energized conductors or circuit parts are insulated from the qualified person and from any conductive object at a different potential. The purpose of the RAB is to prevent inadvertent or accidental contact with the energized parts through a predetermined air gap that serves as a safety buffer. This safety zone contains both an electrical component of air insulation and an ergonomic component to account for human errors. Consequently, crossing the RAB per section 130.4(G) must be treated the same as making intentional contact through the two conditions listed above. Additionally, according to the column #4 in Tables 130.4(E)(a) and 1130.4(E)(b), the RAB includes an "Inadvertent Movement Factor", which is also known as the ergonomic component, but this is only true for those RABs with a physical distance. Whereas 'Avoid Contact' is the only RAB if crossed results in inadvertent contact with the energized part(s) followed by serious injury or death. Additionally, OSHA regulations pursuant to 29CFR1910.269, Appendix B – Working On Exposed Energized Parts states in part states 'Avoid Contact' contains neither an electrical component nor an ergonomic component." Please note, OSHA uses the term "Minimum Approach Distance" (MAD) rather than RAB to designate the shock boundary, furthermore the OSHA voltage range for 'Avoid Contact' is 50 to 300 volts. But the purpose for OSHA's MAD is identical to 70E's RAB. https://www.osha.gov/laws-regs/regulations/standard number/1910/1910.269AppB In OSHA's Final Rules to 1910.269, Subpart R, OSHA cited 26 fatalities of electric utility workers after inadvertent contact with 120 volts between 1984 to 1996. According to more recent data from the Electrical Foundation International (ESFI) from 2011 to 2022, 30 workers lost their lives from voltages ranging between 110 to 120 volts with another 23 deaths from 208 to 240 volt systems. However, it is very likely that most of the fatal shocks listed as 208 or 240 volt systems were the result of a phase-to-ground contact, which would technically be a 120 volt shock. For more background and details, please review the paper

	ESW2025-08 titled "Avoid Contact – The Shock Boundary Without a Distance" authored by George T. Cole, presented during the 2025 IEEE Electrical Safety Workshop conference in Jacksonville, FL, USA.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The public comment did not provide the specific wording to be added. See Sections 4.4.4.3 and 4.4.4.4 of the NFPA Regulations Governing the Development of NFPA Standards for further information.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (new def)	113		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	Avoid Contact The implementation of safety measures intended to prevent inadvertent physical contact with energized electrical conductors or circuit parts. This is achieved through actions such as using Personal Protective Equipment (PPE), applying insulating barriers or covers rated for the voltage, minimizing the chance of contact with live electrical parts.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Per Section 2.1.2.5 of the 2023 National Electrical Code Style Manual definitions shall not contain requirements or recommendations. Workers can utilize one or more methods to comply with this approach limit requirement as clearly presented in 130.4(G).
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 New def (energy isolation device)	89	PC-89 had comments on multiple terms combined in one PC. TG handled as a single action and addressed each term individually in our response.	☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Energy Isolation Device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed definition of “Energy Isolation Device” is well understood in industry and appears in OSHA 1910.147(b). Insufficient substantiation was included to demonstrate the term is not well understood or is being misapplied by users of NFPA 70E. The terms “Lockout", "Lockout Device", "Lockout/Tagout (LOTO)", "Tagout", "Tagout Device” are specifically described by the requirements of section 120.4. Per Section 2.1.2.5 of the 2023 National Electrical Code Style Manual definitions shall not contain requirements or recommendations. An informational note to explain “rated for available fault current” is unnecessary. NEC Section 110.24 referred to in the public comment does not contain such a note, nor does NEC Section 110.24 bear any resemblance to the proposed informational note. As a best practice multiple separate definitions in NFPA standards are more efficiently processed by the technical committee if they are submitted as separate public inputs or public comments.		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 New def (lockout device)	(89 cont.)		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Lockout Device. A hardened device that utilizes a positive means such as a lock, either key or combination type, that physically restrains an energy isolating device in a safe position and prevents the energizing of a machine or equipment.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New def (LOTO)	(89 cont.)		☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Lockout/Tagout (LOTO). The combination use of both a Lockout Device with a Tagout Device to control hazardous electrical energy.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New def (tagout)	(89 cont.)		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Tagout. The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	Technical reason for rejecting or not making some of the proposed changes.		

Proposed Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 New def (tagout device)	(89 cont.)		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Tagout Device. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed. Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock where tags may evoke a false sense of security.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.		

Do not delete	

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 New def	90	PC-90 had two items combined in one PC. TG handled as a single action and addressed each individually in our response.	☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Equipotential Zone. (For Temporary Protective Grounding) (EPZ). The state of maintaining a near identical electrical potential between two or more points in the work area, which minimizes electric shock exposure from step potential hazards and touch potential hazards.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes**. The term “Equipotential Zone” is not included in the requirements of the document and therefore the proposed definition is not necessary. The term “Temporary Protective Grounding” is not used within the standard except as a description of the term “Temporary Protective Grounding Equipment", which is specifically described by the requirements of section 120.6. Additionally, per section 2.1.2.5 of the 2023 National Electrical Code Style Manual definitions shall not contain requirements or recommendations. As a best practice multiple separate definitions in NFPA standards are more efficiently processed by the technical committee if they are submitted as separate public inputs or public comments.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.		

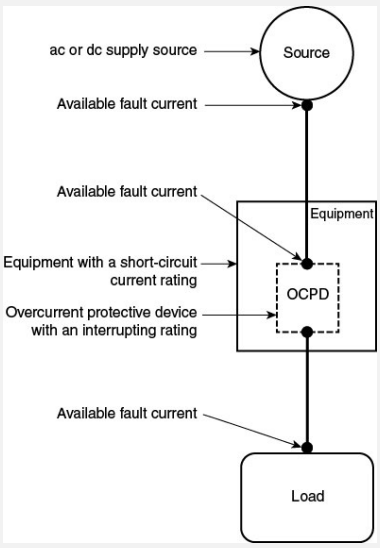
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 New def	(90 cont.)		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Temporary Protective Grounding. The intentional act of installing specialized conductors and clamps to all normally energized circuit parts and phases of a power system to ground and bond them together to conduct short circuit current for a specified duration of time by having sufficient current withstand rating which limits currents through the worker to acceptable levels. This is accomplished by limiting potential differences between any two or more accessible points at the worksite by developing an equipotential zone (EPZ).		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (arc rating)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **CDC NOTE:** Definition does not appear to meet NFPA MOS. MOS **7.2 General Requirements.** **7.2.1** A definition shall be only a statement of the meaning of a word or phrase. **7.2.2** Definitions shall be in the format of a bold term followed by the statement of meaning for a word or phrase to form a single paragraph. **7.2.3** Definitions shall not contain requirements.		

	NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	The definition is restructured to comply with Section 7.2 of the Manual of Style for NFPA Technical Committee Documents October 2023 Edition. The informative material is relocated as a new Informational Note No. 1 and subsequent informational notes are retained and renumbered. The parenthesis are removed per Section 3.5.1.1 of the National Electrical Code Style Manual.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	Arc Rating. The value attributed to materials that describes their performance to exposure to an electrical arc discharge. Informational Note No. 1: The arc rating is expressed in cal/cm2 and is derived from the determined value of the arc thermal performance value (ATPV) or energy of breakopen threshold (EBT), ~~(~~should a material system exhibit a breakopen response below the ATPV value~~)~~. Arc rating is reported as either ATPV or EBT, whichever is the lower value. Informational Note No. ~~1~~2: Arc-rated clothing or equipment indicates that it has been tested for exposure to an electric arc. Flame-resistant clothing without an arc rating has not been tested for exposure to an electric arc. All arc-rated clothing is also flame resistant. Informational Note No. ~~2~~3: See ASTM F1959/F1959M, Standard Test Method for Determining the Arc Rating of Materials for Clothing, which defines ATPV as the incident energy (cal/cm2) on a material or a multilayer system of materials that results in a 50 percent 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. Informational Note No. ~~3~~4: See ASTM F1959/F1959M, Standard Test Method for Determining the Arc Rating of Materials for Clothing, which defines EBT as the incident energy (cal/cm2) on a material or a material system that results in a 50 percent probability of breakopen. Breakopen is a material response evidenced by the formation of one or more holes of a defined size [an area of 1.6 cm2 (0.5 in.2) or an opening of 2.5 cm (1.0 in.) in any dimension] in the innermost layer of arc-rated material that would allow thermal energy to pass through the material.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (available fault current)	40	In Cart with 121	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the definition "Fault Current Available" Informational Note to No. 1 Figure regarding "See Figure Figure Informational Note 100.0" and revise for clarity.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (available fault current)	121	40	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **Fault Current, Available. (Available Fault Current)** The largest amount of current capable of being delivered at a point on the system during a short-circuit condition. Informational Note No. 1: See Figure Figure Informational Note 100.0 A short circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. Figure Informational Note 100.0 ~~Available Fault~~ 0 Fault Current.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The title and references to Informational Note Figure 100.0 is updated for clarity and to remove redundant language.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** While the fault current also varies, the figure depicts that the available fault current varies at different locations in the system as indicated in Informational		

	Note No. 3 to the definition of “Available Fault Current”. The figure is not associated with the defined term “Fault Current”.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. **Fault Current, Available. (Available Fault Current)** The largest amount of current capable of being delivered at a point on the system during a short-circuit condition. Informational Note No. 1: See ~~Figure~~ ~~Figure~~ Informational Note Figure 100.0. A short circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. **~~Figure~~ Informational Note Figure 100.0 Available Fault Current.** 

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (cutout)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Definition does not appear to meet NFPA MOS. MOS **7.2 General Requirements.** **7.2.1** A definition shall be only a statement of the meaning of a word or phrase. **7.2.2** Definitions shall be in the format of a bold term followed by the statement of meaning for a word or phrase to form a single paragraph. **7.2.3** Definitions shall not contain requirements. NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		

Statement	**Technical reason for revision.**
	The definition is restructured to comply with Section 7.2 of the Manual of Style for NFPA Technical Committee Documents October 2023 Edition. The informative material is relocated as a new informational note. The word “may” is replaced with “might” for clarity.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	Cutout. An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. Informational Note: The fuseholder or fuse carrier ~~may~~ might include a conducting element (fuse link), or ~~may~~ might act as the disconnecting blade by the inclusion of a nonfusible member.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (ESWC)	27	In cart with PC 12	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	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 for the absence of electrical energy (voltage and current), and, if necessary, temporarily grounded for personnel protection. Informational Note: See 110.2(C) and 120.2 through 120.6 for the requirements to establish and verify an electrically safe work condition.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

100 (ESWC)	12	27 In cart TG offering 2 recommendations – see below.	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

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 for the absence of ~~voltage~~ electrical energy, and, if necessary, temporarily grounded for personnel protection.

Informational Note: See 110.2(C) and 120.2 through 120.6 for the requirements to establish and verify an electrically safe work condition.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Statement

Technical reason for revision.

Response

Technical reason for rejecting or not making some of the proposed changes.

Task Group was unable to reach consensus and is offering 2 paths:

1) **Create SR to change the definition:**

"A state during which electrical hazards associated with a conductor or circuit part have been eliminated while the state is maintained.

Informational Note: See Article 120 for procedures on establishing an electrically safe work condition."

Committee Statement: "The definition of "Electrically Safe Work Condition" is revised for clarity."

2) **Reject**

The committee reaffirms the action and statement associated with PI-49.

A more holistic approach is needed than the proposed change of replacing “voltage” with “electrical energy”. Simply changing the phrase would reduce clarity and may result in unintended consequences.

Chapter 3 of NFPA 70E applies to special electrical equipment in the workplace and modifies the general requirements of Chapter 1. The submitter may wish to consider adding provisions to Chapter 3 as a method to address the specialized hazards associated with airfield ground lighting or similar circuits.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	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 for the absence of voltage, and, if necessary, temporarily grounded for personnel protection. Informational Note: See 110.2(C) and 120.2 through 120.6 for the requirements to establish and verify an electrically safe work condition.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (exposed)	MOS		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC NOTE: Definition does not appear to meet NFPA MOS. MOS **7.2 General Requirements.** **7.2.1** A definition shall be only a statement of the meaning of a word or phrase. **7.2.2** Definitions shall be in the format of a bold term followed by the statement of meaning for a word or phrase to form a single paragraph. **7.2.3** Definitions shall not contain requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	The definition is restructured to comply with Section 7.2 of the Manual of Style for NFPA Technical Committee Documents October 2023 Edition. The informative material is relocated as a new informational note and modified for clarity.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	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. Informational Note: The term "exposed" applies ~~It is applied~~ to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (Electrical hazard)	227		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **Hazard, Electrical. (Electrical Hazard)** A source of possible injury or damage to health that can result in electric shock arc flash burn, or a contact thermal burn~~, or arc blast injury~~. Informational Note 1: See Annex K for further information on the associated hazards. Informational Note 2: Class 2 power supplies, listed low-voltage lighting systems, and similar sources are examples of circuits or systems that are not considered an electrical hazard.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** The definition is clarified to align with the three hazards described in the standard, the risk assessments required by the standard, and with Informative Annex K.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. Hazard, Electrical. (Electrical Hazard) A source of possible injury or damage to health that can result in electric shock, arc flash burn, or a contact thermal burn~~, or arc blast injury~~. Informational Note No. 1: See Annex K for further information on the associated hazards. Informational Note No. 2: Class 2 power supplies, listed low-voltage lighting systems, and similar sources are examples of circuits or systems that are not considered an electrical hazard.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (pilot cell)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	CDC NOTE: Definition does not appear to meet NFPA MOS. MOS **7.2 General Requirements.** **7.2.1** A definition shall be only a statement of the meaning of a word or phrase. **7.2.2** Definitions shall be in the format of a bold term followed by the statement of meaning for a word or phrase to form a single paragraph. **7.2.3** Definitions shall not contain requirements. NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** The definition of "Pilot Cell" is removed because the term is not used in the requirements of NFPA 70E.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. ~~**Pilot Cell.**~~ ~~One or more cells chosen to represent the operating parameters of the entire battery (sometimes called "temperature reference" cell). (320)~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (prospective short-circuit current)	MOS		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Definition does not appear to meet NFPA MOS. MOS **7.2 General Requirements.** **7.2.1** A definition shall be only a statement of the meaning of a word or phrase. **7.2.2** Definitions shall be in the format of a bold term followed by the statement of meaning for a word or phrase to form a single paragraph. **7.2.3** Definitions shall not contain requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	The definition is restructured to comply with Section 7.2 of the Manual of Style for NFPA Technical Committee Documents October 2023 Edition. The informative material is relocated as a new Informational Note No. 1 and the existing informational note is renumbered as No. 2. The article reference is relocated to be after the definition and updated to Article 360 to reflect changes made in the first draft.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	Short-Circuit Current, Prospective. (Prospective Short-Circuit Current) The highest level of fault current that could theoretically occur at a point on a circuit. (360) Informational Note No. 1: This is the fault current that can flow in the event of a zero impedance short circuit and if no protection devices operate. ~~(320)~~ Informational Note No. 2: Some batteries have built-in management devices to limit maximum short-circuit current. The determination of the prospective short-circuit current for these batteries assumes that the internal battery management system protection devices are operable.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
100 (metal enclosed switchgear)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC NOTE: Definition does not appear to meet NFPA MOS. MOS **7.2 General Requirements.** **7.2.1** A definition shall be only a statement of the meaning of a word or phrase. **7.2.2** Definitions shall be in the format of a bold term followed by the statement of meaning for a word or phrase to form a single paragraph. **7.2.3** Definitions shall not contain requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	The definition is restructured to comply with Section 7.2 of the Manual of Style for NFPA Technical Committee Documents October 2023 Edition. The informative material is relocated as a new informational note. The word “may” is replaced with “might” for clarity.		

Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	Switchgear, Metal-Enclosed. (Metal-Enclosed Switchgear) 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. Informational Note: This assembly ~~may~~ might include 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.

DOC #	NFPA 70E
TG #/NAME	TG2 Articles 105 and 110
TG CHAIR	Mark McNellis
TG MEMBERS	* indicates non-committee member Chaitanya Katekar: IntertekDawn Carney: US Army Corps of Engineers, Daniel Roberts: Electrical Safety Solutions, Scott Cavanaugh: Schneider Electric, Al Winfield: Caddick Corporation, Ray Crow: DRC Consulting, *Jennifer Martin: Pacific Northwest National Laboratory, Jesse Robert Duvuvei, Bill Harris: Barton Malow Co, Amanda Newsome: Underwriters Laboratories

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
105.5	134		☒ Create Second Revision ☐ Reject
Talking points	This PC seeks to delete 105.5 since it's no longer needed as it's redundant with 90.4 and figure 90.4		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	~~105.5 Organization.~~ ~~Chapter 1 of this standard is divided into five articles. Article 100 provides definitions for terms used in one or more of the chapters of this standard. Article 105 covers employer and employee responsibilities for the application of safety-related work practices and procedures. Article 110 covers general requirements for electrical safety-related work practices and procedures. Article 120 covers requirements for establishing an electrically safe work condition. Article 130 covers requirements for work involving electrical hazards.~~		
Proposed Statement	**Technical reason for revision.**		
	Section 105.5 is deleted to correlate with actions taken in first revisions where both the title of Article 105 and the scope of Article 105 were revised to include only employer and employee responsibilities. Further, the content of 105.5 is no longer necessary as it is redundant to 90.4 and Figure 90.4.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.		
	~~**105.5 Organization.**~~ ~~Chapter 1 of this standard is divided into five articles. Article 100 provides definitions for terms used in one or more of the chapters of this standard. Article 105 covers employer and employee responsibilities for the application of safety-related work practices and~~		

	~~procedures. Article 110 covers general requirements for electrical safety-related work practices and procedures. Article 120 covers requirements for establishing an electrically safe work condition. Article 130 covers requirements for work involving electrical hazards.~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.2(B)	41		☒ Create Second Revision ☐ Reject
Talking points	This is a comment from the CC requesting the TC tddress parenthetical use in 110.2B Informational Note. The motion is to create a second revision with minor edits.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review 110.2(B)(2)(7) Exception No.3 Informational Note regarding (e.g., start-up or troubleshooting) that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions and use of "e.g." shall be avoided and revised to comply with the NEC Style Manual.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	The revision removes the parenthetical expression "e.g., start up testing or troubleshooting" and incorporates the word "troubleshooting" within the Exception No. 3 Informational Note to comply with the NEC Style Manual Section 3.5.1.1.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.		
	Exception No. 3: Energized work shall be permitted where the employer can demonstrate that the task to be performed is infeasible in a de-energized state due to equipment design or operational limitations Informational Note: Examples of work that might be performed within the limited approach boundary of exposed energized electrical conductors or circuit parts because of infeasibility due to equipment design or operational limitations include performing diagnostics, ~~and~~ testing, ~~(e.g. start up~~ or troubleshooting~~)~~ of electric circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous process that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

110.2(B)	200		☐ Create Second Revision ☒ Reject
Talking points	This PC is a follow up to PI suggesting the addition of "all" in front of energized conductors in 110.2B. This PI was rejected during first draft meeting and the task group feels that the proposed text is unnecessary and does nott add clarity Motion is to reject		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC NOTE: only changes identified by me are shown. (B) When Required. ~~Energized~~ All energized electrical conductors and circuit parts operating at voltages equal to or greater than 50 volts or where an electrical hazard exists shall be put into an electrically safe work condition before an employee performs work if any of the following conditions exist: (1) The employee is within the limited approach boundary. (2) The employee interacts with equipment where conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists. Informational Note: See 120.2 through 120.6 for requirements to establish and verify an electrically safe work condition for the period of time for which the state is maintained.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	The use of the word "all" before the subject "energized electrical conductors and circuit parts" is unnecessary and does not add clarity.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Revision must be shown in track changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.2(B)	(89 cont.)		☐ Create Second Revision ☒ Reject
Talking points	This PC seeks to add a new informational note to 110.2B ±to clarify what "rated for the available current" is and is not. The task group felt that the proposed text did not add clarity and that getting information from utilities, as the submitter suggests, was unreliable. The motion is to reject		
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	CDC NOTE: only changes identified by me are shown. 110.2(B) Exception No. 1 Informational Note No. 3: The phrase *rated for the available fault current* means the available fault-current marking(s) related to the required short-circuit and interrupting ratings of the equipment. Values of available fault current for use in determining appropriate minimum short-circuit current and interrupting ratings of service equipment are available from electric utilities in published or other forms. [70:110.24]
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed informational note regarding the meaning of the phrase "rated for available fault current" does not provide useful information for the user of the Standard beyond that which is found in Article 100 in the definitions of "available fault current" and "short-circuit current rating.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Revision must be shown in track changes**.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.2(B)	132		☐ Create Second Revision ☒ Reject
Talking points	This PC suggests deleting conditions 2 from 110.2(B) (equipment is properly maintained) and 3 (equipment is rated for the available fault current) stating that since equipment installed per code means that it is used and maintained per its listing. The TG felt that all list items are essential to a normal operating condition and need to be viewed in context rather than implied. The motion is to reject.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC NOTE: only changes identified by me are shown. *Exception No. 1: Normal operation of electric equipment shall be permitted where a normal operating condition exists. A normal operating condition exists when all of the following conditions are satisfied:* *(1) The equipment is properly installed.* ~~*(2) The equipment is properly maintained.*~~ ~~*(3) The equipment is rated for the available fault current.*~~		

	(4) The equipment is used in accordance with instructions included in the listing and labeling and in accordance with manufacturer's instructions. *(5) The equipment doors are closed and secured.* *(6) All equipment covers are in place and secured.* *(6) There is no evidence of impending failure.* Informational Note No. 1: The phrase *properly installed* means that the equipment is installed in accordance with applicable industry codes and standards and the manufacturer's recommendations. The phrase *properly maintained* means that the equipment has been maintained in accordance with the manufacturer's recommendations and applicable industry codes and standards. The phrase *evidence of impending failure* means that there is evidence such as arcing, overheating, loose or bound equipment parts, visible damage, deterioration, or water damage. Informational Note No. 2: See NEMA GD 1-2019, *Evaluating Water-Damaged Electrical Equipment*, as an example of a document that provides further information on evaluating electrical equipment that may have been exposed to water.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Exception No. 1 list items 2 "…properly maintained" and No. 3 "…rated for the available fault current" are not deleted as all 7 list items are essential to a normal operating condition and need to be viewed in context rather than implied.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.2(C)	42		☒ Create Second Revision ☐ Reject
Talking points	This PC was submitted by the CC requesting a re-evaluation of the title of 110.2C to ensure it matched the following content or that we remove the second level subdivision re-write. Motion is to create a second revision with minor edits (C1 and C2 become C and D) to address this concern as well as an MOS submission to address the multiple requirements issue		
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	The Correlating Committee requests that the Technical Committee review the second level subdivision title relative to the content in (C), (1) and (2) to ensure the title accurately reflects the content of the requirement or remove the second level sub-division restructuring.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Revisions were made to 110.2(C) to comply with the NEC Style Manual Section 3.5.1.2 Multiple Requirements and to ensure that the sub-division titles accurately reflected the content.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(C) ~~Requirements Until Established~~. Requirements to Establish ~~(1) When Established.~~ Electrical conductors and circuit parts shall not be considered to be in an electrically safe work condition until all of the applicable requirements of 120.2 through 120.6 have been met (D) ~~(2)~~ Work Practices Until Established Safe work practices applicable to the circuit voltage and energy level shall be used until such time that electrical conductors and circuit pasts are in an electrically safe work condition.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.2(C)	MOS	No action required – the revision is captured by the action on PC 42.	☐ Create Second Revision ☐ Reject
Talking points	This is a another style manual issue: CC identified multiple requirements in subdivision. No action is required due to action taken on PC42		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(C) Requirements Until Established.** (1) When Established. Electrical conductors and circuit parts shall not be considered to be in an electrically safe work condition until all of the applicable requirements of 120.2 through 120.6 have been met. (2) Work Practices Until Established. Safe work practices applicable to the circuit voltage and energy level shall be used until such time that electrical conductors and circuit parts are in an electrically safe work condition.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(A)	33	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Talking points	PC33 was submitted by the CC to address the use of the word “appropriate” in 110.3A *The employer shall implement and document an overall electrical safety program that directs activity appropriate to the risk associated with electrical hazards*. The Task group agreed that the language presented ambiguous and unenforceable language so		

	The motion is to create a second revision
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	The phrase "appropriate to" is potentially vague and unenforceable and is replaced with the phrase "applicable to."
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Must be shown in track changes**.
	110.3(A) General. The employer shall implement and document an overall electrical safety program that directs activity ~~appropriate to~~applicable to the risk associated with electrical hazards Informational Note No. 1: Safety-related work practices such as verification of proper maintenance and installation, alerting techniques, auditing requirements, and training requirements provided in this standard are administrative controls and part of an overall electrical safety program. Informational Note No. 2: See Informative Annex P for information on implementing an electrical safety program within an employer's occupational health and safety management system. Informational Note No. 3: See IEEE 3007.1, *Recommended Practice for the Operation and Management of Industrial and Commercial Power Systems*, which provides additional guidance for the implementation of the electrical safety program. Informational Note No. 4: See IEEE 3007.3, *Recommended Practice for Electrical Safety in Industrial and Commercial Power Systems*, which provides additional guidance for electrical safety in the workplace.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(D)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue requesting the TG address multiple requirements identified in 110.3D. The motion is to create a second revision with minor restructuring edits		
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(D) Awareness and Self-Discipline. My preference** The electrical safety program shall be designed and developed to accomplish the following: 1) ~~designed to p~~Provide an awareness of the potential electrical hazards to employees who work in an environment with the presence of electrical hazards. 2) ~~The program shall be developed to p~~Provide the required self-discipline for all employees who must perform work that may involve electrical hazards. 3) ~~The program shall i~~Instill safety principles and controls.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** Section 110.3(D) has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(D) Awareness and Self-Discipline**. The electrical safety program shall be designed and developed to accomplish the following: (1). ~~to provide~~Provide an awareness of the potential electrical hazards to employees who work in an environment with the presence of electrical hazards. (2). ~~The program shall be developed to provide~~ Provide the required self-discipline for all employees who must perform work that may involve electrical hazards. (3). ~~The program shall instill~~Instill safety principals and controls.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(L)(1)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue suggesting the TG address multiple requirements identified in 110.3L1. There is no change in content, only in renumbering- 110.3L1 becomes L1a&b. The motion is that that we create a second revision		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		

	(1) Electrical Safety Program Audit. (a) The electrical safety program shall be audited to verify that the principles and procedures of the electrical safety program are in compliance with this standard. (b) Audits shall be performed at intervals not to exceed 3 years.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Section 110.3(L)1 has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Sectopm 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(1) Electrical Safety Program Audit. (a). The electrical safety program shall be audited to verify that the principles and procedures of the electrical safety program are in compliance with this standard. (b). Audits shall be performed at intervals not to exceed 3 years.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(L)(2)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Talking points	PC33, submitted by the CC is another use of "appropriate"in 110.3L2 : The motion is to create a second revision and address the CC concern with minor edits.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	Section 110.3(L)2 was edited to avoid the use of unenforceable or vague terminology per NEC Style Manual Section 3.2.1.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(2) Work Practices Audit.** (a) Employee work practices shall be audited to verify that the requirements contained in the procedures of the employer's electrical safety program are being followed. (b). When the auditing determines that the principals and procedures of the electrical safety program are not being followed, the ~~appropriate revisions to the~~ training program or ~~revisions to~~ the procedures shall be ~~made.~~revised to address the deficiencies. (c) Audits shall be performed at intervals not to exceed 1 year.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(L)(2)	92	243	☐ Create Second Revision ☒ Reject
Talking points	During the first draft meeting the TC voted to editorially change "field work audit" to Work practices audit" to address work taking place in locations other than "in the field". This PC and PC 243 look to reverse that change. Reverting back to "field work" might imply that the audit only applies to field work rather than all types of work in various locations. Motion is to reject		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision. There was a word document attached to comment with the following: Revise the wording in first revision FR 41as shown below: 1. Field Work Audit - Change the wording in the title of 110.3(L)(2) to **"Field Work Audit"** as stated in the 2024 edition.- **2.** Change the wording in 110.3(L)(2)(a) to read **"The task(s) observed during the field audit shall verify that the requirements contained in the employee's electrical safety program are being followed".** 3. Keep the proposed wording in (b) and (c) in the FR 41 first revision. **Substantiation:** One cannot verify work practices in the employee's electrical safety program are being followed unless the work practices being used are seen during the audit. One can only audit actions that are taking place when the audit is performed. One cannot see if people are following the work practices that are not used when the audit is taking place.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.** Section 110.3(L)(2) sub-division title and requirements are not revised from "work practices" to "field work" as the phrase "field work" is not defined in the document and implies that the work audit potentially apply only in the "field" rather than all types of work locations.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(L)(2)	243	Addressed by committee actions taken on PC92	☐ Create Second Revision ☒ Reject
Talking points	Looks to revert first draft change from “field work” audit to “work practices” back to “field work” audit. This was rejected with PC92		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	~~(2) Work Practices Audit.~~ (a) ~~Employee work practices shall be audited to verify that the requirements contained in the procedures of the employer's electrical safety program are being followed.~~ (b) ~~When the auditing determines that the principles and procedures of the electrical safety program are not being followed, the appropriate revisions to the training program or revisions to the procedures shall be made.~~ (c) ~~Audits shall be performed at intervals not to exceed 1 year.~~		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	110.3(L)(2) sub-division title and requirements are not revised from “work practices” to “field work” as the phrase “field work” is not defined in the document and implies that the work audit potentially apply only in the “field” rather than all types of work locations.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	(2) Work Practices Audit. (a) Employee work practices shall be audited to verify that the requirements contained in the procedures of the employer's electrical safety program are being followed. (b) When the auditing determines that the principles and procedures of the electrical safety program are not being followed, the appropriate revisions to the training program or revisions to the procedures shall be made. (c) Audits shall be performed at intervals not to exceed 1 year.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(L)(2)	238		☐ Create Second Revision ☒ Reject
Talking points	This PC seeks to add a new requirement to audit at least one work practice in progress. This requirement to audit at least one work practice in progress is already adequately addressed in 110.3(L)(2)(a). Motion is to reject		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (2) Work Practices Audit. (a) Employee work practices shall be audited to verify that the requirements contained in the procedures of the employer's electrical safety program are being followed. (b) When the auditing determines that the principles and procedures of the electrical safety program are not being followed, the appropriate revisions to the training program or revisions to the procedures shall be made. (c) Audits shall be performed at intervals not to exceed 1 year. (d) Audit shall cover at least one work practice in progress		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed requirement to audit at least one work practice in progress is adequately addressed in 110.3(L)(2)(a).		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(2) Work practices Audit** (a) Employee work practices shall be audited to verify that the requirements contained in the procedures of the employer's electrical safety program are being followed (b) When the auditing determines that the principles and procedures of the electrical safety program are not being followed, the appropriate revisions to the training program or revisions to the procedures shall be made (c) Audits shall be performed at intervals not to exceed 1 year		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 110.3(L)(3)	244		☐ Create Second Revision ☒ Reject
Talking points	PC 244 seeks to add an IN to help define what a work practice may be. The requirement to audit "employee work practices" is clear and unambiguous as written and does not		

	need an informational note to clarify the intent. If we read 110.3L2a, its clear on practices/procedures/program *Employee **work practices** shall be audited to verify that the requirements contained in **the procedures** of the employer's **electrical safety program** are being followed.* Motion is to reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	Add an informational note to define work practice- A work practice may be a program or procedure to perform a specific work to minimize risk from exposure to injury and to achieve a specific objective.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	·
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The requirement to audit "employee work practices" is clear and unambiguous as written and does not need an informational note to clarify the intent.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(2) Work practices Audit (a) Employee work practices shall be audited to verify that the requirements contained in the procedures of the employer's electrical safety program are being followed (b) When the auditing determines that the principles and procedures of the electrical safety program are not being followed, the appropriate revisions to the training program or revisions to the procedures shall be made (c) Audits shall be performed at intervals not to exceed 1 year

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.3(L)(4)	145		☒ Create Second Revision ☐ Reject
Talking points	PC 145 was submitted to eliminate redundancy in LOTO audit requirements resultant from a transcription error in the First Draft meeting. Motion is to create a Second revision abd delete duplicate text.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	(4) Lockout/Tagout Procedure Audit. (a) The lockout/tagout procedures required by 120.2 through 120.6 shall be audited by a qualified person at intervals not to exceed 1 year.		

	(b) The audit shall cover at least one lockout/tagout in progress. (c) ~~The audit shall cover at least one lockout/tagout in progress.~~ The audit shall be designed to identify and correct deficiencies in the following: (1) The lockout/tagout procedures (2) The lockout/tagout training (3) Worker execution of the lockout/tagout procedure
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	The sentence "The audit shall cover at least one lockout/tagout in progress" in 110.3(L)(4)(c) is deleted as it is already stated in 110.3(L)(4)(b).
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(4) Lockout/Tagout Procedure Audit. (a) The lockout/tagout procedures required by 120.2 through 120.6 shall be audited by a qualified person at intervals not to exceed 1 year. (b) The audit shall cover at least one lockout/tagout in progress. (c) ~~The audit shall cover at least one lockout/tagout in progress.~~ The audit shall be designed to identify and correct deficiencies in the following: (1) The lockout/tagout procedures (2) The lockout/tagout training (3) Worker execution of the lockout/tagout procedure

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing multiple requirements in section 110.4(A). The motion is to create a second revision with monir edits as shown below in clean text box		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(A) Electrical Safety Training.**		

	(1) NEEDS TITLE. The training requirements contained in 110.4(A) shall apply to employees exposed to an electrical hazard when the risk associated with that hazard is not reduced to a safe level by the applicable electrical installation requirements. **(2) Exposed Employees** (a) ~~Such e~~Employees shall be trained to understand the specific hazards associated with electrical energy. (b) ~~They~~ Employees shall be trained in safety-related work practices and procedural requirements, as necessary, to provide protection from the electrical hazards associated with their respective job or task assignments. ~~(a)~~(c) Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury. Informational Note: See NFPA 70, National Electrical Code, for further information concerning installation requirements. OR ALTERNATELY: **(A) Electrical Safety Training.** ~~The training requirements contained in 110.4(A) shall apply to~~ All employees exposed to an electrical hazard when the risk associated with that hazard is not reduced to a safe level by the applicable electrical installation requirements shall be ~~trained as follows~~: 1) ~~The training~~ Trained in requirements contained in 110.4(A)~~shall apply to~~. 2) ~~Such employees shall be t~~Trained to understand the specific hazards associated with electrical energy. 3) ~~They shall be t~~Trained in safety-related work practices and procedural requirements, as necessary, to provide protection from the electrical hazards associated with their respective job or task assignments. ~~1)~~4) ~~Employees shall be t~~Trained to identify and understand the relationship between electrical hazards and possible injury. Informational Note: See NFPA 70, National Electrical Code, for further information concerning installation requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** The multiple requirements contained in 110.4(A) were moved into a second level sub-division and separated into list items to comply with NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(A) Electrical Safety Training.** The training requirements contained in 110.4(A) shall apply to employees exposed to an electrical hazard when the risk associated with that hazard is not reduced to a safe level by the applicable electrical installation requirements. **(1) Training Requirements.** Such employees shall be trained as follows: (a) ~~to~~ To understand the specific hazards associated with electrical energy~~.~~;

	(b) ~~They shall be trained i~~In safety-related work practices and procedural requirements, as necessary, to provide protection from the electrical hazards associated with their respective job or task assignments~~.~~; and (c) ~~Employees shall be trained t~~To identify and understand the relationship between electrical hazards and possible injury. Informational Note: See *NFPA 70*, *National Electrical Code*, for further information concerning installation requirements.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(1)(c)	33 (cont)		☒ Create Second Revision ☐ Reject
Talking points	This is a continuation of PC33 requesting the TC address the use of the word "appropriate", this time with respect to 110.A1(c)(4)(d) Motion is to create a second revision as seen in the language below.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	In 110.4(A)(1)(c)(4)d the word "appropriate" is deleted as it is unnecessary.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	Revision must be shown in track changes.		

	(c) Such persons permitted to work within the limited approach boundary shall, at a minimum, be additionally trained in all of the following: (1) Skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment (2) Skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts (3) Approach distances specified in Table 130.4(E)(a) and Table 130.4(E)(b) and the corresponding voltages to which the qualified person will be exposed (4) Decision-making process necessary to be able to do the following: a. Perform the job safety planning b. Identify electrical hazards c. Assess the associated risk d. Select the ~~appropriate~~ risk control methods from the hierarchy of controls identified in 110.3(H)(3), including PPE

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(1)(e)	13	28	☒ Create Second Revision ☐ Reject
Talking points	This PC proposes to change language in 110.4(A)(1) from "voltage" to "electrical energy" stating that a QP has to verify absence of current in certain applications. The TC rejected this PI during the first draft meeting but felt that we could take a small step to meeting the submitters intent by verifying an electrically safe work condition as written in clean text box. Additionally, section (e) is restructured from paragraph to list items to improve readability and address multiple requirements. Motion is to create a second revision.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. **(1)** Qualified Person. A qualified person shall be trained and knowledgeable in the construction and operation of equipment or a specific work method and be trained to identify and avoid the electrical hazards that might be present with respect to that equipment or work method. (a) Such persons shall also be familiar with the proper use of applicable precautionary techniques, electrical policies, procedures, PPE, insulating materials, shielding materials, and insulated tools and test equipment. (b) A person shall be permitted to be considered qualified with respect to certain equipment and tasks, but unqualified for others. (c) Such persons permitted to work within the limited approach boundary shall, at a minimum, be additionally trained in all of the following:		

	1. Skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment 2. Skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts 3. Approach distances specified in Table 130.4(E)(a) and Table 130.4(E)(b) and the corresponding voltages to which the qualified person will be exposed 4. Decision-making process necessary to be able to do the following: a. Perform the job safety planning b. Identify electrical hazards c. Assess the associated risk d. Select the appropriate risk control methods from the hierarchy of controls identified in 110.3(H)(3), including PPE (d) An employee who is undergoing on-the-job training for the purpose of obtaining the skills and knowledge necessary to be considered a qualified person, and who in the course of such training demonstrates an ability to perform specific 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 specific duties. (e) Employees shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to test for the absence of ~~voltage~~ electrical energy , including interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each test instrument that might be used. The employer shall determine through regular supervision or through inspections conducted on at least an annual basis that each employee is complying with the safety-related work practices required by this standard.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** In 110.4(A)(1)(e) the phrase “an appropriate test instrument” is revised to “a test instrument rated for the application” to comply with NEC Style Manual Section 3.2.1. The phrase “verify the absence of voltage” is revised to “verify an electrically safe work condition” to correlate with the requirement found in 120.6(7). Section (e) is restructured from paragraph to list items to comply with NEC Style Manual Section 3.5.1.2 multiple requirements in a subdivision, and to improve readability.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR)	**Revision must be shown in track changes**.

Clean first revision text is provided to be revised. **Do not delete**	(e) Employees shall be trained ~~to select a test instrument and shall demonstrate how to use a device to test for 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 test instrument that might be used.~~on each test instrument they will use in all of the following: a. How to select a test instrument that is rated for the application b. The correct use of the test instrument c. The limitations of the test instrument d. How to interpret the indications provided by the test instrument (f) The training required by 110.4(A)(1)(e) shall include a demonstration by the employee on how to use the test instrument to verify an electrically safe work condition. (~~F~~g) The employer shall determine through regular supervision or through inspections conducted on at least an annual basis that each employee is complying with the safety-related work practices required by this standard.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(1)	28	Taken care of with PC13	☐ Create Second Revision ☐ Reject

Talking points	This PC proposes to change language in 110.4(A)(1) from "voltage" to "electrical energy" stating that QP also has to verify absence of current in different applications. The TC rejected this PI during the first draft meeting. Employees shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to test for the absence of ~~voltage~~ electrical energy , including interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each test instrument that might be used.
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 1. Employees shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to test for the absence of electrical energy (voltage and current), including interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each test instrument that might be used.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR)	**Revision must be shown in track changes**.

Clean first revision text is provided to be revised. **Do not delete**			
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(1)(e)	MOS	No action necessary. This has been addressed by the action taken on PC13	☐ Create Second Revision ☐ Reject
Talking points	This is another MOS Issue addressing Multiple requirements in section 110.4A1e.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. e. Employees shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to test for 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 test instrument that might be used.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**		
	a. Employees shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to test for 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 test instrument that might be used.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(3)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing multiple requirements in section 110.4A3. There is no change in content, only renumbering to break up the requirements. The motion is to create a second revision.		
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (3) Additional Training and Retraining. (a) Additional training and retraining in safety-related work practices and applicable changes in this standard shall be performed at intervals not to exceed 3 years. (b) An employee shall receive additional training or retraining if any of the following conditions exists: 1. The supervision or annual inspections indicate the employee is not complying with the safety-related work practices. 2. New technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices different from those that the employee would normally use. 3. The employee needs to review tasks that are performed less often than once per year. 4. The employee needs to review safety-related work practices not normally used by the employee during regular job duties. 5. The employee's job duties change.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** Section 110.4(A)3 has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(3) Additional Training and Retraining.** (a) Additional training and retraining in safety-related work practices and applicable changes in this standard shall be performed at intervals not to exceed 3 years. (b) An employee shall receive additional training or retraining if any of the following conditions exists: (1) The supervision or annual inspections indicate the employee is not complying with the safety-related work practices. (2) New technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices different from those that the employee would normally use. (3) The employee needs to review tasks that are performed less often than once per year.

	(4) The employee needs to review safety-related work practices not normally used by the employee during regular job duties. (5) The employee's job duties change

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(4)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing multiple requirements in section 110.4A4. There is no change to content, only numbering per the clean text box below. Motion is to create a second revision.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (4) Type of Training. (a) The training required by 110.4(A) shall be classroom, on-the-job, or a combination of the two. (b) The type and extent of the training provided shall be determined by the risk to the employee. Informational Note: Classroom training can include interactive electronic or interactive web-based training components.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** Section 110.4(A)4 has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. (4) Type of Training. (a) The training required by 110.4(A) shall be classroom, on-the-job, or a combination of the two. (b) The type and extent of the training provided shall be determined by the risk to the employee. Informational Note: Classroom training can include interactive electronic or interactive web-based training components.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(A)(5)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing multiple requirements in section 110.4A5. Only subtle change in text to help with the breakup of requirements. The primary change is in the numbering. The motion is to create a second revision.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (5) Electrical Safety Training Documentation. (a) The employer shall document that each employee has received the training required by 110.4(A). (b) ~~This d~~Documentation shall be in accordance with the following: 1. Be made when the employee demonstrates proficiency in the work practices involved 2. Be retained for the duration of the employee's employment 3. Contain the content of the training, each employee's name, and dates of training Informational Note No. 1: Content of the training could include one or more of the following: course syllabus, course curriculum, outline, table of contents, or training objectives. Informational Note No. 2: Employment records that indicate that an employee has received the required training are an acceptable means of meeting this requirement.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	Section 110.4(A)5 has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	(5) Electrical Safety Training Documentation (a) The employer shall document that each employee has received the training required by 110.4(A). (b) ~~This~~ Training documentation shall be in accordance with the following: (1) Be made when the employee demonstrates proficiency in the work practices involved		

	(2) Be retained for the duration of the employee's employment (3) Contain the content of the training, each employee's name, and dates of training Informational Note No. 1: Content of the training could include one or more of the following: course syllabus, course curriculum, outline, table of contents, or training objectives. Informational Note No. 2: Employment records that indicate that an employee has received the required training are an acceptable means of meeting this requirement.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(C)(1)	3		☐ Create Second Revision ☒ Reject
Talking points	This PC proposes new material seeking to change the frequency of training for *methods of release* from annual to 2 years or in line with certifying agency. No technical substantiation was provided to revise the requirement from annually to every two years and there is no certifying body for contact release training. Motion is to reject.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **1)** Contact Release. Employees exposed to electric shock hazards and those responsible for the safe release of victims from contact with energized electrical conductors or circuit parts shall be trained in methods of safe release. Refresher training shall occur ~~annually.~~ every 2 years or at a frequency that satisfies the requirements of the certifying body.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.** No technical substantiation was provided to revise the contact release refresher training requirement from annually to every two years. Additionally, there is no certifying body for contact release training.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.4(C)(1)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing multiple requirements, this time in section 110.4C1. The motion is to create a second revision. No change in content, only renumbering to breakup the multiple requirements.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(1) Contact Release.** (a) Employees exposed to electric shock hazards and those responsible for the safe release of victims from contact with energized electrical conductors or circuit parts shall be trained in methods of safe release. ~~(a)~~(b) Refresher training shall occur annually.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	Section 110.4(C)1 has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.		
	(1) Contact Release. (a) Employees exposed to electric shock hazards and those responsible for the safe release of victims from contact with energized electrical conductors or circuit parts shall be trained in methods of safe release. (b) Refresher training shall occur annually.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.5(A) and (B)	43	Following MOS	☒ Create Second Revision ☐ Reject
Talking points	This is a CC comment requesting we address110.5A1 “provide hazard information” to ensure it accurately reflects the content of the requirement. Motion is to create a second revision.		
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. **(A) Host Employer Responsibilities.** ~~(1) Provide Hazard Information to Contract Employer.~~ The host employer shall inform contract employers of the following: 1. 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 2. Information about the employer's installation that the contract employer needs to make the assessments required by Chapter 1 ~~(2) Report Violations to Contract Employer.~~ 3. ~~The host employer shall report~~ ~~observed~~ Observed contract employer–related violations of this standard ~~to the contract employer.~~ Informational Note: Examples of a host employer can include owner or their designee, construction manager, general contractor, or employer. **(B) Contract Employer Responsibilities.** ~~(1) Communicate Hazard Information to Employees.~~ ~~1.~~ The contract employer shall ensure the following: (1) ~~that~~ That in addition to the basic training required by this standard, each of his or her employees is instructed in the hazards communicated to the contract employer by the host employer. ~~2. This instruction shall be in addition to the basic training required by this standard~~. (2) ~~Ensure Employee Compliance.~~ ~~The contract employer shall ensure t~~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) ~~Provide Hazard Information and Report Corrective Actions to the Host Employer.~~ ~~The contract employer shall advise~~ That the host employer is advised of the following: a~~1~~. Any unique hazards presented by the contract employer's work b~~2~~. Hazards identified during the course of work by the contract employer that were not communicated by the host employer c~~3~~. The measures the contractor took to correct any violations reported by the host employer under 110.5(A)(2) and to prevent such violation from recurring in the future **(C) Documentation.** Where the host employer has knowledge of hazards covered by this standard that are related to the contract employer's work, there shall be a documented meeting between the host employer and the contract employer. Informational Note to 110.5: On multi-employer work sites (in all industry sectors), more than one employer can be responsible for identifying hazardous conditions and creating safe work practices.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	The second level sub-division titles are removed in 110.5(A) and 110.5(B) as they are unnecessary. Additionally, the requirements are editorially revised and formatted as list items to comply with the NEC Style Manual.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**

(A) Host Employer Responsibilities.

~~(1) Provide Hazard Information to Contract Employer.~~

The host employer shall inform contract employers of the following:

(1) 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

(2) Information about the employer's installation that the contract employer needs to make the assessments required by Chapter 1

~~(2) Report Violations to Contract Employer.~~

(3) ~~The host employer shall report o~~Observed contract employer–related violations of this standard ~~to the contract employer~~.

Informational Note: Examples of a host employer can include owner or their designee, construction manager, general contractor, or employer.

(B) Contract Employer Responsibilities.

~~(1) Communicate Hazard Information to Employees.~~

~~(1)~~ The contract employer shall ensure the following:

(1) ~~that~~ That in addition to the basic training required by this standard, each of his or her employees is instructed in the hazards communicated to the contract employer by the host employer.

(2) ~~This instruction shall be in addition to the basic training required by this standard.~~

~~(2) Ensure Employee Compliance.~~

~~The contract employer shall ensure that~~ 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) ~~Provide Hazard Information and Report Corrective Actions to the Host Employer.~~

~~The contract employer shall advise~~That the host employer is advised of the following:

~~(1)~~a. Any unique hazards presented by the contract employer's work

~~(2)~~b. Hazards identified during the course of work by the contract employer that were not communicated by the host employer

~~(3)~~c. The measures the contractor took to correct any violations reported by the host employer under 110.5(A)(2) and to prevent such violation from recurring in the future

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

110.5(A)	MOS	Addressed by action taken on PC43	☐ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing multiple requirements in section 110.5A. The motion is to create a second revision		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(A) Host Employer Responsibilities.** (1) Provie Hazard Information to Contract Employer. The host employer shall inform contract employers of the following: 1. 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 2. Information about the employer's installation that the contract employer needs to make the assessments required by Chapter 1 (2) Report Violations to Contract Employer. The host employer shall report observed contract employer–related violations of this standard ~~to the contract employer.~~ Informational Note: Examples of a host employer can include owner or their designee, construction manager, general contractor, or employer. **(B) Contract Employer Responsibilities.** (1) Communicate Hazard Information to Employees. 1. The contract employer shall ensure that each of his or her employees is instructed in the hazards communicated to the contract employer by the host employer. 2. This instruction shall be in addition to the basic training required by this standard. (2) Ensure Employee Compliance. 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) Provide Hazard Information and Report Corrective Actions to the Host Employer. The contract employer shall advise the host employer of the following: 1. Any unique hazards presented by the contract employer's work 2. Hazards identified during the course of work by the contract employer that were not communicated by the host employer 3. The measures the contractor took to correct any violations reported by the host employer under 110.5(A)(2) and to prevent such violation from recurring in the future **(C) Documentation.** Where the host employer has knowledge of hazards covered by this standard that are related to the contract employer's work, there shall be a documented meeting between the host employer and the contract employer.		

	Informational Note to 110.5: On multi-employer work sites (in all industry sectors), more than one employer can be responsible for identifying hazardous conditions and creating safe work practices.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Section 110.5(A) has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual 3.5.1.2
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.6(D)	44	245	☒ Create Second Revision ☐ Reject
Talking points	This is a CC comment requesting the TC address110.6(D)(1) "inspection" to ensure it accurately reflects the content of the requirement or remove the 2nd level subdivision. We are adding 245 to the cart to make a minor editorial change to "portable test equipment". The motion is to create a second revision to remove the titles in 110.6D and turn the requirements into a list to comply with the NEC style manual and make minor editorial changes to 6D.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the second level subdivision title relative to the content restructuring to ensure the title accurately reflects the content of the requirement or remove the second level sub-division.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
	The second level sub-division restructuring and the associated titles were removed in 110.6(D) and the requirements turned into a list to comply with the NEC Style Manual. 110.5(D)(1) is revised to clarify that the equipment being referred to within this requirement is "portable test equipment."		
	Technical reason for rejecting or not making some of the proposed changes.		

Proposed Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(D) Visual Inspection and Repair.** Portable test instruments and equipment shall be inspected and repaired as follows: (1) ~~Inspection.~~ Portable test instruments and portable test equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage before each use. (2) ~~Repair.~~ If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service until a person(s) qualified to perform the repairs and tests that are necessary to render the equipment safe has done so.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.6(D)(1)	245	addressed by committee actions taken on PC44	☒ Create Second Revision ☐ Reject
Talking points	This PC seeks to add further clarification that section D1 applies to portable test instruments and portable test equipment. Motion is to create a second revision		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (1) Inspection. Portable test instruments and portable test equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage before each use.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** 110.5(D)(1) is revised to clarify that the equipment being referred to within this requirement is "portable test equipment."		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.6(E)	14	29 (below addresses similar issue)	☒ Create Second Revision ☐ Reject
Talking points	This comment seeks to replace "voltage" with "electrical energy" in 110.6(E) in testing for the absence of voltage. Similarly to the actions taken in 110.4A1 The TG felt that we		

	could edit text to read "verify an electrically safe work condition" to meet the submitters intent and to correlate with the requirement found in 120.6. Motion is to create a second revision
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **(E)** Operation Verification. When test instruments are used for testing the absence of ~~voltage~~ electrical energy on conductors or circuit parts operating at voltages equal to or greater than 50 volts, the operation of the test instrument shall be verified on any known ~~voltage~~ electrical energy source before and after an absence of ~~voltage~~ electrical energy test is performed. The known electrical energy source shall match the circuit type under test; constant voltage or constant current. Informational Note. The test instrument range/function used during the test instrument verification process should be the same range/function used for the absence of electrical energy test.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** The phrase "verify the absence of voltage" is revised to "verify an electrically safe work condition" to correlate with the requirement found in 120.6
Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed revision to require the "known energy source" to "match the circuit type under test" and the proposed informational note are not added as any requirements that are specific to the use of a test instrument to verify an electrically safe work condition are more appropriately located in Article 120.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(E) Operation Verification.** When test instruments are used ~~for testing the absence of voltage~~to verify an electrically safe work condition on conductors or circuit parts operating at voltages equal to or greater than 50 volts, the operation of the test instrument shall be verified ~~on any known voltage source before and after an absence of voltage test is performed~~ in accordance with 120.6.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.6(E)	29	Addressed by action on PC14	☐ Create Second Revision ☐ Reject
Talking points	This comment seeks to replace "voltage" with "electrical energy" in 110.6(E)		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **(E)** Operation Verification. When test instruments are used for testing the absence of ~~voltage on~~ electrical energy (voltage and current) on conductors or circuit parts operating at voltages equal to or greater than 50 volts, the operation of the test instrument shall be verified on any known ~~voltage~~ electrical energy source before and after an absence of ~~voltage~~ electrical energy test is		

	performed.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.7(A)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS requesting that we address multiple requirements in 110.7A. Motion is to create a second revision using option 1 below. Additionally, 110.7 is edited to remove parentheses per style manual requirements by striking content inside parentheses and adding an IN explaining cordsets/extension cords. .		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (A) **Handling and Storage.** (1) **Portable Equipment.** Portable equipment shall be handled and stored in a manner that will not cause damage. **(2) Flexible Cords.** a. Flexible electric cords connected to equipment shall not be used for raising or lowering the equipment. ~~a.~~b. Flexible cords shall not be fastened with staples or hung in such a fashion as could damage the outer jacket or insulation. OR ALTERNATELY: **(A) Handling and Storage.** Portable equipment and flexible cords connected to equipment shall be handled and stored in a manner such that: 1) It will not cause damage~~.~~ 2) The ~~F~~flexible electric cords ~~connected to equipment~~ are ~~shall~~ not be used for raising or lowering the equipment~~.~~		

	~~1)~~3) The ~~F~~flexible cords ~~shall~~ are not ~~be~~ fastened with staples or hung in such a fashion as could damage the outer jacket or insulation.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	The parenthetical expression "extension cords" is deleted in 110.7 to comply with NEC Style Manual Section 3.5.1.1 and moved into an informational note to ensure that the user of the document understand what is intended by the term "cord sets." Second level subdivisions and titles are added and some requirements are placed in a list format to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	110.7 Portable Cord- and-Plug-Connected Equipment. This section applies to the use of cord- and plug-connected equipment, including plug-connected test instruments and cord sets ~~(extension cords)~~. Informational Note: Cord sets are sometimes referred to as extension cords. **(A) Handling and Storage.** (1) Portable Equipment. Portable equipment shall be handled and stored in a manner that will not cause damage. (2) Flexible cords. a. Flexible electric cords connected to equipment shall not be used for raising or lowering the equipment. b. Flexible cords shall not be fastened with staples or hung in such a fashion as could damage the outer jacket or insulation.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.7(B)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS requesting that we address multiple requirements in 110.7B. Motion is to create a second revision		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(B) Grounding-Type Equipment.** (~~a~~1) A flexible cord used with grounding-type utilization equipment shall contain an equipment grounding conductor.		

	(~~b~~2) Attachment plugs and receptacles shall not be connected or altered in a manner that would interrupt continuity of the equipment grounding conductor. (3) ~~Additionally, these devices~~ Attachment plugs and receptacles shall not be altered in order to allow use in a manner that was not intended by the manufacturer. (~~c~~4) Adapters that interrupt the continuity of the equipment grounding conductor shall not be used.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Section 110.7(B) second level subdivisions are turned into a list and parent text added to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2. The second sentence in list item (2) is turned into a separate list item (3) to avoid multiple requirements in one subdivision.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.
	110.7(B) Grounding-Type Equipment. The following shall apply to flexible cords and attachment plugs for grounding type equipment: (~~a~~1) A flexible cord used with grounding-type utilization equipment shall contain an equipment grounding conductor. (~~b~~2) Attachment plugs and receptacles shall not be connected or altered in a manner that would interrupt continuity of the equipment grounding conductor. (3) ~~Additionally, these devices~~Attachment plugs and receptacles shall not be altered in order to allow use in a manner that was not intended by the manufacturer. (~~c~~4) Adapters that interrupt the continuity of the equipment grounding conductor shall not be used.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.7(C)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another MOS issue addressing the use of parenthese and to edit multiple requirements in 110.7(C). Motion is to create a second revision. Section is reorganized to break up the multiple requirements and parenthetical text is relocated to an IN		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		

	CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (C) **Visual Inspection and Repair of Portable Cord- and Plug-Connected Equipment and Flexible Cord Sets.** (~~a~~1) **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 and missing pins)~~ and for evidence of possible internal damage ~~(such as a pinched or crushed outer jacket)~~. **(1) Frequency of Inspection.** Before each use, portable cord- and plug-connected equipment shall be visually inspected to detect: (a) Loose parts, missing pins, or other external defects; and (b) Evidence of ~~possible~~ internal damage, such as a pinched or crushed outer jacket. Exception: Stationary cord- and plug-connected equipment that remain connected once they are put in place and are installed such that the cord and plug are not subject to physical damage during normal use shall not be required to be visually inspected until they are relocated or repaired. (~~b~~2) **Defective Equipment.** (a) If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service. ~~(a)~~(b) No employee shall use the defective equipment until a person(s) qualified to perform the repairs and tests necessary to render the equipment safe has done so. (~~c~~3~~)~~ **Proper Mating.** When an attachment plug is to be connected to a receptacle, the relationship of the plug and receptacle contacts shall first be checked to ensure that they are of mating configurations.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Section 110.7(A) has been edited organizationally and renumbered to comply with Style Manual Section 3.5.1.2 and an informational note has been added to delete parentheticals to comply with Section 3.5.1.1.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**(C) Visual Inspection and Repair of Portable Cord- and Plug-Connected Equipment and Flexible Cord Sets.** **(~~a~~1) 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 and missing pins)~~ and for evidence of possible internal damage ~~(such as a pinched or crushed outer jacket).~~ Informational Note: Evidence of external defects could include loose parts or deformed or missing attachment plug pins. Evidence of possible internal damage could include a pinched or crushed cord set outer jacket. Exception: Stationary cord- and plug-connected equipment that remain connected once they are put in place and are installed such that the cord and plug are not subject to physical damage during normal use shall not be required to be visually inspected until they are relocated or repaired. **(~~b~~2) Defective Equipment.** (a) If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service. (b) No employee shall use ~~it~~ the defective equipment until a person(s) qualified to perform the repairs and tests necessary to render the equipment safe has done so. **(~~c~~3) Proper Mating.** When an attachment plug is to be connected to a receptacle, the relationship of the plug and receptacle contacts shall first be checked to ensure that they are of mating configurations.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.7(D)	45		☒ Create Second Revision ☐ Reject
Talking points	This is a submission by the CC directing the committee to addres use of parentheses in 110.7D. Motion is to create a second revision deleting the words “extension cords” that have already been explained earlier in 110.7 in an IN		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the text in 110.7(D) regarding (extension cords) that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	110.7(D) is edited to remove parenthetical expressions to comply with NEC Style Manual Section 3.5.1.1.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**(D) Conductive or Wet Work Locations.** Cord sets ~~(extension cords)~~ and portable cord-and-plug-connected electric equipment used in conductive or wet work locations shall be approved for use in those locations. Informational Note: The risk assessment procedure can also include identifying when the use of portable tools and equipment powered by sources other than 120 volts ac, such as batteries, air, and hydraulics, should be used to minimize the potential for injury from electrical hazards for tasks performed in conductive or wet locations.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.7(E)	MOS		☒ Create Second Revision ☐ Reject
Talking points	This is another comment submitted by the CC requesting that we address style manual problems (use of parentheses) in 110.7(E). Motion is to create a second revision as shown in the clean text box.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided. I have marked it below.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** The parenthetical example in 110.7(E) is is restated as a requirement to comply with NEC Style Manual Section 3.5.1.1.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(E) Connecting Attachment Plugs.** (~~a~~1) Employees' hands shall not be wet when plugging and unplugging flexible cords and cord- and plug-connected equipment if energized equipment is involved. (~~b~~2) Energized plug and receptacle connections shall be handled only with insulating protective equipment if the cord connector is wet or the condition of the connection could provide a conductive path to the employee's hand ~~(e.g, if a cord connector is wet from being immersed in water)~~. (~~c~~3) Locking-type connectors shall be secured after connection.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.8(B)(2)	84	46	☒ Create Second Revision ☐ Reject

Talking points	This PC seeks to edit 110.8B2 to align with 110.8B1 with a couple grammatical improvements as shown in the clean text box below. Motion is to create a second revision revising B1 and B2 to align language, additionally, addressing multiple requirements in section 110.8(A). and use of parentheses.- “extension cords” is deleted as it has been explained earlier in 110.7 in an IN The motion is to create a second revision as shown in the clean text box below. Additionally, second level subdivision 110.8(C) has been moved into 110.8(A) as a list item as the requirement is general in nature.
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(2) Greater then 120-Volt Cord Circuits. Cord sets (extension cords) and cord- and plug-connected tools used for maintenance or construction or maintenance activity, or outdoors, or in conductive or wet work locations and that are supplied by greater than 120-volt, 15-, 20-, or 30-ampere circuits, shall be provided with GFCI protection or operated under an assured equipment grounding conductor program shall be implemented. Informational Note No. 1: See Informative Annex O. Where an assured equipment grounding conductor program is used, a special purpose ground-fault circuit interrupter may provide additional protection. Informational Note No. 2: See applicable state, federal, or local codes and standards such as *NFPA 70*, *National Electrical Code*, Section 590.6(B)(2) for more information regarding implementation of an assured equipment grounding conductor program.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Section 110.8(A) has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual Section 3.5.1.2. Second level subdivision 110.8(C) has been moved into 110.8(A) as a list item as the requirement is general in nature. 110.8(B)(1)&(2) are edited to improve readability and provide paralell structure in accordance with NEC Style Manual. Additionally, parenthetical expresions are removed to comply with NEC Style Manual Section 3.5.1.1
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(A) General. The following general requirements shall apply to ground-fault-circuit-interruptors. (1) Employees shall be provided with listed ground-fault circuit-interrupter (GFCI) protective devices where required by applicable state, federal, or local codes and standards.

(2) Listed cord sets or devices incorporating listed GFCI protection for personnel identified for portable use shall be permitted.

~~(1)~~(3) GFCI protection devices shall be tested in accordance with the manufacturer's instructions

(B) Additional Circumstances Requiring GFCI Protection

(1) 120-Volt Cord Circuits

Cord sets ~~(extension cords)~~ and cord and plug connected tools used for maintenance or construction activity, or outdoors, or in conductive or wet locations that are supplied by 120-volt, 15-, 20-, or 30-ampere circuits shall be provided with GFCI protection

(2) Greater ~~then~~ than 120-Volt Cord Circuits.

Cord sets ~~(extension cords)~~ and cord- and plug-connected tools used for maintenance or construction ~~or maintenance~~ activity, or outdoors, or in conductive or wet work locations and that are supplied by greater than 120-volt, 15-, 20-, or 30-ampere circuits, shall be provided with GFCI protection or operated under an assured equipment grounding conductor program ~~shall be implemented.~~

Informational Note No. 1: See Informative Annex O. Where an assured equipment grounding conductor program is used, a special purpose ground-fault circuit interrupter may provide additional protection.

Informational Note No. 2: See applicable state, federal, or local codes and standards such as *NFPA 70*, *National Electrical Code*, Section 590.6(B)(2) for more information regarding implementation of an assured equipment grounding conductor program

~~C. GFCI protection devices shall be tested in accordance with manufacturer's instruction.~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.8(A)	MOS	Addressed by committee action taken on PC84	☒ Create Second Revision ☐ Reject

Talking points

This is another MOS issue addressing multiple requirements in section 110.8(A). The motion is to create a second revision as shown in the clean text box below. Additionally, second level subdivision 110.8(C) has been moved into 110.8(A) as a list item as the requirement is general in nature.

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.

(A) General.

(1) Employees shall be provided with listed ground-fault circuit-interrupter (GFCI) protective devices where required by applicable state, federal, or local codes and standards. Listed cord sets or devices incorporating listed GFCI protection for personnel identified for portable use shall be permitted.

Another option

(1) Employees shall be provided with listed ground-fault circuit-interrupter (GFCI) protective devices, Listed cord sets, or devices incorporating listed GFCI protection where required

	by applicable state, federal, or local codes and standards. ~~Listed cord sets or devices incorporating listed GFCI protection for personnel identified for portable use shall be permitted.~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Section 110.8(A) has been edited to eliminate multiple requirements within a single subdivision to comply with NEC Style Manual 3.5.1.2 Second level subdivision 110.8(C) has been moved into 110.8(A) as a list item as the requirement is general in nature.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(A) General. The following general requirements shall apply to ground-fault-circuit-interruptors. (1) Employees shall be provided with listed ground-fault circuit-interrupter (GFCI) protective devices where required by applicable state, federal, or local codes and standards. (2) Listed cord sets or devices incorporating listed GFCI protection for personnel identified for portable use shall be permitted. ~~(1)~~(3) GFCI protection devices shall be tested in accordance with the manufacturer's instructions. C. GFCI protection devices shall be tested in accordance with the manufacturer's instructions.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
110.8(B), 110.8(C)	46	Addressed by actions taken for PC84	☐ Create Second Revision ☐ Reject
Talking points	This is another comment submitted by the CC requesting that we address style manual problems (use of parentheses) in 110.8B1 & 2. And whether the title of "C" matches the content. Motion is to create a second revision to remove parentheticals- "extension cords" is deleted as it has been explained earlier in 110.7 in an IN.		
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review 110.8(B)(1) and (2) regarding"(extension cords)" that do not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual. Further, consider a parallel grammar in clause (2) as clause (1) to improve structure and readability. The Correlating Committee requests that the Technical Committee review 110.8(C) regarding the second level subdivision title relative to the content to ensure the title accurately reflects the content of the requirement or remove the second level sub-division restructuring.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes**.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(1) 120-Volt Cord Circuits Cord sets (extension cords) and cord and plug connected tools used for maintenance or construction activity or outdoors or in conductive or wet locations that are supplied by 120-volt, 15-, 20-, or 30-ampere circuits shall be provided with GFCI protection (2) Greater then 120-Volt Cord Circuits. Cord sets (extension cords) and cord- and plug-connected tools used for construction or maintenance activity, outdoors, or in conductive or wet work locations and that are supplied by greater than 120-volt, 15-, 20-, or 30-ampere circuits, GFCI protection or an assured equipment grounding conductor program shall be implemented.

DOC #	70E
TG #/NAME	Article 120
TG CHAIRS	Tom Norwood and Jason Wolf
TG MEMBERS	* indicates non-committee member Eric Zane Simmons, Roy Sparks, Bill Harris, John Tobias, James Holton, Al Winfield, Duke Schamel

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.2(A)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **120.2 Lockout/Tagout Program.** **(A) General.** Each employer shall establish, document, and implement a lockout/tagout program that complies with the following: ~~.~~(1) The lockout/tagout program shall specify lockout/tagout procedures to safeguard workers from exposure to electrical hazards. (2) The lockout/tagout program and procedures shall ~~also~~ incorporate the following: 1. Be applicable to the experience and training of the workers and conditions in the workplace		

	2. Meet the requirements of 120.2 through 120.6 3. Apply to fixed, permanently installed equipment, temporarily installed equipment, and portable equipment

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.3(B)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(B) Lockout/Tagout Procedure.** A lockout/tagout procedure complying with the following shall be developed on the basis of the existing electrical equipment and system: ~~and~~1) The procedure shall use suitable documentation including up-to-date drawings and diagrams. 2) The procedure shall meet the requirements of applicable codes, standards, and regulations for lockout and tagging of electrical sources.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.3(E)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. Title was revised to reflect the contents of the listed multiple requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(E) Control of Electrical Sources ~~Devices.~~ Electrical sources shall be controlled with lockout/tagout devices as follows: 1) Locks/tags shall be installed only on circuit disconnecting means. ~~1)~~2) Control devices, such as push-buttons or selector switches, shall not be used as the primary isolating device.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.3(H)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. Simple lockout/tagout and complex lockout tagout are removed from paragraph to avoid redundancy.		

Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(H) Forms of Control of Hazardous Electrical Energy. Two forms of hazardous electrical energy control shall be permitted: ~~simple lockout/tagout and complex lockout/tagout [see 120.5]~~ with the following responsibilities: 1) ~~.~~For the simple lockout/tagout, the qualified person shall be in charge. ~~1)~~2) For the complex lockout/tagout, the person in charge shall have overall responsibility.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.4(B)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. Employees "shall use" has been revised to "required to use" to reduce redundancy.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**		
	(B) Lockout/Tagout Device. Each employer shall supply, and employees ~~shall~~ are required to use~~,~~ lockout/tagout devices and equipment necessary to execute the requirements of 120.4 that comply with the following:		

	1)~~.~~ Locks and tags ~~used for control of exposure to electrical hazards shall be~~ are unique~~,~~ 2) Locks and tags are ~~shall be~~ readily identifiable as lockout/tagout devices~~,~~ 3) Locks and tags are ~~and shall be~~ used for no other purpose~~.~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.4(D)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(D) Tagout Device.** The tagout device shall meet the following requirements: 1. A tagout device shall include a tag together with an attachment means. 2. The tagout device shall be readily identifiable as a tagout device and suitable for the environment and duration of the tagout. 3. A tagout device attachment means shall comply with the following: (a) Be capable of withstanding at least 222.4 N (50 lb) of force exerted at a right angle to the disconnecting means surface (b) Be nonreusable, attachable by hand, self-locking, and nonreleasable cable tie (c) Be suitable for the environment where used 4. Tags shall contain a statement prohibiting unauthorized operation of the disconnecting means or removal of the tag. 5. A hold card shall comply with the following: (a) A hold card tagging tool on an overhead conductor in conjunction with a hotline tool to install the tagout device safely on a disconnect that is isolated from the work(s) shall be permitted.		

	(b) Where a hold card is used, the tagout procedure shall include the method of accounting for personnel who are working under the protection of the hold card.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(A)(1)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	(1) Locating Sources. (a) Up-to-date single-line drawings shall be considered a primary reference source for such information. ~~(a)~~(b) When up-to-date drawings are not available, the employer shall be responsible for ensuring that an equally effective means of locating all sources of energy is employed. Informational Note: Locating sources of supply could include identifying situations where a neutral conductor continues to carry current after phase conductors have been de-energized.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(A)(4)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(4) Simple Lockout/Tagout Procedure. (a) All lockout/tagout procedures that involve only a qualified person(s) de-energizing one set of conductors or circuit part source for the sole purpose of safeguarding employees from exposure to electrical hazards shall be considered to be a simple lockout/tagout. (b) Simple lockout/tagout procedures shall not be required to be written for each application. ~~(a)~~(c) Each worker shall be responsible for his or her own lockout/tagout. *Exception: Lockout/tagout is not required for work on cord- and plug-connected equipment for which exposure to the hazards of unexpected energization of the equipment is controlled by the unplugging of the equipment from the energy source, provided that the plug is under the exclusive control of the employee performing the servicing and maintenance for the duration of the work.*

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(A)(5)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(5) Complex Lockout/Tagout. (a) A complex lockout/tagout procedure shall be permitted where one or more of the following exists: 1. Multiple energy source 2. Multiple crews 3. Multiple crafts 4. Multiple locations 5. Multiple employers 6. Multiple disconnecting means 7. Particular sequences 8. Job or task that continues for more than one work period (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 employees working under the protection of a group lockout or tagout device, such as an operation lock or lockbox. (d)The person in charge shall be held accountable for safe execution of the complex lockout/tagout. (e) 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. (f) 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.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(2)	MOS		☒ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(2) Stored Energy. (a) The procedure shall include requirements for releasing stored electric or mechanical energy that might endanger personnel. (b) All capacitors shall be discharged, and high-capacitance elements shall also be short-circuited and grounded before the associated equipment is touched or worked on. (c) Springs shall be released or physical restraint shall be applied when necessary to immobilize mechanical equipment and pneumatic and hydraulic pressure reservoirs. ~~(a)~~(d) Other sources of stored energy shall be blocked or otherwise relieved to the extent that the circuit cannot be unintentionally energized. Informational Note: See 320.3, 320.5, and Informative Annex R for more information on methods and procedures to place capacitors in an electrically safe work condition.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(4)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL Section 3.5.1.1 **Sentence Structure**. Parenthetical expressions shall be avoided.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. Complex is deleted to comply with NEC Style Manual Section 3.5.1.1 **Sentence Structure**. Parenthetical expressions shall be avoided. Complex is redundant in this section as multiple is used to describe the intent.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(4) Responsibility. (a) The procedure shall identify the person who is responsible for verifying that the lockout/tagout procedure is implemented and who is responsible for ensuring that the task is completed prior to removing locks/tags. ~~(a)~~(b) A mechanism to accomplish lockout/tagout for multiple ~~(complex)~~ jobs/tasks where required, including the person responsible for coordination, shall be included.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(5)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Revision must be shown in track changes**.		
	(5) Verification. (a) The procedure shall verify that equipment cannot be restarted.		

Do not delete	~~(a)~~(b) The equipment operating controls, such as push-buttons, selector switches, and electrical interlocks, shall be operated or otherwise it shall be verified that the equipment cannot be restarted.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(6)	15	see PC 30	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	(6) Testing. The procedure shall establish the following: (1) Test instrument to be used, the required PPE, and the person who will use it to verify proper operation of the test instrument on a known ~~voltage~~ electrical energy source source before and after use (2) Requirement to define the boundary of the electrically safe work condition (3) Requirement to test before touching every exposed conductor or circuit parts within the defined boundary of the work area (4) Requirement to retest for absence of ~~voltage~~ electrical energy when circuit conditions change or when the job location has been left unattended (5) Planning considerations that include methods of verification where there is no accessible exposed point to take ~~voltage measurements~~ electrical energy measurements such as a constant current circuit.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(6)	30	15	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	(6) Testing. The procedure shall establish the following: (1) Test instrument to be used, the required PPE, and the person who will use it to verify proper operation of the test instrument on a known electrical energy (voltage and current) source before and after use		

	(2) Requirement to define the boundary of the electrically safe work condition (3) Requirement to test before touching every exposed conductor or circuit parts within the defined boundary of the work area (4) Requirement to retest for absence of electrical energy (voltage and current) when circuit conditions change or when the job location has been left unattended (5) Planning considerations that include methods of verification where there is no accessible exposed point to take ~~voltage~~ measurements
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** (PC 30, 15) The application of testing for the absence of current requires a more holistic approach to the requirements that might involve more than simply replacing 'voltage" with "energy" throughout the standard. An additional List Item #6 is added to recognize additional testing methods may be required other than voltage measurement to establish an electrically safe work condition.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.** **(6) Testing.** The procedure shall establish the following: 1. Test instrument to be used, the required PPE, and the person who will use it to verify proper operation of the test instrument on a known voltage source before and after use 2. Requirement to define the boundary of the electrically safe work condition 3. Requirement to test before touching every exposed conductor or circuit parts within the defined boundary of the work area 4. Requirement to retest for absence of voltage when circuit conditions change or when the job location has been left unattended 5. Planning considerations that include methods of verification where there is no accessible exposed point to take voltage measurements ~~5.~~6. Methods of testing where voltage measurements alone do not establish an electrically safe work condition.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(7)	47		☒ ~~☐~~ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	The Correlating Committee requests that the Technical Committee review the second level subdivision title relative to the content to ensure the title accurately reflects the content of the requirement or remove the second level sub-division restructuring.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** The title is changed to better reflect the content of the section according to NEC Style Manual Section 2.1.6.2 "Shall be" is replaced by "is" to improve clarity for temporary protective grounding requirements.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** **7) Temporary Protective Grounding Requirements~~.~~** a. Temporary protective grounding requirements for the circuit shall be established, including whether the temporary protective grounding equipment ~~shall be~~ is installed for the duration of the task or is temporarily established by the procedure. b. Temporary protective grounding needs or requirements shall be permitted to be covered in other work rules and might not be part of the lockout/tagout procedure.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(11)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.** Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided.		

	Added “installation of” and removed the reference to definitions of lockout and tagout in List Items #1 and #2 to meet NEC Style Manual Section 2.1.2.2 that definitions are in Article 100.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(11) Lockout/Tagout Application.** The procedure shall clearly identify when and where lockout applies, in addition to when and where tagout applies, and shall address the following: 1. Installation of ~~Lockout shall be defined as installing~~ a lockout device on all sources of hazardous energy such that operation of the disconnecting means is prohibited, and forcible removal of the lock is required to operate the disconnecting means. 2. Installation of ~~Tagout shall be defined as installing~~ a tagout device on all sources of hazardous energy, such that operation of the disconnecting means is prohibited. The tagout device shall be installed in the same position available for the lockout device. 3. Where it is not possible to attach a lock to existing disconnecting means, the disconnecting means shall not be used as the only means to put the circuit in an electrically safe work condition. 4. The use of tagout procedures without a lock shall be permitted only in cases where equipment design precludes the installation of a lock on an energy isolation device(s). 5. When tagout is employed, at least one additional safety measure shall be employed. ~~4.~~6. ~~In such cases,~~ When tagout is employed, the procedure shall clearly establish responsibilities and accountability for each person who might be exposed to electrical hazards. Informational Note: Examples of additional safety measures include the removal of an isolating circuit element such as fuses, blocking of the controlling switch, or opening an extra disconnecting device to reduce the likelihood of inadvertent energization.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

120.5(B)(12)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(12) Removal of Lockout/Tagout Devices.** a) The procedure shall identify the details for removing locks or tags when the installing individual is unavailable. b) When locks or tags are removed by someone other than the installer, the employer shall attempt to locate that person prior to removing the lock or tag. ~~a)~~c) When the lock or tag is removed because the installer is unavailable, the installer shall be informed prior to returning to work.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(13)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
	Technical reason for rejecting or not making some of the proposed changes.		

Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(13) Release for Return to Service.** a) The procedure shall identify steps to be taken when the job or task requiring lockout/tagout is completed. b) Before electric circuits or equipment are re-energized, tests and visual inspections shall be conducted to verify that all tools, mechanical restraints and electrical jumpers, short circuits, and temporary protective grounding equipment have been removed, so that the circuits and equipment are in a condition to be safely energized. c) When applicable, the employees responsible for operating the machines or process shall be notified when circuits and equipment are ready to be energized, and such employees shall provide assistance as necessary to safely energize the circuits and equipment. d) The procedure shall contain a statement requiring the area to be inspected to ensure that nonessential items have been removed. ~~a)~~e) One such step shall ensure that all personnel are clear of exposure to dangerous conditions resulting from re-energizing the service and that blocked mechanical equipment or grounded equipment is cleared and prepared for return to service.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.5(B)(14)	CDC		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Requirement does not seem to read correctly. Seems like two requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Section 120.5(B)(14) is revised for clarity in accordance with NEC Style Manual Section 2.1.6.3.4, to direct user to the steps required in 120.5(B)(13)		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**(14) Temporary Release for Testing/Positioning.** The procedure shall clearly identify the steps and qualified persons' responsibilities when the job or task requiring lockout/tagout is to be interrupted temporarily for testing or positioning of equipment~~;~~, ~~then the steps shall be identical to the steps for return to service.~~in accordance with 120.5(B)(13). Informational Note: See 110.6 for requirements when using test instruments and equipment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	11	31, 9, 189, MOS, 144, 35, 48, 251	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

120.6 Process for Establishing and Verifying an Electrically Safe Work Condition.

Establishing and verifying an electrically safe work condition shall include all of the following steps. The steps shall be performed in the order presented to the extent feasible:

(1) Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

(2) After properly interrupting the load current, open the disconnecting device(s) for each source.

(3) Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the test or fully disconnected position.

(4) Release stored electrical energy.

(5) Block or relieve stored nonelectrical energy in devices to the extent the circuit parts cannot be unintentionally energized by such devices.

(6) Apply lockout/tagout devices in accordance with a documented and established procedure.

(7) Use an adequately rated portable test instrument to test for the absence of ~~voltage of~~ electrical energy. Before and after testing, determine that the test instrument is operating satisfactorily. When testing voltage driven circuits test each phase conductor or circuit part at each point of work~~,~~ both phase- to- phase and phase- to- ground to confirm the absence of voltage. When testing current driven (constant current) circuits test each conductor or circuit part at each point of work to confirm the absence of current flow/ amperage. Before and after ~~testing~~ each test, determine that the test instrument is operating satisfactorily through verification ~~on any known voltage source.~~ in accordance with 110.6(E).

Informational Note No. 1: See UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements*, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 volts and below.

Exception No. 1 to 7: An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements:

(1) It is permanently mounted and installed in accordance with the manufacturer's instructions

and tests the conductors and circuit parts at the point of work.

(2) It is listed and labeled for the purpose of testing for the absence of voltage.

(3) It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground.

(4) The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage.

Informational Note 2: See UL 1436, *Outlet Circuit Testers and Other Similar Indicating Devices*, for additional information on rating and design requirements for permanently mounted absence of voltage testers.

Exception No. 2 to 7: On electrical systems over 1000 volts, adequately rated noncontact capacitive test instruments shall be permitted to be used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground. Noncontact capacitive test instruments shall not be used to test for the absence of electrical energy on a current driven circuit.

Informational Note No. 3: Noncontact capacitive test instruments require a minimum voltage to operate and are therefore not suitable to test for the absence of voltage.

Informational Note No. 4: See IEC 61243-1, *Live Working — Voltage Detectors — Part 1: Capacitive ty pe to be used for voltages exceeding 1kV a.c.*, or IEC 61243-2, *Live Working — Voltage Detectors — Part 2: Resistive ty pe to be used for voltages of 1kV to 36 kV a.c.*, or IEC 61243-3, *Live Working — Voltage Detectors — Part 3: Two-pole low voltage ty pe* , for additional information on rating and design requirements for voltage detectors.

Informational Note No. 5: An airfield lighting series circuit is an ungrounded current loop, operating at up to 4,545 volts (open circuit >9,000 volts). Absence of electrical energy testing of an airfield lighting series circuit is performed with an ammeter. To determine that the airfield lighting series circuit is de-energized a true RMS ammeter should be used. See Federal Aviation Administration (FAA) Advisory Circular 150/5340-26C, Maintenance of Airport Visual Aid Facilities, June 20, 2014.

(8) Temporary protective grounding equipment shall be applied to electrical conductors and circuit parts before touching them where the following conditions exist:

1. Where there is the possibility of induced voltages or stored electrical energy exists, all circuit conductors and circuit parts shall be grounded before touching them in those conductors or circuit parts.
2. Where it could be reasonably anticipated that the conductors or circuit parts being de-energized could contact other exposed energized conductors or circuit parts, temporary protective grounding equipment shall be applied.

(9) If required by 120.6(8), temporary protective grounding equipment shall be installed in accordance with the following:

1. *Placement.* Placement of temporary grounding equipment shall meet the following requirements:

a. Temporary protective grounding equipment shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to an electric shock hazard (i.e., hazardous differences in electrical potential).

b. The location, sizing, and application of temporary protective grounding equipment shall be identified as part of the employer's job planning.

2. *Capacity.* Temporary protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the

	fault. Informational Note No. 5: See ASTM F855, *Standard Specification for Temporary Protective Grounds to be Used on De-energized Electric Power Lines and Equipment*, which is an example of a standard that contains information on capacity of temporary protective grounding equipment. *3. Impedance.* Temporary protective grounding equipment and connections shall have an impedance low enough to cause immediate operation of protective devices in case of unintentional energizing of the electric conductors or circuit parts.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** (PC 11, 31, 9, 189, 251) The application of testing for the absence of current requires a more holistic approach to the requirements that might involve more than simply replacing 'voltage" with "energy" throughout the standard. Exception No. 3 to 7 has been added to require other test methods in addition to voltage measurement that may be needed to verify an electrically safe work condition. A new informational note was added to Exception No.3 to 7 to provide an example of other test methods. (PC 144, 35, 48, MOS) The terms infeasible, adequately and satisfactorily have been removed per NEC Style Manual Section 3.2.1, as vague and unenforceable terms. (PC 144) The 120.6 requirements to follow the steps in the order presented has been removed to allow employers lockout tagout policy to establish the safe order based on equipment and system design. (MOS) 120.6 List item #1. Subdivisions were added to comply with NEC Style Manual Section **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. (MOS)120.6 List item #9. Deleted parenthetical phrase to meet NEC Style Manual Section 3.5.1.1 **Sentence Structure.**
Response	**Technical reason for rejecting or not making some of the proposed changes**. (PC 31) Exception No. 2 to 7, and Information Note No. 5 are addressed in the standard for test instruments. Test instruments shall be rated for the application and environment including instruments used for current driven circuits. (PC 251) The term "voltage-regulated" is undefined and potentially limits the scope of testing for the absence of voltage. (PC 251) Testing the function of the meter is a requirement in accordance with manufacturer's instruction.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

120.6	31	See PC 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

120.6 Process for Establishing and Verifying an Electrically Safe Work Condition.

Establishing and verifying an electrically safe work condition shall include all of the following steps. The steps shall be performed in the order presented to the extent feasible:

(1) Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

(2) After properly interrupting the load current, open the disconnecting device(s) for each source.

(3) Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the test or fully disconnected position.

(4) Release stored electrical energy.

(5) Block or relieve stored nonelectrical energy in devices to the extent the circuit parts cannot be unintentionally energized by such devices.

(6) Apply lockout/tagout devices in accordance with a documented and established procedure.

(7) Use an adequately rated portable test instrument to test for the absence of electrical energy (voltage and current) of each ~~phase~~ conductor or circuit part at each point of work~~, phase to phase and phase to ground~~. Before and after testing, determine that the test instrument is operating satisfactorily through verification on any known ~~voltage~~ electrical energy source.

(8) When testing voltage driven circuits, test each conductor or circuit part to confirm the absence of voltage for both phase to phase and phase to ground.

(9) When testing current driven (constant current) circuits, test each conductor or circuit part to confirm the absence of current.

Informational Note No. 1: See UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements*, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 volts and below.

Informational Note No 2: Noncontact capacitive test instruments are not suitable to test for the absence of electrical energy for current driven series circuits such as airfield lighting circuits. Absence of electrical energy testing of an airfield lighting series circuit must be performed with a true RMS ammeter.

Exception No. 1 to ~~7~~8 : An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements:

a. It is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work.
b. It is listed and labeled for the purpose of testing for the absence of voltage.
c. It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground.
d. The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage.

Informational Note ~~2~~: See UL 1436, *Outlet Circuit Testers and Other Similar Indicating Devices*, for additional information on rating and design requirements for permanently mounted absence of voltage testers.

	Exception No. 2 to~~7~~8: On electrical systems over 1000 volts, adequately rated noncontact capacitive test instruments shall be permitted to be used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground. Noncontact capacitive test instruments shall not be used to test for the absence of energy on a current driven circuits. Informational Note No. ~~3~~ 3: Noncontact capacitive test instruments require a minimum voltage to operate and are therefore not suitable to test for the absence of voltage. Informational Note No. ~~4~~3: See IEC 61243-1, *Live Working — Voltage Detectors — Part 1: Capacitive type to be used for voltages exceeding 1kV a.c.*, or IEC 61243-2, *Live Working — Voltage Detectors — Part 2: Resistive ty pe to be used for voltages of 1kV to 36 kV a.c.*, or IEC 61243-3, *Live Working — Voltage Detectors — Part 3: Two-pole low voltage ty pe* , for additional information on rating and design requirements for voltage detectors. (10) Temporary protective grounding equipment shall be applied to electrical conductors and circuit parts before touching them where the following conditions exist: a. Where there is the possibility of induced voltages or stored electrical energy exists, all circuit conductors and circuit parts shall be grounded before touching them in those conductors or circuit parts. b. Where it could be reasonably anticipated that the conductors or circuit parts being de-energized could contact other exposed energized conductors or circuit parts, temporary protective grounding equipment shall be applied. (11) If required by 120.6(~~8~~ 10), temporary protective grounding equipment shall be installed in accordance with the following: *a. Placement.* Placement of temporary grounding equipment shall meet the following requirements: a. Temporary protective grounding equipment shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to an electric shock hazard (i.e., hazardous differences in electrical potential). b. The location, sizing, and application of temporary protective grounding equipment shall be identified as part of the employer's job planning. *b. Capacity.* Temporary protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault. Informational Note No. 5: See ASTM F855, *Standard Specification for Temporary Protective Grounds to be Used on De-energized Electric Power Lines and Equipment*, which is an example of a standard that contains information on capacity of temporary protective grounding equipment. c. *Impedance.* Temporary protective grounding equipment and connections shall have an impedance low enough to cause immediate operation of protective devices in case of unintentional energizing of the electric conductors or circuit parts.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**

Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	144	See PC 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

120.6 Process for Establishing and Verifying an Electrically Safe Work Condition.

Establishing and verifying an electrically safe work condition shall include all of the following steps. The steps shall be performed in the order presented ~~to the extent feasible~~:

(1) Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

(2) After properly interrupting the load current, open the disconnecting device(s) for each source.

(3) ~~Wherever possible, visually~~ Visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the test or fully disconnected position. If visual verification of isolation cannot be confirmed use an application-specific portable test instrument to verify the absence of generated electrical power at each point of work.

(4) Release stored electrical energy.

(5) Block or relieve stored nonelectrical energy in devices to the extent the circuit parts cannot be unintentionally energized by such devices.

(6) Apply lockout/tagout devices in accordance with a documented and established procedure.

(7) Use an ~~adequately rated~~ application-specific portable test instrument to test for the absence of voltage of each phase conductor or circuit part at each point of work, phase to phase and phase to ground. Test for all possible energy sources. Before and after testing, determine that the test instrument is operating satisfactorily through verification on ~~any~~ a known voltage source.

Informational Note No. 1: See UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements*, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 volts and below.

Exception No. *1 to 7:* A ~~An adequately rated~~ permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements:

(1) It is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work.

(2) It is listed and labeled for the purpose of testing for the absence of voltage.

	(3) It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground. *(4) The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage.* Informational Note 2: See UL 1436, *Outlet Circuit Testers and Other Similar Indicating Devices*, for additional information on rating and design requirements for permanently mounted absence of voltage testers. Exception No. *2 to 7: On electrical systems over 1000 volts, ~~adequately~~ appropriately rated noncontact capacitive test instruments shall be permitted to be used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground.*
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	35	See PC 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review 120.6(7) Exceptions No. 1 and 2 to (7) for use of the term “adequately” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Sectoin3.2.1 on unenforceable terms. Related
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	48	See PC 11	☐ Create Second Revision ☐ Reject

	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

Proposed Text (from PC)	The Correlating Committee requests that the Technical Committee review the word “feasible” in 120.6 in the phrase “to the extent feasible” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Sectoin3.2.1.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	9	Refer to PC 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

(8) Use an adequately rated portable test instrument to test for the absence of voltage of each phase conductor or circuit part at each point of work, phase to phase and phase to ground. Before and after testing, determine that the test instrument is operating satisfactorily through verification on any known voltage source.

Informational Note No. 1: See UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements*, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 volts and below.

Informational Note No. 2: After all the above steps have been taken, there could still be an unknown source that is connected to the system through a neutral conductor. Extra care should be taken to ensure hazardous voltage does not appear when disconnecting neutral conductors.

Exception No. 1 to 7: An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements:

1. *It is permanently mounted and installed in accordance with the manufacturer’s instructions and tests the conductors and circuit parts at the point of work.*
2. *It is listed and labeled for the purpose of testing for the absence of voltage.*
3. *It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground.*
4. *The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage.*

Informational Note 2: See UL 1436, *Outlet Circuit Testers and Other Similar Indicating Devices*, for additional information on rating and design requirements for permanently mounted absence of voltage testers.

Exception No. 2 to 7: On electrical systems over 1000 volts, adequately rated noncontact capacitive test instruments shall be permitted to be used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground.

	Informational Note No. 3: Noncontact capacitive test instruments require a minimum voltage to operate and are therefore not suitable to test for the absence of voltage. Informational Note No. 4: See IEC 61243-1, *Live Working — Voltage Detectors — Part 1: Capacitive ty pe to be used for voltages exceeding 1kV a.c.*, or IEC 61243-2, *Live Working — Voltage Detectors — Part 2: Resistive ty pe to be used for voltages of 1kV to 36 kV a.c.*, or IEC 61243-3, *Live Working — Voltage Detectors — Part 3: Two-pole low voltage ty pe* , for additional information on rating and design requirements for voltage detectors Informational Note No. 5: An airfield lighting series circuit is an ungrounded current loop, operating at up to 4,545 volts (open circuit >9,000 volts). Absence of electrical energy testing of an airfield lighting series circuit is performed with an ammeter. To determine that the airfield lighting series circuit is de-energized a true RMS ammeter should be used. See Federal Aviation Administration (FAA) Advisory Circular 150/5340-26C, Maintenance of Airport Visual Aid Facilities, June 20, 2014.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6(1)	247		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 1. Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags. Identify abandoned-in-place electrical equipment and record this equipment on current drawings. Mark for later removal. Verify this abandoned equipment is not energized.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed comment is addressed in NFPA 1 Section 11.1.2.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

120.6(3)	248		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (3)Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the " test" position or to the fully disconnected position identified by the manufacturer.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed language does not add clarity as equipment is required to be operated in accordance with manufacturer's instructions.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6(4)	249		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 4. Release stored electrical energy by creating short circuits for voltage regulated/controlled circuits and by creating open circuits for current regulated (series) circuits.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed language is overly prescriptive as certain types of equipment might require a different method of releasing stored electrical energy.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6(5)	250		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown.		

	5. Block or relieve stored nonelectrical energy in devices to the extent the circuit parts cannot be unintentionally energized by ~~such devices~~ the devices having capability to store nonelectrical energy.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	It is clear that the phrase "such devices" applies to devices that store non electrical energy.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6(7)	251	In Cart with 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	CDC NOTE: only changes identified by me are shown. 7, ~~Use~~ For voltage-regulated circuits, use an adequately- rated, portable test ~~instrument to test for the absence of voltage of~~ instrument to test each phase conductor or circuit part at each point (node) of work~~, phase to~~ to verify the absence-of-voltage. Test each phase conductor or circuit part both phase-to- phase and phase- to- ground. Before and after ~~testing, determine~~ each test procedure on each part of the circuit, determine that the test instrument is operating satisfactorily through verification by performing a test on any source with a known voltage ~~source~~. Verify the test instrument function has not been changed. At each point of interruption or restart of testing, re-verify the instrument, its function, and re-test for absence-of-voltage. Verify the neutral of a wye-configured, voltage-regulated circuit verifies absence-of-current (is not carrying any current), a condition which requires further attention.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 120.6(8)	252		☐ Create Second Revision ☒ ~~☐~~ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	CDC NOTE: only changes identified by me are shown. The PC does show existing (8) being deleted but I think it is a new section not a replacement for existing (8). The file attached to PC is as follows: Reword Section 120.6 part (8) as follows. (8) For current-regulated circuits such as airfield lighting circuits (rated 5kV), it is necessary to test for absence-of-current. Prior to testing each series circuit, test each series circuit conductor with a true RMS, clamp-on, properly-rated ammeter, on a circuit known to be energized. Test the series circuit conductor under repair with that same ammeter. Protect the series circuits against induced voltages which are an inherent issue in airfield lighting circuits. If the circuit conductors are shielded, disconnect the shield at each end of the segment under repair. Airfield lighting circuit conductors may be L-824-C, either shielded or non-shielded, depending on the application and environment. Check to ensure if testing is being performed on shielded or unshielded cable, as other safety procedures may apply. Airfield lighting is typically backed up by a generator with automatic transfer capabilities. Ensure the transfer switch is locked out so the generator cannot be automatically energized during work.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed text includes prescriptive details for a specific application and is not appropriate for the Standard.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6(7) Exception No. 1	253		☐ Create Second Revision ☒ ~~☐~~ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Exception No. 1 to 7: An adequately rated permanently mounted absence of voltage tester (multimeter) shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements: 1. ~~It~~ The multimeter is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work. 2. ~~It~~ The multimeter is listed and labeled for the purpose of testing for the absence of voltage. 3. ~~It~~ The multimeter tests each phase conductor or circuit part both phase-to-phase and phase-to-ground. 4. The ~~test device~~multimeter is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage. Note: For large future construction projects, consider the addition of a permanent electrical safety device that may provide indicator lamps when voltage is present, adding an additional layer of personnel safety.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** Exception No. 1 to 7 addresses permanently mounted absence of voltage testers as referenced UL1436, Section 12, and does not use the term “multimeter”. The proposed note contains recommendations which are not permitted by NEC Style Manual Section 2.1.10.2.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	88		☐ Create Second Revision ☒ ~~☐~~ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown. I have done my best to show the proposed revision in track changes.

(7) Verify the equipment cannot be started or restarted, by using the control circuitry.

~~(7)~~(8) Use an adequately rated portable test instrument to test ~~for the absence of voltage of~~ each ~~phase~~ conductor or circuit part at each point of work for the absence of voltage, ~~phase to phase and phase to ground. Before and after testing, determine that the test instrument is operating satisfactorily through verification on any known voltage source.~~ For dc systems, test each polarity conductor or circuit part both positive (+) to negative(-) and each polarity to ground. Before and after each test, determine that the test instrument is operating correctly through verification on any known voltage source of the applicable current type (ac or dc).

~~*Exception No. 1 to 7: An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements:*~~

~~*1. It is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work.*~~

~~*2. It is listed and labeled for the purpose of testing for the absence of voltage.*~~

~~*3. It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground.*~~

~~*4. The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage.*~~

~~Informational Note 2: See UL 1436, *Outlet Circuit Testers and Other Similar Indicating Devices*, for additional information on rating and design requirements for permanently mounted absence of voltage testers.~~

~~*Exception No. 2 to 7: On electrical systems over 1000 volts, adequately rated noncontact capacitive test instruments shall be permitted to be used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground.*~~

~~Informational Note No. 3: Noncontact capacitive test instruments require a minimum voltage to operate and are therefore not suitable to test for the absence of voltage.~~

~~Informational Note No. 4: See IEC 61243-1, *Live Working — Voltage Detectors — Part 1: Capacitive type to be used for voltages exceeding 1kV a.c.*, or IEC 61243-2, *Live Working — Voltage Detectors — Part 2: Resistive type to be used for voltages of 1kV to 36 kV a.c.*, or IEC~~

~~61243-3, *Live Working — Voltage Detectors — Part 3: Two-pole low voltage type*, for additional information on rating and design requirements for voltage detectors.~~

~~(8)~~(9) ~~Temporary protective grounding equipment shall be applied to electrical conductors and circuit parts before touching them where the following conditions exist:~~

~~a.~~ Where ~~there is~~ the possibility of induced voltages or induced current or stored ~~electrical~~ energy exists, install temporary protective grounds to all circuit conductors and circuit parts ~~shall be grounded~~ before touching them ~~those conductors or circuit parts.~~

~~b. Where it could be reasonably anticipated that the conductors or circuit parts being de-energized could contact other exposed energized conductors or circuit parts, temporary protective grounding equipment shall be applied.~~

~~(9) If required by 120.6(8), temporary protective grounding equipment shall be installed~~ in accordance with the following:

b. Placement. ~~Placement of temporary grounding equipment shall meet the following requirements:~~

~~i.~~ Temporary protective grounding equipment shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to an electric shock hazard (i.e., hazardous differences in electrical potential).

~~ii.~~ The location, sizing, and application of temporary protective grounding equipment shall be identified as part of the employer's job planning.

c. Capacity. Temporary protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault without failure of the grounding equipment.

~~Informational Note No. 5: See ASTM F855, Standard Specification for Temporary Protective Grounds to be Used on De-energized Electric Power Lines and Equipment, which is an example of a standard that contains information on capacity of temporary protective grounding equipment.~~

d. Impedance. Temporary protective grounding equipment and connections shall have an impedance low enough to not delay and cause the immediate operation of protective devices in case of unintentional energizing of the electric conductors or circuit parts.

e. Installation and Removal. Temporary protective grounding equipment shall be applied and removed in the following sequence:

1. Attaching Temporary Protective Grounding - The employee shall first attach the ground end connections, then attaches the other end to the lines or equipment by means of a live-line-tool of adequate length to maintain body parts outside of the restricted approach boundary. For lines or equipment operating at 600 volts or less, the use of insulating equipment of the correct class (such as rubber gloves with protectors) may be used in lieu of a live-line-tool is permitted.
2. Removing Temporary Protective Grounding - The employee shall first remove the connections from the line or equipment by means of a live-line-tool of adequate length to maintain body parts outside of the restricted approach boundary, then the ground end connections shall be removed last. For lines or equipment operating at 600 volts or less, the use of insulating equipment of the correct class (such as rubber gloves with protectors) may be used in lieu of a live-line-tool is permitted.

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The public comment includes new material which does not reference a PI or FR.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	91		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	CDC NOTE: only changes identified by me are shown. *Exception No. 2 to 7: On electrical systems over 1000 volts, adequately rated noncontact capacitive test instruments shall be permitted to be used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground.* Informational Note No. 3: Noncontact capacitive test instruments require a minimum voltage to operate and are therefore not suitable to test for the absence of voltage. Informational Note No. 4: See IEC 61243-1, *Live Working — Voltage Detectors — Part 1: Capacitive type to be used for voltages exceeding 1kV a.c.*, or IEC 61243-2, *Live Working — Voltage Detectors — Part 2: Resistive type to be used for voltages of 1kV to 36 kV a.c.*, or IEC 61243-3, *Live Working — Voltage Detectors — Part 3: Two-pole low voltage type*, for additional information on rating and design requirements for voltage detectors. Informational Note No. 5: Never break any connection on an airfield lighting primary series circuit without first checking for current with a true RMS ammeter.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed information note contains a requirement in an information note which does not comply with NEC Style Manual Section 2.1.10.2.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	111		☐ Create Second Revision ☒ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	CDC NOTE: only changes identified by me are shown. (7) Use an adequately rated portable test instrument to test for the absence of voltage of each phase conductor or circuit part at each point of work. For ac systems test phase to phase and phase to ground, for dc systems test positive (+) to negative (-) and each polarity to ground. Before and after testing, determine that the test instrument is and leads are operating satisfactorily through verification on any known voltage source of the applicable current (ac or dc) type.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The public comment includes new material which does not reference a PI or FR.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	189	See PC 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (7) Use an adequately rated portable test instrument to test for the absence of ~~voltage of each phase~~ electrical energy on each phase conductor or circuit part at each point of work, phase to phase and phase to ground. Before and after testing, determine that the test instrument is operating satisfactorily through verification on any known voltage source.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	246		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown.

	(7) Use an adequately rated portable test instrument to test for the absence of voltage of each phase conductor or circuit part at each point of work, phase to phase and phase to ground. Before and after testing, determine that the test ~~instrument is operating~~ instrument and equipment used to test for the absence of voltage are operating satisfactorily through verification on any known voltage source. Informational Note No. 1: See UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements*, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 volts and below.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed text to add "equipment" is not necessary as permanently mounted equipment used to test for the absence of voltage, or permanently mounted devices used in conjunction with a portable test instrument, must meet the requirements of Exception No. 1 to 7.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
120.6	MOS	See PC 11	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	NEC STYLE MANUAL Section 3.5.1.1 **Sentence Structure**. Parenthetical expressions shall be avoided. NEC STYLE MANUAL 3.5.1.2 Multiple Requirements. Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR)	**Revision must be shown in track changes.**
	120.6 Process for Establishing and Verifying an Electrically Safe Work Condition.

Clean first revision text is provided to be revised. **Do not delete**	Establishing and verifying an electrically safe work condition shall include all of the following steps. (PC 48, 144) ~~The steps shall be performed in the order presented to the extent feasible:~~ 1. Determine all possible sources of electrical supply to the specific equipment (MOS) by referencing ~~. Check~~ applicable up-to-date drawings, diagrams, and identification tags. 2. After properly interrupting the load current, open the disconnecting device(s) for each source. 3. Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the test or fully disconnected position. 4. Release stored electrical energy. 5. Block or relieve stored nonelectrical energy in devices to the extent the circuit parts cannot be unintentionally energized by such devices. 6. Apply lockout/tagout devices in accordance with a documented and established procedure. 7. (MOS) Test for the absence of voltage as follows a. Use a~~n~~ (PC 35) ~~adequately~~ rated portable test instrument to test for the absence of voltage of each phase conductor or circuit part at each point of work, phase to phase and phase to ground. b. Before and after testing, determine that the test instrument is operating (MOS) ~~satisfactorily~~ through verification on any known voltage source. Informational Note No. 1: See UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements*, for rating, overvoltage category, and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 volts and below. *Exception No. 1 to 7: (PC 35)(MOS) A~~n adequately~~ rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements:* *a. It is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work.* *b. It is listed and labeled for the purpose of testing for the absence of voltage.* *c. It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground.* *d. The test device is verified as operating (MOS) using ~~satisfactorily on~~ any known voltage source before and after testing for the absence of voltage.* Informational Note 2: See UL 1436, *Outlet Circuit Testers and Other Similar Indicating Devices*, for additional information on rating and design requirements for permanently mounted absence of voltage testers. *Exception No. 2 to 7: On electrical systems over 1000 volts, (PC 35)(MOS) ~~adequately~~ rated noncontact capacitive test instruments shall be permitted to be*

used to test for the absence of detectable voltage at each phase conductor in lieu of using a contact test instrument for testing for absence of voltage both phase to phase and phase to ground.

Informational Note No. 3: Noncontact capacitive test instruments require a minimum voltage to operate and are therefore not suitable to test for the absence of voltage.

Informational Note No. 4: See IEC 61243-1, *Live Working — Voltage Detectors — Part 1: Capacitive type to be used for voltages exceeding 1kV a.c.*, or IEC 61243-2, *Live Working — Voltage Detectors — Part 2: Resistive type to be used for voltages of 1kV to 36 kV a.c.*, or IEC 61243-3, *Live Working — Voltage Detectors — Part 3: Two-pole low voltage type*, for additional information on rating and design requirements for voltage detectors.

(PC 31,11, 251) Exception No. 3 to 7: Where voltage measurements alone do not establish an electrically safe work condition, other methods of testing shall be required.

Informational Note to Exception: Examples of other methods include testing for the absence of current on current driven circuits.

~~7.~~8. Temporary protective grounding equipment shall be applied to electrical conductors and circuit parts before touching them where the following conditions exist:

a. Where there is the possibility of induced voltages or stored electrical energy exists, all circuit conductors and circuit parts shall be grounded before touching them in those conductors or circuit parts.
b. Where it could be reasonably anticipated that the conductors or circuit parts being de-energized could contact other exposed energized conductors or circuit parts, temporary protective grounding equipment shall be applied.

~~8.~~9. If required by 120.6(8), temporary protective grounding equipment shall be installed in accordance with the following:

a. *Placement.* Placement of temporary grounding equipment shall meet the following requirements:
    1. Temporary protective grounding equipment shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to an electric shock hazard (MOS) ~~(i.e., hazardous differences in electrical potential)~~.
    2. The location, sizing, and application of temporary protective grounding equipment shall be identified as part of the employer's job planning.
b. *Capacity.* Temporary protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault.

	Informational Note No. 5: See ASTM F855, *Standard Specification for Temporary Protective Grounds to be Used on De-energized Electric Power Lines and Equipment*, which is an example of a standard that contains information on capacity of temporary protective grounding equipment. c. *Impedance.* Temporary protective grounding equipment and connections shall have an impedance low enough to cause immediate operation of protective devices in case of unintentional energizing of the electric conductors or circuit parts.

DOC #	70E
TG #/NAME	Article 130
TG CHAIR	Greg Steinman
TG MEMBERS	* indicates non-committee member Tom Dyson, Michael Anthony Alamprese, Eric Glaude, Bradley Caldwell, David Pace, Jeffrey Conkwright, David Wallis, Paul Dobrowsky

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	2		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **(2)** Additional Person. If an energized electrical work permit is required in accordance with 130.3(A), at least one additional person meeting the emergency response training requirements of 110.4(C)(1) and 110.4(C)(2) shall be present in the vicinity of, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** Not all employees need to be responsible or trained for first response to medical emergencies. The additional person on the job needs to be trained in contact release. If the additional person is not trained to respond to the medical emergency, that person can still summon emergency medical services.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	85	86	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (2) Additional Person. If an energized electrical work permit is required in accordance with 130.3~~(A)~~, at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be		

	present in the vicinity of, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Proposed Statement	**Technical reason for revision.**
	The (A) was removed to include all 130.3 so that both the requirements and exemptions of the energized work permit are included. If the exemptions apply, an additional person may not be required. The second revision is created based on using the hierarchy of controls. The additional person is necessary based on the need for an energized electrical work permit and the risk assessment resulting in the need for PPE. The additional criteria are needed because the need for the energized electrical work permit alone was not sufficient to determine whether an additional person is needed. The phrase "in the vicinity of" was deleted because it is vague and unenforceable.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	86	85	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(2) Additional Person. If an energized electrical work permit is required in accordance with 130.3(A), <u>and either the shock risk assessment in accordance with 130.4 or the arc flash risk assessment in accordance with 130.5 determine that an additional person is required,</u> at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be present in the vicinity of, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Proposed Statement	**Technical reason for revision.**
	The second revision is created based on using the hierarchy of controls. The additional person is necessary based on the need for an energized electrical work permit and the risk assessment resulting in the need for PPE. The additional criteria are needed because the need for the energized electrical work permit alone was not sufficient to determine whether an additional person is needed.

	The phrase "in the vicinity of" was deleted because it is vague and unenforceable.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	87		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (2) Additional Person. If an energized electrical work permit is required in accordance with 130.3(A) for elecrical conductors or circuit parts operating at more than 600 volts, at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be present in the vicinity of, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** Voltage over 600 volts is not sufficient criteria for determining whether an additional person is needed. Exposure to hazards that require an additional person can exist for voltages under 600 volts.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	137		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (2) Additional Person. If an energized electrical work permit is required in accordance with 130.3(A), the shock and arc flash risk assessments shall determine and document if at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be present ~~in the vicinity of, but outside of, either~~ within sight of the worker and outside of both the limited approach boundary ~~or~~ and arc flash boundary~~, whichever is greater~~.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The additional person is necessary based on the need for an energized electrical work permit and the risk assessment resulting in the need for PPE. It may not be possible to comply with the proposed changes by requiring the additional person to be both within sight of the work and also outside of the boundaries in all cases.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	115, 122 (same)		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~(2) Additional Person.~~ ~~If an energized electrical work permit is required in accordance with 130.3(A), at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be present in the vicinity of, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater.~~ Delete this requirement of mandatred second person
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**

Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** Risk assessments have generally not been effective at determining the need for additional persons and that standby persons are needed when energized work requiring PPE is performed. The additional person is necessary based on the need for an energized electrical work permit and the risk assessment resulting in the need for PPE.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	93		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision There was a word document attached to comment with the following: **FR 101 - 130.2(A)(5)**

	Omit item 5 in FR101 stating an additional person is require when an EEWP is required including the requirement that the additional person cannot cross the limited approach boundary or the arc flash boundary. **Substantiation:** Management is responsible for safety. It is up to management to decide the number of people required and the training and equipment needed to perform a task when an EEWP is required. The following statements already exist in NFPA 70E: 1. Employees exposed to electrical shock hazards shall be trained in methods of safe release [(110.4(C)(1)]. 2. A risk assessment is required before start of work including when a second person could be required and the training and equipment that person should have [110.3(H)(1)].
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Risk assessments have generally not been effective at determining the need for additional persons and that standby persons are needed when energized work requiring PPE is performed. The additional person is necessary based on the need for an energized electrical work permit and the risk assessment resulting in the need for PPE.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.2(A)(2)	179		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (2) Additional Person. If an energized electrical work permit is required in accordance with 130.3(A), at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be present in the vicinity of, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater. Determining whether an additional person is required based on the proposed language should continue to be the responsibility of the employer based on the existing required risk assessments currently defined in 110.3(H): Currently 110.3 (H) Informational Note No 1 states Informational Note No. 1: The risk assessment procedure could include identifying when a second person could be required and the training and equipment that person should have.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.

Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Risk assessments have generally not been effective at determining the need for additional persons and that standby persons are needed when energized work requiring PPE is performed. The additional person is necessary based on the need for an energized electrical work permit and the risk assessment resulting in the need for PPE.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(2) Additional Person. If an energized electrical work permit is required in accordance with 130.3~~(A)~~and the energized electrical work permit specifies the use of electric shock or arc flash PPE, or both, in accordance with 130.2(B)(5)d and 130.2(B)(6)b, at least one additional person meeting the emergency response training requirements of 110.4(C)(1) shall be present~~ in the vicinity of~~, but outside of, either the limited approach boundary or arc flash boundary, whichever is greater.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.3(B)	49		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the text in 130.3(B)(9) regarding "(authorizing or responsible management, safety officer, or owner, etc,)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual. Additionally, the Technical Committee should review the bracketed references for conversion to part of the requirement or for inclusion as an informational note. In list item (9) the term "signature(s)" with the parenthetical "(s)" should be revised for compliance with the NEC Style Manual on the use of plural terminology.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	The wording was changed because of the NEC Correlating Committee request to comply with the NEC Style Manual Section 3.5.1.1 and avoid using parenthetical notes. Bracketed references in 130.3(B) are retained for useability. Parenthesis were changed to brackets in Item 4 for consistency		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR)
 	
Clean first revision text is provided to be revised.
 	
Do not delete
	(B) Elements of Work Permit.
	
	The work permit shall include, but not be limited to, the following items:
	
	1. Description of the circuit and equipment to be worked on and their location
	2. Description of the work to be performed
	3. Justification for why the work must be performed in an energized condition *[see 110.2(B)]*
	4. Description of the safe work practices to be employed [~~(~~*see 130.1*]~~)~~
	5. Results of the electric shock risk assessment *[see 130.4(A)]*
	  1. Voltage to which personnel will be exposed
	  2. Limited approach boundary *[see 130.4(F), Table 130.4(E)(a), and Table 130.4(E)(b)]*
	  3. Restricted approach boundary *[see 130.4(G), Table 130.4(E)(a), and Table 130.4(E)(b)]*
	  4. Personal and other protective equipment required by this standard to safely perform the assigned task and to protect against the electric shock hazard *[see 130.4(F), 130.5(G), 130.7(C)(1) through 130.7(C)(15), and 130.7(D)]*
	
	6. Results of the arc flash risk assessment *[see 130.5(A)]*
	  1. Incident energy at the working distance or arc flash PPE category *[see 130.5(F)]*
	  2. Personal and other protective equipment required by this standard to protect against the arc flash hazard *[see 130.5(F), 130.7(C)(1) through 130.7(C)(15), Table 130.7(C)(15)(c), and 130.7(D)]*
	  3. Arc flash boundary *[see 130.5(E)]*
	
	7. Means employed to restrict the access of unqualified persons from the work area *[see 130.8(O)]*
	8. Evidence of completion of a job briefing, including a discussion of any job-specific hazards *[see 110.3(I)]*
	9. Energized work approval ~~(authorizing or responsible management, safety officer, or owner, etc.)~~ signature or signatures such as authorizing or responsible management, safety officer,~~(s)~~
	
	Informational Note: See Figure J.1 for an example of an acceptable energized work permit.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.3(C)	33 (cont)	201	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the		

	following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** The word "appropriate" was deleted because of the NEC Correlating Committee request to comply with the NEC Style Manual Section 3.2.1 and avoid using unenforceable or vague terms. List items (5) and (6) were added to provide clear direction for when an energized electrical work permit is not required, as these tasks are not likely to cause injuries.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 130.3(D)	201		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. 130.3(D) Energized Electrical Work Permit Not Required. Tasks done in compliance with 110.2(B) Exception No 1, Exception No 2, or Exception No 5 shall be permitted without an energized electrical work permit.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** List items (5) and (6) were added to provide clear direction for when an energized electrical work permit is not required, as these tasks are not likely to cause injuries.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.3(C)	5		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **(C)** Exemptions to Work Permit. Electrical work shall be permitted without an energized electrical work permit if a qualified person is provided with and uses appropriate safe work practices and PPE in accordance with Chapter 1 under any of the following conditions: (1) Testing, troubleshooting, or voltage measuring

	(2) Thermography, ultrasound, or visual inspections if the restricted approach boundary is not crossed (3) Access to and egress from an area with energized electrical equipment if no electrical work is performed and the restricted approach boundary is not crossed (4) General housekeeping and miscellaneous non-electrical tasks if the restricted approach boundary is not crossed (5) For sources that by their nature (such as batteries) cannot be physically de-energized, a separate energized electrical work permit shall not be required if the hazard analysis covered here in Article 130.3 is part of a general job hazard/safety analysis (JHA/ JSA) that already requires signatures.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	If the power source cannot be placed in an electrically safe work condition, such as for infeasibility as suggested in the public comment, an energized electrical work permit that is specific to the scope of work is necessary.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(C) Exemptions to Work Permit. Electrical work shall be permitted without an energized electrical work permit if a qualified person is provided with and uses ~~appropriate~~ safe work practices and PPE in accordance with Chapter 1 under any of the following conditions: 1. Testing, troubleshooting, or voltage measuring 2. Thermography, ultrasound, or visual inspections if the restricted approach boundary is not crossed 3. Access to and egress from an area with energized electrical equipment if no electrical work is performed and the restricted approach boundary is not crossed 4. General housekeeping and miscellaneous non-electrical tasks if the restricted approach boundary is not crossed ~~4.~~ 5. Normal operation of electrical equipment that is in normal operating condition 6. Energized electrical conductors and circuit parts that operate at less than 50 volts and there is no increased exposure to electrical burns or explosions due to electric arcs

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

130.4(C)	50		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the second level subdivision title relative to the content to ensure the title accurately reflects the content of the requirement or remove the second level sub-division restructuring.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes**.		
	The second level subdivision titles accurately reflect the content of the requirements.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.		
	(C) Additional Protective Measures. **(1) Selection.** If additional protective measures are required, they shall be selected and implemented according to the hierarchy of risk control identified in 110.3(H)(3). **(2) Requirements.** When the additional protective measures include the use of PPE, the following shall be determined: 1. The voltage to which personnel will be exposed 2. The electric shock boundary requirements 3. The personal and other protective equipment required by this standard to protect against the electric shock hazard **(D) Documentation.** The results of the electric shock risk assessment shall be documented.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.4(E)	25		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. **Table 130.4(E)(a) Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Alternating-Current Systems**		

50 V–150 V[e]	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	*Avoid contact

NOTES

* Avoid Contact does not contain an Inadvertent Movement Adder. See definition of Avoid Contact in Article 100 for additional information.

(1) For arc flash boundary, see 130.5(E).

(2) All dimensions are distance from exposed energized electrical conductors or circuit part to personnel.

Table 130.4(E)(b) Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Direct-Current Voltage Systems

50 V–300 V	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	*Avoid contact

Note: All dimensions are distance from exposed energized electrical conductors or circuit parts to worker.

*Avoid Contact does not contain an Inadvertent Movement Adder. See definition of Avoid Contact in Article 100 for additional information.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Statement

Technical reason for revision.

Response

Technical reason for rejecting or not making some of the proposed changes.

There is no definition of avoid contact and the note would create a referencing error.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.4(E)	MOS		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.

(E) **Electric Shock Protection Boundaries**.

(1) **Application.** The electric shock protection boundaries identified as limited approach boundary and restricted approach boundary shall be applicable where personnel are approaching exposed energized electrical conductors or circuit parts.

(2) **AC Table.** Table 130.4(E)(a) shall be used for the distances associated with various ac system voltages.

(3) **DC Table.** Table 130.4(E)(b) shall be used for the distances associated with various dc system voltages.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Statement

Technical reason for revision.

Titles were added to the subdivisions to comply with the NEC Style Manual Section 3.5.1.2.

Response

Technical reason for rejecting or not making some of the proposed changes.

Proposed Second Revision Text (SR)

Clean first revision text is provided to be revised.

Do not delete for a reject

Revision must be shown in track changes.

(E) Electric Shock Protection Boundaries.

(1) **Application.** The electric shock protection boundaries identified as limited approach boundary and restricted approach boundary shall be applicable where personnel are approaching exposed energized electrical conductors or circuit parts.

(2) **AC Table.** Table 130.4(E)(a) shall be used for the distances associated with various ac system voltages.

~~(1)~~(3) **DC Table.** Table 130.4(E)(b) shall be used for the distances associated with various dc system voltages.

Informational Note: In certain instances, the arc flash boundary might be a greater distance from the energized electrical conductors or circuit parts than the limited approach boundary. The electric shock protection boundaries and the arc flash boundary are independent of each other.

Table 130.4(E)(a) Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Alternating-Current Systems

(1)	(2)	(3)	(4)
	Limited Approach Boundary[b]		
Nominal System Voltage Range, Phase to Phase[a]	Exposed Movable Conductor[c]	Exposed Fixed Circuit Part	Restricted Approach Boundary[b,d]; Includes Inadvertent Movement Adder
Less than 50 V	Not specified	Not specified	Not specified
50 V–150 V[e]	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	Avoid contact
151 V–750 V	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	0.31 m (1 ft 0 in.)
751 V–5 kV	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	0.63 m (2 ft 1 in.)
5.1 kV–15 kV	3.1 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.65 m (2 ft 2 in.)
15.1 kV–36 kV	3.1 m (10 ft 0 in.)	1.8 m (6 ft 0 in.)	0.77 m (2 ft 7 in.)

36.1 kV–46 kV	3.1 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	0.84 m (2 ft 10 in.)
46.1 kV–72.5 kV	3.1 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 4 in.)
72.6 kV–121 kV	3.3 m (10 ft 8 in.)	2.5 m (8 ft 0 in.)	1.2 m (3 ft 9 in.)
121.1 kV–145 kV	3.4 m (11 ft 0 in.)	3.1 m (10 ft 0 in.)	1.3 m (4 ft 4 in.)
145.1 kV–169 kV	3.6 m (11 ft 8 in.)	3.6 m (11 ft 8 in.)	1.5 m (4 ft 10 in.)
169.1 kV–242 kV	4.0 m (13 ft 0 in.)	4.0 m (13 ft 0 in.)	2.1 m (6 ft 8 in.)
242.1 kV–362 kV	4.7 m (15 ft 4 in.)	4.7 m (15 ft 4 in.)	3.5 m (11 ft 2 in.)
362.1 kV–420 kV	5.8 m (19 ft 0 in.)	5.8 m (19 ft 0 in.)	4.3 m (14 ft 0 in.)
420.1 kV–550 kV	5.8 m (19 ft 0 in.)	5.8 m (19 ft 0 in.)	5.1 m (16 ft 8 in.)
550.1 kV–800 kV	7.2 m (23 ft 9 in.)	7.2 m (23 ft 9 in.)	6.9 m (22 ft 7 in.)

Notes:
(1) For arc flash boundary, see 130.5(E).
(2) All dimensions are distance from exposed energized electrical conductors or circuit part to personnel.

[a]For single-phase systems above 250 volts, select the range that is equal to the system's maximum phase-to-ground voltage multiplied by 1.732.

[b]See definition in Article 100 and text in 130.4(F)(3) and Informative Annex C for elaboration.

[c]*Exposed movable conductors* describes 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.

[d]The restricted approach boundary in Column 4 is based on an elevation not exceeding 900 m (3000 ft). For higher elevations, adjustment of the restricted approach boundary shall be considered.

Informational Note: See 29 CFR 1910.269, Table R-5, Altitude Correction Factor; ANSI/IEEE C2-2023, *National Electrical Safety Code*; and IEEE 516-2021, *Guide for Maintenance Methods on Energized Power Lines*, Section 4.7.6 for information on adjusting the restricted approach boundary for elevations exceeding 900 m (3000 ft).

[e]This voltage range applies to line to ground voltages up to 240 volts.

Table 130.4(E)(b) Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Direct-Current Voltage Systems

Table 130.4(E)(b) Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Direct-Current Voltage Systems

(1)	(2)	(3)	(4)[b]
Nominal Potential Difference	Limited Approach Boundary		Restricted Approach Boundary; Includes Inadvertent Movement Adder
	Exposed Movable Conductor*[a]	Exposed Fixed Circuit Part	
Less than 50 V	Not specified	Not specified	Not specified
50 V–300 V	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	Avoid contact
301 V–1 kV	3.1 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	0.3 m (1 ft 0 in.)
1.1 kV–5 kV	3.1 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.5 m (1 ft 5 in.)
5.1 kV–15 kV	3.1 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.7 m (2 ft 2 in.)
15.1 kV–45 kV	3.1 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	0.8 m (2 ft 9 in.)
45.1 kV– 75 kV	3.1 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 6 in.)
75.1 kV–150 kV	3.3 m (10 ft 8 in.)	3.1 m (10 ft 0 in.)	1.2 m (3 ft 10 in.)
150.1 kV–250 kV	3.6 m (11 ft 8 in.)	3.6 m (11 ft 8 in.)	1.6 m (5 ft 3 in.)
250.1 kV–500 kV	6.0 m (20 ft 0 in.)	6.0 m (20 ft 0 in.)	3.5 m (11 ft 6 in.)
500.1 kV–800 kV	8.0 m (26 ft 0 in.)	8.0 m (26 ft 0 in.)	5.0 m (16 ft 5 in.)

Note: All dimensions are distance from exposed energized electrical conductors or circuit parts to worker.

*[a]*Exposed movable conductor* describes 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.

[b]The restricted approach boundary in Column 4 is based on an elevation not exceeding 900 m (3000 ft). For higher elevations, adjustment of the restricted approach boundary shall be considered.

Informational Note: See 29 CFR 1910.269, Table R-5, Altitude Correction Factor; ANSI/IEEE C2-2023, *National Electrical Safety Code*; and IEEE 516-2021, *Guide for Maintenance Methods on Energized Power Lines*, Section 4.7.6 for information on adjusting the restricted approach boundary for elevations exceeding 900 m (3000 ft).

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

130.4(G)	CDC		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (G) Restricted Approach Boundary. No qualified person shall approach or take any conductive object closer to exposed energized electrical conductors or circuit parts than the restricted approach boundary set forth in Table 130.4(E)(a) and Table 130.4(E)(b), unless one of the following conditions applies: 1. The qualified person is insulated or guarded from energized electrical conductors or circuit parts operating at 50 volts or more. Insulating gloves and sleeves are considered insulation only with regard to the energized parts upon which work is performed. 2. The energized electrical conductors or circuit parts are insulated from the qualified person and from any other conductive object at a different potential.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** "Insulating gloves and sleeves are considered insulation only with regard to the energized parts upon which work is performed" was deleted because it adds no additional clarity and to comply with the NEC Style Manual Sections 3.1.1 and 3.5.1.1.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. (G) Restricted Approach Boundary. No qualified person shall approach or take any conductive object closer to exposed energized electrical conductors or circuit parts than the restricted approach boundary set forth in Table 130.4(E)(a) and Table 130.4(E)(b), unless one of the following conditions applies: ~~1.~~ The qualified person is insulated or guarded from energized electrical conductors or circuit parts operating at 50 volts or more. ~~Insulating gloves and sleeves are considered insulation only with regard to the energized parts upon which work is performed.~~ ~~2.~~ 1. ~~3.~~ 2. The energized electrical conductors or circuit parts are insulated from the qualified person and from any other conductive object at a different potential.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(D)(1)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** The parenthetical marks were deleted to comply with the NEC Style Manual Section 3.5.1.1 to avoid using parenthetical notes.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(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 headgear, or metal frame glasses~~)~~ shall not be worn within the restricted approach boundary or where they present an electrical contact hazard with exposed energized electrical conductors or circuit parts.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(E)(1)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (1) **General.** a) 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 unintentional contact with energized electrical conductors or circuit parts. b) Such materials and equipment shall 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.			
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	This section was revised into a and b to create subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(1) General. a) 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 unintentional contact with energized electrical conductors or circuit parts. ~~a)~~b) Such materials and equipment shall 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.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(H)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (H) **Clear Spaces.** (1) **NEEDS TITLE.** Working space required by other codes and standards shall not be used for storage. (2) **NEEDS TITLE.** This space shall be kept clear to permit safe operation and maintenance of electrical equipment. OR ALTERNATELY (H) **Clear Spaces.** Working space required by other codes and standards shall comply with the following: 1. Working space shall not be used for storage. 2. ~~This~~ Working space shall be kept clear to permit safe operation and maintenance of electrical equipment.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
	Technical reason for revision.		

Statement	This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(H) Clear Spaces. 1) Storage Working space required by other codes and standards shall not be used for storage. ~~1)~~2) Operation and Maintenance This space shall be kept clear to permit safe operation and maintenance of electrical equipment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(I)	61		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the text in 130.8(I)(1) regarding "(such as insulating equipment or barriers)" and 130.8(I)(2) regarding "(including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Proposed Statement	**Technical reason for revision.**		
	In order to comply with the NEC Style Manual Section 3.5.1.1, parenthesis were deleted and replaced with commas as the information contained although is not all inclusive but is useful.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**		
	(I) Housekeeping Duties. 1. Employees shall not perform housekeeping duties inside the limited approach boundary where there is a possibility of contact with energized electrical conductors or circuit parts, unless adequate safeguards, ~~(~~such as insulating equipment or barriers~~)~~, are provided to prevent contact. 2. Electrically conductive cleaning materials, ~~(~~including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions~~)~~, shall not be used inside the limited approach boundary unless procedures to prevent electrical contact are followed.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(J)	MOS		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (J) **Occasional Use of Flammable Materials.** 1) **NEEDS TITLE.** Where flammable materials are present only occasionally, electric equipment capable of igniting them shall not be permitted to be used, unless measures are taken to prevent hazardous conditions from developing. 2) **NEEDS TITLE.** Such materials shall include, but are not limited to, flammable gases, vapors, or liquids, combustible dust, and ignitible fibers or flyings. Informational Note: See NFPA 70, National Electrical Code, for electrical installation requirements for locations where flammable materials are present on a regular basis.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(J) Occasional Use of Flammable Materials.** 1. Ignition Capable Electric Equipment Where flammable materials are present only occasionally, electric equipment capable of igniting them shall not be permitted to be used, unless measures are taken to prevent hazardous conditions from developing. ~~1.~~2. Material Types Such materials shall include, but are not limited to, flammable gases, vapors, or liquids, combustible dust, and ignitible fibers or flyings. Informational Note: See *NFPA 70*, *National Electrical Code*, for electrical installation requirements for locations where flammable materials are present on a regular basis.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(L)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (L) **Routine Opening and Closing of Circuits.** 1) Load-Break Type. Load-rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. 2) Not of the Load-Break Type. Cable connectors not of the load-break type, fuses, terminal lugs, and cable splice connections shall not be permitted to be used for such purposes, except in an emergency.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(L) Routine Opening and Closing of Circuits.** 1) Load-Break Type. Load-rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. ~~1)~~2) Not of the Load-Break Type. Cable connectors not of the load-break type, fuses, terminal lugs, and cable splice connections shall not be permitted to be used for such purposes, except in an emergency.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(M)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		

	CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (M) **Reclosing Circuits After Protective Device Operation.** (1) **NEEDS TITLE.** After a circuit is de-energized by the automatic operation of a circuit protective device, the circuit shall not be manually re-energized until a qualified person or persons determines the equipment and circuit can be safely energized. (2) **NEEDS TITLE.** Manually reclosing circuit breakers or re-energizing circuits through replaced fuses shall be prohibited until the fault has been cleared. Exception: When it is determined from the design of the circuit and the overcurrent devices involved that the automatic operation of a device was caused by an overload rather than a fault condition, examination of the circuit or connected equipment shall not be required before the circuit is re-energized.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes**.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(M) Reclosing Circuits After Protective Device Operation. After a circuit is de-energized by the automatic operation of a circuit protective device, the following shall be required prior to re-energization: 1.Tthe circuit shall not be manually re-energized until a qualified person or persons determines the equipment and circuit can be safely energized. 2.Manually reclosing circuit breakers or re-energizing circuits through replaced fuses shall be prohibited until the fault has been cleared. *Exception: When it is determined from the design of the circuit and the overcurrent devices involved that the automatic operation of a device was caused by an overload rather than a fault condition, examination of the circuit or connected equipment shall not be required before the circuit is re-energized.*

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(N)	MOS		☒ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (N) **Safety Interlocks.** (1) **Bypass.** Only qualified persons following the requirements for working inside the restricted approach boundary as covered by 130.4(G) shall be permitted to defeat or bypass an electrical safety interlock over which the person has sole control, and then only temporarily while the qualified person is working on the equipment. **(2) Return to Service.** The safety interlock system shall be returned to its operable condition when the work is completed.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(N) Safety Interlocks.** (1) **Bypass.** Only qualified persons following the requirements for working inside the restricted approach boundary as covered by 130.4(G) shall be permitted to defeat or bypass an electrical safety interlock over which the person has sole control, and then only temporarily while the qualified person is working on the equipment. ~~(1)~~(2) **Return to Service** The safety interlock system shall be returned to its operable condition when the work is completed.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(O)(1)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (1) **Safety Signs and Tags.**		

	a) Safety signs, safety symbols, or tags shall be used where necessary to warn employees about electrical hazards that might endanger them. b) Such signs and tags shall meet the requirements of applicable state, federal, or local codes and standards. Informational Note No. 1: Safety signs, tags, and barricades used to identify energized "look-alike" equipment can be employed as an additional preventive measure. Informational Note No. 2: See Table Informational Note 130.7(E), for a list of examples of standards that contain information on safety signs and tags.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised by adding subdivisions to separate independent requirements to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(1) Safety Signs and Tags.** a) Safety signs, safety symbols, or tags shall be used where necessary to warn employees about electrical hazards that might endanger them. ~~a)~~b) Such signs and tags shall meet the requirements of applicable state, federal, or local codes and standards. Informational Note No. 1: Safety signs, tags, and barricades used to identify energized "look-alike" equipment can be employed as an additional preventive measure. Informational Note No. 2: See Table Informational Note 130.7(E), for a list of examples of standards that contain information on safety signs and tags.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(O)(2)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (2) **Barricades.**		

	a) Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing energized conductors or circuit parts. b) Conductive barricades shall not be used where it might increase the likelihood of exposure to an electrical hazard. c) Barricades shall be placed no closer than the limited approach boundary given in Table 130.4(E)(a) and Table 130.4(E)(b). d) Where the arc flash boundary is greater than the limited approach boundary, barricades shall not be placed closer than the arc flash boundary.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	This section was revised by adding subdivisions to separate independent requirements to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(2) Barricades. a) Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing energized conductors or circuit parts. b) Conductive barricades shall not be used where it might increase the likelihood of exposure to an electrical hazard. c) Barricades shall be placed no closer than the limited approach boundary given in Table 130.4(E)(a) and Table 130.4(E)(b). ~~a)~~d) Where the arc flash boundary is greater than the limited approach boundary, barricades shall not be placed closer than the arc flash boundary.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.8(O)(3)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (3) **Attendants.** a) If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.		

	b) The primary duty and responsibility of an attendant providing manual signaling and alerting shall be to keep unqualified employees outside a work area where the unqualified employee might be exposed to electrical hazards. c) An attendant shall remain in the area as long as there is a potential for employees to be exposed to the electrical hazards.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	This section was revised by adding subdivisions to separate independent requirements to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(3) Attendants. a) If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees. b) The primary duty and responsibility of an attendant providing manual signaling and alerting shall be to keep unqualified employees outside a work area where the unqualified employee might be exposed to electrical hazards. ~~a)~~c) An attendant shall remain in the area as long as there is a potential for employees to be exposed to the electrical hazards.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.9(A)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (A) **Uninsulated and Energized.** 1) **Unguarded or Isolated.** Where work is performed in locations containing uninsulated energized overhead lines that are not guarded or isolated, precautions shall be taken to prevent employees from contacting such lines directly with any unguarded parts of their body or indirectly through conductive materials, tools, or equipment.		

	2) **Possible Contact.** Where the work to be performed is such that contact with uninsulated energized overhead lines is possible, the lines shall be de-energized and visibly grounded at the point of work or suitably guarded.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(A) Uninsulated and Energized.** 1) Not Guarded or Isolated Where work is performed in locations containing uninsulated energized overhead lines that are not guarded or isolated, precautions shall be taken to prevent employees from contacting such lines directly with any unguarded parts of their body or indirectly through conductive materials, tools, or equipment. ~~1)~~2) Possible Contact Where the work to be performed is such that contact with uninsulated energized overhead lines is possible, the lines shall be de-energized and visibly grounded at the point of work or suitably guarded.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.9(C)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (C) **De-energizing or Guarding**. 1) **NEEDS TITLE.** If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the lines to de-energize them and visibly ground them at the point of work. 2) **NEEDS TITLE.** If arrangements are made to use protective measures, such as guarding, isolating, or insulation, these precautions shall prevent each employee from contacting such lines directly with any part of his or her body or indirectly through conductive materials, tools, or equipment. OR ALTERNATELY			

	(C) De-energizing ~~or Guarding~~. If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the lines to de-energize them and visibly ground them at the point of work. (D) Guarding. If arrangements are made to use protective measures, such as guarding, isolating, or insulation, these precautions shall prevent each employee from contacting such lines directly with any part of his or her body or indirectly through conductive materials, tools, or equipment.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(C) De-energizing ~~or Guarding~~.** If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the lines to de-energize them and visibly ground them at the point of work. D. Guarding, Isolating or Insulation If arrangements are made to use protective measures, such as guarding, isolating, or insulation, these precautions shall prevent each employee from contacting such lines directly with any part of his or her body or indirectly through conductive materials, tools, or equipment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.9(D)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (D) **Employer and Employee Responsibility.**		

	1) **NEEDS TITLE.** The employer and employee shall be responsible for ensuring that guards or protective measures are satisfactory for the conditions. 2) **NEEDS TITLE.** Employees shall comply with established work methods and the use of protective equipment. OR ALTERNATELY (D) **Employer ~~and Employee~~ Responsibility.** The employer ~~and employee~~ shall be responsible for ensuring that guards or protective measures are satisfactory for the conditions. **(E) Employee Responsibility.** (1) **NEEDS TITLE.** Employees shall be responsible for ensuring that guards or protective measures are satisfactory for the conditions (2) **NEEDS TITLE** Employees shall comply with established work methods and the use of protective equipment.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(D) Employer and Employee Responsibility.** 1. Protective Measures. The employer and employee shall be responsible for ensuring that guards or protective measures are satisfactory for the conditions. ~~1.~~2. Work Methods. Employees shall comply with established work methods and the use of protective equipment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.9(F)(1)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		

	(1) **Elevated Equipment.** a) Where any vehicle or mechanical equipment structure will be elevated near energized overhead lines, it shall be operated so that the limited approach boundary distance of Table 130.4(E)(a), column 2 or Table 130.4(E)(b), column 2, is maintained. b) ~~However, under any of the following conditions, the~~ The clearances shall be permitted to be reduced under any of the following conditions: (1) If the vehicle is in transit with its structure lowered, the limited approach boundary to overhead lines in Table 130.4(E)(a), column 2 or Table 130.4(E)(b), column 2, shall be permitted to be reduced by 1.83 m (6 ft). (2) If insulated barriers, rated for the voltages involved, are installed and they are not part of an attachment to the vehicle, the clearance shall be permitted to be reduced to the design working dimensions of the insulating barrier. (~~2~~3) If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the uninsulated portion of the aerial lift and the power line) shall be permitted to be reduced to the restricted approach boundary given in Table 130.4(E)(a), column 4 or Table 130.4(E)(b), column 4.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised by adding subdivisions to separate independent requirements to comply with the NEC Style Manual Section 3.5.1.2. Editorial changes were also made to match the revision structure.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(1) Elevated Equipment.** a) Where any vehicle or mechanical equipment structure will be elevated near energized overhead lines, it shall be operated so that the limited approach boundary distance of Table 130.4(E)(a), column 2 or Table 130.4(E)(b), column 2, is maintained. ~~a)~~b) ~~However, under any of the following conditions~~, T~~t~~he clearances shall be permitted to be reduced under any of the following conditions: 1. If the vehicle is in transit with its structure lowered, the limited approach boundary to overhead lines in Table 130.4(E)(a), column 2 or Table 130.4(E)(b), column 2, shall be permitted to be reduced by 1.83 m (6 ft). ~~1.~~2. If insulated barriers, rated for the voltages involved, are installed and they are not part of an attachment to the vehicle, the clearance shall be permitted to be reduced to the design working dimensions of the insulating barrier.

	~~2.~~3. If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the uninsulated portion of the aerial lift and the power line) shall be permitted to be reduced to the restricted approach boundary given in Table 130.4(E)(a), column 4 or Table 130.4(E)(b), column 4.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.9(F)(3)	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL Section 3.5.1.1 **Sentence Structure**. Parenthetical expressions shall be avoided. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (3) **Equipment Grounding.** a) If any vehicle or mechanical equipment is capable of having parts of its structure elevated within the limited approach boundary of exposed movable conductors of energized overhead lines and is intentionally grounded, employees working on the ground near the point of grounding shall not stand at the grounding location whenever there is a possibility of overhead line contact. b) Additional precautions, such as the use of barricades, dielectric overshoe footwear, or insulation, shall be taken to protect employees from hazardous ground potentials ~~(step and touch potential)~~. Informational Note: Upon contact of the elevated structure with the energized lines, hazardous ground potentials can develop within a few feet or more outward from the grounded point.			
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** This section was revised by adding subdivisions to separate independent requirements to comply with the NEC Style Manual Section 3.5.1.2. The parenthetical marks were deleted to comply with the NEC Style Manual Section 3.5.1.1 to avoid using parenthetical notes.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**(3) Equipment Grounding.** a) If any vehicle or mechanical equipment is capable of having parts of its structure elevated within the limited approach boundary of exposed movable conductors of energized overhead lines and is intentionally grounded, employees working on the ground near the point of grounding shall not stand at the grounding location whenever there is a possibility of overhead line contact. ~~a)~~b) Additional precautions, such as the use of barricades, dielectric overshoe footwear, or insulation, shall be taken to protect employees from hazardous ground potentials such as ~~(~~step and touch potential~~)~~. Informational Note: Upon contact of the elevated structure with the energized lines, hazardous ground potentials can develop within a few feet or more outward from the grounded point.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.10	33 (cont)	TG 2 is responsible for PC.	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The word "appropriate" was deleted because of the NEC Correlating Committee request to comply with the NEC Style Manual Section 3.2.1 and avoid using unenforceable or vague terms		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.10	MOS		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		

	CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. 130.10 **Underground Electrical Lines and Equipment.** (A) **NEEDS TITLE.** Before excavation starts where there exists a reasonable possibility of contacting electrical lines or equipment, the employer shall take the necessary steps to contact the appropriate owners or authorities to identify and mark the location of the electrical lines or equipment. (B) **NEEDS TITLE.** When it has been determined that a reasonable possibility of contacting electrical lines or equipment exists, appropriate safe work practices and PPE shall be used during the excavation.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** This section was revised to create titled subdivisions to comply with the NEC Style Manual Section 3.5.1.2. The word "appropriate" was deleted because of the NEC Correlating Committee request to comply with the NEC Style Manual Section 3.2.1 and avoid using unenforceable or vague terms
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **130.10 Underground Electrical Lines and Equipment.** A) Before Excavation Before excavation starts where there exists a reasonable possibility of contacting electrical lines or equipment, the employer shall take the necessary steps to contact the ~~appropriate~~ owners or authorities to identify and mark the location of the electrical lines or equipment. ~~A)~~B) Safe Work Practices And PPE When it has been determined that a reasonable possibility of contacting electrical lines or equipment exists, ~~appropriate~~ safe work practices and PPE shall be used during the excavation.

DOC #	70E
TG #/NAME	Sections 130.5, 130.7, and AC tables
TG CHAIR	Jim Dollard
TG MEMBERS	* indicates non-committee member Amanda Newsom, Paul Barnhart, Jim Phillips, Jarod Guier, Daniel Roberts, Eric Glaude, David Wallis, Palmer Hickman, Jason Wolf, Daleep Mohla

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(B)	51	96 (below addresses same issue)	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review 130.5(B)(2) regarding "operation condition" and consider changing to "operating condition" as it appears in (3) for correlation.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Proposed Statement	**Technical reason for revision.** The phrase "operation condition" in 130.5(B)(2) was editorially revised to "operating condition" to correlate with existing 130.5(B) list item (3).		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(B)	96	In cart with PC 51 above	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (B) Estimate of Likelihood and Severity. The estimate of the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health shall take into consideration the following: (1) The design of the electrical equipment (2) The overcurrent protective device for the electrical equipment and its operating time and ~~operation~~ operating condition		

	(3) The electrical equipment operating condition and condition of maintenance Informational Note: In most cases, closed doors do not provide enough protection to eliminate the need for PPE in situations in which the state of the equipment is known to readily change (e.g., doors open or closed, rack in or rack out).
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(B)	139	PC 139 is in the cart with PC 138 creating an SR in 130.5(F)	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (B) Estimate of Likelihood and Severity. The estimate of the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health shall take into consideration the following: (1) The design of the electrical equipment (2) The overcurrent protective device for the electrical equipment and its operating time and operation condition (3) The electrical equipment operating condition and condition of maintenance Informational Note No. 1: In most cases, closed doors do not provide enough protection to eliminate the need for PPE in situations in which the state of the equipment is known to readily change (e.g., doors open or closed, rack in or rack out). Informational Note No. 2: Some equipment is marked with third-party verified incident energy information to aid in the selection of arc flash PPE for specified tasks.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**(B) Estimate of Likelihood and Severity.** The estimate of the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health shall take into consideration the following: 1. The design of the electrical equipment 2. The overcurrent protective device for the electrical equipment and its operating time and operating ~~operation~~ condition 3. The electrical equipment operating condition and condition of maintenance Informational Note: In most cases, closed doors do not provide enough protection to eliminate the need for PPE in situations in which the state of the equipment is known to readily change (e.g., doors open or closed, rack in or rack out)

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(C)(2)	~~33 (cont)~~ CC	TG 2 is responsible for PC.	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The revision brings this text into compliance with the NEC Style Manual. The term "appropriate" is vague.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Must be shown in track changes**. **130.5(C)(2) When PPE is Used.** When the additional protective measures include the use of PPE, the following shall be determined: 1. ~~Appropriate s~~Safety-related work practices 2. The arc flash boundary		

Do not delete for a reject	3. The PPE to be used within the arc flash boundary

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(C)(3)	36	52	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review expression of maximum and minimum limits as described in the NEC Style Manual Section 3.2.2. regarding "below 600 V" and physical clearance "where the exposed electrical conductors are separated by more than 1 millimeter (0.039 in.) per volt".		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.** Revisions were made in the first column of Table 130.5(C) to express maximum and minimum limits in a manner that complies with NEC Style Manual Section 3.2.2. Table note b (referred to in Column 3) was revised to be Informational Note No. 1 as it does not contain any requirements. The first two sentences of this note are deleted as they repeat what is stated in the definitions of Risk and Risk Assessment. The remaining informational notes were renumbered accordingly.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(C)(3)	52	IN THE CART WITH PC 36 ABOVE	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review expression of maximum and minimum limits as described in the NEC Style Manual Section3.2.2. regarding "below 600 V" and physical clearance "where the exposed electrical conductors are separated by more than 1 millimeter (0.039 in.) per volt".		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
	Technical reason for revision.		

Proposed Statement	
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(C)(3)	160		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

Table 130.5(C)(3) Estimate of the Likelihood of Occurrence of an Arc Flash Incident for ac and dc Systems

Task	Operating Condition[a]	Likelihood of Occurrence[b]
Reading a panel meter while operating a meter switch.	Any	No
Performing infrared thermography and other noncontact inspections outside the restricted approach boundary. This activity does not include opening of doors or covers.	-	-
Working on control circuits with exposed energized electrical conductors and circuit parts, nominal 125 volts ac or dc, or below without any other exposed energized equipment over nominal 125 volts ac or dc, including opening of hinged covers to gain access.	-	-
Examination of insulated cable with no manipulation of cable.	-	-
For dc systems, maintenance on a single cell of a battery system or multi-cell units in an open rack.	-	-
Working on battery equipment below 600 volts where the exposed electrical conductors are separated by more than 1 mm per volt (~~0.039~~ 1 in. per 25 volts) ~~per volt~~.	-	-

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement	**Technical reason for revision.**
	Technical reason for rejecting or not making some of the proposed changes.

Proposed Response	The phrase “1 inch per 25 volts” was not added as it would have established two distinct separation thresholds. This would have resulted in different separation requirements based on the units in use. For example, it would require a minimum separation of 12 mm for a 12-volt battery when SI units are used, but 0 inches or 1 inch when inch-pound units are used.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(C)(3)	CDC		☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC Note: Table notes and footnotes are requirements. As I read some notes, it is a little confusing if they are really requirements or informational. Please review the notes and their purpose.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		

(3) Use of Table 130.5(C)(3).

Table 130.5(C)(3) shall be permitted to be used to estimate the likelihood of occurrence of an arc flash event to determine if additional protective measures are required.

Table 130.5(C)(3) Estimate of the Likelihood of Occurrence of an Arc Flash Incident for ac and dc Systems

Task	Operating Condition[a]	Likelihood of Occurrence[b]
Reading a panel meter while operating a meter switch.	Any	No
Performing infrared thermography and other noncontact inspections outside the restricted approach boundary. This activity does not include opening of doors or covers.		
Working on control circuits with exposed energized electrical conductors and circuit parts, nominal 125 volts ac or dc, or below without any other exposed energized equipment over nominal 125 volts ac or dc, including opening of hinged covers to gain access.		
Examination of insulated cable with no manipulation of cable.		
For dc systems, maintenance on a single cell of a battery system or multi-cell units in an open rack.		

	Working on battery equipment less than ~~below~~ 600 volts where the separation between exposed electrical conductors ~~are separated by more than~~exceeds 1 mm (0.039 in.) per volt.		
	For ac systems, work on energized electrical conductors and circuit parts, including electrical testing. Operation of a CB or switch the first time after installation or completion of maintenance in the equipment. For dc systems, working on energized electrical conductors and circuit parts of series-connected battery cells, including electrical testing. Removal or installation of CBs or switches. Opening hinged door(s) or cover(s) or removal of bolted covers (to expose bare, energized electrical conductors and circuit parts). For dc systems, this includes bolted covers, such as battery terminal covers. Application of temporary protective grounding equipment, after voltage test. Working on control circuits with exposed energized electrical conductors and circuit parts, greater than 120 volts. Insertion or removal of individual starter buckets from motor control center (MCC). Insertion or removal (racking) of circuit breakers (CBs) or starters from cubicles, doors open or closed. Insertion or removal of plug-in devices into or from busways. Examination of insulated cable with manipulation of cable. Working on exposed energized electrical conductors and circuit parts of equipment directly supplied by a panelboard or motor control center. Insertion or removal of revenue meters (kW-hour, at primary voltage and current). Insertion or removal of covers for battery intercell connector(s). For dc systems, working on exposed energized electrical conductors and circuit parts of utilization equipment directly supplied by a dc source. Opening voltage transformer or control power transformer compartments. Operation of outdoor disconnect switch (hookstick operated) at 1 kV through 15 kV. Operation of outdoor disconnect switch (gang-operated, from grade) at 1 kV through 15 kV.	Any	Yes
	Operation of a CB, switch, contactor, or starter.	Normal Abnormal	No Yes
	Voltage testing on individual battery cells or individual multi-cell units. Removal or installation of covers for equipment such as wireways, junction boxes, and cable trays that does not expose bare, energized electrical conductors and circuit parts.		

Opening a panelboard hinged door or cover to access dead front overcurrent devices.	
Removal of battery nonconductive intercell connector covers.	
Maintenance and testing on individual battery cells or individual multi-cell units in an open rack	
Insertion or removal of individual cells or multi-cell units of a battery system in an open rack.	
Arc-resistant equipment with the DOORS CLOSED and SECURED, and where the available fault current and fault clearing time does not exceed that of the arc-resistant rating of the equipment in one of the following conditions:	
(1) Insertion or removal of individual starter buckets	
(2) Insertion or removal (racking) of CBs from cubicles	
(3) Insertion or removal (racking) of ground and test device	
(4) Insertion or removal (racking) of voltage transformers on or off the bus	

[a]Equipment is considered to be in a "normal operating condition" if all of the conditions in 110.2(B), Exception No. 1 are satisfied.

Informational Note No. 1: [b]~~As defined in this standard, the two components of risk are the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard. Risk assessment is an overall process that involves estimating both the likelihood of occurrence and severity to determine if additional protective measures are required.~~ The estimate of the likelihood of occurrence contained in this table does not cover every possible condition or situation, nor does it address severity of injury or damage to health. Where this table identifies "No" as an estimate of likelihood of occurrence, it means that an arc flash incident is not likely to occur. Where this table identifies "Yes" as an estimate of likelihood of occurrence, it means an arc flash incident should be considered likely to occur. The likelihood of occurrence must be combined with the potential severity of the arcing incident to determine if additional protective measures are required to be selected and implemented according to the hierarchy of risk control identified in 110.3(H).

Informational Note No. 2~~1~~: See IEEE C37.20.7, *Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults*, as an example of a standard that provides information for arc-resistant equipment referred to in Table 130.5(C)(3).

Informational Note No. 3~~2~~: Improper or inadequate maintenance can result in increased fault clearing time of the overcurrent protective device, thus increasing the incident energy. Where equipment is not properly installed or maintained, PPE selection based on incident energy analysis or the PPE category method might not provide adequate protection from arc flash hazards.

Informational Note No. 4~~3~~: Both larger and smaller fault currents could result in higher incident energy. If the fault current increases without a decrease in the fault clearing time of the overcurrent protective device, the incident energy will

	increase. If the fault current decreases, resulting in a longer fault clearing time for the overcurrent protective device, incident energy could also increase. Informational Note No. 5~~4~~: See Informative Annex O for safety-related design requirements. The occurrence of an arcing fault inside an enclosure produces a variety of physical phenomena very different from a bolted fault. For example, the arc energy resulting from an arc developed in the air will cause a sudden pressure increase and localized overheating. Equipment and design practices are available to minimize the energy levels and the number of procedures that could expose an employee to high levels of incident energy. Proven designs such as arc-resistant switchgear, remote racking (insertion or removal), remote opening and closing of switching devices, high-resistance grounding of low-voltage and 5000-volt (nominal) systems, current limitation, and specification of covered bus or covered conductors within equipment are available to reduce the risk associated with an arc flash incident. Informational Note No. 6~~5~~: See 205.4, 225.1, 225.2, and 225.3 for additional direction for performing maintenance on overcurrent protective devices. Informational Note No. 7~~6~~: See IEEE 1584, *Guide for Performing Arc Flash Hazard Calculations*, for more information regarding incident energy and the arc flash boundary for three-phase systems.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(F)	53	IN THE CART WITH PC 138	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the second level subdivision title relative to the content to ensure the title accurately reflects the content of the requirement or remove the second level sub-division restructuring. The Correlating Committee requests that the Technical Committee review the new exception to130.5(F)(3) regarding if the location is appropriate as it is “task based” and if the exception to the rule is needed. See the affirmative and negative ballot comments.		

CDC NOTE: Here are the first draft ballot comments on 130.5(F). (FR-38)

Affirmative with Comment

The new exception to 130.5(F)(1) is intended to permit manufacturers to employ safety by design techniques to reduce incident energy exposure and to permit the use of the reduced incident energy in the selection of PPE provided the stated conditions are met. This intent that the equipment specific and task specific incident energy is provided by the manufacturer is not clearly stated in the new exception. It is also not clear how the manufacturer will communicate to the worker under what specific tasks and conditions the equipment was tested and listed to. For example, supply changes to the equipment (such as system configuration) can modify the conditions of use in which the equipment was designed and tested and therefore result in an increase of the incident energy exposure without the worker knowing that such operating condition were not included in the testing. Additional guidance is needed on the specific tasks and operating conditions covered by the "task specific incident energy".

Negative with Comment

Listing of PPE may not improve the quality of PPE. One should always purchase PPE from well-known qualified companies that provide quality test documents for the PPE they offer for sale. Counter for PPE does exist.

While we certainly support a concept that enhances worker safety, we have at least two concerns with this First Revision if it were to pass ballot. First, PPE selection is not, and has not been, task-based so it is an exception that is misplaced at best. Secondly, the concept being proposed is not specifically prohibited so, regardless of where an exception would be considered as a revision, it would be unnecessary. In sum, the recommended exception is recommending an exception to a rule that does not need an exception. Regardless, where this exception was recommended and has been accepted been accepted by a majority of the Technical Committee is, without question, the incorrect location from both a technical and correlation standpoint.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(F)(3)	1	IN THE CART WITH PC 138	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

(3) Incident Energy and PPE Categories.

The results of an incident energy analysis to specify an arc flash PPE category in Table 130.7(C)(15)(c) shall not be permitted.

~~*Exception: A task specific incident energy value shall be permitted to be used for the selection of arc flash PPE if the equipment complies with all of the following:*~~

~~*(1) The equipment is listed.*~~

	~~(2) The equipment is installed in accordance with the manufacturer's instructions.~~ ~~(3) The equipment is installed in accordance with its ratings.~~ ~~(4) The equipment has been tested by a third party qualified electrical testing laboratory to verify the task specific incident energy information.~~ ~~(5) The task specific incident energy information is marked on the equipment.~~ *Informational Note: See UL RP 2986, Recommended Practice for Measuring Incident Energy Exposure, for further information.*
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(F)(3)	138	1, 53, 139	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(4) Incident Energy and PPE Categories. The results of an incident energy analysis to specify an arc flash PPE category in Table 130.7(C)(15)(c) shall not be permitted. ~~*Exception: A task specific incident energy value shall be permitted to be used for the selection of arc flash PPE if the equipment complies with all of the following:*~~ ~~*(1) The equipment is listed.*~~ ~~*(2) The equipment is installed in accordance with the manufacturer's instructions.*~~ ~~*(3) The equipment is installed in accordance with its ratings.*~~ ~~*(4) The equipment has been tested by a third party qualified electrical testing laboratory to verify the task specific incident energy information.*~~ ~~*(5) The task specific incident energy information is marked on the equipment.*~~ ~~*Informational Note: See UL RP 2986, Recommended Practice for Measuring Incident Energy Exposure, for further information.*~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	The exception following 130.5(F)(3) is deleted as it is not necessary. The informational note following the exception is retained and relocated. A new Informational Note Number 1 is added to clarify that some electrical equipment is marked with third party incident energy information to assist with the selection of arc flash PPE.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	RESPONSE TO PC 53: The second level subdivision titles were reviewed and are considered to accurately reflect the content.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(F)(3)	97	98	☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(F) Arc Flash PPE Selection Methods. (1) Selection Methods. One of the following methods shall be used for the selection of arc flash PPE: (1) The incident energy analysis method in accordance with 130.5(G) (2) The arc flash PPE category method in accordance with 130.7(C)(15) (2) One Method Per Equipment. Either, but not both, methods shall be permitted to be used on the same piece of equipment. (3) Incident Energy and PPE Categories. The results of an incident energy analysis to specify an arc flash PPE category in Table 130.7(C)(15)(c) shall not be permitted. *Exception to 130.5(F)(1): A task specific incident energy value shall be permitted to be used for the selection of arc flash PPE if the equipment complies with all of the following:* *(1) The equipment is listed.* *(2) The equipment is installed in accordance with the manufacturer's instructions.* *(3) The equipment is installed in accordance with its ratings.* *(4) The equipment has been tested by a third party qualified electrical testing laboratory to verify the task specific incident energy information.* *(5) The task specific incident energy information is marked on the equipment.* Informational Note: See UL RP 2986, *Recommended Practice for Measuring Incident Energy Exposure*, for further information.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revisions are rejected because the exception following 130.5(F)(3) has been deleted. See the action to delete the exception and the addition of a new informational note on Section 130.5(F)(3), SR XXX

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(F)(3)	98	IN THE CART WITH PC 97 ABOVE	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(3) Incident Energy and PPE Categories. The results of an incident energy analysis to specify an arc flash PPE category in Table 130.7(C)(15)(c) shall not be permitted. *Exception: A task specific incident energy value shall be permitted to be used for the selection of arc flash PPE if the equipment complies with all of the following:* *(1) The equipment is listed.* *(2) The equipment is installed in accordance with the manufacturer's instructions.* *(3) The equipment is installed in accordance with its ratings.* *(4) The equipment has been tested by a third party qualified electrical testing laboratory to verify the task specific incident energy information.* *(5) The task specific incident energy information is marked on the equipment.* *(6) The specific tasks and operating conditions covered by the task specific incident energy is marked on the equipment.* Informational Note: See UL RP 2986, *Recommended Practice for Measuring Incident Energy Exposure*, for further information.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR)	**Revision must be shown in track changes.**
	(F) Arc Flash PPE Selection Methods. **(1) Selection Methods.**

Clean first revision text is provided to be revised. **Do not delete**	One of the following methods shall be used for the selection of arc flash PPE: 1. The incident energy analysis method in accordance with 130.5(G) 2. The arc flash PPE category method in accordance with 130.7(C)(15) Informational Note No. 1: Some equipment has been tested by a qualified third-party electrical testing laboratory and is marked with verified incident energy information for specified conditions to aid in the selection of arc flash PPE. Informational Note No. 2: See UL RP 2986, *Recommended Practice for Measuring Incident Energy Exposure*, for further information. **(2) One Method Per Equipment.** Either, but not both, methods shall be permitted to be used on the same piece of equipment. **(3) Incident Energy and PPE Categories.** The results of an incident energy analysis to specify an arc flash PPE category in Table 130.7(C)(15)(c) shall not be permitted. ~~*Exception: A task specific incident energy value shall be permitted to be used for the selection of arc flash PPE if the equipment complies with all of the following:*~~ ~~*1. The equipment is listed.*~~ ~~*2. The equipment is installed in accordance with the manufacturer's instructions.*~~ ~~*3. The equipment is installed in accordance with its ratings.*~~ ~~*4. The equipment has been tested by a third party qualified electrical testing laboratory to verify the task specific incident energy information.*~~ ~~*5. The task specific incident energy information is marked on the equipment.*~~ ~~Informational Note: See UL RP 2986, *Recommended Practice for Measuring Incident Energy Exposure*, for further information.~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 130.5(F)(4)	161		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. Table 130.7(C)(15)(a) highlihts the fault current and clearing times (incident energy) of surface equipment and advises the corresponding PPE category and Arc Flash Boundary. For the Oil & Gas industry, Electrical Submersible Pumps utilizing Permanent Magnet Motors (PMMs) could potentially generate lethal level of voltages if their shafts are unintentionally rotated by fluid movements downhole. A similar table to 130.7(c)(15)(a) needs to be developed for these motors based on their HP ratings. There have been some simulated power studies to quantify the potential incident energy generated. We need to have similar visibility of the incident energy and the corresponding PPE and Arc Flash Boundaries for downhole PMMs.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The public comment did not provide a suggested revision as required in Section 4.4.4.3(c) of the NFPA rules governing committee projects.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(G)	MOS CC		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. G) **Incident Energy Analysis Method.** (1) **NEEDS TITLE** 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. (2) **NEEDS TITLE.** Arc-rated clothing and other PPE shall be used by the employee based on the incident energy exposure associated with the specific task. (3) **NEEDS TITLE.** 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 working distance at which the incident energy was determined. (4) **NEEDS TTITLE.** The incident energy analysis shall take into consideration the characteristics of the overcurrent protective device and its fault clearing time, including its condition of maintenance.		

(5) **NEEDS TITLE.** The incident energy analysis shall be updated when changes occur in the electrical distribution system that could affect the results of the analysis. The incident energy analysis shall also be reviewed for accuracy at intervals not to exceed 5 years.

Informational Note: Changes that could affect the results of the incident energy analysis include changes made by utilities or other entities, such as transformer sizing, as well as modifications to protective devices or changes to protective settings.

(6) **NEEDS TITLE.** Table 130.5(G) identifies arc-rated clothing and other PPE requirements and shall be permitted to be used with the incident energy analysis method of selecting arc flash PPE.

Informational Note No. 1: See Informative Annex D for information on estimating the incident energy.

Informational Note No. 2: See Informative Annex H for information on selection of arc-rated clothing and other PPE.

OR ALTERNATELY

G) **Incident Energy Analysis Method.**

(1) **NEEDS TITLE.**

(a) 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 clothing and other 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 working distance at which the incident energy was determined.~~

(b) The incident energy analysis shall take into consideration the characteristics of the overcurrent protective device and its fault clearing time, including its condition of maintenance.

(c) The incident energy analysis shall be updated when changes occur in the electrical distribution system that could affect the results of the analysis. The incident energy analysis shall also be reviewed for accuracy at intervals not to exceed 5 years.

Informational Note: Changes that could affect the results of the incident energy analysis include changes made by utilities or other entities, such as transformer sizing, as well as modifications to protective devices or changes to protective settings.

Informational Note ~~No. 1~~: See Informative Annex D for information on estimating the incident energy.

(2) **PPE**.

(a) Arc-rated clothing and other PPE shall be used by the employee based on the incident energy exposure associated with the specific task.

(b) 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 working distance at which the incident energy was determined.

(c) Table 130.5(G) identifies arc-rated clothing and other PPE requirements and shall be permitted to be used with the incident energy analysis method of selecting arc flash PPE.

Informational Note ~~No. 2~~: See Informative Annex H for information on selection of arc-rated clothing and other PPE.

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
	Multiple requirements within a single subdivision have been separated into additional subdivisions and list items in order to comply with NEC Style Manual Section 3.5.1.2. PPE requirements were editorially reordered and consolidated within one subdivision.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(G) Incident Energy Analysis Method. **(1) Incident Energy Analysis.** (a) 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 clothing and other 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 working distance at which the incident energy was determined.~~ (b) The incident energy analysis shall take into consideration the characteristics of the overcurrent protective device and its fault clearing time, including its condition of maintenance. (c) The incident energy analysis shall be updated when changes occur in the electrical distribution system that could affect the results of the analysis. ~~(c)~~(d) The incident energy analysis shall also be reviewed for accuracy at intervals not to exceed 5 years. Informational Note No. 1: Changes that could affect the results of the incident energy analysis include changes made by utilities or other entities, such as transformer sizing, as well as modifications to protective devices or changes to protective settings. Informational Note No. 2: See Informative Annex D for information on estimating the incident energy. **(2) PPE.**

	(a) Arc-rated clothing and other PPE shall be used by the employee based on the incident energy exposure associated with the specific task. ~~(a)~~(b) 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 working distance at which the incident energy was determined. ~~(b)~~(c) Table 130.5(G) identifies arc-rated clothing and other PPE requirements and shall be permitted to be used with the incident energy analysis method of selecting arc flash PPE. ~~Informational Note No. 1: See Informative Annex D for information on estimating the incident energy.~~ Informational Note ~~No. 2~~: See Informative Annex H for information on selection of arc-rated clothing and other PPE.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.5(H)	MOS CC		☒ ~~☐~~ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
	
	CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.
	
	(H) Equipment Labeling.
	
	(1) NEEDS TITLE. Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling units and that are likely to require examination, adjustment, servicing, or maintenance while energized shall be marked with a label containing all the following information:
	
	1. Nominal system voltage
	2. Arc flash boundary
	3. At least one of the following:
	  1. Available incident energy and the corresponding working distance, or the arc flash PPE category in Table 130.7(C)(15)(a) or Table 130.7(C)(15)(b) for the equipment, but not both
	  2. Minimum arc rating of clothing
	  3. Site-specific level of PPE
	
	Exception No. 1: Unless changes in electrical distribution system(s) render the label inaccurate, labels applied prior to the effective date of this edition of the standard shall be acceptable if they complied with the requirements for equipment labeling in the standard in effect at the time the labels were applied.
	
	Exception No. 2: In supervised industrial installations where conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system, the		

	information required in 130.5(H)(1) through 130.5(H)(3) shall be permitted to be documented in a manner that is readily available to persons likely to perform examination, servicing, maintenance, and operation of the equipment while energized. **(2) NEEDS TITLE.** The method of calculating and the data to support the information for the label shall be documented. **(3) NEEDS TITLE.** The data shall be reviewed for accuracy at intervals not to exceed 5 years. **(4) NEEDS TITLE.** Where the review of the data identifies a change that renders the label inaccurate, the label shall be updated. **(5) NEEDS TITLE.** The label shall be of sufficient durability to withstand the environment involved. **(6) NEEDS TITLE.** The owner of the electrical equipment shall be responsible for the documentation, installation, and maintenance of the marked label.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** Multiple requirements within a single subdivision have been separated into additional subdivisions in order to comply with NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**

Proposed Second Revision Text (SR)
 	
Clean first revision text is provided to be revised.
 	
Do not delete
	Revision must be shown in track changes.
	
	(H) Equipment Labeling.
	
	(1) General. Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling units and that are likely to require examination, adjustment, servicing, or maintenance while energized shall be marked with a label containing all the following information:
	
	1. Nominal system voltage
	2. Arc flash boundary
	3. At least one of the following:
	  1. Available incident energy and the corresponding working distance, or the arc flash PPE category in Table 130.7(C)(15)(a) or Table 130.7(C)(15)(b) for the equipment, but not both
	  2. Minimum arc rating of clothing
	  3. Site-specific level of PPE
	
	Exception No. 1: Unless changes in electrical distribution system(s) render the label inaccurate, labels applied prior to the effective date of this edition of the standard shall be acceptable if they complied with the requirements for equipment labeling in the standard in effect at the time the labels were applied.

	Exception No. 2: In supervised industrial installations where conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system, the information required in 130.5(H)(1) through 130.5(H)(3) shall be permitted to be documented in a manner that is readily available to persons likely to perform examination, servicing, maintenance, and operation of the equipment while energized. **(2) Calculation Method and Data Documentation.** The method of calculating and the data to support the information for the label shall be documented. **(3) Data Review.** The data shall be reviewed for accuracy at intervals not to exceed 5 years. ~~(2)~~**(4) Label Updated.** Where the review of the data identifies a change that renders the label inaccurate, the label shall be updated. **(5) Label Durability.** The label shall be of sufficient durability to withstand the environment involved. **(6) Equipment Owner Responsibility.** The owner of the electrical equipment shall be responsible for the documentation, installation, and maintenance of the marked label.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(A)	54		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review 130.7(A) regarding "adequately" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on use of unenforceable terms.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The term "adequately" is deleted in accordance with the NEC Style Manual Section 3.2.1 on the use of unenforceable terms.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR)	**Revision must be shown in track changes.** **(A) General.** Employees exposed to an electrical hazard~~s~~ when the risk associated with that hazard is not ~~adequately~~ reduced by the applicable electrical installation requirements shall be provided with, and shall use, personal protective equipment		

Clean first revision text is provided to be revised. **Do not delete for a reject**	that is designed and constructed for the specific part of the body to be protected and for the work to be performed. Informational Note: The PPE requirements of 130.7 are intended to protect a person from arc flash and electric shock hazards. While some situations could result in burns to the skin, even with the protection selected, burn injury should be reduced and survivable. Due to the explosive effect of some arc events, physical trauma injuries could occur. The PPE requirements of 130.7 do not address protection against physical trauma other than exposure to the thermal effects of an arc flash.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(1)	MOS CC		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. 1) **General.** a) When an employee is working within the restricted approach boundary, the worker shall wear PPE in accordance with 130.4. b) When an employee is working within the arc flash boundary, he or she shall wear protective clothing and other PPE in accordance with 130.5. c) All parts of the body inside the arc flash boundary shall be protected.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Multiple requirements within a single subdivision have been separated into a list in order to comply with NEC Style Manual Section 3.5.1.2.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**(1) General.** (a) When an employee is working within the restricted approach boundary, the worker shall wear PPE in accordance with 130.4. (b) When an employee is working within the arc flash boundary, he or she shall wear protective clothing and other PPE in accordance with 130.5. ~~(a)~~(c) All parts of the body inside the arc flash boundary shall be protected. Informational Note: Where the estimated incident energy exposure is greater than the arc rating of commercially available arc-rated PPE, then for the purpose of testing for the absence of voltage, the following examples of risk reduction methods could be used to reduce the likelihood of occurrence of an arcing event or the severity of exposure: 1. Use of noncontact capacitive test instrument(s) or a permanently installed metering device(s) in the equipment for indication, before using a contact-type test instrument to test for the absence of voltage. 2. If equipment design allows, observe visible gaps between the equipment conductors and circuit parts and the electrical source(s) of supply. 3. Increase the working distance. 4. Consider system design options to reduce the incident energy level.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(3)	MOS CC		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (3) **Head, Face, Neck, and Chin (Head Area) Protection.** a) 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. b) Employees shall wear nonconductive 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. c) If employees use hairnets or beard nets, or both, these items shall be arc rated. Informational Note: See 130.7(C)(10)(b) and 130.7(C)(10)(c) for arc flash protective requirements.			

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.** Multiple requirements within a single subdivision have been separated into a list in order to comply with NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.** **(3) Head, Face, Neck, and Chin (Head Area) Protection.** (a) 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. (b) Employees shall wear nonconductive 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. ~~(a)~~(c) If employees use hairnets or beard nets, or both, these items shall be arc rated. Informational Note: See 130.7(C)(10)(b) and 130.7(C)(10)(c) for arc flash protective requirements.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(6)	55	230, 99, 136	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review 130.7(C)(6) regarding the ballot comments and verify the intended revised language. The recommendation is to ensure clarity of the intended committee action.		

	CDC NOTE: Here are the first draft ballot comments on 130.7(C)(6). (FR-51) **Affirmative with Comment** While the intent of the change is good, it is not correct in that it will only require protection when the incident energy is equal to 1.2cal/cm2, and at no value greater than this. Suggest the following change: "Employees shall wear arc-rated clothing wherever there is possible exposure to incident energy equal to or greater than 1.2 cal/cm2 (5 J/cm2). The phrase “or more” needs to be added after “1.2 cal/cm2” as per PI No. 98 and the actual wording provided in the task group report. As it currently reads in terraview, this requirement is inaccurate. A literal reading of this text means the only time someone would require arc-rated clothing for "body protection" is when the incident energy is exactly 1.2 ca./cm2. I support the revision. However, as currently proposed, the rule will only apply with the incident energy is 1.2 cal/cm2. The text should read: “Employees shall where arc-rated clothing wherever there is possible exposer to 1.2 cal/cm2 or greater.”
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Stating the requirement in terms of incident energy correlates with the definition of arc flash boundary, which is “an approach limit from an arc source at which incident energy equals 1.2 cal/cm2 (5 J/cm2).” This revision also correlates with Table 130.5(G), which requires arc flash protection when the incident energy exposure is equal to or greater than 1.2 cal/cm2. The proposed wording aligns with how the phrase is already used in Table H.3.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(6)	99	IN THE CART WITH PC 55 ABOVE	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(6) Body Protection. Employees shall wear arc-rated clothing wherever there is possible exposure to incident energy of greater than or equal to 1.2 cal/cm^2 (5 J/cm^2).
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
	Technical reason for rejecting or not making some of the proposed changes.

Response			
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(6)	136	IN THE CART WITH PC 55 ABOVE	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (6) Body Protection. Employees shall wear arc-rated clothing wherever there is possible exposure to incident energy ~~of~~ equal to or greater than 1.2 cal/cm^2 (5 J/cm^2).		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(6)	204		☐ Create Second Revision ☒ ~~☐~~ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (6) Body Protection. Employees shall wear arc-rated clothing wherever there is possible exposure to an electric arc flash above the threshold incident energy ~~of~~ level for a second degree burn [1.2 cal/~~cm^2~~ cm2 (~~5 J~~5 J/~~cm^2~~cm2)].		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The technical committee supports the First Revision action as modified in Second Revision. The revised text is in compliance with the NEC Style Manual and provides more clarity.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

130.7(C)(6)	230	IN THE CART WITH PC 55 ABOVE	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (6) Body Protection. Employees shall wear arc-rated clothing wherever there is possible exposure to incident energy of 1.2 cal/cm^2 (5 J/cm^2) or more.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. **(6) Body Protection.** Employees shall wear arc-rated clothing wherever there is possible exposure to incident energy equal to or greater than~~of~~ 1.2 cal/cm^2 (5 J/cm^2).		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(7)	56		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the title to (e) relative to the content as the title does not accurately reflect the term covered by the requirement.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The requirement in 130.7(C)(7)(e) has been revised to more accurately reflect the subdivision title, and to correlate with the titles for (a) and (b) in this section. The parent text was updated to include new requirement (e) added by First Revision 103.		

	Multiple requirements within a single subdivision have been separated into additional subdivisions and lists in order to comply with NEC Style Manual Section 3.5.1.2.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(7)	MOS	THIS ISSUE IS ADDRESSED IN THE SR CREATED BY PC 56	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.

(7) **Hand and Arm Protection**.

Hand and arm protection shall be provided in accordance with 130.7(C)(7)(a), 130.7(C)(7)(b), and 130.7(C)(7)(c).

(a) **Electric Shock Protection**. Electric shock protection shall comply with the following:

1. Employees shall wear rubber insulating gloves with protectors where there is a danger of hand injury from electric shock due to contact with exposed energized electrical conductors or circuit parts.

2. Employees shall wear rubber insulating gloves with protectors and rubber insulating sleeves where there is a danger of hand and arm injury from electric shock due to contact with exposed energized electrical conductors or circuit parts.

3. Rubber insulating gloves shall be rated for the voltage for which the gloves will be exposed. 4. Rubber insulating gloves shall be permitted to be used without protectors, under the following conditions:

a~~1~~. There shall be no activity performed that risks cutting or damaging the glove.
b~~2~~. The rubber insulating gloves shall be electrically retested before reuse.
c~~3~~. The voltage rating of the rubber insulating gloves shall be reduced by 50 percent for class 00 and by one whole class for classes 0 through 4.

(b) **Arc Flash Protection.** Arc flash protection shall comply with the following:

1) Hand and arm protection shall be worn where there is possible exposure to arc flash burn.

2. The apparel described in 130.7(C)(10)(d) shall be required for protection of hands from burns.

3) Arm protection shall be accomplished by the apparel described in 130.7(C)(6).

(c) **Maintenance and Use**. Electrical protective equipment shall comply with the following:

1) Electrical protective equipment shall be maintained in a safe, reliable condition.

	2) 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. 3) Insulating gloves shall be given an air test, along with the inspection. 4) Maximum use voltages for rubber insulating gloves shall not exceed that specified in Table 130.7(C)(7)(a). 5) The top of the cuff of the protector glove shall be shorter than the rolled top of the cuff of the insulating glove by at least the distance specified in Table 130.7(C)(7)(a). (d) **Periodic Electrical Tests**. Electrical tests shall comply with the following: 1) Rubber insulating equipment shall be subjected to periodic electrical tests. 2) Test voltages shall be in accordance with applicable state, federal, or local codes and standards. 3) The maximum intervals between tests shall not exceed that specified in Table 130.7(C)(7)(b). (e) **Thermal Hand Protection**. Hand protection shall be worn where there is possible exposure to a contact thermal hazard. Informational Note: See OSHA 29 CFR 1910.137; ASTM F478, Standard Specification for In-Service Care of Insulating Line Hose and Covers; ASTM F479, Standard Specification for In-Service Care of Insulating Blankets; and ASTM F496, Standard Specification for In-Service Care of Insulating Gloves and Sleeves, which contain information related to in-service and testing requirements for rubber insulating equipment.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(7) Hand and Arm Protection. Hand and arm protection shall be provided in accordance with 130.7(C)(7)(a), 130.7(C)(7)(b), ~~and~~ 130.7(C)(7)(c) and 130.7(C)(7)(e). *(a) Electric Shock Protection.* (1) Employees shall wear rubber insulating gloves with protectors where there is a danger of hand injury from electric shock due to contact with exposed energized electrical conductors or circuit parts. (2) Employees shall wear rubber insulating gloves with protectors and rubber insulating sleeves where there is a danger of hand and arm injury from electric shock due to contact with exposed energized electrical conductors or circuit parts. (3) Rubber insulating gloves shall be rated for the voltage for which the gloves will be exposed.

(4) Rubber insulating gloves shall be permitted to be used without protectors, under the following conditions:

a. There shall be no activity performed that risks cutting or damaging the glove.
b. The rubber insulating gloves shall be electrically retested before reuse.
c. The voltage rating of the rubber insulating gloves shall be reduced by 50 percent for class 00 and by one whole class for classes 0 through 4.

(b) *Arc Flash Protection.*

(1) Hand and arm protection shall be worn where there is possible exposure to arc flash burn.
(2) The apparel described in 130.7(C)(10)(d) shall be required for protection of hands from burns.
(3) Arm protection shall be accomplished by the apparel described in 130.7(C)(6).

(c) *Maintenance and Use.*

(1) Electrical protective equipment shall be maintained in a safe, reliable condition.
(2) 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.
(3) Rubber ~~I~~insulating gloves shall be given an air test, along with the inspection.
(4) Maximum use voltages for rubber insulating gloves shall not exceed that specified in Table 130.7(C)(7)(a).
(5) The top of the cuff of the protector glove shall be shorter than the rolled top of the cuff of the insulating glove by at least the distance specified in Table 130.7(C)(7)(a).

(d) *Periodic Electrical Tests*.

(1) Rubber insulating equipment shall be subjected to periodic electrical tests.
(2) Test voltages shall be in accordance with applicable state, federal, or local codes and standards.
(3) The maximum intervals between tests shall not exceed that specified in Table 130.7(C)(7)(b).

(e) *Thermal Hand Protection*. Thermal ~~H~~hand protection shall be worn where there is possible exposure to a contact thermal hazard.

Informational Note: See OSHA 29 CFR 1910.137; ASTM F478, *Standard Specification for In-Service Care of Insulating Line Hose and Covers*; ASTM F479, *Standard Specification for In-Service Care of Insulating Blankets*; and ASTM F496, *Standard Specification for In-Service Care of Insulating Gloves and*

	Sleeves, which contain information related to in-service and testing requirements for rubber insulating equipment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(8)	MOS CC		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (8) **Foot Protection.** a) Where insulated footwear is used as protection against step and touch potential, dielectric footwear shall be required. b) Insulated soles shall not be used as primary electrical protection. Informational Note: Electrical hazard (EH) footwear can provide a secondary source of electric shock protection under dry conditions.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** This revision separates multiple requirements within a single subdivision as required by the NEC Style Manual. List items are added to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. **(8) Foot Protection.** (a) Where insulated footwear is used as protection against step and touch potential, dielectric footwear shall be required. ~~(a)~~(b) Insulated soles shall not be used as primary electrical protection. Informational Note: Electrical hazard (EH) footwear can provide a secondary source of electric shock protection under dry conditions.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(9)	MOS CC		☒ ~~☐~~ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.

NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.

(9) **Factors in Selection of Protective Clothing.**

a) Clothing and equipment that provide worker protection from electric shock and arc flash hazards shall be used.

b) If arc-rated clothing is required, it shall cover associated parts of the body as well as all flammable apparel while allowing movement and visibility.

c) Clothing and equipment required for the degree of exposure shall be permitted to be worn alone or integrated with flammable, nonmelting apparel.

d) Garments that are not arc rated shall not be permitted to be used to increase the arc rating of a garment or of a clothing system.

Informational Note: Protective clothing includes shirts, pants, coveralls, jackets, and parkas worn routinely by workers who, under normal working conditions, are exposed to momentary electric arc and related thermal hazards. Arc-rated rainwear worn in inclement weather is included in this category of clothing.

~~a~~e. ~~Layering.~~ Nonmelting, flammable fiber garments shall be permitted to be used as underlayers in conjunction with arc-rated garments in a layered system.

f. If nonmelting, flammable fiber garments are used as underlayers, the system arc rating shall be sufficient to prevent breakopen of the innermost arc-rated layer at the expected arc exposure incident energy level to prevent ignition of flammable underlayers.

g. Garments that are not arc rated shall not be permitted to be used to increase the arc rating of a garment or of a clothing system.

Informational Note: A typical layering system might include cotton underwear, a cotton shirt and trouser, and an arc-rated coverall. Specific tasks might call for additional arc-rated layers to achieve the required protection level.

~~b~~h. ~~Outer Layers.~~ Garments worn as outer layers over arc-rated clothing, such as jackets, high-visibility apparel, or rainwear, shall also be made from arc-rated material.

i. The arc rating of outer layers worn over arc-rated clothing as protection from the elements or for other safety purposes, and that are not used as part of a layered system, shall not be required to be equal to or greater than the estimated incident energy exposure.

	ic. Underlayers. Meltable fibers such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric underlayers. Exception: An incidental amount of elastic used on nonmelting fabric underwear or socks shall be permitted. Informational Note No. 1: Arc-rated garments (e.g., shirts, trousers, and coveralls) worn as underlayers that neither ignite nor melt and drip in the course of an exposure to electric arc and related thermal hazards generally provide a higher system arc rating than nonmelting, flammable fiber underlayers. Informational Note No. 2: Arc-rated underwear or undergarments used as underlayers generally provide a higher system arc rating than nonmelting, flammable fiber underwear or undergarments used as underlayers. kd. Clothing cCoverage shall comply with the following:. 1. -Clothing shall cover potentially exposed areas as completely as possible. 2. Shirt and coverall sleeves shall be fastened at the wrists, shirts shall be tucked into pants, and shirts, coveralls, and jackets shall be closed at the neck. le. The Ffit of clothing shall comply with the following: 1. Tight-fitting clothing shall be avoided. Loose-fitting clothing provides additional thermal insulation because of air spaces. 2. Arc-rated apparel shall fit properly such that it does not interfere with the work task. fm. Interference. The garment selected shall result in the least interference with the task but still provide the necessary protection. The work method, location, and task could influence the protective equipment selected.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Multiple requirements within a single subdivision have been separated into additional subdivisions in order to comply with NEC Style Manual Section 3.5.1.2. Additionally, editorial revisions have been made for the following reasons: The last sentence in 130.7(C)(9) has been deleted as this requirement is duplicated in 130.7(C)(9)(a). The second sentence in 130.7(C)(9)(e) has been moved into an informational note as it does not contain any requirements. The third sentence in 130.7(C)(9)(e) has been merged with the requirement in the first sentence of 130.7(C)(9)(f). The last sentence in 130.7(C)(9)(f) has been moved into an informational note as it does not contain any requirements.

	Parenthetical expressions are removed in the informational note.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**
	(9) Factors in Selection of Protective Clothing. **(a) General.** The following general factors shall apply to the selection of protective clothing: (1) Clothing and equipment that provide worker protection from electric shock and arc flash hazards shall be used. ~~(1)~~(2) If arc-rated clothing is required, it shall cover associated parts of the body as well as all flammable apparel while allowing movement and visibility. ~~(2)~~(3) Clothing and equipment required for the degree of exposure shall be permitted to be worn alone or integrated with flammable, nonmelting apparel. ~~Garments that are not arc rated shall not be permitted to be used to increase the arc rating of a garment or of a clothing system.~~ Informational Note: Protective clothing includes shirts, pants, coveralls, jackets, and parkas worn routinely by workers who, under normal working conditions, are exposed to momentary electric arc and related thermal hazards. Arc-rated rainwear worn in inclement weather is included in this category of clothing. (b) *Layering.* The following shall apply to the layering of protective clothing: (1) Nonmelting, flammable fiber garments shall be permitted to be used as underlayers in conjunction with arc-rated garments in a layered system. (2) If nonmelting, flammable fiber garments are used as underlayers, the system arc rating shall be sufficient to prevent breakopen of the innermost arc-rated layer at the expected arc exposure incident energy level to prevent ignition of flammable underlayers. (3) Garments that are not arc rated shall not be permitted to be used to increase the arc rating of a garment or of a clothing system. Informational Note: A typical layering system might include cotton underwear, a cotton shirt and trouser, and an arc-rated coverall. Specific tasks might call for additional arc-rated layers to achieve the required protection level. (c) *Outer Layers.* The following shall apply to garments worn as outer layers over arc-rated clothing: (1) Garments worn as outer layers over arc-rated clothing, such as jackets, high-visibility apparel, or rainwear, shall also be made from arc-rated material. (2) The arc rating of outer layers worn over arc-rated clothing as protection from the elements or for other safety purposes, and that are not used

as part of a layered system, shall not be required to be equal to or greater than the estimated incident energy exposure.

(d) *Underlayers.* The following shall apply to underlayers:
Meltable fibers such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric underlayers.

Exception: An incidental amount of elastic used on nonmelting fabric underwear or socks shall be permitted.

Informational Note No. 1: Arc-rated garments, such as, ~~(e.g.,~~ shirts, trousers, and coveralls,~~)~~ worn as underlayers that neither ignite nor melt and drip in the course of an exposure to electric arc and related thermal hazards generally provide a higher system arc rating than nonmelting, flammable fiber underlayers.

Informational Note No. 2: Arc-rated underwear or undergarments used as underlayers generally provide a higher system arc rating than nonmelting, flammable fiber underwear or undergarments used as underlayers.

(e) *Coverage.* The following shall apply to coverage provided by protective clothing:
(1) Clothing shall cover potentially exposed areas as completely as possible.
(2) Shirt and coverall sleeves shall be fastened at the wrists, shirts shall be tucked into pants, and shirts, coveralls, and jackets shall be closed at the neck.

(f) *Fit.* Tight-fitting clothing shall be avoided.
Informational Note: Loose-fitting clothing provides additional thermal insulation because of air spaces.
~~Arc-rated apparel shall fit properly such that it does not interfere with the work task.~~

(g) *Interference.* Arc-rated apparel ~~T~~shall be~~he garment~~ selected so that the fit ~~shall~~ results in the least amount of interference with the work tasks but still provides the necessary protection.
Informational Note: The work method, location, and task could influence the protective equipment selected.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(10)	57		☒~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 130.7(C)(10)(c)(4) regarding "(safety glasses or goggles)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** This revision editorially corrects a violation of the NEC Style Manual Section 3.5.1.1. The parenthetical expression is modified to comply with the NEC Style Manual.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** **(10) Arc Flash Protective Equipment.** (a) *Arc Flash Suits.* Arc flash suits shall meet the following requirements: 1. Arc flash suit design shall permit easy and rapid removal by the wearer. 2. The entire arc flash suit, including the hood's face shield, shall have an arc rating that is suitable for the arc flash exposure. 3. When exterior air is supplied into the hood, the air hoses and pump housing shall be either covered by arc-rated materials or constructed of nonmelting and nonflammable materials. (b) *Head Protection.* Head protection shall meet the following requirements: 1. An arc-rated hood or an arc-rated balaclava with an arc-rated face shield shall be used when the back of the head is within the arc flash boundary. 2. An arc-rated hood shall be used when the anticipated incident energy exposure exceeds 12 cal/cm^2 (50.2 J/cm^2). (c) *Face Protection.* Face protection shall meet the following requirements: 1. Face shields shall have an arc rating suitable for the arc flash exposure. 2. Face shields with a wrap-around guarding to protect the face, chin, forehead, ears, and neck area shall be used. 3. Face shields without an arc rating shall not be used. 4. Eye protection in the form of either ~~(~~safety glasses or goggles~~)~~ shall always be worn under face shields or hoods. Informational Note: Face shields made with energy-absorbing formulations that can provide higher levels of protection from the radiant energy of an arc flash are available, but these shields are tinted and can reduce visual acuity and color perception. Additional illumination of the task area might be necessary when these types of arc-protective face shields are used.

	(d) *Hand Protection.* Hand protection shall meet the following requirements: 1. Heavy-duty leather gloves or arc-rated gloves shall be worn where required for arc flash protection. Informational Note: Heavy-duty leather gloves are made entirely of leather with minimum thickness of 0.03 in. (0.7 mm) and are unlined or lined with nonflammable, nonmelting fabrics. Heavy-duty leather gloves meeting this requirement have been shown to have ATPV values in excess of 10 cal/cm^2 (41.9 J/cm^2). 2. Where insulating rubber gloves are used for electric shock protection, protectors shall be worn over the rubber gloves. Informational Note: The protectors worn over rubber insulating gloves provide additional arc flash protection for the hands for arc flash protection exposure. (e) *Foot Protection.* Foot protection shall meet the following requirements: 1. Leather footwear or dielectric footwear or both provide some arc flash protection to the feet and shall be used in all exposures greater than 4 cal/cm^2 (16.75 J/cm^2). 2. Footwear other than leather or dielectric shall be permitted to be used provided it has been tested to demonstrate no ignition, melting, or dripping at the estimated incident energy exposure or the minimum arc rating for the respective arc flash PPE category.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(11)	MOS CC		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. (11) **Clothing Material Characteristics.** a) Arc-rated clothing shall meet the requirements described in 130.7(C)(12) and 130.7(C)(14). Informational Note No. 1: Arc-rated materials, such as flame-retardant-treated cotton, meta-aramid, para-aramid, and poly-benzimidazole (PBI) fibers, provide thermal protection. These materials can ignite but will not continue to burn after the ignition source is removed. Arc-rated fabrics can reduce burn injuries during an arc flash exposure by providing a thermal barrier between the arc flash and the wearer.			

	Informational Note No. 2: Non-arc-rated cotton, polyester-cotton blends, nylon, nylon-cotton blends, silk, rayon, and wool fabrics are flammable. Fabrics, zipper tapes, and findings made of these materials can ignite and continue to burn on the body, resulting in serious burn injuries. Informational Note No. 3: Rayon is a cellulose-based (wood pulp) synthetic fiber that is a flammable but nonmelting material. b) Clothing consisting of fabrics, zipper tapes, and findings made from flammable synthetic materials that melt at temperatures below 315°C (600°F), such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, either alone or in blends, shall not be used. Informational Note: These materials melt as a result of arc flash exposure conditions, form intimate contact with the skin, and aggravate the burn injury.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Multiple requirements within a single subdivision have been separated into additional subdivisions in order to comply with NEC Style Manual Section 3.5.1.2.
Response	**Technical reason for rejecting or not making some of the proposed changes**.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(11) Clothing Material Characteristics. (a) Arc-rated clothing shall meet the requirements described in 130.7(C)(12) and 130.7(C)(14). Informational Note No. 1: Arc-rated materials, such as flame-retardant-treated cotton, meta-aramid, para-aramid, and poly-benzimidazole (PBI) fibers, provide thermal protection. These materials can ignite but will not continue to burn after the ignition source is removed. Arc-rated fabrics can reduce burn injuries during an arc flash exposure by providing a thermal barrier between the arc flash and the wearer. Informational Note No. 2: Non-arc-rated cotton, polyester-cotton blends, nylon, nylon-cotton blends, silk, rayon, and wool fabrics are flammable. Fabrics, zipper tapes, and findings made of these materials can ignite and continue to burn on the body, resulting in serious burn injuries. Informational Note No. 3: Rayon is a cellulose-based (wood pulp) synthetic fiber that is a flammable but nonmelting material. (b) Clothing consisting of fabrics, zipper tapes, and findings made from flammable synthetic materials that melt at temperatures below 315°C (600°F), such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, either alone or in blends, shall not be used.

	Informational Note: These materials melt as a result of arc flash exposure conditions, form intimate contact with the skin, and aggravate the burn injury. *Exception: Fiber blends that contain materials that melt, such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, shall be permitted if such blends in fabrics are arc rated and do not exhibit evidence of melting and dripping during arc testing.* Informational Note: See ASTM F1959/F1959M, *Standard Test Method for Determining the Arc Rating of Materials for Clothing*, and ASTM F1506, *Standard Performance Specification for Flame Resistant and Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs*, for information on test methods used to determine the arc rating of fabrics.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(13)	MOS CC		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL 3.5.1.2 Multiple Requirements. Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. **(13) Care and Maintenance of Arc-Rated Clothing and Arc-Rated Arc Flash Suits.** *(a) Inspection.* Arc-rated apparel shall be inspected before each use and comply with the following: 1) ~~.~~ Work clothing or arc flash suits that are contaminated or damaged to the extent that their protective qualities are impaired shall not be used. 2) Protective items that become contaminated with grease, oil, or flammable liquids or combustible materials shall not be used. *(b) Manufacturer's Instructions.* The garment manufacturer's instructions for care and maintenance of arc-rated apparel shall be followed. *(c) Storage.* Arc-rated 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.* The following shall apply to ~~When~~ arc-rated clothing that is cleaned or repaired: 1) ~~,~~ The manufacturer's instructions shall be followed. 2) ~~When arc-rated clothing is repaired, the~~ The same arc-rated materials used to manufacture the arc-rated clothing shall be used to provide repairs.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		

Proposed Statement	**Technical reason for revision.** This revision editorially provides compliance with the NEC Style Manual by adding parent text and list item numbering.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** **(13) Care and Maintenance of Arc-Rated Clothing and Arc-Rated Arc Flash Suits.** (a) ~~(a)~~ *Inspection.* Arc-rated apparel shall be inspected before each use as follows: ~~.~~ (1) Work clothing or arc flash suits that are contaminated or damaged to the extent that their protective qualities are impaired shall not be used. (2)Protective items that become contaminated with grease, oil, or flammable liquids or combustible materials shall not be used. *(b) Manufacturer's Instructions.* The garment manufacturer's instructions for care and maintenance of arc-rated apparel shall be followed. *(c) Storage.* Arc-rated 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) ~~(d)~~ *Cleaning, Repairing, and Affixing Items.* The following shall apply to the cleaning, repairing and the affixing of items to arc-rated clothing: (1) When arc-rated clothing is cleaned, the manufacturer's instructions shall be followed. ~~(1)~~(2) When arc-rated clothing is repaired, the same arc-rated materials used to manufacture the arc-rated clothing shall be used to provide repairs. Informational Note No. 1: The purpose of following manufacturer's instructions is to avoid the loss of protection and to remove contaminants such as hydrocarbons and metallic and disease-causing contaminants that could compromise safety. Informational Note No. 2: See ASTM F1506, *Standard Performance Specification for Flame Resistant and Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs*, for additional guidance when trim, name tags, logos, or any combination thereof are affixed to arc-rated clothing. Informational Note No. 3: See ASTM F1449, *Standard Guide for Industrial Laundering of Flame, Thermal, and Arc Resistant Clothing*, and ASTM F2757, *Standard Guide for Home Laundering Care and Maintenance of Flame, Thermal, and Arc Resistant Clothing*, for additional guidance.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)	33 (cont)	TG 2 is responsible for PC. Action taken in PC 107	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)	140		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision. This was the statement provided for the PC: The ASTM F18 Committee tried to mandate retesting every 5 years, but this effort was delayed after members documented variability as high as ±20% vs. published arc ratings when repeatedly testing widely used FR fabrics. The Committee has undertaken an effort to understand and address the sources of this variability. The Committee doesn't believe it's reasonable to mandate listing of Arc Rated PPE before this variability is addressed. Otherwise, a large portion of fabrics currently on the market could have new ratings that are no more accurate than current ratings.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.** NFPA rules require compliance with Regulations Governing the Development of NFPA Standards, Section 4.4.4.3(c), no suggested revision was provided.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	107	114, 120, 184, 222, 206, 94, 95	☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (b) *Conformity Assessment* ~~. All arc-rated PPE shall be listed~~ All suppliers or manufacturers of PPE shall demonstrate conformity with an appropriate product standard by one of the following methods: (1) Self-declaration with a Supplier's Declaration of Conformity (2) Self-declaration under a registered quality management system and product testing by an accredited laboratory and a Supplier's Declaration of Conformity (3) Certification by an accredited independent third-party certification organization. Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard. Informational Note No. 2: See ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.			
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** This revision reverses the First Revision action to require arc rated PPE to be listed. The requirements of the 2024 edition of NFPA 70E were restored with the exception of "self-declaration with a suppliers declaration of conformity" which was a driving factor of the revision to require arc rated PPE to be listed. Editorial modifications were made in accordance with the NEC Style Manual.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	120	IN THE CART WITH PC 107	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Statement is "the original NFPA 70E allowances for arc-flash PPE certification should be left in place."		

	(b) *Conformity Assessment.* All arc-rated PPE shall be ~~listed.~~demonstrate conformity with an appropriate product standard by one of the following methods: (1) Self-declaration with a Supplier's Declaration of Conformity (2) Self-declaration under a registered quality management system and product testing by an accredited laboratory and a Supplier's Declaration of Conformity (3) Certification by an accredited independent third-party certification organization Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard. Informational Note No. 2: See ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	222	IN THE CART WITH PC 107	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (b) *Conformity Assessment.* ~~All arc-rated PPE shall be listed.~~ All suppliers or manufacturers of PPE shall demonstrate conformity with an appropriate product standard by one of the following methods: (1) Self-declaration and product testing under a registed quality management system, arc rating by an accredited laboratory, and a Supplier's Declaration of Conformity (2) Certification by an accredited independent third-party certification organization Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard. Informational Note No. 2: See ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**

Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	16		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (b) Conformity Assessment. All arc-rated PPE shall be listed. Informational Note No. See H.4 and ~~ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard.~~ ~~Informational Note No. 2: See~~ ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**

Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The reversal of First Revision 54 deleted the revision which mandated listing only. This reversal requires that the referenced informational note remain unchanged.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	94	IN THE CART WITH PC 107	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision. There was a word document attached to comment with the following: **FR 53 - 130.7(C)(14)** Revise the wording in 130.7(C)(14)(b) to read **"PPE provided by a supplier or manufacturer shall meet the requirements in conformity assessment level 1, 2, or 3"**. Add note: Refer to informative annex H.4.2 for the requirements listed for conformity assessment levels 1, 2, and 3.

	Substantiation: Using the requirements in conformity assessment level 1, 2, or 3 will allow the purchase of quality PPE equipment.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	95	IN THE CART WITH PC 107	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision. There was a word document attached to comment with the following: **FR 54 - [130.7(C)(14)(b)]** Revise the wording to read **"PPE provided by a supplier or manufacturer shall meet the requirements in conformity assessment level 1, 2, or 3"**. **Add note:** Refer to informative annex H.4.2 for the requirements listed for conformity assessment levels 1, 2, and 3. **Substantiation:** Using the requirements in conformity assessment level 1, 2, or 3 will allow the purchase of quality PPE equipment.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	114	IN THE CART WITH PC 107	☐ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	CDC NOTE: only changes identified by me are shown. (b) *Conformity Assessment*~~. All arc-rated PPE shall be listed.~~ Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard. Informational Note No. 2: See ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(b)	133		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (b) *Conformity Assessment.* All arc-rated PPE shall be listed. This requirement will go into effect January 1, 2030. Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard. Informational Note No. 2: See ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed revision is no longer applicable as the First Revision action to permit only listing has been reversed.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

130.7(C)(14)(b)	184	IN THE CART WITH PC 107	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (b) *Conformity Assessment.* All arc-rated PPE shall be listed. Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an appropriate product standard. Informational Note No. 2: See ISO 17065, *Conformity assessment* — ~~*Requirements*~~ *Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations. The language as written deletes items (1) and (2) regarding Self declaration. Self declaration under a registered quality management system and product testing by an accredited laboratory and a Supplier's Declaration of Conformity should NOT be deleted as this method for conformity assessment has been used successfully in North America and Globally. Requiring ALL arc-rated PPE to be listed will create an unnecessary burden for the industry by increasing cost and potentially making PPE that is currently used out of compliance with NFPA 70E requiring replacement.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(c)	32		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. *(c) Marking.* ~~All suppliers or~~ Garments that are not certified as indicated on 130.7(b)(14) above shall not use any label or reference to a certification organization nor to any safety standard. Manufacturers shall not label clothing nor claim compliance with a portion(s) or segment(s) of the applicable requirements of the corresponding standard and shall not use the same or identification of NFPA standards in any statement about their respective products unless the garment product is certified as indicated on 130.7(b)(14) above. Suppliers or manufacturers of PPE shall provide the following information on the PPE, on the smallest unit container, or contained within the manufacturer's instructions: (1) Name of manufacturer (2) Conformity assessment method used		

	(3) Product performance standards to which the product conforms (4) Arc rating where appropriate for the equipment (5) One or more identifiers such as model, serial number, lot number, or traceability code (6) Care instructions
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revisions are rejected because the action taken in FR 54 has been reversed.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(c)	17		☐ Create Second Revision ☒ ~~☐~~ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	CDC NOTE: only changes identified by me are shown. (c) Marking. All suppliers or manufacturers of PPE shall provide the following information on the PPE, on the smallest unit container, or contained within the manufacturer's instructions: 1. Name of manufacturer 2. PPE Listing or PPE Certification code reference or PPE Certification QR Code~~Conformity assessment method used~~ 3. Product performance standards to which the product conforms 4. Arc rating where appropriate for the equipment 5. One or more identifiers such as model, serial number, lot number, or traceability code 6. Care instructions
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is no longer applicable as the First Revision action to permit only listing has been reversed.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(14)(c)	109		☐ Create Second Revision ☒ ~~☐~~ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (c) *Marking.* All suppliers or manufacturers of PPE shall provide the following information on the PPE, on the smallest unit container, or contained within the manufacturer's instructions: (1) Name of manufacturer ~~(2) Conformity assessment method used~~ (3) Product performance standards to which the product conforms (4~~3~~) Arc rating where appropriate for the equipment (~~5~~4) One or more identifiers such as model, serial number, lot number, or traceability code (~~6~~5) Care instructions
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is no longer applicable as the First Revision action to permit only listing has been reversed.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(14) Standards for PPE. (a) *General.* PPE shall conform to applicable state, federal, or local codes and standards. Informational Note No. 1: See Table Informational Note 130.7(C)(14) for a list of examples of standards that contain information on the care, inspection, testing, and manufacturing of PPE. Informational Note No. 2: See 130.7(C)(11) and 130.7(C)(12) for requirements on non-arc-rated or flammable fabrics not covered by any of the standards in Table Informational Note 130.7(C)(14). (b) *Conformity Assessment.* All suppliers or manufacturers of PPE shall demonstrate conformity with an applicable product standard by one of the following methods: (1) Self-declaration under a registered quality management system and product testing by an accredited laboratory and a Supplier's Declaration of Conformity (2) Certification by an accredited independent third-party certification organization. ~~All arc-rated PPE shall be listed.~~

Informational Note No. 1: See H.4 and ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, for examples of a process for conformity assessment to an ~~appropriate~~ applicable product standard.

Informational Note No. 2: See ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, for an example of a process to accredit independent third-party certification organizations.

~~(b)~~(c) *Marking.* All suppliers or manufacturers of PPE shall provide the following information on the PPE, on the smallest unit container, or contained within the manufacturer's instructions:

1. Name of manufacturer
2. Conformity assessment method used
3. Product performance standards to which the product conforms
4. Arc rating ~~where appropriate~~ if ~~for~~ the equipment is arc rated
5. One or more identifiers such as model, serial number, lot number, or traceability code
6. Care instructions

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(15)	58	IN THE CART WITH PC 233	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the text in Table 130.7(C) (15)(b) regarding "(excluding capacitors covered in Article 360)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual. Further, clarify whether "maximum" should be deleted from preceding the defined term "available fault current" in multiple locations. See 130.7(C)(15)(a)(1) IN, 130.7(C)(15)(a)(2)(a), 130.7(C)(15)(b)(1) IN, and 130.7(C)(15)(b)(2)(a) per the committee statement, and per Public Inputs 11 and 12. See the ballot comment stating that the defined term "available fault current" is the "largest amount of current capable of being delivered and based on this definition the term "maximum" is superfluous.		
	CDC NOTE: Here are the first draft ballot comments on 130.7(C)(15). (FR-55) **Affirmative with Comment** The qualifier "maximum" was not deleted in front of the defined term "available fault current" in multiple locations. See 130.7(C)(15)(a)(1) IN, 130.7(C)(15)(a)(2)(a), 130.7(C)(15)(b)(1) IN, and 130.7(C)(15)(b)(2)(a) per the Committee Statement, and per Public Input Numbers 11 and 12. The defined term "available fault current" is the "largest amount of current capable of being delivered...." There is no such thing as the largest maximum.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(15)	37	IN THE CART WITH PC 233	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the text in Table 130.7(C)(15)(b) regarding "(excluding capacitors covered in Article 360)" and Table 130.7(C)(15)(c) arc-flash category 1,2,3 and 4 regarding "(ear canal inserts)" that do not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(15)	MOS	IN THE CART WITH PC 233	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC Note: Table notes and footnotes are requirements. As I read some notes, it is a little confusing if they are really requirements or informational. Please review the notes and their purpose.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(C)(15)	233	37, 58	☒ ~~☐~~ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

(15) Arc Flash PPE Category Method.

The requirements of 130.7(C)(15) shall apply when the arc flash PPE category method is used for the selection of arc flash PPE.

Informational Note: For both ac and dc systems, the arc flash PPE category of the protective clothing and equipment is generally based on determination of the estimated exposure level.

a. Alternating-Current (ac) Equipment. Alternating-current (ac) equipment shall meet the following requirements:

1. When the arc flash risk assessment performed in accordance with 130.5 indicates that arc flash PPE is required and the arc flash PPE category method is used for the selection of PPE for ac systems in lieu of the incident energy analysis of 130.5(G), Table 130.7(C)(15)(a) shall be used to determine the arc flash PPE category.

Informational Note: The estimated maximum available fault current, ~~maximum~~ fault-clearing times, and minimum working distances for various ac equipment types or classifications are listed in Table 130.7(C)(15)(a).

2. An incident energy analysis shall be required in accordance with 130.5(G) for the following:

1. Power systems with greater than the estimated ~~maximum~~ available fault current
2. Power systems with longer than the maximum ~~f~~ault clearing times
3. Less than the minimum working distance

b. Direct-Current (dc) Equipment. Direct-current (dc) equipment shall meet the following requirements:

1. When the arc flash risk assessment performed in accordance with 130.5(G) indicates that arc flash PPE is required and the arc flash PPE category method is used for the selection of PPE for dc systems in lieu of the incident energy analysis of 130.5(G), Table 130.7(C)(15)(b) shall be used to determine the arc flash PPE category.

Informational Note: The estimated ~~maximum~~ available fault current, maximum arc duration, and working distances for dc equipment are listed in 130.7(C)(15)(b). The estimated ~~maximum~~ available fault current, maximum arc duration, and working distances for dc equipment are listed in 130.7(C)(15)(b).

2. An incident energy analysis shall be required in accordance with 130.5(G) for the following:

1. Power systems with greater than the estimated ~~maximum~~ available fault current
2. Power systems with longer than the maximum arc duration
3. Less than the minimum working distance

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement	**Technical reason for revision.**
	The word "maximum" is deleted in front of "available fault current" in 130.7(C)(15)(a)(1) Informational Note, 130.7(C)(15)(a)(2)(a), 130.7(C)(15)(b)(1) Informational Note, and 130.7(C)(15)(b)(2)(a) to correlate with definition of "available fault current" in Article 100. The word “maximum” is unnecessary as “available fault current” is the "largest amount of current capable of being delivered…”. Table 130.7(C)(15)(a) Informational Note No. 1 (4) – The parenthetical expression (i.e., “no intentional delay) is deleted as it is unnecessary. Table 130.7(C)(15)(b) – The parenthesis were removed from “excluding capacitors covered in Article 360” and it has been editorially revised to “other than capacitors covered in Article 360” as the expression is intended to be an exception to the equipment listed in this row of the table. Table 130.7(C)(15)(b) – Table Note (1) is editorially revised to avoid the use of the vague and unenforceable term “can” and to express the requirement as “shall” rather than “must.” Table 130.7(C)(15)(b) – Table Note (2) is revised to be Table 130.7(C)(15)(b) Informational Note No. 1 as it does not contain any requirements. The remaining Informational Notes have been renumbered accordingly. In accordance with the NEC Style Manual Section 3.5.1.1, parenthetical expressions are removed. This revision modifies “Hearing protection (ear canal inserts)[d]” to “Hearing protection, ear canal inserts[d]” in four locations in Table 130.7(C)(15)(c).
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**(15) Arc Flash PPE Category Method.** The requirements of 130.7(C)(15) shall apply when the arc flash PPE category method is used for the selection of arc flash PPE. Informational Note: For both ac and dc systems, the arc flash PPE category of the protective clothing and equipment is generally based on determination of the estimated exposure level. a. *Alternating-Current (ac) Equipment.* Alternating-current (ac) equipment shall meet the following requirements: 1. When the arc flash risk assessment performed in accordance with 130.5 indicates that arc flash PPE is required and the arc flash PPE category method is used for the selection of PPE for ac systems in lieu of the incident energy analysis of 130.5(G), Table 130.7(C)(15)(a) shall be used to determine the arc flash PPE category. Informational Note: The estimated ~~maximum~~ available fault current, maximum fault-clearing times, and minimum working distances for various ac equipment types or classifications are listed in Table 130.7(C)(15)(a). 2. An incident energy analysis shall be required in accordance with 130.5(G) for the following: 1. Power systems with greater than the estimated ~~maximum~~ available fault current 2. Power systems with longer than the maximum fault clearing times 3. Less than the minimum working distance b. *Direct-Current (dc) Equipment.* Direct-current (dc) equipment shall meet the following requirements: 1. When the arc flash risk assessment performed in accordance with 130.5(G) indicates that arc flash PPE is required and the arc flash PPE category method is used for the selection of PPE for dc systems in lieu of the incident energy analysis of 130.5(G), Table 130.7(C)(15)(b) shall be used to determine the arc flash PPE category. Informational Note: The estimated ~~maximum~~ available fault current, maximum arc duration, and working distances for dc equipment are listed in 130.7(C)(15)(b). The estimated maximum available fault current, maximum arc duration, and working distances for dc equipment are listed in 130.7(C)(15)(b). 2. An incident energy analysis shall be required in accordance with 130.5(G) for the following:

1. Power systems with greater than the estimated ~~maximum~~ available fault current
2. Power systems with longer than the maximum arc duration
3. Less than the minimum working distance

c. *Protective Clothing and Personal Protective Equipment (PPE).* Protective clothing and PPE shall meet the following requirements:

1. Once the arc flash PPE category has been identified from Table 130.7(C)(15)(a) or Table 130.7(C)(15)(b), Table 130.7(C)(15)(c) shall be used to determine the required PPE.

Note: Table 130.7(C)(15)(c) lists the requirements for PPE based on arc flash PPE categories 1 through 4.

2. This clothing and equipment shall be used when working within the arc flash boundary.
3. The use of PPE other than or in addition to that listed shall be permitted provided it meets 130.7(C)(7).

Informational Note No. 1: See Informative Annex H for a suggested simplified approach to ensure adequate PPE for electrical workers within facilities with large and diverse electrical systems.

Informational Note No. 2: The PPE requirements of this section are intended to protect a person from arc flash hazards. While some situations could result in burns to the skin even with the protection described in Table 130.7(C)(15)(c), burn injury should be reduced and survivable. Due to the explosive effect of some arc events, physical trauma injuries could occur. The PPE requirements of this section do not address protection against physical trauma other than exposure to the thermal effects of an arc flash.

Informational Note No. 3: The arc rating for a particular clothing system can be obtained from the arc-rated clothing manufacturer.

Table 130.7(C)(15)(a) Arc Flash PPE Categories for ac Systems

Equipment	Arc Flash PPE Category	Arc Flash Boundary
Panelboards or other equipment rated 240 volts and below	1	485 mm (19 in.)
Parameters: Available fault current not exceeding 25 kA; fault clearing time not exceeding 0.03 sec (2 cycles); minimum working distance 455 mm (18 in.)		
Panelboards or other equipment rated greater than 240 volts and up to 600 volts	2	900 mm (3 ft)
Parameters: Available fault current not exceeding 25 kA; fault clearing time not exceeding 0.03 sec		

	(2 cycles); minimum working distance 455 mm (18 in.)		
	600-volt class motor control centers (MCCs) Parameters: Available fault current not exceeding 65 kA; fault clearing time not exceeding 0.03 sec (2 cycles); minimum working distance 455 mm (18 in.)	2	1.5 m (5 ft)
	600-volt class motor control centers (MCCs) Parameters: Available fault current not exceeding of 42 kA fault clearing time not exceeding 0.33 sec (20 cycles); minimum working distance 455 mm (18 in.)	4	4.3 m (14 ft)
	600-volt class switchgear (with power circuit breakers or fused switches) and 600-volt class switchboards Parameters: Available fault current not exceeding 35 kA; fault clearing time not exceeding 0.5 sec (30 cycles); minimum working distance 455 mm (18 in.)	4	6 m (20 ft)
	Other 600-volt class (277 volts through 600 volts, nominal) equipment Parameters: Available fault current not exceeding 65 kA; fault clearing time not exceeding 0.03 sec (2 cycles); minimum working distance 455 mm (18 in.)	2	1.5 m (5 ft)
	NEMA E2 (fused contactor) motor starters, 2.3 kV through 7.2 kV Parameters: Available fault current not exceeding 35 kA; fault clearing time not exceeding 0.24 sec (15 cycles); minimum working distance 910 mm (36 in.)	4	12 m (40 ft)
	Metal-clad switchgear, 1 kV through 15 kV Parameters: Available fault current not exceeding 35 kA; fault clearing time not exceeding 0.24 sec (15 cycles); minimum working distance 910 mm (36 in.)	4	12 m (40 ft)
	Metal enclosed interrupter switchgear, fused or unfused type construction, 1 kV through 15 kV Parameters: Available fault current not exceeding 35 kA; fault clearing time not exceeding 0.24 sec (15 cycles); minimum working distance 910 mm (36 in.)	4	12 m (40 ft)
	Other equipment 1 kV through 15 kV Parameters: Available fault current not exceeding 35 kA; fault clearing time not exceeding 0.24 sec (15 cycles); minimum working distance 910 mm (36 in.)	4	12 m (40 ft)
	Arc-resistant equipment up to 600-volt class	N/A	N/A

Parameters: DOORS CLOSED and SECURED; with an available fault current and a fault clearing time that does not exceed the arc-resistant rating of the equipment*		
Arc-resistant equipment 1 kV through 15 kV	N/A	N/A
Parameters: DOORS CLOSED and SECURED; with an available fault current and a fault clearing time that does not exceed the arc-resistant rating of the equipment*		

N/A: Not applicable

Note:
For equipment rated 600 volts and below and protected by upstream current-limiting fuses or current-limiting molded case circuit breakers sized at 200 amperes or less, the arc flash PPE category ~~can~~ shall be permitted to be reduced by one number but not below arc flash PPE category 1.

*For DOORS OPEN refer to the corresponding non-arc-resistant equipment section of this table.

Informational Note No. 1 to Table 130.7(C)(15)(a): The following are typical fault clearing times of overcurrent protective devices:

(1) 0.5 cycle fault clearing time is typical for current-limiting fuses and current-limiting molded case circuit breakers when the fault current is within the current limiting range.

(2) 1.5 cycle fault clearing time is typical for molded case circuit breakers rated less than 1000 volts with an instantaneous integral trip when the fault current is within the instantaneous trip region.

(3) 3.0 cycle fault clearing time is typical for insulated case circuit breakers rated less than 1000 volts with an instantaneous integral trip or relay operated trip when the fault current is within the instantaneous trip region.

(4) 5.0 cycle fault clearing time is typical for relay operated circuit breakers rated 1 kV to 35 kV when the relay operates in the instantaneous range ~~(i.e., "no intentional delay")~~ when the fault current is within the instantaneous trip region.

(5) 20 cycle fault clearing time is typical for low-voltage power and insulated case circuit breakers with a short time fault clearing delay for motor inrush when the fault current is within the instantaneous trip region.

(6) 30 cycle fault clearing time is typical for low-voltage power and insulated case circuit breakers with a short time fault clearing delay without instantaneous trip when the fault current is within the instantaneous trip region.

Informational Note No. 2 to Table 130.7(C)(15)(a): See Table 1 of IEEE 1584-2002, *Guide for Performing Arc Flash Hazard Calculations*, for further information regarding list items (2) through (4) in Informational Note No. 1.

Informational Note No. 3 to Table 130.7(C)(15)(a): See IEEE C37.20.7, *Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults*, for an example of a standard that provides information for arc-resistant equipment referred to in Table 130.7(C)(15)(a).

Informational Note No. 4 to Table 130.7(C)(15)(a): See O.2.4(9) for information on arc-resistant equipment.

Table 130.7(C)(15)(b) Arc Flash PPE Categories for dc Systems

Equipment	Arc Flash PPE Category	Arc Flash Boundary
Storage batteries, dc switchboards, and other dc supply sources excluding capacitors covered in Article 360 ~~(excluding capacitors covered in Article 360)~~ Parameters: Greater than 150 volts and less than or equal to 600 volts Maximum arc duration and minimum working distance: 2 sec @ 455 mm (18 in.)		
Available fault current less than 1.5 kA	2	900 mm (3 ft)
Available fault current greater than or equal to 1.5 kA and less than 3 kA	2	1.2 m (4 ft)
Available fault current greater than or equal to 3 kA and less than 7 kA	3	1.8 m (6 ft)
Available fault current greater than or equal to 7 kA and less than 10 kA	4	2.5 m (8 ft)

Notes:
(1) Where there is a likelihood that apparel ~~Apparel that can be expected to~~will be exposed to electrolyte, ~~must meet~~ both of the following conditions shall apply to apparel:

(a) Be evaluated for electrolyte protection

Informational Note: See ASTM F1296, *Standard Guide for Evaluating Chemical Protective Clothing*, for information on evaluating apparel for protection from electrolyte.

(b) Be arc rated

Informational Note: See ASTM F1891, *Standard Specification for Arc and Flame Resistant Rainwear*, for information on evaluating arc-rated apparel.

Informational Note No. 1: ~~(2)~~ A two-second arc duration is assumed if there is no overcurrent protective device (OCPD) or if the fault clearing time is not known. If the fault clearing time is known and is less than 2 seconds, an incident energy analysis could provide a more representative result.

Informational Note No. 2~~1~~: See D.5 for the basis for table values and alternative methods to determine dc incident energy. Methods should be used with good engineering judgment. When determining available fault current, the effects of cables and any other impedances in the circuit should be included. Direct-current (dc) circuit modeling is the best method to determine the available short-circuit current at the point of the arc. Battery cell short-circuit current can be obtained from the battery manufacturer.

Informational Note No. 3~~2~~: The methods for estimating the dc arc flash incident energy that were used to determine the categories for this table are based on open-air incident energy calculations. Open-air calculations were used because many battery systems and other dc process systems are in open areas or rooms. If the specific task is within an enclosure, the incident energy can be higher and additional PPE protection beyond the value shown in this table should be considered.

Informational Note No. 4~~3~~: See the following references for dc voltages below 150 volts nominal:

(1) J. G. Hildreth and K. Feeney, “Arc Flash Hazards of 125 Vdc Station Battery Systems,” 2018 IEEE Power & Energy Society General Meeting (PESGM), 2018, pp. 1–5, doi: 10.1109/PESGM.2018.8586181.
(2) US Department of Energy Bonneville Power Administration Engineering and Technical Services Report BPA F 5450.05, “DC Arc Flash: 125V, 1300 amp-hour battery,” May 11, 2017.
(3) K. Gray, S. Robert, and T. L. Gauthier, "Low Voltage 100–500 Vdc Arc Flash Testing," 2020 IEEE IAS Electrical Safety Workshop (ESW), 2020, pp. 1–7, doi: 10.1109/ESW42757.2020.9188336.

Table 130.7(C)(15)(c) Personal Protective Equipment (PPE)

Arc Flash PPE Category	PPE
1	**Arc-Rated Clothing, Minimum Arc Rating of 4 cal/cm^2 (16.75 J/cm^2)[a]**
	Arc-rated long-sleeve shirt and pants or arc-rated coverall
	Arc-rated face shield[b] or arc-rated arc flash suit hood
	Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[c]
	Protective Equipment
	Hard hat
	Safety glasses or safety goggles (SR)

		Hearing protection, in the form of ~~(~~ear canal inserts~~)~~[d]
		Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with protectors (SR)[e]
		Leather footwear[f] (AN)
	2	**Arc-Rated Clothing, Minimum Arc Rating of 8 cal/cm^2 (33.5 J/cm^2)[a]**
		Arc-rated long-sleeve shirt and pants or arc-rated coverall
		Arc-rated arc flash suit hood or arc-rated face shield[b] and arc-rated balaclava
		Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[c]
		Protective Equipment
		Hard hat
		Safety glasses or safety goggles (SR)
		Hearing protection, in the form of ~~(~~ ear canal inserts~~)~~[d]
		Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with protectors (SR)[e]
		Leather footwear[f]
	3	**Arc-Rated Clothing Selected so That the System Arc Rating Meets the Required Minimum Arc Rating of 25 cal/cm^2 (104.7 J/cm^2)[a]**
		Arc-rated long-sleeve shirt (AR)
		Arc-rated pants (AR)
		Arc-rated coverall (AR)
		Arc-rated arc flash suit jacket (AR)
		Arc-rated arc flash suit pants (AR)
		Arc-rated arc flash suit hood
		Arc-rated gloves or rubber insulating gloves with protectors (SR)[e]
		Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[c]
		Protective Equipment
		Hard hat
		Safety glasses or safety goggles (SR)
		Hearing protection, in the form of ~~(~~ear canal inserts~~)~~[d]
		Leather footwear[f]

4	**Arc-Rated Clothing Selected so That the System Arc Rating Meets the Required Minimum Arc Rating of 40 cal/cm^2 (167.5 J/cm^2)[a]**
	Arc-rated long-sleeve shirt (AR)
	Arc-rated pants (AR)
	Arc-rated coverall (AR)
	Arc-rated arc flash suit jacket (AR)
	Arc-rated arc flash suit pants (AR)
	Arc-rated arc flash suit hood
	Arc-rated gloves or rubber insulating gloves with protectors (SR)[e]
	Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[c]
	Protective Equipment
	Hard hat
	Safety glasses or safety goggles (SR)
	Hearing protection, in the form of ~~(~~ear canal inserts~~)~~[d]
	Leather footwear[f]

AN: As needed (optional). AR: As required. SR: Selection required.

[a]~~*Arc*~~Arc ratings shall be permitted to be for a single layer, such as an arc-rated shirt and pants or a coverall, or for an arc flash suit or a multi-layer system if tested as a combination consisting of an arc-rated shirt and pants, coverall, and arc flash suit. ~~*rating* is defined in Article 100.~~

[b]Face shields are to have 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 to be worn.

[c]The arc rating of outer layers worn over arc-rated clothing as protection from the elements or for other safety purposes, and that are not used as part of a layered system, shall not be required to be equal to or greater than the estimated incident energy exposure.

[d]Other types of hearing protection are permitted to be used in lieu of or in addition to ear canal inserts provided they are worn under an arc-rated arc flash suit hood.

[e]Rubber insulating gloves with protectors provide arc flash protection in addition to electric shock protection. Higher class rubber insulating gloves with protectors, due to their increased material thickness, provide increased arc flash protection.

[f]Footwear other than leather or dielectric shall be permitted to be used provided it has been tested to demonstrate no ignition, melting or dripping at the minimum arc rating for the respective arc flash PPE category.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(D)(1)	59		☒ ~~☐~~ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

The Correlating Committee requests that the Technical Committee review 130.7(D)(1)(5) regarding "(e.g., damaged tip on a screwdriver)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual. Also, clarify "inspection shall look for damage" and consider rewording for clarity.

Proposed Statement

Technical reason for revision.

The parenthetical expression is modified to comply with the NEC Style Manual. Parent text and list item numbering are added in 130.7(D)(1)(e) for clarity and compliance with the NEC Style Manual. The reference to a damaged tool is deleted as there are many possible ways a tool could be damaged.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(D)(1)	MOS	IN THE CART WITH PC 59	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.

a. **Requirements for Insulated Tools**. The following requirements shall apply to insulated tools:

1. Insulated tools shall be rated for the voltages on which they are used.
2. Insulated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.
3. Insulated tools shall be protected from damage to the insulating material.
4. Insulated tools and equipment shall be inspected prior to each use.
5. Inspection shall look for damage to the insulation or damage that can limit the tool from performing its intended function or could increase the potential for an incident ~~(e.g., damaged tip on a screwdriver)~~.

e. **Portable Ladders**. Portable ladders shall comply with the following:

1) Ladders shall have nonconductive side rails when used within the limited approach boundary or where the employee or ladder could contact exposed energized electrical conductors or circuit parts.

	2) Nonconductive ladders shall meet the requirements of applicable state, federal, or local codes and standards.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.

(1) Insulated Tools and Equipment.

Tools and handling equipment used within the restricted approach boundary, or where they present an electrical contact hazard, shall be insulated.

Informational Note: See 130.4(E), Electric Shock Protection Boundaries.

a. *Requirements for Insulated Tools.* The following requirements shall apply to insulated tools:

   1. Insulated tools shall be rated for the voltages on which they are used.
   2. Insulated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.
   3. Insulated tools shall be protected from damage to the insulating material.
   4. Insulated tools and equipment shall be inspected prior to each use.
   5. Inspection shall look for damage to the insulation or damage that can limit the tool from performing its intended function or could increase the potential for an incident ~~(e.g., damaged tip on a screwdriver)~~.

b. *Fuse or Fuseholder Handling Equipment.* Fuse or fuseholder handling equipment, insulated for the circuit voltage, shall be used to remove or install a fuse if the fuse terminals are energized.

c. *Ropes and Handlines.* Ropes and handlines used within the limited approach boundary shall be nonconductive.

d. *Fiberglass-Reinforced Plastic Rods.* Fiberglass-reinforced plastic rod and tube used for live line tools shall meet the requirements of applicable state, federal, or local codes and standards.

Informational Note: See ASTM F711, *Standard Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used in Live Line Tools*, for further

	information concerning visual inspection and testing of fiberglass-reinforced plastic rods and tubes. e. *Portable Ladders.* Portable ladders shall comply with the following: (1) Portable ladders shall have nonconductive side rails when used within the limited approach boundary or where the employee or ladder could contact exposed energized electrical conductors or circuit parts. (2) Nonconductive ladders shall meet the requirements of applicable state, federal, or local codes and standards. Informational Note: See Table Informational Note 130.7(E) for a list of standards that contain information on portable ladders.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(D)(2)	60		☒ ~~☐~~ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 130.7(D)(2)(2)(c) regarding "(field fabricated)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Proposed Statement	**Technical reason for revision.** The parenthetical statement “field fabricated” in 130.7(D)(2)(c) has been moved to precede the phrase “physical or mechanical barriers” in the title as this requirement is specific to those types of barriers. This also correlates with and distinguishes this type of barrier from the barriers identified as “rubber insulating equipment” and “voltage-rated plastic guard equipment” in 130.7(D)(2)(a) and 130.7(D)(2)(b) respectively.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
130.7(D)(2)	MOS	IN THE CART WITH PC 60	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown. c. **Physical or Mechanical Barriers**. Barriers shall comply with the following:		

	1. Physical or mechanical (field-fabricated) barriers shall be installed no closer than the restricted approach boundary distance given in Table 130.4(E)(a) and Table 130.4(E)(b). 2. While the barrier is being installed, the restricted approach boundary distance specified in Table 130.4(E)(a) and Table 130.4(E)(b) shall be maintained, or the energized conductors or circuit parts shall be placed in an electrically safe work condition.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes**.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(2) Barriers. The following requirements shall apply to barriers: 1. Exposed energized electrical conductors or circuit parts operating at 50 volts or more shall be guarded by a barrier in accordance with 130.7(D)(2)(a) through 130.7(D)(2)(c) to prevent unintentional contact while an employee is working within the restricted approach boundary of those conductors or circuit parts. 2. Barriers shall be supported to remain in place and shall prevent unintentional contact by a person, tool, or equipment. a. *Rubber Insulating Equipment.* Rubber insulating equipment used for protection from unintentional contact with energized conductors or circuit parts shall be rated for the voltage and shall meet the requirements of applicable state, federal, or local codes and standards. Informational Note: See Table Informational Note 130.7(E) for a list of examples of standards that contain information on rubber insulating equipment. b. *Voltage-Rated Plastic Guard Equipment.* Plastic guard equipment for protection of employees from unintentional contact with energized conductors or circuit parts, or for protection of employees or energized equipment or material from contact with ground, shall be rated for the voltage and shall meet the requirements of applicable state, federal, or local codes and standards. Informational Note: See Table Informational Note 130.7(E) for a list of examples of standards that contain information on voltage-rated plastic guard equipment.

	c. Field Fabricated Physical or Mechanical Barriers. The following requirements shall apply to field fabricated ~~Physical p~~~~P~~hysical or mechanical ~~(field-fabricated)~~ barriers: (1) The barriers ~~-~~shall be installed no closer than the restricted approach boundary distance given in Table 130.4(E)(a) and Table 130.4(E)(b). (2) While the barrier is being installed, the restricted approach boundary distance specified in Table 130.4(E)(a) and Table 130.4(E)(b) shall be maintained, or the energized conductors or circuit parts shall be placed in an electrically safe work condition.

DOC #	70E
TG #/NAME	Chapter 2
TG CHAIR	Ron Widup
TG MEMBERS	Rod West, Karl Cunningham, Donald Hacke, Daniel Hook, Louis Barrios

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
205.4	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **205.4 General Maintenance Requirements.** **(A) Maintenance.** Electrical equipment shall be maintained in accordance with manufacturers' instructions or industry consensus standards to reduce the risk associated with failure. **(B) Responsibility.** The equipment owner or the owner's designated representative shall be responsible for maintenance of the electrical equipment and documentation. Informational Note No. 1: Common industry practice is to apply test or calibration decals to equipment to indicate the test or calibration date and overall condition of equipment that has been tested and maintained in the field. These decals provide the employee immediate indication of last maintenance date and if the tested		

	device or system was found acceptable on the date of test. This local information can assist the employee in the assessment of overall electrical equipment maintenance status. Informational Note No. 2: Noncontact diagnostic methods in addition to scheduled maintenance activities of electrical equipment can assist in the identification of electrical anomalies.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
205.8	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **205.8 Guarding of Energized Conductors and Circuit Parts.** **(A) Enclosures.** Enclosures shall be maintained to guard against unintentional contact with exposed energized conductors and circuit parts and other electrical hazards. **(B) Covers and Doors.** Covers and doors shall be in place with all associated fasteners and latches secured.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
225.2	MOS		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **225.2 Fuses.** The following shall apply to fuse installations: (1) Fuses shall be maintained free of breaks or cracks in fuse cases, ferrules, and insulators. (2) Fuse clips shall be maintained to provide adequate contact with fuses. (3) Fuseholders for current-limiting fuses shall not be modified to allow the insertion of fuses that are not current-limiting. (4) Non-current limiting fuses shall not be modified to allow their insertion into current-limiting fuseholders.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
225.4	76		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. 225.4 Circuit Breaker Testing After Electrical Faults. Circuit breakers that ~~interrupt faults~~ have interrupted an electrical fault approaching their interrupting ratings, capable of saving and making the magnitude of the cleared fault current available, shall be inspected and tested in accordance with the manufacturer's instructions.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		

Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision limits the intent of the section, lacks clarity, and presents technical ambiguity. Manufacturers already specify in their instructions what to do when a circuit breaker experiences a fault close to its rated capacity, therefore the proposed revision does not add clarity.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
240.2	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Revision must be shown in track changes**.		
	240.2 Ventilation. The following shall apply to ventilation systems:		

Do not delete	(1) When forced or natural ventilation systems are required by the battery system design and are present, they shall be examined and maintained to prevent buildup of explosive mixtures. (2) ~~This m~~Maintenance shall include a functional test of any associated detection and alarm systems. Informational Note: “Natural ventilation” implies there are no mechanical mechanisms. Maintenance includes activities such as inspection and removal of any obstructions to natural air flow.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
240.4	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made. The order of the title was changed to align with the section text.		
Response	**Technical reason for rejecting or not making some of the proposed changes**.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **240.4 ~~Cell Flame Arresters and~~ Cell Ventilation and Cell Flame Arresters.** **(A) Cell Ventilation.** When present, battery cell ventilation openings shall be unobstructed. **(B) Cell Flame Arresters.** Cell flame arresters shall be inspected for proper installation and unobstructed ventilation and ~~shall be~~ replaced when necessary in accordance with the manufacturer's instructions.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
250.4	MOS		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made. To align with consistent use of the term, the word "personal" was changed to "temporary" and "ground" to "grounding" in (A)(1). The word "properly" was deleted from (C)(2) as a vague and unenforceable term per NEC Style Manual Section 3.2.1.
Response	**Technical reason for rejecting or not making some of the proposed changes**.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **250.4 Grounding Equipment.** **(A) Inspection.** (1) Cable Sets. Temporary~~Personal~~ protective grounding cable sets shall be inspected for cuts in the protective sheath and damage to the conductors. (2) Strain Relief. Clamps and connector strain relief devices shall be checked for tightness. (3) Inspection Interval. These inspections shall be made at intervals thereafter as service conditions require, but in no case shall the interval exceed 1 year. **(B) Testing.** (1) Return to Service Testing. Prior to being returned to service, temporary protective grounding equipment that has been repaired or modified shall be tested.

	(2) Testing Interval. Temporary protective grounding equipment shall be tested as service conditions require. Informational Note: See ASTM F2249, *Standard Specification for In-Service Test Methods for Temporary Grounding Jumper Assemblies Used on De-energized Electric Power Lines and Equipment*, for guidance for inspecting and testing temporary protective grounding equipment. **(C) -Grounding and Testing Devices.** (1) Storage. Grounding and testing devices shall be stored in a clean and dry area. (2) Inspection and Testing. Grounding and testing devices shall be ~~properly~~ inspected and tested before each use. Informational Note: See IEEE C37.20.6, *Standard for 4.76 kV to 38 kV Rated Ground and Test Devices Used in Enclosures,* Section 9.5 for guidance on testing of grounding and testing devices.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
250.5	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. CDC NOTE: In some cases it might be better for this to be a list of requirements rather than separate sub-sections of requirements. Examples of how this could be revised are shown.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** The section was revised to comply with the NEC Style Manual Section 3.5.1.2 and the NFPA Manual of Style. No technical changes were made.		
Response	**Technical reason for rejecting or not making some of the proposed changes**. 		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**250.5 Test Instruments.** **(A) Maintenance.** Test instruments and associated test leads used to verify the absence or presence of voltage shall be maintained to assure functional integrity. **(B) Functional Verification.** The maintenance program shall include functional verification as described in 110.6(E).

DOC #	70E
TG #/NAME	Chapter 3
TG CHAIR	Bobby Gray and Heath Garrison
TG MEMBERS	* indicates non-committee member Mark McNellis, Larry Perkins, Ray Crow, *Lloyd Gordon, Ernest Gallo, *David Rosewater, Scott Lubaczewski, Terrance McKinch

All task group **proposed** motions, revisions, and entries displayed below are for consideration by the entire TC.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Chapter 3	**104**	177	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. Note: It was very difficult to show the suggested changes in TerraView; therefore the suggested structure changes to Chapter 3 are given below. The purpose of this change is to improve useability by grouping where possible dc hazards together and ac hazards together in the redistribution of Chapter 3 articles. No technical changes, or changes to article titles are proposed for this public comment, only changes in article numbers. If the suggested changes are accepted, 300.3 will need to be updated to reflect the organization. Article 300 Introduction Article 310 Safety-Related Work Practices: dc Electrical Hazards (Reserved) Article 320 Safety Requirements Related to Batteries and Battery Rooms Article 330 Safety-Related Work Practices: Electrical Double Layer Capacitors (EDLCs) Article 340 Safety-Related Requirements: Photovoltaic Systems Article 350 Safety-Related Work Practices for Electrolytic Cell Lines Article 360 Electrical Hazards 1 Hz to 110 MHz (Not Including 50/60 Hz) Article 370 Safety-Related Work Practices: Electrical Hazards for Mixed Frequencies (Reserved) Article 380 Safety-Related Work Requirements for Capacitors Article 390 Safety-Related Work Requirements: Research and Development Laboratories		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** R&D laboratories are moved to the end because it applies to more than single equipment hazards, including requirements for enforcement. Titles are aligned to be consistent.		
Response	**Technical reason for rejecting or not making some of the proposed changes.** Restructuring of the remaining articles is not accepted because grouping topics by ac and dc alone is not technically accurate.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

Chapter 3	177	104	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision. Statement seems to agree with reorganization.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. 300 Introduction 310 ~~Safety-Related Work Practices: dc~~DC Electrical Hazards ~~(Reserved)~~ 320 ~~Safety-Related Work Requirements for~~ Capacitor~~s~~ Electrical Hazards 330 Electrical Hazards 1 Hz to 110 MHz (Not Including dc and 50/60 Hz) 340 ~~Safety-Related Work Practices:~~ Electrical Hazards for Mixed Frequencies (Reserved) 350 Safety-Related Work Practices for Electrolytic Cells 360 Safety-Related Requirements ~~Related to~~for Batteries ~~and Battery Rooms~~ ~~370~~ 390 Safety-Related Work Requirements for ~~:~~ Research and Development (R&D) Laboratories ~~380~~ 370 Safety-Related Work Practices for ~~:~~ Electrical Double Layer Capacitors (EDLCs) ~~390~~ 380 Safety-Related Work ~~Requirements~~ Practices for ~~:~~ Photovoltaic Systems		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
300.3	105		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. 300.3 Organization. Chapter 3 of this standard is divided into Articles. Article 300 applies generally to electrical hazards associated with special equipment within the scope of Chapter 3. Article 310 applies to dc electrical hazards. Article 320 applies to ~~capacitor electrical hazards~~ batteries and battery rooms. F ~~covers electrical~~ applies to electrical double-layer capacitors. Article 340 applies to photovoltaic systems. Article 350 applies to electrolytic cell lines. Article 360 applies to electrical hazards from 1 Hz to 110 MHz, other than dc and 50/60 Hz. Article ~~350~~ 370 applies to ~~electrolytic cells. Article 360 applies to batteries and battery rooms. Article 370~~ electrical hazards for mixed frequencies. Article 380 applies to capacitors. Article 390 applies to research and development		

	laboratories. ~~Article 380 applies to electrical double-layer capacitors. Article 390 applies to photovoltaic systems.~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Changes made to align with the restructuring and moving of articles.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	300.3 Organization. Chapter 3 of this standard is divided into Articles. Article 300 applies generally to electrical hazards associated with special equipment within the scope of Chapter 3. Article 310 applies to dc electrical hazards. Article 320 applies to capacitor electrical hazards. Article 330 covers electrical hazards from 1 Hz to 110 MHz, other than dc and 50/60 Hz. Article 350 applies to electrolytic cells. Article 360 applies to batteries and battery rooms. ~~Article 370 applies to research and development laboratories.~~ Article 37~~8~~0 applies to electrical double-layer capacitors. Article 38~~9~~0 applies to photovoltaic systems. Article 390 applies to research and development laboratories.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New Article 310	143		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	Article 310 DC Electrical Hazards This article covers the electrical safety-related requirements for the practical safeguarding of employees while working with direct current (dc) that present an electrical hazard. 310.2 DC Electrical Hazard Thresholds (A) Electrical Thermal Hazard Thresholds For dc systems, hazardous power is considered greater than or equal to 1000 W. (B) Electrical Shock Thresholds. For dc systems, hazardous voltage is considered greater than or equal to 100 volts dc and 40 mA. (C) Electrical Arc Flash Hazard Thresholds.		

	For dc systems, hazardous arc flash is considered for systems greater than or equal to 150 volts dc and greater than or equal to 1.2 cal/cm2 incident energy.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** Added new Article 310 to improve usability of Chapter 3 by consolidating the electrical hazards related to DC that require implementing controls.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. Article 310 DC Electrical Hazards 310. 1 Scope. This article covers the electrical safety-related requirements for the practical safeguarding of employees while working with direct current (dc) that present an electrical hazard. 310.2 DC Electrical Hazard Thresholds Controls, based on the hierarchy of controls in 110.3(H), shall be applied where any of the following hazard thresholds for dc systems is exceeded: (1) hazardous power is greater than or equal to 1000 W (2) hazardous voltage is greater than or equal to 100 volts dc and 40 mA (3) hazardous arc flash is greater than 150 volts dc and greater than 1.2 cal/cm^2 incident energy

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.1	6		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. **320.1** Scope. This article covers the electrical safety-related requirements for the practical safeguarding of employees while working with capacitors, other than electric double layer capacitors (EDLCs), supercapacitors, or hybrid supercapacitors, that present an electrical hazard. It does not cover capacitors that are a part of NRTL listed products that include instructions that deal with the discharge of capacitors before working on the equipment.		

	Informational Note 1: An example of instructions are the instructions on a variable frequency drive that instructs the user to turn the VFD off, lead the display blank out, and then wait a number of seconds before the door is opened. Informational Note 2: See Informative Annex R for more information on working safely with capacitors.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Excluding capacitors in all NRTL listed equipment could violate the requirements to release stored energy and perform absence of voltage testing.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	320.1 Scope. This article covers the electrical safety-related requirements for the practical safeguarding of employees while working with capacitors, other than electric double layer capacitors (EDLCs), supercapacitors, or hybrid supercapacitors, that present an electrical hazard. Informational Note: See Informative Annex R for more information on working safely with capacitors.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.3	33 (cont)	TG 2 is responsible for PC. See below	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		

Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.3	68	102, 146, 178	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the text in 320.3(1) regarding "(contact thermal hazard)", 320.3(2) regarding "(electric shock hazard)", 320.3(3) "(electric shock hazard)", 320.3(4) regarding "(arc flash hazard)", 320.3(5) regarding "(hearing acoustic hazard)", 320.3(6) regarding "(lung collapse acoustic hazard)", that do not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual. Further, review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on the use of unenforceable terms. Also, consider the concerns expressed in the ballot comment regarding list item (6), "dl/dt" that should be "di/dt".		
	CDC NOTE: Here are the first draft ballot comments on 320.3. (FR-96) **Affirmative with Comment** list item (6), "dl/dt" should be "di/dt".		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.3	102	68, 146, 178	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	320.3 Stored Energy Hazard Thresholds. Appropriate controls shall be applied where any of the following hazard thresholds are exceeded: (1) Less than 100 volts and greater than 100 joules of stored energy (contact thermal hazard) (2) Greater than or equal to 100 volts and greater than 1.0 joules of stored energy (electric shock hazard) (3) Greater than or equal to 400 volts and greater than 0.25 joules of stored energy (electric shock hazard)		

	(4) Greater than or equal to 1.2 cal/cm^2 incident energy at the working distance (arc flash hazard) (5) Greater than 100 joules of stored energy regardless of voltage (hearing acoustic hazard) (6) Greater than 122 kJ of stored energy when ~~dI~~di/dt is greater than 109 amperes per second (lung collapse acoustic hazard)
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.3	146	68, 102, 178	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. 320.3 Stored Energy Hazard Thresholds. Appropriate controls shall be applied where any of the following hazard thresholds are exceeded: (1) Less than 100 volts and greater than 100 joules of stored energy (contact thermal hazard) (2) Greater than or equal to 100 volts and greater than 1.0 joules of stored energy (electric shock hazard) (3) Greater than or equal to 400 volts and greater than 0.25 joules of stored energy (electric shock hazard) (4) Greater than or equal to 1.2 cal/cm^2 incident energy at the working distance (arc flash hazard) (5) Greater than 100 joules of stored energy regardless of voltage (hearing acoustic hazard) (6) Greater than 122 kJ of stored energy when dI/dt is greater than ~~109~~ 10^9 amperes per second (lung collapse acoustic hazard)
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.3	**178**	102, 146, 68	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

320.3 Stored Energy Hazard Thresholds.

Appropriate controls shall be applied where any of the following hazard thresholds are exceeded:

(1) Less than 100 volts and greater than 100 joules of stored energy (contact thermal hazard)

(2) Greater than or equal to 100 volts and greater than 1.0 joules of stored energy (electric shock hazard)

(3) Greater than or equal to 400 volts and greater than 0.25 joules of stored energy (electric shock hazard)

(4) Greater than or equal to 1.2 cal/cm^2 incident energy at the working distance (arc flash hazard)

(5) Greater than 100 joules of stored energy regardless of voltage (hearing acoustic hazard)

(6) Greater than 122 kJ of stored energy when dI/dt is greater than ~~109~~ 1*10^9 amperes per second (lung collapse acoustic hazard)

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

The changes remove parenthetical language to comply with NEC Style Manual Section 3.5.1.1.

Numbers "109" were changed to "10^9" to correct the error in the numbers and units and spelled out the rate of change of current in list item (6) to clarify dI/dt.

Additionally, a vague and unenforceable term "appropriate" is removed to comply with NEC Style Manual Section 3.2.1.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

Proposed Second Revision Text (SR)

Clean first revision text is provided to be revised.

Do not delete for a reject

Revision must be shown in track changes.

320.3 Stored Energy Hazard Thresholds.

~~Appropriate controls~~Controls shall be applied where any of the following hazard thresholds are exceeded:

(1) Contact thermal hazard: Less than 100 volts and greater than 100 joules of stored energy ~~(contact thermal hazard)~~

(2) Electrical shock hazard: Greater than or equal to 100 volts and greater than 1.0 joules of stored energy ~~(electric shock hazard)~~

	(3) Electrical shock hazard: Greater than or equal to 400 volts and greater than 0.25 joules of stored energy ~~(electric shock hazard)~~ (4) Arc flash hazard: Greater than or equal to 1.2 cal/cm^2 incident energy at the working distance ~~(arc flash hazard)~~ (5) Hearing acoustic hazard: Greater than 100 joules of stored energy regardless of voltage ~~(hearing acoustic hazard)~~ (6) Lung collapse acoustic hazard: Greater than 122 kJ of stored energy when the rate of change of current~~dI/dtdi/dt~~ is greater than ~~109~~ 10^9 amperes per second ~~(lung collapse acoustic hazard)~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.4(B)(3)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.4(B)(3)	**147, 185** (same revision)		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (3) PPE and Hazards. When the additional protective measures include the use of PPE, the following shall be determined: (1) Capacitor voltage and stored energy for the worker exposure: An exposure shall be considered to exist when a conductor or circuit part that could potentially remain energized with hazardous stored energy is exposed. (2) Thermal hazard: The appropriate thermal PPE if the stored energy of the exposed part is greater 100 joules.		

	(3) Electric shock hazard: The appropriate electric shock PPE in accordance with 130.7 if the voltage is greater than or equal to 100 volts. (4) Arc flash and arc blast hazard at the appropriate working distance: The appropriate protection for the arc flash and arc blast hazard as follows: a. Arc flash PPE in accordance with 130.7 if the incident energy exceeds 1.2 cal/cm^2 (5 J/cm^2) at the working distance. b. Hearing protection where the stored energy exceeds 100 joules. c. The lung protection boundary if stored energy is above 122 kJ and dI/dt is greater than ~~109~~ 10^9 A/sec. Employees shall not enter the lung protection boundary. d. Alerting techniques in accordance with 130.8(O) to warn employees of the hazards. (5) Required test and grounding method meeting the following requirements: a. Soft grounding shall be used for stored energy greater than 1000 joules. b. If capacitors are equipped with bleed resistors, or if using a soft grounding system, the required discharge wait time shall be determined where applicable. (6) Develop a written procedure that captures all of the required steps to place the equipment in an electrically safe work condition and includes information about the amount of stored energy available, how long to wait after de-energization before opening the enclosure, how to test for absence of voltage, and what to do if there is still stored energy present. Informational Note No. 1: See Informative Annex R for more information on calculating capacitor stored energy, arc flash, and arc blast boundaries. Informational Note No. 2: Heavy duty leather with a minimum thickness of 0.03 in. (0.7 mm) provides protection from thermal hazards. Informational Note No. 3: For 320.4(B)(3)(4)c~~.~~ only, the current risetime can be modeled using voltage, capacitance, and system impedances.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** The changes correct errors in the numbers and units in Item 3. Additionally, a vague and unenforceable term is removed to comply with NEC Style Manual Section 3.2.1.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised.	**Revision must be shown in track changes.** (3) PPE and Hazards. When the additional protective measures include the use of PPE, the following shall be determined:

Do not delete for a reject	1. Capacitor voltage and stored energy for the worker exposure: An exposure shall be considered to exist when a conductor or circuit part that could potentially remain energized with hazardous stored energy is exposed.
	2. Thermal hazard: ~~The appropriate thermal~~Thermal PPE if the stored energy of the exposed part is greater 100 joules.
	3. Electric shock hazard: ~~The appropriate electric~~Electric shock PPE in accordance with 130.7 if the voltage is greater than or equal to 100 volts.
	4. Arc flash and arc blast hazard at the ~~appropriate~~ estimated working distance: ~~The appropriate protection~~Protection for the arc flash and arc blast hazard as follows:
	  1. Arc flash PPE in accordance with 130.7 if the incident energy exceeds 1.2 cal/cm^2 (5 J/cm^2) at the working distance.
	  2. Hearing protection where the stored energy exceeds 100 joules.
	  3. The lung protection boundary if stored energy is above 122 kJ and ~~dI/dt~~di/dt is greater than ~~109~~ 10^9 A/sec. Employees shall not enter the lung protection boundary.
	  4. Alerting techniques in accordance with 130.8(O) to warn employees of the hazards.
	5. Required test and grounding method meeting the following requirements:
	  1. Soft grounding shall be used for stored energy greater than 1000 joules.
	  2. If capacitors are equipped with bleed resistors, or if using a soft grounding system, the required discharge wait time shall be determined where applicable.
	6. Develop a written procedure that captures all of the required steps to place the equipment in an electrically safe work condition and includes information about the amount of stored energy available, how long to wait after de-energization before opening the enclosure, how to test for absence of voltage, and what to do if there is still stored energy present.
	
	Informational Note No. 1: See Informative Annex R for more information on calculating capacitor stored energy, arc flash, and arc blast boundaries.
	
	Informational Note No. 2: Heavy duty leather with a minimum thickness of 0.03 in. (0.7 mm) provides protection from thermal hazards.
	Informational Note No. 3: For 320.4(B)(3)(4)c. only, the current risetime can be modeled using voltage, capacitance, and system impedances.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.5(A)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
	New subdivisions with titles were added to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	(A) Written Procedure. (1) Discharging. Where a conductor or circuit part is connected to a capacitor(s) operating at or above the thresholds in 320.3, a written procedure shall be used to document the necessary steps and sequence to discharge the capacitor(s) and place the equipment into an electrically safe work condition. ~~(1)~~(2) Risk Assessment. The written procedure shall incorporate the results of the risk assessment performed in 320.5(B) and specify the following at a minimum:

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.5(B)	33 (cont)	TG 2 is responsible for PC. See below	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.5(B)	69	148, MOS	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 320.5(B)(5)e regarding "(containing a discharge resistor)" and 320.5(B)(10) regarding "(e.g., a ground stick)" that do not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.5(B)	148	69, MOS	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (5) Determine capacitor discharge in accordance with the following: a. If bleed resistors or automatic discharge systems are applicable, wait the prescribed time for the capacitors to discharge to less than the thresholds in 320.3 and proceed to step (6). b. For systems without bleed resistors or automatic discharge systems, discharge the capacitors with an adequately rated grounding device (e.g., ground stick). c. Perform soft grounding above 1000 joules and remote soft grounding above 100 kJ. d. If the capacitor(s) are not referenced to ground through either terminal, use a shorting stick to discharge the capacitor from terminal to terminal. e. A hard shorting stick is permitted to be used up to 1000 joules, a soft shorting stick (containing a discharge resistor) ~~is permitted to~~ shall be used up to 100 kJ, and remote soft shorting ~~is permitted~~ shall be used above 100 kJ.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		

Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.5(B)	**MOS**	69, 148	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.** The changes remove parenthetical language to comply with NEC Style Manual Section 3.5.1.1. The vague and unenforceable term “appropriate” is removed to comply with NEC Style Manual Section 3.2.1. New list items were added to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. This revision cleans up formatting errors and clarifies requirements for soft, hard and remote shorting. Changed soft grounding from “shall be permitted” to “shall be required” is consistent with 320.5(B)(6)(b) and (c). Existing list Item 5(c) is removed as it contained redundant requirements now covered in 5(d)&(e)&(f).
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** **(B) Safe Work Practices.** In order to place the capacitor(s) into an electrically safe work condition, a qualified person shall use ~~the appropriate~~ safe work practices and PPE and shall apply the following process for establishing and verifying an electrically safe work condition: 1. Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

2. After properly interrupting the load current, open the disconnecting device(s) for each source.
3. Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the fully disconnected position.
4. Apply lockout/tagout devices in accordance with a documented and established policy.
5. Determine capacitor discharge in accordance with the following:
    a. If bleed resistors or automatic discharge systems are applicable, wait the prescribed time for the capacitors to discharge to less than the thresholds in 320.3 and proceed to step (6).
    b. For systems without bleed resistors or automatic discharge systems, discharge the capacitors with an adequately rated grounding device ~~(e.g., ground stick)~~.
    ~~c. Perform soft grounding above 1000 joules and remote soft grounding above 100 kJ.~~
    ~~d.~~c. If the capacitor(s) are not referenced to ground through either terminal, ~~use~~ a shorting stick shall be used to discharge the capacitor from terminal to terminal.
    ~~Shorting shall comply with the following:~~
    d. A hard shorting stick shall~~is~~ be permitted to be used up to 1000 joules,
    e. ~~a~~A soft shorting stick, which contains a discharge resistor, ~~(containing a discharge resistor)~~ ~~is permitted to be used~~ shall be used above 1000 joules and up to 100 kJ, and
    ~~e.~~f. ~~r~~Remote soft shorting shall be used ~~is permitted~~ above 100 kJ.
6. Verify that the capacitors are discharged and grounded in accordance with the following:
    a. For capacitors less than 1000 joules, verification shall be permitted to be done either by testing or by grounding.
    b. For capacitors between 1000 joules and less than 100 kJ, verification shall be done using testing or soft grounding, then hard grounding.
    c. Above 100 kJ, an engineered and redundant system shall be used for remote testing and grounding.
    d. An adequately rated grounding device ~~(ground stick)~~ or portable test instrument shall be used to test between each capacitor terminal and from each terminal to ground to assure that the capacitor is de-energized.
7. When test instruments are used for testing the absence of voltage, verify the operation of the test instrument on a known dc voltage source before and after each absence of voltage procedure is performed.
8. If voltage remains, determine and correct the cause, and repeat step (5) to discharge the capacitors.
9. Determine the use of shorting wires in accordance with the following:
    a. Where recharging can occur due to dielectric absorption or induced voltages, all the capacitor terminals shall be connected together and grounded with a bare or transparent-insulated wire.
    b. For series capacitors, the shorting wires shall be attached across each individual capacitor's terminals.

	10. For single capacitors or for a parallel capacitor bank, the grounding device shall be permitted to be left attached to the capacitor terminals for the duration of the work ~~(e.g., a ground stick)~~. 11. For single, series, or parallel capacitors, an approved engineered discharge path that remains in place after zero energy is verified, shall be permitted to be used instead of additional shorting wires, provided the engineered system complies with the following: a. The ~~as long as the~~ engineered system is inspected after the zero-energy verification and before the work begins. ~~a.~~b. The engineered system ~~shall~~ ensures that all capacitors are shorted and grounded. *Exception: Lockout/tagout shall not be required for work on cord- and plug-connected equipment for which exposure to the hazards of unexpected energization of the equipment is controlled by the unplugging of the equipment from the energy source, provided that the plug is under the exclusive control of the employee performing the servicing and maintenance for the duration of the work.*

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 320.5(B)	186		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.** The submittal does not meet the requirements of Regulations Governing Development of Standards, Section 4.4.4.3 and is rejected per Section 4.4.4.4.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.** To create a revision, revise text above or paste final version here.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.6	70		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review 320.6(B)(3) and 320.5(B)(3) regarding "proper" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 regarding the use of unenforceable terms.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** A vague and unenforceable term is replaced to comply with NEC Style Manual Section 3.2.1.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. **(3) Resistors.** Resistors shall be visually inspected for cracks or other defects and electrically tested for ~~proper~~ ~~specified~~ rated resistance.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Article 330	**66**	106, 33	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 330.4(1) regarding "(not including 50/60 Hz)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual. Further, the article title "electrical hazards" does not correlate with the scope in Section 330.1 and needs to be clarified.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
	Technical reason for revision.		

Proposed Statement	A vague and unenforceable term “appropriate” is removed to comply with NEC Style Manual Section 3.2.1. Parenthetical expressions are deleted to comply with the NEC Style Manual Section 3.5.1.1. Title to article is edited to reflect the information in the article. Added “practices for” in the scope for consistency.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** **Article 330 Safety Related Work Practices for ~~Electrical Hazards~~ 1 Hz to 110 MHz (~~N~~not Including dc or 50/60 Hz)** **330.1 Scope.** This article covers the hazards and safety-related work practices for equipment that includes ac waveforms from 1 Hz to 3 kHz (sub RF) and 3 kHz to 110 MHz (RF). It does not cover power frequencies of 50/60 Hz. Typical equipment includes the following: 1. Electric arc welding equipment 2. High-power radio, radar, and television transmitting towers and antennas 3. Industrial dielectric and radio frequency (RF) induction heaters 4. Shortwave or RF diathermy devices 5. Equipment that includes rectifiers and inverters such as the following: a. Motor drives b. Uninterruptible power supply systems c. Lighting controllers 6. Generators producing sub RF ~~(1 kHz to 3 kHz)~~ and RF ~~(3 kHz to 100 MHz)~~ fields 7. Ionizing radiation field generators including X-rays, magnetrons, klystrons, thyratrons, vacuum tubes, and similar high-voltage vacuum devices 8. Nonionizing radiation field generating equipment, including the following: a. Antennas and RF transmission lines b. Radar equipment c. Industrial scientific and medical equipment d. RF induction and dielectric heaters e. Industrial microwave heaters and diathermy radiators f. Magnetic resonance imagers (MRIs) g. Large electromagnets Informational Note: See the following standards for specific guidance on safety-related work practices around equipment containing sub RF and RF electrical hazards: 1. IEEE C95.1, *IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz*, 2019

2. International Electrotechnical Commission IEC TS 60479-1, *Effects of Current on Human Beings and Livestock, Part 1: General Aspects*

330.4 Electrical Hazard Thresholds.

Exposure levels shall not exceed those identified in the following list unless ~~appropriate~~ controls are implemented:

1. Alternating current (ac) (1 Hz to 3 kHz): 50 volts and 3 milliamperes (not including 50/60 Hz)
2. Alternating current (ac) (3 kHz to 100 kHz): 1 x f mA, f in kHz
3. Alternating current (ac) (100 kHz to 3 MHz): 100 mA
4. Alternating current (ac) (3 MHz to 30 MHz): 100 $(f/3)^{*0.3}$, f in MHz
5. Alternating current (ac) (30 MHz to 110 MHz): 200 mA

Informational Note No. 1: See IEEE Std C95.1-2019, *IEEE Standard for Safety Levels with Respect to Human Exposure to Electrical, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz*, for information regarding hazard thresholds for workers trained in sub RF and RF contact electric shock.

Informational Note No. 2: RF electric shock thresholds depend on current and frequency, not voltage.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
330.1	106	(If the scope is modified due to the CC comment above, and PC 106 is also revising scope put this in cart above) 66	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 330.1 Scope. This article covers the hazards and safety-related work ~~or~~ practices for equipment that includes ac waveforms from 1 Hz to 3 kHz (sub RF) and 3 kHz to 110 MHz (RF). It does not cover power frequencies of 50/60 Hz. Typical equipment includes the following:
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

330.4	33 (cont)	TG 2 is responsible for PC. 66, 106	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
330.5	149		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. 330.5 Specific Measures for Personnel Safety. The employer and employee shall implement the responsibilities, training requirements, and safe work practices in accordance with 110.5 for working with sub RF and RF hazards, with the exceptions in 330.5(A)~~ and ~~, 330.5(B), and 330.5(C). Informational Note: Equipment that contains RF electrical hazards also could produce nonionizing radiation hazards — that is, RF electromagnetic fields (EM). Risk assessment should be performed to determine if there is a risk to EM exposure. (A) Adequately Rated Meters. Adequately rated meters used for safety purposes, including zero energy verification, shall be rated for the frequency of measurement. (B) Use of Dielectric PPE. Dielectric PPE shall be derated when used to protect against frequencies greater than 100 kHz. (C) Training for Workers Exposed to EM hazards. If risk assessment determines that there are hazards to the thresholds set by IEEE C95.1, *IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagetic Fields, 0 Hz to 300 GHz, 2019*, created by electrical equipment, the workers must		

	be trained to EM hazards and controls must be put in place to prevent exposure, such as access prevention.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Additional requirements were added to address training associated with electromagnetic (EM) field hazards, not sufficiently addressed in Article 330. Changed "exceptions" to "additional requirements" to clarify that these are in addition to the training requirements in Section 110.4. Changed Section 110.5 to 110.4 to better align with the qualified worker training.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	330.5 Specific Measures for Personnel Safety. The employer and employee shall implement the responsibilities, training requirements, and safe work practices in accordance with 110.4~~5~~ for working with sub RF and RF hazards, with the ~~exceptions~~ additional requirements in 330.5(A), ~~and~~ 330.5(B), and 330.5(C). Informational Note: Equipment that contains RF electrical hazards also could produce nonionizing radiation hazards — that is, RF electromagnetic fields (EM). Risk assessment should be performed to determine if there is a risk to EM exposure. (A) Adequately Rated Meters. Adequately rated meters used for safety purposes, including zero energy verification, shall be rated for the frequency of measurement. (B) Use of Dielectric PPE. Dielectric PPE shall be derated when used to protect against frequencies greater than 100 kHz. (C) Workers Exposed to EM hazards. Workers shall be trained to identify and protect themselves from EM hazards.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

350.3(B)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Added subdivisions and titles to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.** 		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(B) Training Requirements.** (1) Specific Electrical Hazards. Employees shall be trained to understand the specific electrical hazards associated with electrical energy on the cell line. (2) Safety-Related Work Practices. Employees shall be trained in safety-related work practices and procedural requirements to provide protection from the electrical hazards associated with their respective job or task assignment.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.4(A)(1)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	Added lists to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. 350.4 Employee Training. **(A) Qualified Persons.** **(1) Training.** a) Qualified persons shall: 1) -be trained and knowledgeable in the operation of cell line working zone equipment and specific work methods. ~~1) Qualified persons shall~~ 2) be trained to avoid the electrical hazards that are present. ~~2)~~3) ~~Such persons shall~~ be familiar with the proper use of precautionary techniques and PPE. b) Training for a qualified person shall include the following: **(1)** Skills and techniques to avoid an electric shock hazard: a. Between exposed energized surfaces, which might include temporarily insulating or guarding parts to permit the employee to work on exposed energized parts b. Between exposed energized surfaces and grounded equipment, other grounded objects, or the earth itself, that might include temporarily insulating or guarding parts to permit the employee to work on exposed energized parts. **(2)** Method of determining the cell line working zone area boundaries **(2) Qualified Persons.** Qualified persons shall be permitted to work within the cell line working zone.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

350.5(A)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Added subdivisions and titles to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A statement was removed in the new Bullet No. 3 because it does not contain a requirement.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(A) General.** Operation and maintenance of electrolytic cell lines might require contact by employees with exposed energized surfaces such as buses, electrolytic cells, and their attachments. 1. Not Applicable. The approach distances referred to in Table 130.4(E)(a) and Table 130.4(E)(b) shall not apply to work performed by qualified persons in the cell line working zone. 2. Safeguards. Safeguards such as safety-related work practices and other safeguards shall be used to protect employees from injury while working in the cell line working zone. 3. Consistency. These safeguards shall be consistent with the nature and extent of the related electrical hazards. ~~Safeguards might be different for energized cell lines and de-energized cell lines.~~ ~~1.~~4. Batteries. Hazardous battery effect voltages shall be dissipated to consider a cell line de-energized. Informational Note No. 1: Exposed energized surfaces might not present an electrical hazard. Electric shock hazards are related to current through the body, producing possible injury or damage to health. Electric shock severity is a function of many factors, including skin and body resistance, current path through the body, paths in parallel with the body, and system voltage. Arc flash burns and arc blasts are a function of the arcing current and the duration of arc exposure. Informational Note No. 2: A cell line or group of cell lines operated as a unit for the production of a particular metal, gas, or chemical compound might differ from other cell lines producing the same product because of variations in the particular raw materials used, output capacity, use of proprietary methods or process		

	practices, or other modifying factors. Detailed standard electrical safety-related work practice requirements could become overly restrictive without accomplishing the stated purpose of Chapter 1.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.5(C)	33 (cont)	TG 2 is responsible for PC. MOS below	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.5(C)	**MOS**		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A vague and unenforceable term "appropriate" is removed to comply with NEC Style Manual Section 3.2.1.		
	Technical reason for rejecting or not making some of the proposed changes.		

Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(1) General.** a) Each task performed in the electrolytic cell line working zone shall be analyzed for the likelihood of arc flash injury. ~~a)~~b) If there is a likelihood of personal injury, ~~appropriate~~ measures shall be taken to protect persons exposed to the arc flash hazards, including one or more of the following: 1. Providing ~~appropriate~~ PPE *[see 350.5(D)(2)]* to prevent injury from the arc flash hazard 2. Altering work procedures to reduce the likelihood of occurrence of an arc flash incident 3. Scheduling the task so that work can be performed when the cell line is de-energized **(2) Routine Tasks.** a) Arc flash risk assessment shall be done for all routine tasks performed in the cell line work zone. b) The results of the arc flash risk assessment shall be used in training employees in job procedures that minimize the possibility of arc flash hazards. ~~a)~~c) The training shall be included in the requirements of 350.3. **(3) Nonroutine Tasks.** a) Before a nonroutine task is performed in the cell line working zone, an arc flash risk assessment shall be done. ~~a)~~b) If an arc flash hazard is a possibility during nonroutine work, ~~appropriate~~ instructions shall be given to employees involved on how to minimize the risk associated with arc flash.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.5(D)(6)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.5(D)(6)	**MOS**		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A vague and unenforceable term "appropriate" is removed or replaced to comply with NEC Style Manual Section 3.2.1. Recommendations are converted to mandatory language.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(6) Safe Work Practices. a) Employees shall be trained in safe work practices. b) The training shall include why the work practices in a cell line working zone are different from similar work situations in other areas of the plant. c) Employees shall comply with established safe work practices and the safe use of protective equipment. d) Safe work practice training shall include attitude awareness instruction, including:~~.~~ 1) Awareness that s~~S~~imultaneous contact with energized parts and ground can cause serious electric shock, and~~.~~ ~~3)~~2) ~~Of special importance is the~~ There is a need to be aware of body position where contact may be made with energized parts of the electrolytic cell line and grounded surfaces.

	~~*Attitude Awareness.*~~ ~~*Bypassing of Safety Equipment.*~~ e) Safe work practice training shall include techniques to prevent bypassing the protection of safety equipment including information that: a. ~~.~~ Wet clothing shall not be worn if the clothing ~~may~~ could bypass protective equipment ~~if the clothing is wet~~. b. Trouser legs ~~should~~ shall be kept at ~~appropriate~~ a length so as to not bypass protective equipment. c. ~~, and s~~Shirt sleeves ~~should~~ shall ~~be a good~~ fit so as not to drape while reaching. ~~a.~~d. Jewelry and other metal accessories that ~~may~~ could bypass protective equipment shall not be worn while working in the cell line working zone.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
320.5(D)(8)	33 (cont)	TG 2 is responsible for PC. MOS below	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.5(D)(8)	**MOS**		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		

Statement	**Technical reason for revision.**
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A vague and unenforceable term “appropriate” is removed to comply with NEC Style Manual Section 3.2.1.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(8) Portable Cutout-Type Switches. a) Portable cell cutout switches that are connected shall be considered as energized and as an extension of the cell line working zone. ~~a)~~b) ~~Appropriate p~~Procedures shall be used to ensure proper cutout switch connection and operation.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.5(D)(9)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	The format change is necessary to comply with the NEC Style Manual Section 3.5.1.2**,** which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	(9) Cranes and Hoists. a) Cranes and hoists shall meet the requirements of applicable codes and standards to safeguard employees. ~~a)~~b) Insulation required for safeguarding employees, such as insulated crane hooks, shall be periodically tested.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
350.6(A)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	Added subdivisions and titles to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes**.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	(A) Portable Electrical Equipment. 1) Grounding. The grounding requirements of 110.7(B) shall not be permitted within an energized cell line working zone. 2) Code and Standards. Portable electrical equipment and associated power supplies shall meet the requirements of applicable codes and standards. **(B) Auxiliary Nonelectric Connections.** 1) Codes and Standards. Auxiliary nonelectric connections such as air, water, and gas hoses shall meet the requirements of applicable codes and standards. 2) Air Hoses. Pneumatic-powered tools and equipment shall be supplied with nonconductive air hoses in the cell line working zone.		

	(C) Welding Machines. 1) Frames. Welding machine frames shall be considered at cell potential when within the cell line working zone. 2) Grounding. Safety-related work practices shall require that the cell line not be grounded through the welding machine or its power supply. ~~1)~~3) Barricades. Welding machines located outside the cell line working zone shall be barricaded to prevent employees from touching the welding machine and ground simultaneously where the welding cables are in the cell line working zone.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.1	62	124, 150, 163	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The technical committee needs to review the scope statement that includes the reference to 360.3(A) and consider not using a reference to a specific requirement in the scope of an article.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.1	124	62, 150, 163	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 360.1 Scope. This article covers electrical safety requirements for the practical safeguarding of employees while manufacturing, handling, or working with ~~exposed stationary storage~~ batteries that present an electrical hazard.exceed one or more of the hazard thresholds listed in 360.3(A).		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
	Technical reason for revision.		

Proposed Statement	
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.1	150	62, 124, 163	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 360.1 Scope. This article covers electrical safety requirements for the practical safeguarding of employees while working with ~~exposed stationary storage~~ exposed storage batteries that exceed one or more of the hazard thresholds listed in 360.3(A). Informational Note: See the following documents for additional information on best practices for safely working on ~~stationary~~ storage batteries:
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.1	**163**	62, 124, 150	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. 360.1 Scope. This article covers electrical safety requirements for the practical safeguarding of employees while working with exposed stationary storage or other batteries that exceed one or more of the hazard thresholds listed in 360.3(A). Informational Note: See the following documents for additional information on best practices for safely working on stationary batteries:

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	The reference to 360.3(A) is removed as to not reference a specific requirement in the scope of an article. The scope has been clarified to align with the Article 90 scope and include all batteries that present a hazard.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes**.
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**360.1 Scope.** This article covers electrical safety requirements for the practical safeguarding of employees while working with ~~exposed stationary storage~~ batteries that present an electrical hazard. ~~exceed one or more of the hazard thresholds listed in 360.3(A).~~ Informational Note: See the following documents for additional information on best practices for safely working on ~~stationary~~ batteries: 1. NFPA 1, *Fire Code*, Chapter 52, Stationary Storage Battery Systems, 2021 2. *NFPA 70*, *National Electrical Code*, Article 480, Storage Batteries, 2020 3. IEEE 450, *IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications*, 2020 4. IEEE 937, *Recommended Practice for Installation and Maintenance of Lead-Acid Batteries for Photovoltaic Systems*, 2019 5. IEEE 1106, *IEEE Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*, 2005 (R 2011) 6. IEEE 1184, *IEEE Guide for Batteries for Uninterruptible Power Supply Systems*, 2015 7. IEEE 1188, *IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*, 1188a-2014 8. IEEE 1657, *Recommended Practice for Personnel Qualifications for Installation and Maintenance of Stationary Batteries,* 2018 9. OSHA 29 CFR 1910.305(j)(7), “Storage batteries” 10. OSHA 29 CFR 1926.441, “Batteries and battery charging” 11. DHHS (NIOSH) Publication No. 94-110, *Applications Manual for the Revised NIOSH Lifting Equation,* 1994 12. IEEE/ASHRAE 1635, *Guide for the Ventilation and Thermal Management of Batteries for Stationary Applications*, 2018 13. NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, 2020 14. UL 9540, *Energy Storage Systems and Equipment*, 2020 15. UL 9540A, *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems*, 2019 16. UL 9540B, *Outline of Investigation for Large Scale Fire Test for Residential Battery Energy Storage Systems*, 2024

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(A)	33 (cont)	TG 2 is responsible for PC. See below	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the		

	following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(A)	**64**		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	The Correlating Committee requests that the Technical Committee verify that the title in (A) "electrical hazard" is correct for this section.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	A vague and unenforceable term "appropriate" is removed to comply with NEC Style Manual Section 3.2.1. The title is revised to reflect the subject of the section.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	(A) ~~Electrical Hazard~~ ~~Thresholds~~Exposure Levels. Exposure levels shall not exceed the following unless ~~appropriate~~ controls are implemented: 1. Alternating current (ac): 50 volts and 5 milliamperes 2. Direct current (dc): 100 volts and 40 milliamperes 3. Thermal: 1000 watts short-circuit power Informational Note No. 1: Available short-circuit power is calculated by multiplying the battery's nominal voltage by its available short-circuit current at the battery terminals, then dividing the result by four.

	Informational Note 2: See Department of Energy, *DOE Electrical Safety Handbook*, for electrical hazard thresholds.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(B)(2)	38	164	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 360.3(B)(2)b(2)c to comply with the NEC Style Manual Section 2.1.6.3.4 regarding subdivision numbering.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(B)(2)	**164**	38	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		

1. *Additional Protective Measures.* The following shall apply when protective measures are taken:
    1. If additional protective measures are required, they shall be selected and implemented according to the hierarchy of risk controls identified in 110.3(H)(3).
    2. When the additional protective measures include the use of PPE, the following shall be determined and made available to the employee:
        a. Proper hand protection based on performance characteristics relative to the task, conditions present, duration of use, and available short-circuit power of the battery
        b. Proper eye protection including safety goggles or safety glasses or face shield
        c. Tools meeting <u>one of</u> the following criteria:
            1. Equipped with handles rated for the voltage on which they are used in accordance with 130.7(D)(1)
            2. Length of tools for work on batteries selected to minimize the likelihood of short circuit
    3. Employees shall keep battery terminals and all electrical conductors clear of unintended contact with tools, test equipment, liquid containers, and other foreign objects.

Informational Note: The PPE for contact thermal hazards might be covered by other hazard risk assessments.

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** Numbering in 360.3(B)(2)(b)(2)(c) list Items 1 and 2 is revised to comply with the NEC Style Manual Section 2.1.6.3.4 regarding subdivision numbering. The text "one of" is added to prevent misinterpretation that both conditions are necessary.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** **(2) Battery Contact Thermal Risk Assessment.** *(a) Estimate of Likelihood and Severity.* The estimate of likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health from contact thermal hazards shall take into consideration all the following: 1. The available short-circuit power to which personnel will be exposed 2. The work task and tools Informational Note No. 1: Assembling a battery string or returning a battery to service commonly involves manipulating wires or flexible circuit elements that could be installed improperly, resulting in a battery short circuit. Informational Note No. 2: Electrical measurements with undamaged, insulated probes and specific-gravity measurements on the electrolyte have a low likelihood of resulting in a short circuit. 3. The design of the equipment including the spacing of exposed electrical conductors in relation to length of potential shorting materials used in the task 4. The equipment operating condition and the condition of maintenance *(b) Additional Protective Measures.* The following shall apply when protective measures are taken: 1. If additional protective measures are required, they shall be selected and implemented according to the hierarchy of risk controls identified in 110.3(H)(3). 2. When the additional protective measures include the use of PPE, the following shall be determined and made available to the employee: a. Proper hand protection based on performance characteristics relative to the task, conditions present, duration of use, and available short-circuit power of the battery

	b. Proper eye protection including safety goggles or safety glasses or face shield c. Tools meeting one of the following criteria: (1) Equipped with handles rated for the voltage on which they are used in accordance with 130.7(D)(1) (2) Length of tools for work on batteries selected to minimize the likelihood of short circuit 3. Employees shall keep battery terminals and all electrical conductors clear of unintended contact with tools, test equipment, liquid containers, and other foreign objects. Informational Note: The PPE for contact thermal hazards might be covered by other hazard risk assessments.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(B)(3)	166		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (a) *Estimate of Likelihood and Severity.* The estimate of likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health from battery shock hazards shall take into consideration all the following: (1) The dc voltage to which personnel will be exposed (2) The design of the equipment, including the grounding configuration and the ~~spacing~~ separation distance of exposed electrical conductors (3) The potential for hazardous ac voltage on the battery enclosure or rack (4) The equipment operating condition and the condition of maintenance		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The language in Item (2) is revised to be consistent across all battery risk assessment sections.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	(3) Battery Electric Shock Risk Assessment. (a) *Estimate of Likelihood and Severity.* The estimate of likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health from battery shock hazards shall take into consideration all the following: 1. The dc voltage to which personnel will be exposed 2. The design of the equipment, including the grounding configuration and the ~~spacing~~ separation distance of exposed electrical conductors 3. The potential for hazardous ac voltage on the battery enclosure or rack 4. The equipment operating condition and the condition of maintenance (b) *Additional Protective Measures.* The following shall apply when protective measures are taken: 1. If additional protective measures are required, they shall be selected and implemented according to the hierarchy of risk controls identified in 110.3(H)(3). 2. If protective measures include the use of shock protection PPE, they shall be selected so as not to conflict with PPE requirements for chemical hazards. 3. Boundary requirements established in 130.4 shall apply when personnel approach exposed energized electrical conductors or circuit parts operating at not less than 100 volts and 40 milliamperes between battery terminals or between a single terminal and a grounded surface.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(B)(4)	39	83, 210	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 360.3(B)(4)(a)(1) regarding the word “matter” and consider changing to “manner”.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

360.3(B)(4)	83	39, 210	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (4) Battery Arc Flash Risk Assessment. (a) *General.* General requirements for arc flash risk assessment shall be as follows: (1) An electric arc flash risk assessment shall be performed on stationary storage battery systems operating at 150 volts or more before a person interacts with the system in a ~~matter~~ manner likely to create an arc flash hazard. (2) The requirements of 130.5 shall apply if it has been determined that the likelihood of an arc flash hazard exceeds an acceptable threshold.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(B)(4)	**210**	83, 39	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (4) Battery Arc Flash Risk Assessment. (a) *General.* General requirements for arc flash risk assessment shall be as follows: (1) An electric arc flash risk assessment shall be performed ~~on stationary storage battery~~ on battery systems operating at 150 volts or more before a person interacts with the system in a matter likely to create an arc flash hazard. (2) The requirements of 130.5 shall apply if it has been determined that the likelihood of an arc flash hazard exceeds an acceptable threshold.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The word “matter” is changed editorially to “manner.” The words “stationary storage” is removed to align with the modified scope statement in Section 360.1. OCPD is included to comply with a global change throughout the standard.		

Proposed Response	Technical reason for rejecting or not making some of the proposed changes.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**
	(4) Battery Arc Flash Risk Assessment. *(a) General.* General requirements for arc flash risk assessment shall be as follows: 1. An electric arc flash risk assessment shall be performed on ~~stationary storage~~ battery systems operating at 150 volts or more before a person interacts with the system in a ~~matter~~ manner likely to create an arc flash hazard. 2. The requirements of 130.5 shall apply if it has been determined that the likelihood of an arc flash hazard exceeds an acceptable threshold. *(b) Estimate of Likelihood and Severity.* The estimate of likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health from battery arc flash hazards shall take into consideration all the following: 1. The dc voltage and available fault current to which personnel will be exposed 2. The work task 3. The design of the battery, including the grounding configuration, the separation distance of exposed electrical conductors, and any ~~overcurrent protection devices~~OCPD and their operating times 4. The equipment operating condition and the condition of maintenance Informational Note: See Table 130.5(C)(3) and D.5 for more information on evaluating the likelihood and severity of a battery arc flash hazard. *(c) Additional Protective Measures.* The following shall apply when protective measures are taken: 1. If additional protective measures are required, they shall be selected and implemented according to the hierarchy of risk controls identified in 110.3(H)(3). 2. If protective measures include the use of arc flash PPE, the following shall be determined: a. The location of the gap where an arc could occur b. The arc flash boundary c. The PPE to be used within the arc flash boundary

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(F)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.3(F)	**65**		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in 360.3(F)(2)a regarding "(when applicable to the battery type)" and 360.3(F)(2)c "(when applicable to the battery type)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** A vague and unenforceable term "appropriate" is removed or replaced to comply with NEC Style Manual Section 3.2.1. Parenthetical expressions are deleted to comply with the NEC Style Manual Section 3.5.1.1.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR)	**Revision must be shown in track changes.** **(F) Warning Signs.** The following warning signs or labels shall be posted in ~~appropriate~~ locations that are visible before employees are exposed to the associated hazards:		

Clean first revision text is provided to be revised. **Do not delete for a reject**	1. Electrical hazard warnings indicating the electric shock hazard, arc flash hazard, and contact thermal hazard based on the results of the battery risk assessment in 360.3(B) Informational Note No.1: Because internal resistance, prospective short-circuit current, or both are not always provided on battery container labels or data sheets, and because many variables can be introduced into a battery layout, the battery manufacturer should be consulted for accurate data. Variables can include, but are not limited to, the following: (a) Series connections (b) Parallel connections (c) Charging methodology (d) Temperature (e) Charge status (f) Direct-current (dc) distribution cable size and length (g) Grounding configuration of the battery (h) The potential for hazardous ac voltage on the battery enclosure or rack Informational Note No. 2: See 130.5(H) for requirements for equipment labeling. 2. Chemical hazard warnings, applicable to the worst case when multiple battery types are installed in the same space, indicating the following: (a) Potential presence of explosive gas ~~(when applicable to the battery type)~~ (b) Prohibition of open flame and smoking (c) Danger of chemical burns from the electrolyte ~~(when applicable to the battery type)~~ 3. Notice for personnel to use and wear protective equipment and apparel ~~appropriate~~ applicable to the hazard for the battery 4. Notice prohibiting access to unauthorized personnel

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4	63	100, 167, 168, 169	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	The Correlating Committee requests that the Technical Committee provide titles in 360.4(A)(1), (2) and (3) in accordance with NEC Style Manual Section 2.1.6.3.2 regarding subdivision titles.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(A)	100	63, 100, 167, 168, 169	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	(A) General. Each employer whose employees perform work on batteries shall establish, document, and implement a battery hazardous energy control program. (1) ~~Head Needed.~~Procedures The battery hazardous energy control program shall specify procedures to safeguard workers from exposure to battery electrical hazards. (2) Head Needed.Work Planning Employees performing work within the restricted approach boundary of a battery shall plan work to minimize exposure to electric shock and arc flash hazards. (3) ~~Head Needed.~~ Battery Sectionalizing Employees performing battery circuit manipulation shall plan work through a sectionalizing procedure or other risk reduction methods.

	Exception 1: Work within the restricted approach boundary of an installed battery charger shall not be considered battery circuit manipulation. *Exception 2: A sectionalizing procedure shall not be required for batteries below 100 volts dc or 40 milliamperes.* Informational Note No. 1: Work within the restricted approach boundary of an installed battery charger is more appropriately controlled through complex lockout/tagout according to 120.5(A)(5) as it can be deenergized and an electrically safe work condition can be established. Informational Note No. 2: Examples of battery circuit manipulation include bolting, unbolting, connecting, disconnecting, or otherwise increasing or decreasing the series or parallel combination of cells that make up a battery. This might involve work within the limited or restricted approach boundary.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(A)(1)	167	63, 100, 167, 168, 169	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (1) ~~Head Needed~~Battery hazardous energy control program. The battery hazardous energy control program shall specify procedures to safeguard workers from exposure to battery electrical hazards.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(A)(2)	168	63, 100, 167, 168, 169	☒ Create Second Revision ☐ Reject

	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

Proposed Text (from PC)	(2) ~~Head Needed~~Work planning. Employees performing work within the restricted approach boundary of a battery shall plan work to minimize exposure to electric shock and arc flash hazards.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(A)(3)	**169**	63, 100, 167, 168	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (3) ~~Head Needed~~Risk reduction method. Employees performing battery circuit manipulation shall plan work through a sectionalizing procedure or other risk reduction methods. *Exception 1: Work within the restricted approach boundary of an installed battery charger shall not be considered battery circuit manipulation.* *Exception 2: A sectionalizing procedure shall not be required for batteries below 100 volts dc or 40 milliamperes.* Informational Note No. 1: Work within the restricted approach boundary of an installed battery charger is more appropriately controlled through complex lockout/tagout according to 120.5(A)(5) as it can be deenergized and an electrically safe work condition can be established. Informational Note No. 2: Examples of battery circuit manipulation include bolting, unbolting, connecting, disconnecting, or otherwise increasing or decreasing the series or parallel combination of cells that make up a battery. This might involve work within the limited or restricted approach boundary.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** Titles are provided in 360.4(A)(1), (2) and (3) in accordance with NEC Style Manual Section 2.1.6.3.2 regarding subdivision titles. A vague and unenforceable term “more appropriately” is removed to comply with NEC Style Manual Section 3.2.1.
	Technical reason for rejecting or not making some of the proposed changes.

Proposed Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**. **360.4 Establishing a Lower Risk Work Condition in Batteries.** **(A) General.** Each employer whose employees perform work on batteries shall establish, document, and implement a battery hazardous energy control program. **(1) ~~Head Needed~~Procedures.** The battery hazardous energy control program shall specify procedures to safeguard workers from exposure to battery electrical hazards. **(2) ~~Head Needed~~Work Plans.** Employees performing work within the restricted approach boundary of a battery shall plan work to minimize exposure to electric shock and arc flash hazards. **(3) ~~Head Needed~~Risk Reduction Methods.** Employees performing battery circuit manipulation shall plan work through a sectionalizing procedure or other risk reduction methods. *Exception 1: Work within the restricted approach boundary of an installed battery charger shall not be considered battery circuit manipulation.* *Exception 2: A sectionalizing procedure shall not be required for batteries below 100 volts dc or 40 milliamperes.* Informational Note No. 1: Work within the restricted approach boundary of an installed battery charger is ~~more appropriately~~ controlled through complex lockout/tagout according to 120.5(A)(5) as it can be deenergized and an electrically safe work condition can be established. Informational Note No. 2: Examples of battery circuit manipulation include bolting, unbolting, connecting, disconnecting, or otherwise increasing or decreasing the series or parallel combination of cells that make up a battery. This might involve work within the limited or restricted approach boundary.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(B)(2)	170	172	☒ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	(2) Charger Mode. The battery charger shall either be placed into bypass mode or turned off ~~, deenergized, and locked out~~ prior to sectionalizing the battery.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. (2) Charger Mode. The battery charger shall either be placed into bypass mode or turned off, deenergized, and locked out prior to sectionalizing the battery.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 360.4(B)(3)	**172**	170	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. Lockout/Tagout Charger Apply lockout/tagout devices to the battery charger(s) in accordance with a documented and established procedure.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Revised to clarify that the requirement to lock applies to both bypass mode and to turned off mode. The requirement to lock it is independent of the requirement to switch it into bypass or off.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	(2) Charger Mode. The battery charger shall either be placed into bypass mode or turned off~~, deenergized, and locked out~~ prior to sectionalizing the battery. (1) Lockout/Tagout Charger. Apply lockout/tagout devices to the battery charger(s) in accordance with a documented and established procedure.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(C)(2)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(C)(2)	**173**		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (2) Non-Unique Circuit Elements. Removal or disconnection of non-unique intercell busbars, wires, or other circuit elements shall be permitted for use as ~~lockout~~ energy isolation devices in battery systems if the following conditions are met: (1) The circuit elements are identified in the sectionalizing procedure. (2) The visibility of the circuit element's presence or absent in the circuit is unobstructed.		

	(3) Once removed, the circuit elements are, individually or in groups, secured against reinstallation and tagged with REMOVED FOR SECTIONALIZING. (4) Any similar circuit elements in the work area have been identified and either removed or secured against reinstallation and marked DO NOT USE. Informational Note No. 1: Locked cabinets or boxes and nylon cable ties are commonly used to secure non-unique circuit elements against reinstallation and to attach the appropriate tag. Informational Note No. 2: It is best practice to mark or tag both sides of a circuit element before removal or disconnection to ensure that it is reinstalled properly after completion of work.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** A vague and unenforceable term "appropriate" is removed from the informational note to comply with NEC Style Manual Section 3.2.1. Edited to clarify the "lockout device" was intended to be "energy isolation device".
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. (2) Non-Unique Circuit Elements. Removal or disconnection of non-unique intercell busbars, wires, or other circuit elements shall be permitted for use as ~~lockout~~ energy isolation devices in battery systems if the following conditions are met: 1. The circuit elements are identified in the sectionalizing procedure. 2. The visibility of the circuit element's presence or absent in the circuit is unobstructed. 3. Once removed, the circuit elements are, individually or in groups, secured against reinstallation and tagged with REMOVED FOR SECTIONALIZING. 4. Any similar circuit elements in the work area have been identified and either removed or secured against reinstallation and marked DO NOT USE. Informational Note No. 1: Locked cabinets or boxes and nylon cable ties are commonly used to secure non-unique circuit elements against reinstallation and to attach a ~~the appropriate~~ tag. Informational Note No. 2: It is best practice to mark or tag both sides of a circuit element before removal or disconnection to ensure that it is reinstalled properly after completion of work.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

360.4(D)(3)	174		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

(d) The person in charge shall be held accountable for safe execution of the complex sectionalizing procedure.

(e) Each authorized employee shall conduct the following:

(1) Affix a personal lock-out or tagout device to the group lockout device(s), group lockbox(es), or comparable ~~mechanism~~ mechanisms when the employee begins work.

(2) Review the battery risk assessment associated with the current configuration of the battery to identify required protective measures including PPE.

(2) Remove those devices when the employee stops working on the battery being serviced or maintained.

(f) All complex sectionalizing plans shall identify the method to account for all persons who might be exposed to electrical hazards in the course of the sectionalizing.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Statement

Technical reason for revision.

Edited to clarify that the group sectionalizing procedures should account for how the group moves between risk assessments and PPE in stages. Unlike other equipment batteries stay energized even when disconnected so employees need to understand the current condition of the battery to know what controls are needed to keep them safe.

Response

Technical reason for rejecting or not making some of the proposed changes.

Proposed Second Revision Text (SR)

Clean first revision text is provided to be revised.

Do not delete

Revision must be shown in track changes.

(3) Complex Battery Sectionalizing Procedure.

(a) A complex battery sectionalizing procedure shall be permitted where one or more of the following exists:

1. Any electrical work on a battery and its charger (non-battery electrical work covered by traditional LOTO)
2. Multiple battery strings connected in parallel
3. Multiple battery chargers connected in parallel
4. Multiple single-string batteries with chargers located near each other
5. Multiple energy sources (excluding the battery)
6. Multiple crews
7. Multiple crafts
8. Multiple locations

	9. Multiple employers 10. Multiple disconnecting means 11. Multiple sequences 12. Job or task that requires more than one work period (b) All complex sectionalizing procedures shall require a written plan of execution that identifies the person in charge. (c) The complex sectionalizing procedure shall vest primary responsibility in an authorized employee for employees working under the protection of a group lockout or tagout device such as an operation lock or lockbox. (d) The person in charge shall be held accountable for safe execution of the complex sectionalizing procedure. (e) Each authorized employee shall conduct the following: 1. Review the battery risk assessment associated with the current configuration of the battery to identify required protective measures including PPE. 2. Affix a personal lock-out or tagout device to the group lockout device(s), group lockbox(es), or comparable mechanisms when the employee begins work. ~~1.~~ ~~2.~~3. Remove those devices when the employee stops working on the battery being serviced or maintained. (f) All complex sectionalizing plans shall identify the method to account for all persons who might be exposed to electrical hazards in the course of the sectionalizing.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
360.4(E)(4)	175		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (4) Initial Assembly, Installation, or Release for Return to Service. (a) The procedure shall identify steps to be taken when the job or task requiring battery sectionalizing is completed. (b) The procedure shall identify the means and order that battery circuit connections are to be made and any resulting changes in the following: a. Direct current (dc) voltage, b. Available short circuit power, c. Contact thermal PPE, d. Limited approach boundary, e. Restricted approach boundary, f. Electric shock PPE, g. Arc flash incident energy,		

	h. Arc flash boundary, and i. Arc flash PPE." (b) The procedure shall identify any wires or flexible circuit elements that could be reinstalled improperly resulting in a battery short circuit. (c) Reinstallation of these circuit elements shall be identified in the procedure as having an elevated risk of short circuit. (d) When ~~returning a battery to service~~ performing battery circuit manipulation, employees shall wear the PPE identified ~~PPE~~ for the resulting circuit configuration prior to making any circuit connection that increases the risk of shock, thermal, or arc flash hazard.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Changed title to be more inclusive of all work activities that are related to assembling battery systems. Added subsection (b) and edited subsection (c) to clarify the requirements for the written procedure to address hazard during assembly of battery systems. Removed redundant subsection (d) as it was not needed after clarifying subsection (c), which was changed to be in a positive language. Changed subsection (d) to be more inclusive of all work activities that are related to assembling battery systems.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The full list of risk assessment items was not added due to generalizing the new subsection (b) by referring to the battery risk assessment section.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(4) Initial Assembly, Installation, or Release for Return to Service. (a) The procedure shall identify steps to be taken when the job or task requiring battery sectionalizing is completed. (b) The procedure shall identify the means and order that battery circuit connections are to be made and any resulting changes in the battery risk assessment in accordance with 360.3(B). ~~(b)~~(c) The procedure shall identify the proper method and sequence to install ~~any wires or flexible~~ circuit elements to avoid ~~that could be reinstalled improperly resulting in~~ a battery short circuit. ~~(c) Reinstallation of these circuit elements shall be identified in the procedure as having an elevated risk of short circuit.~~

	(d) When ~~returning a battery to service~~ performing battery circuit manipulation, employees shall wear the PPE identified ~~PPE~~ for the resulting circuit configuration prior to making any circuit connection that increases the risk of shock, thermal, or arc flash hazard.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.4	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.4	**MOS**		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	Added subdivisions and titles to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A vague and unenforceable term "appropriate" is removed to comply with NEC Style Manual Section 3.2.1.		
	Technical reason for rejecting or not making some of the proposed changes.		

Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **370.4 Electrical Safety Authority (ESA).** A. Assignment. Each laboratory or R&D system application shall be permitted to assign an ESA to ensure the use of ~~appropriate~~ electrical safety-related work practices and controls. B. Members. The ESA shall be permitted to be an electrical safety committee, engineer, or equivalent qualified individual. ~~A.~~C. Delegation of Authority. The ESA shall be permitted to delegate authority to an individual or organization within their control.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.5	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.5	67	101	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: This was based on a CC note to 350.5. I did not locate where "as defined" appears anywhere in Article 350. Section 350.5 does not have a lead in paragraph nor a reference to the definition for qualified person. I think this was meant for Section 370.5 not 350.5. The Correlating Committee requests that the Technical Committee consider removing "as defined in this article" to correlate with the Article 100 definition of "qualified person".		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.5	**101**	67	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	Each laboratory or R&D system application shall designate a qualified person ~~as defined in this article~~ to ensure the use of appropriate electrical safety-related work practices and controls.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
	A vague and unenforceable term "appropriate" is removed to comply with NEC Style Manual Section 3.2.1. Removed "defined in this article", as a qualified person is defined in Article 100.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	370.5 Specific Measures and Controls for Personnel Safety. Each laboratory or R&D system application shall designate a qualified person ~~as defined in this article~~ to ensure the use of ~~appropriate~~ electrical safety-related work practices and controls.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.5(B)	MOS		☒ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.** Added subdivisions and title to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(B) Personnel Protection.** The following shall apply to personnel protection: 1) Safety-related work practices shall be used to safeguard employees from injury while they are exposed to electrical hazards from exposed electrical conductors or circuit parts that are or can become energized. 2) The specific safety-related work practices shall be consistent with the electrical hazard(s) and the associated risk. 3) For calibration and adjustment of equipment as it pertains to sensors, motor controllers, control hardware, and other devices that need to be installed inside equipment or control cabinet, surrounded by electrical hazards, the ESA shall define the required PPE based on the risk and exposure. 4) Use of electrical insulating blankets, covers, or barriers shall be permitted to prevent inadvertent contact to exposed terminals and conductors. ~~1)~~5) Insulated/nonconductive adjustment and alignment tools shall be used where feasible.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.7(A)(1)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		

Statement	**Technical reason for revision.**
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(1) Marking. a) Marking of equipment shall be required for, but not limited to, equipment fabricated, designed, or developed for research testing and evaluation of electrical systems. b) Marking shall sufficiently list all voltages entering and leaving control cabinets, enclosures, and equipment. ~~a)~~c) Caution, Warning, or Danger labels shall be affixed to the exterior describing specific hazards and safety concerns. Informational Note: See ANSI Z535, *Series of Standards for Safety Signs and Tags*, for more information on precautionary marking of electrical systems or equipment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.7(A)(2)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(2) Documentation.** a) Sufficient documentation shall be provided and readily available to personnel that install, operate, and maintain equipment that describes operation, shutdown, safety concerns, and nonstandard installations. ~~a)~~b) Schematics, drawings, and bill of materials describing power feeds, voltages, currents, and parts used for construction, maintenance, and operation of the equipment shall be provided.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.7(A)(3)	MOS		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.** Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes**.		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. **(3) Shutdown Procedures.** a) Safety requirements and emergency shutdown procedures of equipment shall include lockout/tagout (LOTO) requirements. ~~a)~~b) If equipment-specific LOTO is required, then documentation outlining this procedure and PPE requirements shall be made readily available.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.7(A)(5)	MOS		☒ Create Second Revision

			☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	(5) Approvals. a) Drawings, standard operational procedures, and equipment shall be approved by the ESA on site before initial startup. b) Assembly of equipment shall comply with national standards where applicable unless research application requires exceptions. c) Equipment that does not meet the applicable standards shall be required to be approved by the ESA. ~~a)~~d) Proper safety shutdown procedures and PPE requirements shall be considered in the absence of grounding and/or bonding.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.7(B)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		

Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.7(B)	MOS		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Added subdivisions and titles to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A vague and unenforceable term "appropriate" is removed to comply with NEC Style Manual Section 3.2.1.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(B) Tools, Training, and Maintenance. 1. Documentation. Documentation shall be provided if special tools, unusual PPE, or other equipment is necessary for proper maintenance and operation of equipment. ~~1.~~2. Training and Qualifications. The ESA shall make the determination of ~~appropriate~~ training and qualifications required to perform specific tasks.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
370.8	MOS		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
	Added subdivisions and titles to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	370.8 Custom Built, Unlisted Research Equipment, >1000 Volts ac or dc. A. Installations. Installations shall comply with all requirements of 370.7. ~~A.~~B. PPE. In the event that research equipment requires PPE beyond what is commercially available, the ESA shall determine safe work practices and PPE to be used.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New 380.2(A)	205		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	Electrical Hazard Thresholds Exposure levels shall not exceed the following unless controls are implemented: (1) The highest voltage of the EDLCs exceeds 100 volts dc. (2) The theoretical maximum power exceeds 1000 watts. Informational Note: The theoretical maximum power for EDLCs is calaculated as V*V/(4*R), where V is the initial voltage across the string of capacitors and R is the equivalent series resistance of the string of capacitors, including all connection resistances.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	Removed required energy thresholds from scope statement and made new Section 380.2 to define the thresholds and added information note about calculating theoretical maximum power for EDLCs.		
	Technical reason for rejecting or not making some of the proposed changes.		

Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. 380.1 Scope. This article covers electrical safety requirements for the practical safeguarding of employees while working with exposed electrical double layer capacitors (EDLCs) that ~~exceed 100 volts dc nominal or a theoretical maximum power exceeding 1000 watts.~~present an electrical hazard. 380.2 Exposure Levels. Control shall be applied where any of the hazard thresholds identified in 310.2 are exceeded: Informational Note: The theoretical maximum power for EDLCs is calculated as V*V/(4*R), where V is the initial voltage across the string of capacitors and R is the equivalent series resistance of the string of capacitors, including all connection resistances.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.2(B)(4)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.2(B)(4)	127	207	☒ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	(4) PPE. ~~The appropriate~~ PPE ~~for the hazards~~ shall be determined meeting the ~~following conditions~~ conditions in 380.2(B)(4) list items (1), (2) and (3): (1) Contact thermal hazard — ~~the appropriate~~ contact thermal PPE in accordance with 130.7(C)(7)(e) if the theoretical maximum power of the exposed part is greater than 1000 watts (2) Electric shock hazard — ~~the appropriate~~ electric shock PPE in accordance with 130.7(C) if the voltage is greater than or equal to 100 volts dc (3) Arc flash ~~at the appropriate working distance — the appropriate protection for the arc flash, as follows:Arc flash~~ hazard — arc flash PPE in accordance with 130.7(C) if the voltage exceeds 150 volts dc and the incident energy exceeds 1.2 cal/~~cm²~~ cm2 (~~5 J~~5J/~~cm²~~cm2) at the working distance b. ~~Alerting techniques in accordance with 130.8(O) to warn employees of the hazards~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.2(B)(4)	**207**	127	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (4) PPE. The ~~appropriate~~ PPE for the hazards shall be determined meeting the following conditions: (1) Contact thermal hazard ~~— the appropriate~~ — thermal PPE if the theoretical maximum power of the exposed part is greater than 1000 watts (2) Electric shock hazard ~~— the appropriate~~ — electric shock PPE in accordance with 130.7 if the voltage is greater than or equal to 100 volts dc (3) Arc flash at the ~~appropriate~~ required working distance ~~— the appropriate~~ — protection for the arc flash, as follows: a. Arc flash PPE in accordance with 130.7 if the voltage exceeds 150 volts dc and the incident energy exceeds 1.2 cal/cm^2 (5 J/cm^2) at the working distance b. Alerting techniques in accordance with 130.8(O) to warn employees of the hazards
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**

Proposed Statement	**Technical reason for revision.**
	Removed the vague and unenforceable term "appropriate" per the 2023 NEC Style Manual, Section 3.2.1 and made the list items parallel structure per the 2023 NEC Style Manual, Section 3.5.5.2. Since alerting techniques are already addressed in 130.8(O), it was removed.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	(4) PPE. ~~The appropriate~~ PPE ~~for the hazards~~ shall be determined meeting the following conditions: 1. Contact thermal hazard — ~~the appropriate~~ contact thermal PPE in accordance with 130.7(C)(7)(e) if the theoretical maximum power of the exposed part is greater than 1000 watts. 2. Electric shock hazard — ~~the appropriate~~ electric shock PPE in accordance with 130.7(C) if the voltage is greater than ~~or equal to~~ 100 volts dc. 3. Arc flash hazard ~~at the appropriate working distance~~ — ~~the appropriate protection for the~~ arc flash PPE in accordance with 130.7(C), if the voltage exceeds 150 volts dc and the incident energy exceeds 1.2 cal/cm^2 (5 J/cm^2) at the working distance.~~as follows:~~ ~~a) Arc flash PPE in accordance with 130.7 if the voltage exceeds 150 volts dc and the incident energy exceeds 1.2 cal/cm^2 (5 J/cm^2) at the working distance~~ ~~b) Alerting techniques in accordance with 130.8(O) to warn employees of the hazards~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(B)(1)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(B)(1)	128	209, MOS	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (1) EDLC Discharge. Unless a discharge method is provided by the manufacturer, ~~an appropriately sized and~~ a safeguarded resistor sized to safety discharge the system shall be selected, and a method shall be described to fully discharge the EDLC system.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(B)(1)	209	128, MOS	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (1) EDLC Discharge. Unless a discharge method is provided by the manufacturer, ~~an appropriately sized and~~ a safeguarded resistor shall be selected capable of sustaining the worst-case current and thermal loads, and a method shall be described to fully discharge the EDLC system.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
	Technical reason for revision.		

Proposed Statement			
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(B)(1)	**MOS**	209, 128	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	NEC STYLE MANUAL **3.5.1.2 Multiple Requirements.** Multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Proposed Statement	**Technical reason for revision.**		
	Added subdivisions to comply with the NEC Style Manual Section 3.5.1.2, which states that multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements. A vague and unenforceable term "appropriately" is removed and replaced to comply with NEC Style Manual Section 3.2.1.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.		
	(1) EDLC Discharge. a) Unless a discharge method is provided by the manufacturer, a~~n~~ ~~appropriately sized and safe~~guarded resistor, rated to safely discharge the system, shall be selected, and ~~a)~~b) ~~a~~A method shall be described to fully discharge the EDLC system.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(C)(1)	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d,		

	110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(C)(1)	129	211	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (1) Uninstalled Capacitors. ~~All~~ After being discharged, all uninstalled capacitors shall be short-circuited with a conductor ~~of appropriate size after being discharged.~~ sized to safely maintain the capacitors in a discharged state for storage and transport.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
380.3(C)(1)	**211**	129	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. (1) Uninstalled Capacitors. All uninstalled capacitors shall be short-circuited with ~~a conductor of appropriate size after~~ 22 AWG or larger conductor after being discharged.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	Deleted the vague and unenforceable term "appropriate" per the 2023 NEC Style Manual, Section 3.2.1, and clarified the shorting is both for discharge state and mechanical abuse during storage and transport.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. (1) Uninstalled Capacitors. After discharging, ~~A~~all uninstalled capacitors shall be short-circuited with a conductor ~~of appropriate size after being discharged.~~sized to safely maintain the capacitors in a discharged state and withstand mechanical abuse during storage and transport.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
390.1	34	130, 226	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	The Correlating Committee requests that the Technical Committee review the scope section. A PV system (as defined by the NEC) includes the ac output. This new article appears to only address the dc conductors of the PV system. Consider the appropriateness of the use of the word “robust” as mentioned in the ballot comment.		
	CDC NOTE: Here are the first draft ballot comments on 390.1. (FR-102) **Affirmative with Comment** This new article addressing electrical safety for photovoltaic systems provides very little guidance, and only addresses connecting and disconnecting panels. Additional guidance to address thermal, electric shock and arc flash hazards (even if they refer to other sections of the Standard) should be provided. This new article will need to be reviewed for writing style to algin better with the other articles. For example, the word robust should be removed or defined.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

390.2	33 (cont)	TG 2 is responsible for PC.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
390.2	130	34, 226	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. 390.2 Energy Hazard Thresholds. ~~Appropriate~~ Applicable controls shall be applied where any of the following thresholds are exceeded: (1) Direct-current (dc) contact thermal hazard: 1000 watts (2) Direct-current (dc) electric shock hazard: 100 volts and 40 milliamperes (3) Direct-current (dc) arc flash hazard: 150 volts and 1.2 cal/cm^2		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

390.3, 390.4	**226**	34, 130	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown, Only existing 390.3 and 390.4 appear to have been revised. New 390.3.

390.1 Scope.

This article covers electrical safety requirements for the practical safeguarding of employees while working on dc photovoltaic (PV) systems.

390.2 Energy Hazard Thresholds.

Appropriate controls shall be applied where any of the following thresholds are exceeded:

(1) Direct-current (dc) contact thermal hazard: 1000 watts.

(2) Direct-current (dc) electric shock hazard: 100 volts and 40 milliamperes.

(3) Direct-current (dc) arc flash hazard: 150 volts and 1.2 cal/cm^2.

390.3 Employee Training

(A) General Requirements

The training requirements shall apply to employees exposed to electrical hazards associated with work on or near solar energy sources, including the interconnected photovoltaic equipment, collection systems and associated power conversion system. An emphasis shall include the issue of continuously energized systems, including the issue that an Electrically Safe Work Condition cannot be achieved on PV panels.

(B) Employee Training

Employees who install, operate, maintain, or repair solar installations and equipment shall be trained in the operating characteristics of the PV modules and equipment with which they will work. Only qualified electrical workers shall work on PV installations and equipment. They shall be trained to:

1. recognize the continuously energized nature of PV panels,
2. perform a risk assessment for energized electrical work,
3. develop and follow procedures that minimize exposure, and
4. use control measures, including PPE to prevent injury.

390.~~3~~4 PV Risk Assessments.

Prior to any work on an energized PV array, risk assessments shall be performed to identify the thermal, electrical shock, and arc flash hazards and assess the risks associated with the type of tasks to be performed. Article 130 shall be used to perform risk assessments on the 60 Hz sources.

(A) Thermal Risk Assessment

A thermal risk assessment shall be performed for systems that can provide a thermal hazard, 390.2(1), to the worker. Procedures shall be developed and PPE worn, to prevent contact thermal burn injury.

(B) Electric Shock Risk Assessment

An electric shock risk assessment shall be performed in accordance with 130.4, for those systems that exceed the dc shock threshold, 390.2(2). Work procedures shall focus on risk reduction by avoiding exposure to energized components. Shock PPE shall be worn, if required.

(C) Arc Flash Risk Assessment

	An arc-flash risk assessment shall be performed on PV systems above 150 V dc, per 390(3). If incident energy may exceed 1.2 cal/cm2, efforts shall be implemented to avoid creating an arc and to choose appropriate arc-rated PPE if required. **390.45 Specific Work Procedures.** **(A) Hazard Thresholds.** ~~No work shall~~ When work must be performed on exposed PV terminal~~s~~ greater than the ~~electric~~ shock or arc flash thresholds, 390.2, additional protective methods shall be determined in accordance with Articles 130.4(C) and 130.5(C). **(B) Conductor Manipulation.** Before manipulating any connectors on an energized system ~~(plugging or unplugging)~~, a risk assessment shall be performed to determine the maximum open circuit voltage that would be generated and the maximum current to be interrupted if a fault were to occur. Informational Note: This risk assessment will determine if the action can be performed safely and what PPE would be required. **(C) Plugging and Unplugging Connectors.** ~~Robust~~ Specific procedures for plugging and unplugging connectors on an energized PV system shall be developed that consider the possibility of making wrong connections and creating a short circuit and the controls necessary to prevent such a situation. Procedures for unplugging PV module cable connectors shall include testing for absence of load current prior to disconnecting. Informational Note: An adequately rated non-contact test instrument capable of measuring amperage ("amp clamp") can be used to perform this test.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	Deleted the vague and unenforceable term "appropriate" per the 2023 NEC Style Manual, Section 3.2.1. Clarified in the scope statement that this article is only applicable to the DC hazards of PV arrays. Added requirements for employee training as new section to clarify the specific PV related training needed to work on these systems. Deleted and replaced the vague and unenforceable term "robust" per the 2023 NEC Style Manual, Section 3.2.1. In the specific procedure section, language was clarified for usability.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Risk assessment was not changed as it is redundant to existing language. The information note was not added as it included a requirement.
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**390.1 Scope.** This article covers electrical safety requirements for the practical safeguarding of employees while working on ~~dc~~ photovoltaic (PV) ~~systems~~arrays which present an electrical hazard. **390.2 Exposure Levels~~nergy Hazard Thresholds~~.** ~~Appropriate c~~Controls shall be applied where any of the following thresholds are exceeded: (1) Direct-current (dc) contact thermal hazard: 1000 watts. (2) Direct-current (dc) electric shock hazard: 100 volts and 40 milliamperes. (3) Direct-current (dc) arc flash hazard: 150 volts and 1.2 cal/cm^2. **390.3 Employee Training** **(A) General Requirements** The training requirements shall apply to employees exposed to electrical hazards associated with work on or near PV arrays, including the interconnected photovoltaic equipment, and collection systems. **(B) Employee Training** (1) Only qualified electrical workers shall work on PV installations and equipment. (2) Employees who install, operate, maintain, or repair PV installations and equipment shall be trained to: (a) understand the operating characteristics of the PV modules and equipment with which they will work. (b) recognize the continuously energized nature of PV panels, (c) perform a risk assessment for energized electrical work, (d) develop and follow procedures that minimize exposure, and (e) use control measures, including PPE to prevent injury. **390.~~3~~4 PV Risk Assessments.** Prior to any work on an energized PV array, risk assessments shall be performed to identify the thermal, electrical shock, and arc flash hazards and assess the risks associated with the type of tasks to be performed. **390.~~4~~5 Specific Work Procedures.** **(A) ~~Hazard Thresholds~~Job Safety Plan.** ~~No work shall~~ ~~When~~If work ~~must be~~is performed on exposed PV terminal~~s~~ greater than the thermal, electric shock or arc flash thresholds, risk assessment shall be documented in the written job safety plan. **(B) Conductor Manipulation.** Before manipulating any connectors on an energized system ~~(plugging or unplugging)~~, a risk assessment shall be performed to determine the maximum open circuit voltage that would be generated and the maximum current to be interrupted.

	Informational Note: This risk assessment will determine if the action can be performed safely and what PPE would be required. **(C) Plugging and Unplugging Connectors.** ~~Robust~~ Specific procedures for plugging and unplugging connectors on an energized PV system shall be developed that ~~consider~~ include the following: 1. ~~possibility~~ prevention of ~~making wrong~~ connections that ~~and~~ create~~ing~~ a short circuit and the controls necessary to prevent such a situation 2. verification of no load current prior to disconnecting

DOC #	70E
TG #/NAME	Annexes
TG CHAIR	Mark Hilbert
TG MEMBERS	* indicates non-committee member Daniel Roberts, Paul Barnhart, Virginia Balitski, Jeffrey Conkwright, Charlie Miller, Daleep Mohla, Jim Phillips

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.1	159		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The public comment did not provide any recommended revisions as required by Regulations Governing the Development of NFPA Standards Section 4.4.4.3.		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.1	141, 232 (same revision)	142	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~D.5.1 Dynamic Behavior of DC Arcs.~~ ~~Direct-current arcs are similar to three-phase ac arcs in that continuously flowing current maintains the hot plasma, as compared to single-phase ac arcs, which cool at current zeros, which contributes to s~~ ~~elf-extinction. However, dc arcs have a unique difference to three-phase ac arcs. The spatially varying magnetic fields of the three phases of a three-phase arc combines to give a net zero effect on the motion of the arc. However, the magnetic field of a dc arc provides a continuous orthogonal force on the arc that causes the arc to move laterally and elongate (see reference 1).~~		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		

Proposed Statement	**Technical reason for revision.**
	Informative Annex D.5.1 created by First Revision 71 is deleted. The substantiation provided for First Revision 71 stated that "Direct-current arcs are similar to three-phase ac arcs in that continuously flowing current maintains the hot plasma". No technical testing data was provided to support this analogy. The Technical Committee notes that in a DC arc the continuously following current maintains the hot plasma. However, three-phase AC arcs generate plasma alternately between different phases, that is, they push different portions of the hot plasma and are not uniform. Further peer-reviewed research and validation are required to establish a comprehensive procedure for addressing the DC arc-flash hazards before Informative Annex D.5 Direct-Current Incident Energy Calculations is revised. This restores the content found in Informative Annex D.5.1, of the 2024 Edition of NFPA 70E with an editorial correction.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5	142	In the cart with 141	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision. This is what is in the PC. I am not trying to edit the text, but I would like to comment on the changes to D.5. I agree that we need better and more precise ways to assess the DC arc flash hazard, but I do not think the new sections in 70E Annex D.5 will lead the industry in the desired direction. The new equations are a piecemeal approach and have not been well validated. Specific applications for their use and their limitations are not well defined. I will try to attach my comments as a file on a later screen of this editor.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	DELETE FIRST DRAFT TEXT AND REPLACE WITH MODIFIED 2024 TEXT: **D.5.1 Maximum Power Method.** The following method of estimating dc arc flash incident energy that follows was published in the *IEEE Transactions on Industry Applications (see reference 2 of D.5.2)*. This method is based on the concept that the maximum power possible in a dc arc will occur when the arcing voltage is one-half the system voltage.

Proposed Second Revision Text (SR) for D.5.1 (From D.5.1 in the 2024)	Testing completed for Bruce Power *(see reference 3 of D.5.~~3~~2)* has shown that this calculation is conservatively high in estimating the arc flash value. This method applies to dc systems rated up to 1000 volts. $I_{arc} = 0.5 \times I_{bf}$ $IE_m = 0.01 \times V_{sys} \times I_{arc} \times T_{arc} / D^2$ [D.5.1] where: I_{arc}= arcing current, amperes I_{bf}= system bolted fault current, amperes IE_m= estimated dc arc flash incident energy at the maximum power point, cal/cm^2 V_{sys}= system voltage, volts T_{arc}= arcing time, sec D= working distance, cm For exposures where the arc is in a box or enclosure, it would be prudent to consider additional PPE protection beyond the values shown in Table 130.7(C)(15)(b).

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.1	199		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. D.5.1 Dynamic Behavior of DC Arcs. Direct-current arcs are similar to three-phase ac arcs in that continuously flowing current maintains the hot plasma, as compared to single-phase ac arcs, which cool at current zeros, which contributes to self-extinction. However, dc arcs have a unique difference to three-phase ac arcs. The spatially varying magnetic fields of the three phases of a three-phase arc combines to give a net zero effect on the motion of the arc. However, the magnetic field of a dc arc provides a continuous orthogonal force on the arc that causes the arc to move laterally and elongate (see reference 1).. All of the methods discussed below assume a static arc, not changing shape in time, but staying in a direct line path between the two electrodes. A lateral magnetic force, plus electrode erosion, results in self extinction that is not predicted by any of the static models. This static assumption is true for models based on circuit theory and plasma physics that does not include dynamic arc behavior. Only an empirical model, based on sufficient data, might predict arc behavior. However, much of the data obtained for the empirical methods is from laboratory tests and does not represent actual systems, including geometry, electrode materials, and gap distances. This lack of accounting for the dynamic behavior of the arc is the primary reason that arc extinction times are not accounted for in the current models, and the models consistently give higher incident energy values than is measured. An example is that all of the below models will predict a higher incident energy for a higher current. However, tests show that the higher currents result in lower incident energy, due to a shorter arc lifetime due to the magnetic force rapidly elongating the arc.		

	Testing of dc arcs has not yet been sufficient nor consistently documented, to create adequate empirically-based models. The difficulty in modeling behavior due to magnetic forces is taking into account the geometry of the conductors, and the lack of knowledge of the erosion effects is failure to document the electrode geometries and materials, and the initial and final gap distance. Nevertheless, there is now sufficient data and dynamic behavior studies to place bounds on the use of the current models.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is not accepted as D.5.1 has been deleted by the action on the second revision to D.5.1.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.
	~~D.5.1 Dynamic Behavior of DC Arcs.~~ ~~Direct-current arcs are similar to three-phase ac arcs in that continuously flowing current maintains the hot plasma, as compared to single-phase ac arcs, which cool at current zeros, which contributes to self-extinction. However, dc arcs have a unique difference to three-phase ac arcs. The spatially varying magnetic fields of the three phases of a three-phase arc combines to give a net zero effect on the motion of the arc. However, the magnetic field of a dc arc provides a continuous orthogonal force on the arc that causes the arc to move laterally and elongate (see reference 1).~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.2	176	231	☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC NOTE: only changes identified by me are shown. D.5.2 Arc Extinction Observations ~~Provides Voltage/Gap Bounds.~~ ~~If~~ Electrode erosion and magnetic forces cause a dc arc to elongate and self-extinguish. ~~to a threshold, the arc self-extinguishes. The extinction length is determined by the arc voltage and initial gap distance. Once the voltage drop in the arc exceeds the source voltage, the arc can no longer sustain.~~ ~~An equation can be written, based on measurements, to provide a lower voltage bound for a given gap distance, below which, an arc cannot be sustain *(see references 1, 2, 3).*~~ ~~$V_{min} = 1.06 \times g + 100$~~ **~~[D.5.2a]~~** ~~or~~		

~~$g_{min} = V - 100 \times 1.06$~~ ~~**[D.5.2b]**~~

~~where:~~e

~~V_{min} = voltage below which an arc can't be sustained~~

~~g = gap distance, cm (in.)~~

~~g_{min} = gap above which an arc can't be sustained, cm (in.)~~

~~V = system voltage~~

~~Table D.5.2 provides a maximum gap distance for various voltages above which an arc will extinguish.~~

~~Table D.5.2 Maximum Gap Distance.~~

~~Table D.5.2 Maximum Gap Distance.~~

~~System Voltage (volts)~~	~~Gap Distance, above which arc will quickly extinguish~~	
	~~cm~~	~~in.~~
~~150~~	~~0.47~~	~~0.18~~
~~250~~	~~1.4~~	~~0.55~~
~~550~~	~~4.2~~	~~1.7~~
~~600~~	~~4.7~~	~~1.8~~
~~1000~~	~~8.5~~	~~3.3~~

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

The proposed text is not accepted as the text of Informative Annex D.5.2 was deleted by the action on the second revision to D.5.2.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.2	231	In the cart with 176	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

Replace the above with the following, several corrections and clarifications were made.

D.5.2 Arc Extinction as a Function of Voltage and Gap

If erosion and magnetic forces cause a dc arc to elongate to a threshold, the arc self-extinguishes. The extinction length is determined by the arc voltage and initial gap distance. Once the voltage drop in the arc exceeds the source voltage, the arc can no longer sustain. *(see references 1, 2, 3)*

An equation can be written, based on measurements, to provide a lower voltage bound for a given gap distance, a voltage below which, an arc cannot be sustained for that gap (Eq. D.5.2a). Solving for the gap distance, for a given voltage, gives the maximum gap that can sustain an arc, for a given voltage (Eq. D.5.2b). Any gap, above g_{max} , cannot sustain at that voltage.

V_{min} =((g*100)/1.06) + 100 **[D.5.2a]**

or

g_{gap} = ((V – 100)*1.06)/100 **[D.5.2b]**

where:

V_{min} = voltage below which an arc can't be sustained for a given gap

g = gap distance (cm)

g_{max} = gap above which an arc can't be sustained (cm) for a given voltage

V = system voltage

Table D.5.2-1 provides a maximum gap distance for various voltages, a gap above which an arc will extinguish at that voltage.

System Voltage (volts)	**Gap Distance, above which arc will quickly extinguish cm (inch)**
150	0.53 (0.21)
250	1.59 (0.63)
550	4.77 (1.9)
600	5.3 (12.1)
1000	9.54 (3.8)
1500	14.84 (5.84)

Table D.5.2-1 Maximum gap that will sustain an arc vs voltage.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

The proposed text is not accepted as Informative Annex D.5.2 was deleted by the action on the second revision to D.5.2.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.2	190		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

~~D.5.2 Arc Extinction Observations Provides Voltage/Gap Bounds.~~

~~If erosion and magnetic forces cause a dc arc to elongate to a threshold, the arc self-extinguishes. The extinction length is determined by the arc voltage and initial gap distance. Once the voltage drop in the arc exceeds the source voltage, the arc can no longer sustain.~~

~~An equation can be written, based on measurements, to provide a lower voltage bound for a given gap distance, below which, an arc cannot be sustain *(see references 1, 2, 3).*~~

$\cancel{V_{min} = 1.06 \times g + 100}$ **~~[D.5.2a]~~**

~~or~~

$\cancel{g_{min} = V - 100 \times 1.06}$ **~~[D.5.2b]~~**

~~where:~~e

~~V_{min} = voltage below which an arc can't be sustained~~

~~g = gap distance, cm (in.)~~

~~g_{min} = gap above which an arc can't be sustained, cm (in.)~~

~~V = system voltage~~

~~Table D.5.2 provides a maximum gap distance for various voltages above which an arc will extinguish.~~

~~Table D.5.2 Maximum Gap Distance.~~

~~Table D.5.2 Maximum Gap Distance.~~

~~System Voltage (volts)~~	~~Gap Distance, above which arc will quickly extinguish~~	
	~~cm~~	~~in.~~
~~150~~	~~0.47~~	~~0.18~~
~~250~~	~~1.4~~	~~0.55~~
~~550~~	~~4.2~~	~~1.7~~
~~600~~	~~4.7~~	~~1.8~~
~~1000~~	~~8.5~~	~~3.3~~

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

Informative Annex D.5.2 created by First Revision 71 is deleted for the following reasons:

- The origin, basis, and or validation of Equations D.5.2a and D.5.2b is not clear.
- Equation D5.2(b)is incorrectly derived from D.5.2(a).
- Table D5.2 does not correspond to equation D5.2(a) – i.e., using the equation as shown, the calculations do not yield the values shown in the table.
- The proposed equations for arc sustainability only consider gap and voltage, not other factors such as electrode configuration or arcing current.
- There are no stated limitations for use of the equations – are they valid for all dc sources, all voltages, all currents?
- The fact that there is no definition of "sustainability" also makes application difficult – it is unclear what the recommendation would be for worker protection in systems falling outside the gap/voltage parameters.
- There exists experimental data provided by K. Gray, S. Robert, and T. Gauthier in "Low voltage 100–500 vdc arc flash testing," in 2020 IEEE IAS Electrical Safety Workshop (ESW), 2020, pp.1–7 that suggests hazardous energy may be

released from arcs with final arc gaps greater than the distances in the provided table.

- Finally, results from these equations reflected in Table D5.2 are substantially different than results of FR58 utilized in Table 130.7(C) (5)(b). Following FR 58, the gap distance where the arc cannot be sustained is 1 mm/volt. This would yield a gap distance for 250 V DC of 250 mm or 25 cm versus 1.4 cm in Table 5.2. This wide disparity would be confusing as both cannot be correct

Further peer-reviewed research and validation are required to establish a comprehensive procedure for addressing the DC arc-flash hazards before Informative Annex D.5 Direct-Current Incident Energy Calculations is revised.

This restores the content found in Informative Annex D.5.2 of the 2024 Edition of NFPA 70E.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

Proposed Second Revision Text (SR)

Clean first revision text is provided to be revised.

Do not delete for a reject

Revision must be shown in track changes.

DELETE FIRST DRAFT TEXT AND REPLACE WITH 2024 TEXT:

~~D.5.2 Arc Extinction Observations Provides Voltage/Gap Bounds.~~

~~If erosion and magnetic forces cause a dc arc to elongate to a threshold, the arc self-extinguishes. The extinction length is determined by the arc voltage and initial gap distance. Once the voltage drop in the arc exceeds the source voltage, the arc can no longer sustain.~~

~~An equation can be written, based on measurements, to provide a lower voltage bound for a given gap distance, below which, an arc cannot be sustain *(see references 1, 2, 3)*.~~

$$\cancel{V_{min} = 1.06 \times g + 100} \quad \cancel{[D.5.2a]}$$

~~or~~

$$\cancel{g_{min} = V - 100 \times 1.06} \quad \cancel{[D.5.2b]}$$

~~where:~~

~~V_{min} = voltage below which an arc can't be sustained~~

~~g = gap distance, cm (in.)~~

~~g_{min} = gap above which an arc can't be sustained, cm (in.)~~

~~V = system voltage~~

~~Table D.5.2 provides a maximum gap distance for various voltages above which an arc will extinguish.~~

~~Table D.5.2 Maximum Gap Distance.~~

~~System Voltage (volts)~~	~~Gap Distance, above which arc will quickly extinguish~~	
	~~cm~~	~~in.~~
~~150~~	~~0.47~~	~~0.18~~
~~250~~	~~1.4~~	~~0.55~~
~~550~~	~~4.2~~	~~1.7~~

~~600~~	~~4.7~~	~~1.8~~
~~1000~~	~~8.5~~	~~3.3~~

D.5.2 Detailed Arcing Current and Energy Calculations Method.

A thorough theoretical review of dc arcing current and energy was published in the IEEE Transactions on Industry Applications. Readers are advised to refer to that paper (see reference 1) for those detailed calculations.

References:

1. "DC-Arc Models and Incident-Energy Calculations," Ammerman, R.F., et al., IEEE Transactions on Industry Applications, Vol. 46, No. 5.

2. "Arc Flash Calculations for Exposures to DC Systems," Doan, D.R., IEEE Transactions on Industry Applications, Vol. 46, No. 6.

3. "DC Arc Hazard Assessment Phase II," Copyright Material, Kinectrics Inc., Report No. K-012623-RA-0002-R00.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.3	117, 234 (same revision)	116,155,187	☐ Create Second Revision ☒ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

D.5.3 Maximum Power Method.

The following method of estimating dc arc flash incident energy *(see reference 4)* is based on the concept that the maximum power possible in a dc arc will occur when the arcing voltage is one-half the system voltage. Multiple tests have shown that this calculation is conservatively high in estimating the arc flash value *(see reference 4)*. This method applies to dc systems rated up to 1000 volts.

$$I_{arc} = 0.5 \times I_{bf}$$
$$IE_m = 0.01 \times V_{sys} \times I_{arc} \times T_{arc} / D^2 \quad \textbf{[D.5.3a]}$$

where:

I_{arc} = arcing current, amperes
I_{bf} = system bolted fault current, amperes
IE_m = estimated dc arc flash incident energy at the maximum power point, cal/cm^2
V_{sys} = nominal system voltage, volts
T_{arc} = arcing time, sec
D = working distance, cm

For exposures where the arc is in a box or enclosure, it would be prudent to consider additional PPE protection beyond the values shown in Table 130.7(C)(15)(b).

~~While IEEE 1584 *(see reference 5)* does not have arc-in-a-box/enclosure multipliers for dc panelboards and cabinets, reflected energy is reflected energy regardless of whether the initial~~

~~source of the energy was ac or dc. Given that dc panelboards (fuse or breaker distribution boxes) are often of very similar dimensions to ac panelboards, the multiplier of 1.6 for calculated arc flash energy from a dc distribution panelboard found in IEEE 1584 for ac panelboards could be assumed to be prudent.~~

~~While there are larger dc distribution cabinets, most large dc enclosures contain batteries, and have quite a bit of depth to them relatively. Using typical distances of centralized large UPS battery cabinets, calculations show *(see reference 6)* that typical reflected energy at the typical calculation distance of 18 in. (455 mm) in front of the cabinet for low-voltage systems yields an approximate additional 3 percent to 4 percent energy. This essentially means that a multiplier for arc-in-a-box is generally not needed for incident energy of large dc battery cabinets at 18 in. (455 mm) in front of it. However, due to ratios of direct vs. reflected distance becoming closer the further the human is away from the box/enclosure, a multiplier for the arc flash boundary for these large dc battery cabinets might be prudent.~~

~~The following formula was derived *(see reference 3)* for the arc flash boundary distance multiplier from the large enclosure curves for ac switchgear in IEEE 1584.~~

$$\cancel{K_{ab} = \left[0.55 \times \ln(d_{ab})\right] - 0.6}$$ **[D.5.3b]**

~~where:~~

$\cancel{K_{ab}}$ = ~~arc flash boundary distance multiplier for large dc battery cabinets~~

$\cancel{d_{ab}}$ = ~~calculated arc flash boundary (in.) without an arc-in-a-box/enclosure multiplier~~

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is not accepted as D.5.3 has been deleted by the action on the second revision to D.5.3.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.3	116	In the cart with 117	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: only changes identified by me are shown.

D.5.3 Maximum Power Method.

The following method of estimating dc arc flash incident energy *(see reference 4)* is based on the concept that the maximum power possible in a dc arc will occur when the arcing voltage is one-half the system voltage. Multiple tests have shown that this calculation is conservatively high in estimating the arc flash value *(see reference 4)*. This method applies to dc systems rated up to 1000 volts.

$$I_{arc} = 0.5 \times I_{bf}$$
$$IE_m = 0.01 \times V_{sys} \times I_{arc} \times T_{arc} / D^2$$

$$IE_m = \frac{0.01 \times V_{sys} \times I_{bf} \times T_{arc}}{2 \times D^2} \quad \textbf{[D.5.3a]}$$

where:

I_{arc} = arcing current, amperes
I_{bf} = system bolted fault current, amperes
IE_m = estimated dc arc flash incident energy at the maximum power point, cal/cm^2
V_{sys} = nominal system voltage, volts
T_{arc} = arcing time, sec
D = working distance, cm

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Statement

Technical reason for revision.

Response

Technical reason for rejecting or not making some of the proposed changes.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.3	187	In the cart with 117	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

CDC NOTE: I have inserted the equation attached to the PC.

D.5.3 Maximum Power Method.

The following method of estimating dc arc flash incident energy *(see reference 4)* is based on the concept that the maximum power possible in a dc arc will occur when the arcing voltage is one-half the system voltage. Multiple tests have shown that this calculation is conservatively high in estimating the arc flash value *(see reference 4)*. This method applies to dc systems rated up to 1000 volts.

$$I_{arc} = 0.5 \times I_{bf}$$
$$IE_m = 0.01 \times V_{sys} \times I_{arc} \times T_{arc} / D^2 \quad \textbf{[D.5.3a]}$$

where:

I_{arc} = arcing current, amperes
I_{bf} = system bolted fault current, amperes
IE_m = estimated dc arc flash incident energy at the maximum power point, cal/cm^2
V_{sys} = nominal system voltage, volts
T_{arc} = arcing time, sec
D = working distance, cm

For exposures where the arc is in a box or enclosure, it would be prudent to consider additional PPE protection beyond the values shown in Table 130.7(C)(15)(b).

~~While IEEE 1584 *(see reference 5)* does not have arc-in-a-box/enclosure multipliers for dc panelboards and cabinets, reflected energy is reflected energy regardless of whether the initial source of the energy was ac or dc. Given that dc panelboards (fuse or breaker distribution boxes) are often of very similar dimensions to ac panelboards, the multiplier of 1.6 for calculated arc flash energy from a dc distribution panelboard found in IEEE 1584 for ac panelboards could be assumed to be prudent.~~

~~While there are larger dc distribution cabinets, most large dc enclosures contain batteries, and have quite a bit of depth to them relatively. Using typical distances of centralized large UPS battery cabinets, calculations show *(see reference 6)* that typical reflected energy at the typical calculation distance of 18 in. (455 mm) in front of the cabinet for low-voltage systems yields an approximate additional 3 percent to 4 percent energy. This essentially means that a multiplier for arc-in-a-box is generally not needed for incident energy of large dc battery cabinets at 18 in. (455 mm) in front of it. However, due to ratios of direct vs. reflected distance becoming closer the further the human is away from the box/enclosure, a multiplier for the arc flash boundary for these large dc battery cabinets might be prudent.~~

~~The following formula was derived *(see reference 3)* for the arc flash boundary distance multiplier from the large enclosure curves for ac switchgear in IEEE 1584.~~

$$K_{ab} = \left[0.55 \times In\left(d_{ab}\right)\right] - 0.6$$ ~~**[D.5.3b]**~~

~~where:~~

~~K_{ab} = arc flash boundary distance multiplier for large dc battery cabinets~~

~~d_{ab} = calculated arc flash boundary (in.) without an arc-in-a-box/enclosure multiplier~~

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.3	155	In the cart with 117	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	CDC NOTE: Could not identify any proposed revision.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section n provided.**

Proposed Statement	**Technical reason for revision.**

Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.3	191		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

~~D.5.3 Maximum Power Method.~~

~~The following method of estimating dc arc flash incident energy *(see reference 4)* is based on the concept that the maximum power possible in a dc arc will occur when the arcing voltage is one-half the system voltage. Multiple tests have shown that this calculation is conservatively high in estimating the arc flash value *(see reference 4)*. This method applies to dc systems rated up to 1000 volts.~~

$$I_{arc} = 0.5 \times I_{bf}$$
$$IE_m = 0.01 \times V_{sys} \times I_{arc} \times T_{arc} / D^2$$
~~[D.5.3a]~~

~~where:~~

~~I_{arc} = arcing current, amperes~~

~~I_{bf} = system bolted fault current, amperes~~

~~IE_m = estimated dc arc flash incident energy at the maximum power point, cal/cm^2~~

~~V_{sys} = nominal system voltage, volts~~

~~T_{arc} = arcing time, sec~~

~~D = working distance, cm~~

~~For exposures where the arc is in a box or enclosure, it would be prudent to consider additional PPE protection beyond the values shown in Table 130.7(C)(15)(b).~~

~~While IEEE 1584 *(see reference 5)* does not have arc-in-a-box/enclosure multipliers for dc panelboards and cabinets, reflected energy is reflected energy regardless of whether the initial source of the energy was ac or dc. Given that dc panelboards (fuse or breaker distribution boxes) are often of very similar dimensions to ac panelboards, the multiplier of 1.6 for calculated arc flash energy from a dc distribution panelboard found in IEEE 1584 for ac panelboards could be assumed to be prudent.~~

~~While there are larger dc distribution cabinets, most large dc enclosures contain batteries, and have quite a bit of depth to them relatively. Using typical distances of centralized large UPS battery cabinets, calculations show *(see reference 6)* that typical reflected energy at the typical calculation distance of 18 in. (455 mm) in front of the cabinet for low-voltage systems yields an approximate additional 3 percent to 4 percent energy. This essentially means that a multiplier for~~

	~~arc-in-a-box is generally not needed for incident energy of large dc battery cabinets at 18 in. (455 mm) in front of it. However, due to ratios of direct vs. reflected distance becoming closer the further the human is away from the box/enclosure, a multiplier for the arc flash boundary for these large dc battery cabinets might be prudent.~~ ~~The following formula was derived *(see reference 3)* for the arc flash boundary distance multiplier from the large enclosure curves for ac switchgear in IEEE 1584.~~ $\cancel{K_{ab} = [0.55 \times ln(d_{ab})] - 0.6}$ ~~**[D.5.3b]**~~ ~~where:~~ ~~K_{ab} = arc flash boundary distance multiplier for large dc battery cabinets~~ ~~d_{ab} = calculated arc flash boundary (in.) without an arc-in-a-box/enclosure multiplier~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Informative Annex D.5.3 created by First Revision 71 is deleted. The specific "enclosure multipliers" and the equation to modify the arc-flash boundary distance for dc systems found in D.5.3 were based on the application of IEEE Std. 1584. The IEEE Std. 1584 was developed based on testing of ac systems, not DC systems. Arcing phenomena in ac and dc systems are different, and there has not been any testing performed to substantiate the validity of applying parameters derived based on ac testing to dc systems. The text from NFPA 70E 2024 Informative Annex D.5.3 is restored with some revisions. Further peer-reviewed research and validation are necessary to establish a comprehensive procedure for addressing dc arc-flash hazards before Informative Annex D.5 is revised.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**DELETE FIRST DRAFT TEXT AND REPLACE WITH 2024 TEXT:** D.5.3 ~~Maximum Power Method~~ ~~The following method of estimating dc arc flash incident energy *(see reference 4)* is based on the concept that the maximum power possible in a dc arc will occur when the arcing voltage is one-half the system voltage. Multiple tests have shown that this calculation is conservatively high in estimating the arc flash value *(see reference 4)*. This method applies to dc systems rated up to 1000 volts.~~ $I_{arc} = 0.5 \times I_{bf}$ $IE_m = 0.01 \times V_{sys} \times I_{arc} \times T_{arc} / D^2$ ~~[D.5.3a]~~ ~~where:~~ ~~I_{arc} = arcing current, amperes~~ ~~I_{bf} = system bolted fault current, amperes~~ ~~IE_m = estimated dc arc flash incident energy at the maximum power point, cal/cm^2~~ ~~V_{sys} = nominal system voltage, volts~~ ~~T_{arc} = arcing time, sec~~ ~~D = working distance, cm~~ ~~For exposures where the arc is in a box or enclosure, it would be prudent to consider additional PPE protection beyond the values shown in Table 130.7(C)(15)(b).~~ ~~While IEEE 1584 *(see reference 5)* does not have arc-in-a-box/enclosure multipliers for dc panelboards and cabinets, reflected energy is reflected energy regardless of whether the initial source of the energy was ac or dc. Given that dc panelboards (fuse or breaker distribution boxes) are often of very similar dimensions to ac panelboards, the multiplier of 1.6 for calculated arc flash energy from a dc distribution panelboard found in IEEE 1584 for ac panelboards could be assumed to be prudent.~~ ~~While there are larger dc distribution cabinets, most large dc enclosures contain batteries, and have quite a bit of depth to them relatively. Using typical distances of centralized large UPS battery cabinets, calculations show *(see reference 6)* that typical reflected energy at the typical calculation distance of 18 in. (455 mm) in front of the cabinet for low-voltage systems yields an approximate additional 3 percent to 4 percent energy. This essentially means that a multiplier for arc-in-a-box is generally not needed for incident energy of large dc battery cabinets at 18 in. (455 mm) in front of it. However, due to ratios of direct vs. reflected distance becoming closer the further the human is away from the box/enclosure, a multiplier for the arc flash boundary for these large dc battery cabinets might be prudent.~~ ~~The following formula was derived *(see reference 3)* for the arc flash boundary distance multiplier from the large enclosure curves for ac switchgear in IEEE 1584.~~

	~~$K_{ab} = \left[0.55 \times \ln(d_{ab})\right] - 0.6$~~ ~~[D.5.3b]~~ ~~where:~~ ~~K_{ab} = arc flash boundary distance multiplier for large dc battery cabinets~~ ~~d_{ab} = calculated arc flash boundary (in.) without an arc-in-a-box/enclosure multiplier~~ D.5.3 Short Circuit Current. The determination of short circuit current is necessary in order to use Table 130.7(C)(15)(b). The arcing current is calculated at 50 percent of the dc short-circuit value. The current that a battery will deliver depends on the total impedance of the short-circuit path. A conservative approach in determining the short-circuit current that the battery will deliver at 25°C is to assume that the maximum available short-circuit current is 10 times the 1 minute ampere rating (to 1.75 volts per cell at 25°C and the specific gravity of 1.215) of the battery. A more accurate value for the short-circuit current for the specific application can be obtained from the battery manufacturer. References: 1. IEEE 946, Recommended Practice for the Design of DC Auxiliary Powers Systems for Generating Stations.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.4	118	156, 235	☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. D.5.4 Modified ~~Maximum Power Method~~ DC Arc Maximum Sustaining Time for Battery Systems Repeated experiments by multiple companies *(see reference 3)* have shown that the maximum power method produces fairly accurate results at around ~~500 Vdc~~nominal 480 Vdc, where arc sustaining times average about 2 seconds. For lower voltages (~~which are quite common~~e.g., nominal 12, 24, 36, 48, 125, 250, and 384 VDC), the arc cannot sustain itself (even with close electrodes in an optimal configuration) for nearly that long, and the maximum sustaining time becomes lower and lower as the voltage goes down. Empirical derivation of a maximum sustaining time yields the formula in Equation D.5.4. $T_{arc} = 0.0043 \times V_{sys}$ **[D.5.4]** Modifying the maximum power incident energy formula with this new value of T_{arc} yields results much closer to the values seen in actual testing and to the values produced by the iterative methods.			
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is not accepted as D.5.4 has been deleted by the action on the second revision to D.5.4.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.4	156	In the cart with 118	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is not accepted as D.5.4 has been deleted by the action on the second revision to D.5.4.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.4	192		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~D.5.4 Modified Maximum Power Method.~~ ~~Repeated experiments by multiple companies *(see reference 3)* have shown that the maximum power method produces fairly accurate results at around 500 Vdc, where arc sustaining times average about 2 seconds. For lower voltages (which are quite common), the arc cannot sustain itself (even with close electrodes in an optimal configuration) for nearly that long, and the maximum sustaining time becomes lower and lower as the voltage goes down. Empirical derivation of a maximum sustaining time yields the formula in Equation D.5.4.~~ ~~$T_{arc} = 0.0043 \times V_{sys}$~~ **[D.5.4]** ~~Modifying the maximum power incident energy formula with this new value of T_{arc} yields results much closer to the values seen in actual testing and to the values produced by the iterative methods.~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
	Technical reason for revision.

Proposed Statement	D.5.4 is deleted for the following reasons. The information does not clarify whether this method of modifying the maximum power method applies to batteries, photovoltaic (PV) systems, converters, capacitors, etc. This method may apply to batteries but would not apply to other dc current/voltage sources, but this is not stated in D.5.4. Figure 1 of the cited reference, Ashton, C., “Modifying the DC Arc-Flash Max Power Formula to Give More Realistic Predictions of Maximum Arc-Flash Energy,” in Proc. of IEEE Electrical Safety Workshop, Tucson, p. 71, March 2024, clearly shows that there are several outlier test points which are not captured under the D.5.4 equation curve. The Authors of this reference indicate that equation D.5.4 was developed by “curve fitting the results so that most of the points fit under the curve”. The use of the term “most” is not a scientifically precise method to apply curve fitting methods (e.g., using one or two standard deviations). Ignoring several of these outliers means that equation D.5.4 can produce incident energy predictions that are not sufficiently conservative. Voltage is not the only factor that should be used to determine arc sustainability and its duration. The gap between conductors, electrode configuration (orientation), and available fault current need to be considered. Foreign contaminants and conductor material are also factors that have been found in certain laboratory tests to increase arc sustainability and cannot be neglected. Allowing this information to remain in NFPA 70E Informative Annex D.5 can create a hazardous condition by generalizing various dc systems operating at various voltages as not capable of producing harmful incident energy.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.4	CDC	No action required as the section has been deleted.	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.4	235	In the cart with 118	☐ Create Second Revision ☐ Reject
	DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.		

Proposed Text (from PC)	CDC NOTE: Could not identify any proposed revision. However, at end of statement this appears to be the issue. . Units need to be provided for parameters Tarc and Vsys.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	~~D.5.4 Modified Maximum Power Method.~~ ~~Repeated experiments by multiple companies *(see reference 3)* have shown that the maximum power method produces fairly accurate results at around 500 Vdc, where arc sustaining times average about 2 seconds. For lower voltages (which are quite common), the arc cannot sustain itself (even with close electrodes in an optimal configuration) for nearly that long, and the maximum sustaining time becomes lower and lower as the voltage goes down. Empirical derivation of a maximum sustaining time yields the formula in Equation D.5.4.~~ $\cancel{T_{arc} = 0.0043 \times V_{sys}}$ **[D.5.4]** ~~Modifying the maximum power incident energy formula with this new value of T_{arc} yields results much closer to the values seen in actual testing and to the values produced by the iterative methods.~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.5, D.5.6, D.5.7, D.5.8	208		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	CDC NOTE: only changes identified by me are shown. There are many PCs in the following blocks that affect the same sections. This PC does not appear to edit text. It only renumbers sections and deletes D.5.7. D.5.~~5~~ 6 Stokes/Oppenlander Method. This is an empirical method based on tests for dc arcs from 0.1 amperes to 1 kA *(see reference 7).* D.5.~~6~~ 7 Paukert Method.		

	This is an empirical method based on data of dc arc measurements from seven sources. It predicts high current arc characteristics *(see reference 8)*. ~~D.5.7 Kinectrics Physics Model.~~ ~~This is a physics model based on mass and energy conservation principles. It is used to compute plasma temperature and resistance using discretized energy balance equations for finite elements across the radius of the arc. It is an iterative technique *(see reference 9).*~~ D.5.~~8~~ 5 Ammerman/Sen Method. This is a circuit/thermal model that assumes complete conversion of electrical arc energy into thermal energy. Arc power is determined from an iterative technique constrained by arc power and circuit characteristics *(see reference 2).*
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is not accepted as D.5.5 – D.5.8 have been deleted by the action on the second revisions to D.5.5, D.5.6, D.5.7, and D.5.8.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.5	180, 193, 237 (same revision)		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	~~D.5.5 Stokes/Oppenlander Method.~~ ~~This is an empirical method based on tests for dc arcs from 0.1 amperes to 1 kA *(see reference 7).*~~		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
	Technical reason for revision.		

Statement	D.5.5 is deleted as it does not contain enough information to be useful, and the information it does contain describes the range of the Stokes arc characteristics method as “0.1 to 1.0 kA” which is inaccurate. The Stokes method has been documented in at least six technical papers as being capable of reproducing arc current, voltage and resistance values for bolted short-circuit currents up to 20 kA or higher. Allowing this first revision to remain in NFPA 70E 2027 could invalidate calculations done per existing NFPA 70E 2012 to 2024 Annex D.5.2 which recommended this method be used according to how Ammerman, et al., intended. The Stokes/Oppenlander equations only provide the initial step for calculating the arc current, voltage and resistance and DO NOT provide an incident energy calculation method or equations. It cannot be explicitly listed as an incident energy calculation method under a section called “Direct Current Incident Energy Calculations”.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	~~D.5.5 Stokes/Oppenlander Method.~~ ~~This is an empirical method based on tests for dc arcs from 0.1 amperes to 1 kA (see reference 7).~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.6	181, 194, 240 (same revision)		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	~~D.5.6 Paukert Method.~~ ~~This is an empirical method based on data of dc arc measurements from seven sources. It predicts high current arc characteristics *(see reference 8).*~~		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	Annex D.5.6 is deleted as the Paukert method equations on their own do not provide an “incident energy calculation method” but rather, they provide the initial		

	step of calculating the arc current, arc voltage and arc resistance. This arc resistance method cannot be explicitly listed as an incident energy calculation method and the proper way to utilize it is as done in the Ammerman method already published in NFPA 70E 2012 to 2024 editions under the existing section D.5.2. Additionally, D.5.6 states that the Paukert method produces "high arcing current characteristics" yet it does not define what a high arcing current characteristic is. This statement can create confusion. A comparative analysis vs other methods may be required to provide a qualitative statement about how high these arc currents can be.
Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes.**
	~~D.5.6 Paukert Method.~~ ~~This is an empirical method based on data of dc arc measurements from seven sources. It predicts high current arc characteristics (see reference 8).~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.7	158, 182, 195, 228 (same revision)		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	~~D.5.7 Kinectrics Physics Model.~~ ~~This is a physics model based on mass and energy conservation principles. It is used to compute plasma temperature and resistance using discretized energy balance equations for finite elements across the radius of the arc. It is an iterative technique *(see reference 9).*~~		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Statement	**Technical reason for revision.**		
	Ac and dc arc characteristics and fundamental physical behavior are very different and theoretical equations developed for ac systems are not applicable to dc systems. The reference D.5.7 promotes the use of an ac system software application to be used for dc incident energy calculations. The Committee is unable to verify the applicability of the equations to dc systems.		

Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.7	165		☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC Note: Document attached to PC in Terra cannot be opened. Check package from Sarah when she sends it out to see if it is available there.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed revision is not accepted as D.5.7 has been deleted by the action on the second revision to D.5.7.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. ~~D.5.7 Kinectrics Physics Model.~~ ~~This is a physics model based on mass and energy conservation principles. It is used to compute plasma temperature and resistance using discretized energy balance equations for finite elements across the radius of the arc. It is an iterative technique (see reference 9).~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.8	183	In the cart with 241	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. Below is the text from the document attached to the PC. D.5.8 Ammerman/Sen Method. This is a circuit/thermal model that assumes complete conversion of electrical arc energy into thermal energy. Arc ~~power is determined from an iterative technique constrained by arc power and circuit characteristics~~ (see reference 2). Arc voltage and current are determined together by setting the arc voltage (from a model developed in reference 7) equal to the battery circuit voltage and solving using an iterative method: $$V_{\text{arc}} = (20 + 0.534 z_{\text{g}}) I_{\text{arc}}^{0.12} = V_{\text{sys}} - I_{\text{arc}} R_{\text{int}} \quad (1)$$

where

V_{arc} is the arc voltage (V)
I_{arc} is the arc current (A)
V_{sys} is the battery voltage (V)
R_{int} is the internal resistance of the dc source (Ω)
z_g is the electrode gap (mm)

Informational note 1: This equation is only valid if the calculated arc current is greater than the transition current $I_t = 10 + 0.2z_g$. If the calculated arc current is below this value, and the dc source is below 600 volts, then the likelihood of a hazardous arc is low. This occurs when the arc gap is greater than approximately 1 mm per volt (1 in. per 25 volts), see Table 130.5(C)(3).

The incident energy at the working distance is determined by plugging the arc current and voltage calculated using (1) into the following equation:

$$IE = \left(0.239\frac{\text{cal}}{\text{J}}\right) V_{\text{arc}} I_{\text{arc}} \frac{T_{\text{arc}}}{4\pi D^2} \quad (2)$$

where

IE is the incident energy (cal/cm2)
V_{arc} is the arc voltage (V)
I_{arc} is the arc current (A)
T_{arc} is the arc time (s)
D is the working distance (cm)

This method does not account for source inductance, electrode erosion, electrode configuration, or self-extinguishing.

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.8	196		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~D.5.8 Ammerman/Sen Method.~~

	~~This is a circuit/thermal model that assumes complete conversion of electrical arc energy into thermal energy. Arc power is determined from an iterative technique constrained by arc power and circuit characteristics (see reference 2).~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.** The 2012 through 2024 Editions of NFPA 70E already reference this dc arc-flash model and incident energy calculation method in D.5.2 which is being retained for the 2027 Edition by the action on the second revision to D.5.2. The additional commentary or description of the Ammerman method does not add any technical value for the qualified person that is estimating the dc arc-flash incident energy.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.8	241	157, 183	☐ Create Second Revision ☒ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. D.5.8 Ammerman ~~/Sen Method~~et al Method. This is a circuit/thermal model that assumes complete conversion of electrical arc energy into thermal energy. Arc power is determined from an iterative technique constrained by arc power and circuit characteristics *(see reference 2).*
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed revision is not accepted as D.5.7 has been deleted by the action on the second revision to D.5.7.
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.** ~~D.5.8 Ammerman/Sen Method.~~ ~~This is a circuit/thermal model that assumes complete conversion of electrical arc energy into thermal energy. Arc power is determined from an iterative technique constrained by arc power and circuit characteristics (see reference 2).~~

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
New D.5.8	157	In the cart with 241	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.
	D.5.8 ETAP Dynamic Transient DC Arc-Flash Incident Energy Calculation Method This is a method which considers dynamic and transient dc arc current and energy by factoring the effects of conductor erosion, arc elongation and enclosure reflectivity based on various laboratory tests. This method is described in the following references. 1. A. Marroquin and T. McKinch, "Methods for Evaluating DC ARC-Flash Incident Energy in Battery Energy Storage Systems," in *IEEE Transactions on Industry Applications*, vol. 60, no. 3, pp. 5150-5160, May-June 2024, doi: 10.1109/TIA.2024.3353723. 2. W. Sekulic, A. Marroquin and P. McNutt, "DC Arc Incident Energy in Photovoltaic Systems: Methods for Evaluation," in *IEEE Industry Applications Magazine*, vol. 28, no. 3, pp. 21-33, May-June 2022, 3. A. Marroquin, R. Veeraraghavan, W. Gonzalez and M. Ruta, "Application of DC AF Incident Energy Reference Boundary Area Plots In TCCs Considering Input Parameter Variability," in *IEEE Transactions on Industry Applications*, doi: 10.1109/TIA.2025.3561762. 4. A. Marroquin, C. Carne, W. Brown, T. Landry, “Transient DC Arc-Flash Incident Energy Calculations for Distribution Systems”, in IEEE / IAS ESW 2025, Paper # 9, March 2025
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**
	To create a revision, revise text above or paste final version here.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.9	188		☐ Create Second Revision

			☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: Could not identify any proposed revision.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.		
Statement	**Technical reason for revision.**		
Response	**Technical reason for rejecting or not making some of the proposed changes.** The proposed revisions are not accepted as D.5.9 has been deleted by the action on the second revision to D.5.9.		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.9	197	242	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. D.5.9 Short Circuit Current and Clearing Time~~.~~ ~~The short-circuit current of the source (battery, EDLC, or PV) needs to be obtained from the manufacturer. The circuit clearing time needs to be determined by analysis of the battery management system, solar management system, and/or fusing.~~ ~~Clearing times from arc dynamics are still under study, but recent dc arc tests provide information to predict arc lifetime as a function of gap distance, voltage, and short-circuit current *(see references 1 and 3)*.~~ The determination of the short-circuit current is necessary to use Table 130.7 (C)(15)(b), to determine the arcing current and the interrupting rating of the overcurrent protective devices. The manufacturer or equipment supplier is the best source to obtain the data necessary to calculate the dc short-circuit current from sources such as batteries, capacitors, motors, and photovoltaics. The total short-circuit current depends on the total network impedance between the source and the point of the fault. The duration of the dc arc is determined by a qualified person based on the clearing time of the overcurrent protective devices using the arcing current. The clearing time might need to consider the discharge time of energy storing components in the circuit as well. For example, the short-circuit current a battery can deliver depends on the total impedance of the short-circuit path. For lead-calcium batteries, a conservative estimate of the short-circuit current at 25°C is 10 times the battery's 1-minute discharge rating (to 1.75 volts per cell at 25°C with a specific gravity of 1.215). For a more accurate value tailored to a specific application, consult the battery manufacturer or the equipment supplier. References: 1. IEEE Std.946-2020, Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations		

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
	Annex D.5.9 created by First Revision 71 is deleted to eliminate the implied requirement that information must be sourced exclusively from the manufacturer. As equipment is not always procured directly from the manufacturer by the end user, the relevant data may be obtained through multiple channels by either the equipment supplier or the end user. Clearing time during an arcing fault is determined by qualified personnel based on system design parameters and engineering analysis. The final paragraph has been removed as it does not offer relevant information or guidance to the intended user of this standard. The reference to 50% of the short-circuit current has been removed to indicate that max power is not the only recommended method. The detailed method provides more accurate results, but the arcing current is typically determined using iterative methods. The text from D.5.3 Short Circuit Current in the 2024 edition of NFPA 70E has been restored with some revisions. This information, which conservatively estimated battery short circuit current has been in NFPA 70E for multiple cycles, remains applicable and should be retained for lead-calcium batteries, which continue to represent a substantial portion of installed battery systems. This conservative estimation approach has been validated by IEEE 946-2020, IEEE Recommended Practice for the Design of DC Power Systems for Stationary Applications. Annex C, Section C.3 of the standard provides detailed calculations and comparisons between actual short-circuit current and estimates based on the battery's 1-minute rating.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.9	242	In the cart with 197	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~D.5.9 Short Circuit Current and Clearing Time.~~ ~~The short-circuit current of the source (battery, EDLC, or PV) needs to be obtained from the manufacturer. The circuit clearing time needs to be determined by analysis of the battery management system, solar management system, and/or fusing.~~		

	~~Clearing times from arc dynamics are still under study, but recent dc arc tests provide information to predict arc lifetime as a function of gap distance, voltage, and short-circuit current *(see references 1 and 3).*~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. ~~D.5.9~~ D.5.3 Short Circuit Current and Clearing Time. ~~The short-circuit current of the source (battery, EDLC, or PV) needs to be obtained from the manufacturer. The circuit clearing time needs to be determined by analysis of the battery management system, solar management system, and/or fusing.~~ ~~Clearing times from arc dynamics are still under study, but recent dc arc tests provide information to predict arc lifetime as a function of gap distance, voltage, and short-circuit current (see references 1 and 3).~~ Determining the short-circuit current is necessary to use Table 130.7(C)(15)(b). Additionally, determining the short-circuit current, calculating the arcing current, and selecting the interrupting rating of overcurrent protective devices is necessary to perform incident energy calculations. The manufacturer or the equipment supplier is the best source to obtain the data necessary to calculate the dc short-circuit current from sources such as batteries, capacitors, motors, and photovoltaics. The total short-circuit current in the system depends on the total network impedance between the source and the point of the arc fault. The duration of the dc arc is determined by a qualified person based on the clearing time of the overcurrent protective devices using the arcing current. the clearing time might need to consider the discharge time of energy storing components in the circuit as well. For example, the short-circuit current a battery can deliver depends on the total impedance of the short-circuit path. For lead-calcium batteries, a conservative estimate of the short-circuit current at 25°C is 10 times the battery's 1-minute discharge rating, to 1.75 volts per cell at 25°C with a specific gravity of 1.215. For a more accurate value tailored to a specific application, consult the battery manufacturer or the equipment supplier. References:

	1. IEEE 946-2020, Recommended Practice for the Design of DC Auxiliary Powers Systems for Generating Stations

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
D.5.10	198	229	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

~~D.5.10 References.~~

~~(1) Gordon, L., "Modeling the Dynamic Behavior of DC Arcs," *IEEE Transactions on Industry Applications*, Vol. 60, No. 1, pp. 1946–1955, January/February 2024.~~

~~(2) Ammerman, R.F., Gammon, T., Sen, P.K., and Nelson, J.P., "DC arc models and incident energy calculations," in Proc. of Petroleum Chem. Ind. Conference, pp. 1–3, 2009.~~

~~(3) Ashton, C., "Modifying the DC Arc-Flash Max Power Formula to Give More Realistic Predictions of Maximum Arc-Flash Energy," in Proc. of IEEE Electrical Safety Workshop, Tucson, p. 71, March 2024.~~

~~(4) Doan, D.R., "Arc flash calculations for exposures to DC systems," *IEEE Transactions on Industry Applications*, Vol. 46, No. 6, pp. 2299–2302, November/December 2010.~~

~~(5) IEEE 1584, *Guide for Performing Arc Flash Calculations*, 2018.~~

~~(6) Rosewater, D.M., "Reducing Risk When Performing Energized Work on Batteries," in *IEEE Transactions on Industry Applications*, Vol. 60, No. 2, pp. 2732–2741, doi: 10.1109/TIA.2023.3332828, March-April 2024.~~

~~(7) Stokes, A. and Oppenlander, W., "Electric arcs in open air," *J. Phys. D: Appl. Phys.*, Vol. 24, pp. 26–35, 1991.~~

~~(8) Paukert, J., "The arc voltage and arc resistance of LV fault arcs," in Proc. 7th Int. Symp. Switching Arc Phenomena, pp. 49–51, 1993.~~

~~(9) Keyes, C. and Maurice, C., "DC arc hazard assessment phase II," *Kinectrics*, Toronto, ON, Canada, Tech. Rep. K-012623-RA-0001-R00, July 2007.~~

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Statement

Technical reason for revision.

The references in Informative Annex D.5.10 are no longer necessary, other than No. 2 which is already referred to in D.5.2. See actions on the second revisions to D.5.5-which deleted the sections containing the references.

Response

Technical reason for rejecting or not making some of the proposed changes.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

D.5.10	229	In the cart with 198	☒ Create Second Revision ☐ Reject

Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. CDC NOTE: only changes identified by me are shown. (9) ~~Keyes, C. and Maurice, C., "DC arc hazard assessment phase II," *Kinectrics*, Toronto, ON, Canada, Tech. Rep. K-012623-RA-0001-R00, July 2007.~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**. ~~D.5.10 References.~~ ~~1. Gordon, L., "Modeling the Dynamic Behavior of DC Arcs," *IEEE Transactions on Industry Applications*, Vol. 60, No. 1, pp. 1946–1955, January/February 2024.~~ ~~2. Ammerman, R.F., Gammon, T., Sen, P.K., and Nelson, J.P., "DC arc models and incident energy calculations," in Proc. of Petroleum Chem. Ind. Conference, pp. 1–3, 2009.~~ ~~3. Ashton, C., "Modifying the DC Arc-Flash Max Power Formula to Give More Realistic Predictions of Maximum Arc-Flash Energy," in Proc. of IEEE Electrical Safety Workshop, Tucson, p. 71, March 2024.~~ ~~4. Doan, D.R., "Arc flash calculations for exposures to DC systems," *IEEE Transactions on Industry Applications*, Vol. 46, No. 6, pp. 2299–2302, November/December 2010.~~ ~~5. IEEE 1584, *Guide for Performing Arc Flash Calculations*, 2018.~~ ~~6. Rosewater, D.M., "Reducing Risk When Performing Energized Work on Batteries," in *IEEE Transactions on Industry Applications*, Vol. 60, No. 2, pp. 2732–2741, doi: 10.1109/TIA.2023.3332828, March-April 2024.~~ ~~7. Stokes, A. and Oppenlander, W., "Electric arcs in open air," *J. Phys. D: Appl. Phys.*, Vol. 24, pp. 26–35, 1991.~~ ~~8. Paukert, J., "The arc voltage and arc resistance of LV fault arcs," in Proc. 7th Int. Symp. Switching Arc Phenomena, pp. 49–51, 1993.~~ ~~9.~~1. ~~Keyes, C. and Maurice, C., "DC arc hazard assessment phase II," *Kinectrics*, Toronto, ON, Canada, Tech. Rep. K-012623-RA-0001-R00, July 2007~~.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION

F.3	236		☒ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

F.3 Hierarchy of Risk Control.

The purpose of specifying and adhering to a hierarchy of risk control methods is to identify the most effective individual or combination of preventive or protective measures to reduce the risk associated with a hazard. Each risk control method is considered less effective than the one before it. Table F.3 lists the hierarchy of risk control identified in this and other safety standards and provides examples of each.

Table F.3 The Hierarchy of Risk Control Methods

Risk Control Method	**Examples**
(1) Elimination	Conductors and circuit parts in an electrically safe working condition
(2) Substitution	~~Reduce the hazard by replacing 120 volts~~ Replace 120 volt control circuitry with 24 Vac or Vdc control circuitry
(3) Engineering controls	Guard energized electrical conductors and circuit parts to reduce the ikelihood of electrical contact or arcing faults
(4) Awareness	Signs alerting of the potential presence of hazards
(5) Administrative controls	Procedures and job planning tools
(6) PPE	Electric shock and arc flash PPE

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

The revision to the "Substitution" example in Table F.3 aligns with the other risk control method examples, none of which identifies the purpose of the method, rather they each are just an example.

"Reduce the hazard…" is inaccurate. Hazards are not reduced, increased, greater, lesser, etc. A hazard either is or is not a source of harm.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

Proposed Second Revision Text (SR)

Revision must be shown in track changes.

F.3 Hierarchy of Risk Control.

The purpose of specifying and adhering to a hierarchy of risk control methods is to identify the most effective individual or combination of preventive or protective

Clean first revision text is provided to be revised. **Do not delete**	measures to reduce the risk associated with a hazard. Each risk control method is considered less effective than the one before it. Table F.3 lists the hierarchy of risk control identified in this and other safety standards and provides examples of each. Table F.3 The Hierarchy of Risk Control Methods

Risk Control Method	Examples
(1) Elimination	Conductors and circuit parts in an electrically safe working condition
(2) Substitution	~~Reduce the hazard by replacing~~ Replace120 volt~~s~~ control circuitry with 24 Vac or Vdc control circuitry
(3) Engineering controls	Guard energized electrical conductors and circuit parts to reduce the likelihood of electrical contact or arcing faults
(4) Awareness	Signs alerting of the potential presence of hazards
(5) Administrative controls	Procedures and job planning tools
(6) PPE	Electric shock and arc flash PPE

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.1	33 (cont)	TG 2 is responsible for PC.	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term “appropriate” in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.1	81		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. H.4.1 Introduction.		

	Section 130.7(C)(14) requires personal protective equipment (PPE) provided by a supplier or manufacturer to conform to appropriate product standards ~~by one of three methods. Additional information for these conformity assessment methods can be found within ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*. ANSI/ISEA 125 establishes criteria for conformity assessment of safety and PPE that is sold with claims of compliance with product performance standards. ANSI/ISEA 125 contains provisions for data collection, product verification, conformation of quality and manufacturing production control, and roles and responsibilities of suppliers, testing organizations, and third-party certification organizations.~~ H.4.2 ~~Level of~~ Conformity. ~~ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, provides for three different levels of conformity assessment: Level 1, Level 2, and Level 3.~~ ~~Level 1 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed. A supplier Declaration of Conformity for each product is required to be made available for examination upon request.~~ ~~Level 2 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed, the supplier or manufacturer has a registered ISO 9001 (*Quality management systems*) quality management system or equivalent quality management system, and all testing has been carried out by an ISO 17025, *General requirements for the competence of testing and calibration laboratories*, accredited testing laboratory. A supplier Declaration of Conformity for each product is required to be made available for examination upon request.~~ ~~Level 3 conformity is where the~~ Conformity products are certified by an ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*, accredited independent third-party certification organization (CO). All product testing is directed by the CO, and all changes to the product must be reviewed and retested if necessary. Compliant products are issued a Declaration of Conformity by the CO and products are marked with the CO's mark or label.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	H.4.1 is revised from "appropriate product standards" to "applicable product standards" to avoid the use of vague and unenforceable terms and to align with the phrase used in 130.7(C)(14)(b).
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	H.4.1 Introduction. Section 130.7(C)(14) requires personal protective equipment (PPE) provided by a supplier or manufacturer to conform to ~~appropriate~~ applicable product standards by one of three methods. Additional information for these conformity assessment methods can be found within ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment. ANSI/ISEA 125 establishes criteria for conformity assessment of safety and PPE that is sold with claims of compliance with product performance standards. ANSI/ISEA 125 contains provisions for data collection, product verification, conformation of quality and manufacturing production control, and roles and responsibilities of suppliers, testing organizations, and third-party certification organizations. H.4.2 Level of Conformity. ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, provides for three different levels of conformity assessment: Level 1, Level 2, and Level 3. Level 1 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed. A supplier Declaration of Conformity for each product is required to be made available for examination upon request. Level 2 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed, the supplier or manufacturer has a registered ISO 9001 (Quality management systems) quality management system or equivalent quality management system, and all testing has been carried out by an ISO 17025, General requirements for the competence of testing and calibration laboratories, accredited testing laboratory. A supplier Declaration of Conformity for each product is required to be made available for examination upon request. Level 3 conformity is where the products are certified by an ISO 17065, Conformity assessment — Requirements for bodies certifying products, processes and services, accredited independent third-party certification organization (CO). All product testing is directed by the CO, and all changes to the product must be reviewed and retested if necessary. Compliant products are issued a Declaration of Conformity by the CO and products are marked with the CO's mark or label.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.3	82		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~H.4.3 Equivalence.~~		

	~~While there are three levels of conformity assessment described in ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, the levels are not to be considered as equivalent. Users are cautioned that the level of rigor required to demonstrate conformity should be based on the potential safety and health consequence of using a product that does not meet a stated performance standard. A higher potential safety and health consequence associated with the use of a noncompliant product should necessitate a higher level of conformity assessment.~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed deletion of text in H.4.3 is not accepted in order to align with the requirements in 130.7(C)(14).
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	H.4.3 Equivalence. While there are three levels of conformity assessment described in ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, the levels are not to be considered as equivalent. Users are cautioned that the level of rigor required to demonstrate conformity should be based on the potential safety and health consequence of using a product that does not meet a stated performance standard. A higher potential safety and health consequence associated with the use of a noncompliant product should necessitate a higher level of conformity assessment.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
I.2	4		☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		
	I.2 Job Safety Planning Checklist. Figure I.2 illustrates considerations for a job safety planning checklist. Figure I.2 Sample Job Safety Planning Checklist. I cannot click and make changes on checklist itself. Therefore: Line item 1a and 1d should be changed to (1a) Equipment operating at greater than 50 V (as this is the threshold for further action. A NO answer indicates an electrically safe work condition but does not tell you to proceed to the forthcoming line items.) Should change (1d) to Abnormal operating condition as normal operating condition is under engineering control. As it stands YES tells tells you to proceed to lower-level controls (which you should not have to if equipment is properly engineered). NO answer again indicates an electrically safe work condition but does not tell you to proceed to the forthcoming line items, when are intended to safeguard in a non-engineered control situation). Line item		

4 indicates "if line 3 or 4 are yes" which duplicates it's own line item. I believe this should read "if line 2 or 3 are yes."

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

Proposed Response

Technical reason for rejecting or not making some of the proposed changes.

Proposed Second Revision Text (SR)

Clean first revision text is provided to be revised.

Do not delete for a reject

Revision must be shown in track changes.

I.2 Job Safety Planning Checklist.

Figure I.2 illustrates considerations for a job safety planning checklist.

Figure I.2 Sample Job Safety Planning Checklist.

Job Safety Planning Checklist				
Equipment:				
Task:				
Location:				
Qualified submitter:			**Date:**	
Section A, General				
Mark "Y" or "N" as appropriate				
No.	**Item**	**Yes**	**No**	**Instructions**
1.	Is there justification for the energized work? a. Equipment operating at less than 50 volts b. Additional hazard or increased risk c. Infeasible to de-energize d. Normal operating condition			*If **No**, the equipment must be placed in an electrically safe working condition.* *If **Yes**, complete 1a, 1b, and 1c, and shock and arc flash risk assessments are required to determine the appropriate hazard controls.* *Proceed to Line 2.*
2.	Will the worker be exposed to energized parts?			*If **No**, a shock risk assessment is discretionary and completing Sections B and C is optional.* *Proceed to Line 3.*
3.	Is there an arc flash hazard?			*If **No**, arc flash risk assessment is discretionary and completing Sections D or E and F is optional.* *Proceed to Line 4.*
4.	Were any of the answers to Questions 3 or 4 yes?			*If **No**, further risk assessment is discretionary.* *If **Yes**, proceed to Line 5.*
5.	Did the arc flash risk assessment determine that additional protective measures are required?			*If **No**, completing Parts D or E and F is discretionary.* *If **Yes**, Part D or E is required to be completed.* *Proceed to Line 6.*
6.	Is the required working distance available?			*If **Yes**, proceed to Line 7.* *If **No**, additional risk assessment is required before completing Section D or E or performing any work.* *Proceed to Line 7.*
Section B, Shock Hazard Information *Use Table 130.4(E)(a) for ac system boundaries or Table 130.4(E)(b) for dc system boundaries*				
7.	Voltage between phases: Limited approach boundary: Restricted approach boundary:			*Establish the shock boundaries.* *Proceed to Line 8.*
Section C, Shock Control Information				
Mark "Y" or "N" as appropriate				
8.	Will the task require the worker to cross the restricted approach boundary?			*If **No**, shock protection controls are discretionary* *Proceed to Section D or E as appropriate.* *If **Yes**, shock protection controls are required.* *Proceed to Line 9.*
9.	Will rubber insulating gloves and leather protectors be used for the task?			*If **Yes**, proceed to Line 10.* *If **No**, proceed to Line 11.*
10.	Minimum glove class required for insulating gloves			*Establish minimum glove class.* *Proceed to Line 11.*
11.	Will insulating blankets be used for the task?			*If **Yes**, proceed to Line 12.* *If **No**, proceed to Line 13.*
12.	Minimum voltage rating for insulating blankets			*Establish minimum voltage rating.* *Proceed to Line 13.*

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Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Annex K	71	103, 239	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review Informative Annex K to address the concerns in the ballot comment. CDC NOTE: Here are the first draft ballot comments on Annex K. (FR-74) **Affirmative with Comment** In the third sentence of K.1, "annual" should be added before "average" for clarity. The last sentence of K.1 addressing contact thermal hazards is probably no longer applicable based on modifications to Chapter 3 and should be deleted.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** In the third sentence of K.1, "annual" has be added before "average" for clarity. The last paragraph of K.1 has been revised to correlate with the revisions to Chapter 3 regarding contact thermal hazards. Parenthetical expressions have been either deleted or the associated text has been revised to incorporate the expression without use of parentheses per the NEC Style Manual.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Annex K	MOS	No action required. The revisions are addressed by the action taken on PC-71, 103 and 239.	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. NEC STYLE MANUAL **Section 3.5.1.1 Sentence Structure.** Parenthetical expressions shall be avoided.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		

Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Annex K.1	103	In the cart with PC-71	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below.		

K.1 General.

Contact with or exposure to electricity continues to be one of the leading causes of workplace fatalities and injuries in the United States. Between 2011 and 2022, there were a total of 1,322 workplace fatalities involving electricity. According to the Occupational Safety and Health Administration (OSHA), an average of 113 Americans died annually in the workplace between 2011 and 2020 due to contact with electricity. Of these fatalities, 30 percent were in occupations that can be considered electrical occupations with employees who have received training on electrical safety and the relevant codes and standards of working around electricity. Seventy percent of the fatalities occurred in non-electrically related occupations. Working on or near energized equipment or parts was identified as the leading cause with 48 percent of the fatalities, closely followed by contact with overhead power lines with 41 percent. Electrical fatalities continue to stay consistent with an average 1.5 percent decrease in workplace electrical fatalities year over year. Electrical fatalities account for 6 percent of all workplace fatalities.

About 98 percent of fatal occupational electric injuries are electric shock injuries. A corporate case study examining electrical injury reporting and safety practices found that 40 percent of electrical incidents involved 250 volts or less and were indicative of a misperception of electrical safety as a high-voltage issue. In addition, electrical incidents once again were found to involve a large share of non-electrical workers, with approximately one-half of incidents involving workers from outside electrical crafts. Research of electrical fatalities in construction found that the highest proportion of fatalities occurred in establishments with 10 or fewer employees and pointed out that smaller employers could have fewer formal training requirements and less structured training in safety practices.

There are two general categories of electrical hazards addressed extensively by the requirements of this standard: electric shock hazards and arc flash hazards. Each of these hazards are discussed separately in this informative annex. A third category of hazard is a thermal hazard related to the overheating of a conductor, circuit part, or other conductive object caused by electric current. ~~This type of hazard is referred to but not specifically addressed by the requirements of this standard.~~

Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**
Proposed Statement	**Technical reason for revision.**
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Annex K.1	239	In the cart with PC-71	☐ Create Second Revision ☐ Reject

Proposed Text (from PC)

DO NOT REVISE THIS TEXT. Revisions must be in the second revision text field (grey) below.

K.1 General.

Contact with or exposure to electricity continues to be one of the leading causes of workplace fatalities and injuries in the United States. Between 2011 and 2022, there were a total of 1,322 workplace fatalities involving electricity. According to the Occupational Safety and Health Administration (OSHA), an average of 113 Americans died annually in the workplace between 2011 and 2020 due to contact with electricity. Of these fatalities, 30 percent were in occupations that can be considered electrical occupations with employees who have received training on electrical safety and the relevant codes and standards of working around electricity. Seventy percent of the fatalities occurred in non-electrically related occupations. Working on or near energized equipment or parts was identified as the leading cause with 48 percent of the fatalities, closely followed by contact with overhead power lines with 41 percent. Electrical fatalities continue to stay consistent with an average 1.5 percent decrease in workplace electrical fatalities year over year. Electrical fatalities account for 6 percent of all workplace fatalities.

About 98 percent of fatal occupational electric injuries are electric shock injuries. A corporate case study examining electrical injury reporting and safety practices found that 40 percent of electrical incidents involved 250 volts or less and were indicative of a misperception of electrical safety as a high-voltage issue. In addition, electrical incidents once again were found to involve a large share of non-electrical workers, with approximately one-half of incidents involving workers from outside electrical crafts. Research of electrical fatalities in construction found that the highest proportion of fatalities occurred in establishments with 10 or fewer employees and pointed out that smaller employers could have fewer formal training requirements and less structured training in safety practices.

There are two general categories of electrical hazards addressed extensively by the requirements of this standard: electric shock hazards and arc flash hazards. A third category of hazard is a ~~thermal hazard related to the overheating of a conductor, circuit part, or other conductive object caused by electric current. This type of hazard is referred to but not specifically addressed~~ contact thermal hazard (see term and definition in Article 100). While this hazard is addressed by the requirements of this standard, it is not discussed in this informative annex.

Second Revision (SR)

See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.

Proposed Statement

Technical reason for revision.

In the third sentence of K.1, "annual" has be added before "average" for clarity.

The last paragraph of K.1 has been revised to correlate with the revisions to Chapter 3 regarding contact thermal hazards.

Parenthetical expressions have been either deleted or the associated text has been revised to incorporate the expression without use of parentheses per the NEC Style Manual.

Technical reason for rejecting or not making some of the proposed changes.

Proposed Response	
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes**.

Informative Annex K General Categories of Electrical Hazards

This informative annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

K.1 General.

Contact with or exposure to electricity continues to be one of the leading causes of workplace fatalities and injuries in the United States. Between 2011 and 2022, there were a total of 1,322 workplace fatalities involving electricity. According to the Occupational Safety and Health Administration (OSHA), an annual average of 113 Americans died in the workplace between 2011 and 2020 due to contact with electricity. Of these fatalities, 30 percent were in occupations that can be considered electrical occupations with employees who have received training on electrical safety and the relevant codes and standards of working around electricity. Seventy percent of the fatalities occurred in non-electrically related occupations. Working on or near energized equipment or parts was identified as the leading cause with 48 percent of the fatalities, closely followed by contact with overhead power lines with 41 percent. Electrical fatalities continue to stay consistent with an average 1.5 percent decrease in workplace electrical fatalities year over year. Electrical fatalities account for 6 percent of all workplace fatalities.

About 98 percent of fatal occupational electric injuries are electric shock injuries. A corporate case study examining electrical injury reporting and safety practices found that 40 percent of electrical incidents involved 250 volts or less and were indicative of a misperception of electrical safety as a high-voltage issue. In addition, electrical incidents once again were found to involve a large share of non-electrical workers, with approximately one-half of incidents involving workers from outside electrical crafts. Research of electrical fatalities in construction found that the highest proportion of fatalities occurred in establishments with 10 or fewer employees and pointed out that smaller employers could have fewer formal training requirements and less structured training in safety practices.

There are two general categories of electrical hazards addressed extensively by the requirements of this standard: electric shock hazards and arc flash hazards. Each of these hazards are discussed separately in this informative annex. A third category of hazard is a contact thermal hazard ~~related to the overheating of a conductor, circuit part, or other conductive object caused by electric current. This type of hazard is referred to but not specifically addressed by the requirements of this standard.~~associated with contact with the heat dissipated by a conductive object as it conducts current. A contact thermal hazard is not discussed in this informative annex.

K.2 Electric Shock.

Over 40 percent of all electrical fatalities in the US involved overhead power line contact. This includes overhead power line fatalities from direct contact by a worker, contact through hand-carried objects, and contact through machines and vehicles. Comparing the ratio of total electrical fatalities to total fatal and nonfatal electrical injuries ~~(fatal and nonfatal)~~, it was noticed that electrical injuries are more often fatal than many other injury categories. For example, from 2003 to 2009 there were 20,033 electrical injuries of which 1,573 were fatalities. One worker died for every 12.74 electrical injuries. For the same period there were 1,718,219 fall injuries of which 5,279 were fatalities — one worker died for every 325 injuries.

A more detailed look at the demographics for 168 electrical fatalities in 2009 showed that 99 percent of deaths were the result of electrocution, and 70 percent occurred while the worker was performing a constructing, repairing, or cleaning activity.

Shock injuries can be divided into the thermal effect of electric current on the human body and the effect of electric current on the body's nervous system. The thermal effect can result in skin burns that might require skin grafting and, if deep enough into subcutaneous tissue, might require amputation of the affected body part. The immediate effect on the nervous system can include loss of voluntary muscle control, asphyxiation, ventricular fibrillation, and cardiac arrest.

The long-term effects of shock injuries, known as electric shock sequela, are the topic of ongoing research. Sequela is an after-effect of a disease, condition, or injury; the plural is sequelae. These long-term effects can include psychological, neurological, and physical symptoms, which can occur and persist whether visible physical trauma occurred or not.

K.3 Arc Flash.

K.3.1 General.
In the recently issued 29 CFR Subpart V, OSHA identified 99 injuries that involved burns from arcs from energized equipment faults or failures, resulting in 21 fatalities and 94 hospitalized injuries for the period January 1991 through December 1998.

Based on this data, OSHA estimated that an average of at least eight burn injuries from arcs occur each year involving employees doing work covered by OSHA rules, leading to 12 nonfatal injuries and two fatalities per year. Of the reports indicating the extent of the burn injury, 75 percent reported third-degree burns.

During the period involved, federal OSHA only required nonfatal injuries to be reported when there were three or more workers hospitalized. OSHA found that there were six injuries for every fatality in California, which requires the reporting of every hospitalized injury.

Using that data, OSHA estimated that would be at least 36 injuries to every fatality, and probably many more. Also, many nonfatal electric shocks involve burns from associated electric arcs.

Since January 1, 2015, federal OSHA has required every hospitalized injury to be reported.

Four types of energies are released by an arcing event, each with different effects on the human body.

K.3.2 Thermal Energy.

The thermal energy developed by an arcing event is conveyed radiantly ~~(infrared energy)~~, convectively ~~(plasma and hot gases)~~, and conductively ~~(molten metal)~~ from the arc to a worker by means of infrared energy, plasma and hot gasses, and molten metal. Depending on the thermal density of this energy, skin burns can result from direct exposure to the arc thermal energy, and from clothing ignition and burning, which can transfer additional thermal energy to the skin. Internal burns can occur in the upper respiratory system such as the mouth, throat, and nose due to inhalation of hot gases produced by the arc plasma and hot gas, and by burning clothing.

The arc flash PPE requirements of this standard primarily address the thermal component of arc energy.

K.3.3 Mechanical Energy (Sudden Pressure Release).

At one time, it was proposed that the vaporization of copper or other metals by the arc produced life-threatening blast pressures. Recent research into arc blast phenomena does not support this theory. While it is true that copper expands several thousand times in volume when transitioning from metal to vapor, only a small amount of copper that is in or is immediately adjacent to the arc plasma stays in a vapor state. Beyond the plasma, the copper vapor drops below the vaporization temperature and condenses into molten copper or reacts chemically and becomes a copper compound.

Research has shown that what was considered to be arc blast pressure is primarily a function the instantaneous heating, expansion, and containment of the air surrounding the arc in an electrical equipment enclosure, which can cause the enclosure to fail. Enclosure failure can result in a sudden release of pressure and a mechanical transfer of energy caused by contact with ejected enclosure components.

Physical trauma can result from being struck by enclosure components. Most of the documented injuries have been from door ejections, broken parts of the equipment caused by the arcing event, and shattered insulators. Concussions and falls have also been recorded.

Research indicates that the pressures developed are substantially less than previously proposed, and that the pressure release is negligible for an open enclosure ~~(i.e., if the enclosure door is open)~~. Research has also shown that there is no correlation of pressure release to incident energy.

The release of mechanical energy should be considered in the risk assessment process. Protective measures could include operating equipment while standing

to the side of the equipment or use of remote racking or other measures to prevent “line-of-fire” injuries.

The release of mechanical energy is normally prevented by arc-resistant equipment as such equipment contains and redirects any pressure away from the worker, provided the equipment is in the arc-resistant configuration.

See Hoagland et al. (2017 and 2020) for more information on the release of mechanical energy caused by an electric arc.

K.3.4 Acoustic ~~(Sound)~~ Energy.

The instantaneous conversion of metals and gases to plasma can produce sound pressure levels in excess of 130 dB. According to the Centers for Disease Control and Prevention (CDC), an instantaneous sound pressure level of 120 dB or higher can cause immediate harm to hearing.

The acoustic energy component of arc energy is addressed to a limited extent by the requirement in this standard to use hearing protection when within the arc flash boundary. See Gordon et al., “Modeling the Conversion of Electrical Energy to Acoustic Energy for Arcs and Applications for the Selection of PPE” for more information on the release of acoustic energy caused by an electric arc.

K.3.5 Light Energy.

The name of the phenomenon, arc flash, came from the intense light produced by an electric arc. The light emitted by an arc contains intense levels in the infrared (IR), visible ~~(light)~~, and ultraviolet (UV) spectrums. These intense components impinging upon a worker and clothing are a significant portion of thermal injury discussed in K.3.2, for some cases up to 50 percent. Documented test research indicates that the light intensity produced by an arcing event depends on a variety of factors such as voltage, current, arc length, and current risetime.

Tests also indicate that the relative luminosity ~~(i.e.~~, the brightness that is observed by someone in front of the arcing event~~)~~, is affected by proximity to the arc, by the conductor configuration ~~(~~whether vertical or horizontal~~)~~, the arc length, and whether the arc is in an enclosure, and if so, the enclosure dimensions.

The light energy component of arc energy is not currently specifically addressed by the requirements of this standard. However, AR PPE clothing protects from the light, especially the UV. AR rated face shields and suit hoods are also rated to block the arc UV.

See Lee et al. (2015) and Rau et al. (2017) for more information on the release of light energy caused by an electric arc.

K.4 Other Information.

For additional information, the following documents are available:

Occupational Injuries From Electrical Shock and Arc Flash Events Final Report, Richard Campbell and David Dini, Fire Protection Research Foundation, Quincy, MA.
Occupational Electrical Injuries in the US, 2003–2009, by James Cawley and Brett C. Banner, ESFI.
Technical paper ESW 2012-24 presented at IEEE ESW conference, *Arc Flash Hazards, Incident Energy, PPE Ratings and Thermal Burn Injury — A Deeper Look*, by Tammy Gammon, Wei-Jen Lee, and Ben Johnson.
Technical Paper ESW 2015-17 presented at IEEE ESW conference, OSHA Subpart V, *Electric Power and Distribution*, April 11, 2014.
Hoagland, E. H., Maurice, C., Haines, A., and Maurice, A., "Arc Flash Pressure Measurement by the Physical Method, Effect of Metal Vapor on Arc Blast," *IEEE Transactions on Industry Applications*, 53(2): 1576–1582, 2017.
Hoagland, E. H., Maurice, C., Haines, A., and Maurice, A., "Arc Flash Pressure and Door Ejection Measurement," *IEEE Transactions on Industry Applications*, 56(4): 3297–3305, 2020.
Lee, W., Zhang, Z., Rau, S., Gammon, T., Johnson, B. C., and Beyreis, J., "Arc Flash Light Intensity Measurement System Design," *IEEE Transactions on Industry Applications*, 51(5): 4267–4274, 2015.
Rau, S., Zhang, Z., Lee, W., and Dini, D. A., "Arc Flash Visible Light Intensity as Viewed From Human Eyes," *IEEE Transactions on Industry Applications*, 53(5): 5068–5077, 2017.
Gordon, L. and Bradley, J., "Modeling the Conversion of Electrical Energy to Acoustic Energy for Arcs and Applications for the Selection of PPE," IEEE Paper No. ESW 2024-09 presented at the IEEE IAS Electrical Safety Workshop, Tucson, AZ, 2024.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
Annex L	72		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the text in L.1 (6) in Informative Annex L regarding "(or grounded)" that does not comply with the NEC Style Manual Section 3.5.1.1. Parenthetical expressions shall be avoided and revised to comply with the NEC Style Manual.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** The second sentence in L.1(6) has been revised to incorporate the parenthetical expression "(or grounded)" without the use of parentheses.		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		
	Revision must be shown in track changes.		

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**L.1 Application of Safeguards.** This informative annex provides a typical application of safeguards in electrolytic areas where electrical hazards exist. Take, for example, an employee working on an energized cell. The employee uses manual contact to make adjustments and repairs. Consequently, the exposed energized cell and grounded metal floor could present an electrical hazard. Safeguards for this employee can be provided in the following ways: 1. Protective boots can be worn that isolate the employee's feet from the floor and that provide a safeguard from the electrical hazard. 2. Protective gloves can be worn that isolate the employee's hands from the energized cell and that provide a safeguard. 3. If the work task causes severe deterioration, wear, or damage to personal protective equipment (PPE), the employee might have to wear both protective gloves and boots. 4. A permanent or temporary insulating surface can be provided for the employee to stand on to provide a safeguard. 5. The design of the installation can be modified to provide a conductive surface for the employee to stand on. If the conductive surface is bonded to the cell, a safeguard will be provided by voltage equalization. 6. Safe work practices can provide safeguards. If protective boots are worn, the employee should not make long reaches over energized ~~(or grounded)~~ surfaces such that his or her elbow bypasses the safeguard. If such movements are required, protective sleeves, protective mats, or special tools should be used. Training on the nature of electrical hazards and proper use and condition of safeguards is, in itself, a safeguard. 7. The energized cell can be temporarily bonded to ground.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
O.1	73		☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the numbering sequence since O.1 was deleted and renumber O.1.1 and O.1.2 in Informative Annex O. Consider adding titles in the subdivisions where appropriate for consistency throughout this annex.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.** Annex O has been editorially simplified into four first-level subdivisions as follows: Second-level subdivisions O.1.1, O.1.2, O.2.1 and O.2.2 have been eliminated as they are unnecessary.		

	Second-level subdivisions O.2.3 and O.2.4 have been revised to be first-level subdivisions O.3 and O.4 respectively.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**

O.1.1

This informative annex covers employee safety-related design concepts for electrical equipment and installations in workplaces covered by the scope of this standard. This informative annex discusses design considerations that have impact on the application of the safety-related work practices only.

O.1.2

This informative annex does not discuss specific design requirements. The facility owner or manager or the employer should choose design options that eliminate hazards or reduce risk and enhance the effectiveness of safety-related work practices.

Informative Annex O Employee Safety-Related Design Concepts

This informative annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

O.1 Introduction.

~~**O.1.1**~~

This informative annex covers employee safety-related design concepts for electrical equipment and installations in workplaces covered by the scope of this standard. This informative annex discusses design considerations that have impact on the application of the safety-related work practices only.

~~**O.1.2**~~

This informative annex does not discuss specific design requirements. The facility owner or manager or the employer should choose design options that eliminate hazards or reduce risk and enhance the effectiveness of safety-related work practices.

O.2 General Design Considerations.

~~**O.2.1**~~

Employers, facility owners, and managers who have responsibility for facilities and installations having electrical energy as a potential hazard to employees and other personnel should ensure that electrical hazard risk assessments are performed during the design of electrical systems and installations.

~~**O.2.2**~~

Design option decisions should facilitate the ability to eliminate hazards or reduce risk by doing the following:

(1) Reducing the likelihood of exposure

(2) Reducing the magnitude or severity of exposure

(3) Enabling achievement of an electrically safe work condition

O.~~2.~~3 Incident Energy Reduction Methods.

The following methods have proved to be effective in reducing incident energy:

(1) Zone-selective interlocking. This is a method that allows two or more circuit breakers to communicate with each other so that a short circuit or ground fault will be cleared by the breaker closest to the fault with no intentional delay. Clearing the fault in the shortest time aids in reducing the incident energy.

(2) Differential relaying. The concept of this protection method is that current flowing into protected equipment must equal the current out of the equipment. If these two currents are not equal, a fault must exist within the equipment, and the relaying can be set to operate for a fast interruption. Differential relaying uses current transformers located on the line and load sides of the protected equipment and fast acting relay.

(3) Energy-reducing maintenance switching with a local status indicator. An energy-reducing maintenance switch allows a worker to set a circuit breaker trip unit to operate faster while the worker is working within an arc flash boundary, as defined in NFPA 70E, and then to set the circuit breaker back to a normal setting after the work is complete.

(4) Energy-reducing active arc flash mitigation system. This system can reduce the arcing duration by creating a low impedance current path, located within a controlled compartment, to cause the arcing fault to transfer to the new current path, while the upstream breaker clears the circuit. The system works without compromising existing selective coordination in the electrical distribution system.

(5) Energy-reducing line side isolation. This is equipment that encloses the line side conductors and circuit parts and has been listed to provide both electric shock and arc flash protection from events on the line side of a circuit breaker or switch.

(6) Arc flash relay. An arc flash relay typically uses light sensors to detect the light produced by an arc flash event. Once a certain level of light is detected, the relay will issue a trip signal to an upstream overcurrent device.

(7) High-resistance grounding. A great majority of electrical faults are of the phase-to-ground type. High-resistance grounding will insert an impedance in the ground return path and will typically limit the fault current to 10 amperes and below (at 5 kV nominal or below), leaving insufficient fault energy and thereby helping reduce the arc flash hazard level. High-resistance grounding will not affect arc flash energy for line-to-line or line-to-line-to-line arcs.

(8) Current-limiting devices. Current-limiting protective devices reduce incident energy by clearing the fault faster and by reducing the current seen at the arc source. The energy reduction becomes effective for current above the current-limiting threshold of the current-limiting fuse or current limiting circuit breaker.

(9) Shunt-trip. Adding a shunt-trip that is signaled to open from an open-fuse relay to switches 800 amperes and greater reduces incident energy by opening the switch immediately when the first fuse opens. The reduced clearing time reduces incident energy. This is especially helpful for arcing currents that are not within the current-limiting threshold of the three current-limiting fuses.

O.~~2.~~4 Additional Safety-by-Design Methods.

The following methods have proven to be effective in reducing risk associated with an arc flash or electric shock hazard:

(1) Installing finger-safe components, covers, and insulating barriers reduces exposure to energized parts.

(2) Installing disconnects within sight of each motor or driven machine increases the likelihood that the equipment will be put into an electrically safe work condition before work has begun.

	(3) Installing current limiting cable limiters can help reduce incident energy. Additionally, cable limiters can be used to provide short-circuit protection (and therefore incident energy reduction) for feeder tap conductors that are protected at up to 10 times their ampacity, a situation where the tap conductor can easily vaporize. (4) Installing inspection windows for noncontact inspection reduces the need to open doors or remove covers. (5) Installing a single service fused disconnect switch or circuit breaker provides protection for buses that would be unprotected if six disconnect switches are used. (6) Installing metering to provide remote monitoring of voltage and current levels reduces exposure to electrical hazards by placing the worker farther away from the hazard. (7) Installing Type 2 "no damage" current limiting protection to motor controllers reduces incident energy whenever the arcing current is within the current limiting threshold of the current-limiting fuse or current-limiting circuit breaker. (8) Installing adjustable instantaneous trip protective devices and lowering the trip settings can reduce the incident energy. (9) Installing arc-resistant equipment, designed to divert hot gases, plasma, and other products of an arc-flash out of the enclosure so that a worker is not exposed when standing in front of the equipment with all doors and covers closed and latched, reduces the risk of arc flash exposure. (10) Installing provisions that provide remote racking of equipment, such as remote-controlled motorized remote racking of a circuit breaker or an MCC bucket, allows the worker to be located outside the arc-flash boundary. An extended length hand-operated racking tool also adds distance between the worker and the equipment, reducing the worker's exposure. (11) Installing provisions that provide remote opening and closing of circuit breakers and switches could permit workers to operate the equipment from a safe distance, outside the arc flash boundary. (12) Class C, D, and E special purpose ground fault circuit interrupters exist for circuits operating at voltages outside the range for Class A GFCI protection. See UL 943C for additional information. (13) Installing high-impedance protected test points for voltage measurement through door.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.1	CSR	This revision is in regards to PC 33. We will need this if we continue to reject the recommendations in H.4.1.	☒ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the numbering sequence since O.1 was deleted and renumber O.1.1 and O.1.2 in Informative Annex O. Consider adding titles in the subdivisions where appropriate for consistency throughout this annex.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
	Technical reason for revision.		

Proposed Statement	The term “appropriate” is changed to “applicable” to comply with Section 3.2.1 of the NEC Style Manual Section on unenforceable or vague terms.
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete for a reject**	**Revision must be shown in track changes.**
	H.4.1 Introduction. Section 130.7(C)(14) requires personal protective equipment (PPE) provided by a supplier or manufacturer to conform to ~~appropriate~~ applicable product standards by one of three methods. Additional information for these conformity assessment methods can be found within ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment. ANSI/ISEA 125 establishes criteria for conformity assessment of safety and PPE that is sold with claims of compliance with product performance standards. ANSI/ISEA 125 contains provisions for data collection, product verification, conformation of quality and manufacturing production control, and roles and responsibilities of suppliers, testing organizations, and third-party certification organizations. H.4.2 Level of Conformity. ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, provides for three different levels of conformity assessment: Level 1, Level 2, and Level 3. Level 1 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed. A supplier Declaration of Conformity for each product is required to be made available for examination upon request. Level 2 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed, the supplier or manufacturer has a registered ISO 9001 (Quality management systems) quality management system or equivalent quality management system, and all testing has been carried out by an ISO 17025, General requirements for the competence of testing and calibration laboratories, accredited testing laboratory. A supplier Declaration of Conformity for each product is required to be made available for examination upon request. Level 3 conformity is where the products are certified by an ISO 17065, Conformity assessment — Requirements for bodies certifying products, processes and services, accredited independent third-party certification organization (CO). All product testing is directed by the CO, and all changes to the product must be reviewed and retested if necessary. Compliant products are issued a Declaration of Conformity by the CO and products are marked with the CO’s mark or label.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.1	33 (cont)	TG 2 is responsible for PC.	☐ Create Second Revision ☐ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. The Correlating Committee requests that the Technical Committee review the term "appropriate" in context, and if the resulting requirement is unenforceable or vague, the term shall not be used. See the NEC Style Manual Section 3.2.1 on unenforceable terms. This term is used in the following sections including but not limited to: 110.3(A),1 110.3(L) (2)(b), 110.4(A)(1)(c)(4)d, 110.4(A)(1)(e), 130.5(C)(2)(1), 130.7(C)(14)(b) Informational Note No. 1, 130.7(C)(14)(c)(4), 330.4, 320.3, 320.4(B)(3)(4), 360.4(C)(2)(4) Informational Note No. 1, 380.2(B)(4),(1),(2) and (3), 380.3(C)(1), 390.2.		
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided.**		
Proposed Statement	**Technical reason for revision.**		
Proposed Response	**Technical reason for rejecting or not making some of the proposed changes.**		

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.1	81	Alternative SR if 130.7(C)(14)(b) is revised. It will be worked, if necessary, at the full meeting.	☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. H.4.1 Introduction. Section 130.7(C)(14) requires personal protective equipment (PPE) provided by a supplier or manufacturer to conform to appropriate product standards ~~by one of three methods. Additional information for these conformity assessment methods can be found within ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*. ANSI/ISEA 125 establishes criteria for conformity assessment of safety and PPE that is sold with claims of compliance with product performance standards. ANSI/ISEA 125 contains provisions for data collection, product verification, conformation of quality and manufacturing production control, and roles and responsibilities of suppliers, testing organizations, and third-party certification organizations.~~ H.4.2 ~~Level of~~ Conformity. ~~ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, provides for three different levels of conformity assessment: Level 1, Level 2, and Level 3.~~ ~~Level 1 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed. A supplier Declaration of Conformity for each product is required to be made available for examination upon request.~~		

	~~Level 2 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed, the supplier or manufacturer has a registered ISO 9001 (*Quality management systems*) quality management system or equivalent quality management system, and all testing has been carried out by an ISO 17025, *General requirements for the competence of testing and calibration laboratories*, accredited testing laboratory. A supplier Declaration of Conformity for each product is required to be made available for examination upon request.~~ ~~Level 3 conformity is where the~~ Conformity products are certified by an ISO 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*, accredited independent third-party certification organization (CO). All product testing is directed by the CO, and all changes to the product must be reviewed and retested if necessary. Compliant products are issued a Declaration of Conformity by the CO and products are marked with the CO's mark or label.
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
	H.4.1 is revised from "appropriate product standards" to "applicable product standards" to avoid the use of vague and unenforceable terms and to align with 130.7(C)(14)(b).
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	Revision must be shown in track changes.

Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	H.4.1 Introduction. Section 130.7(C)(14) requires personal protective equipment (PPE) provided by a supplier or manufacturer to conform to ~~appropriate~~ applicable product standards by one of ~~three~~ two methods. Additional information for these conformity assessment methods can be found within ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment. ANSI/ISEA 125 establishes criteria for conformity assessment of safety and PPE that is sold with claims of compliance with product performance standards. ANSI/ISEA 125 contains provisions for data collection, product verification, conformation of quality and manufacturing production control, and roles and responsibilities of suppliers, testing organizations, and third-party certification organizations. H.4.2 Level of Conformity. ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, provides for three different levels of conformity assessment: Level 1, Level 2, and Level 3. Only Level 2 and Level 3 are recognized in 130.7(C)(14)(b). Level 1 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed. A supplier Declaration of Conformity for each product is required to be made available for examination upon request. Level 2 conformity is where the supplier or manufacturer is making a self-declaration that a product meets all of the requirements of the standard(s) to which conformance is claimed, the supplier or manufacturer has a registered ISO 9001 (Quality management systems) quality management system or equivalent quality management system, and all testing has been carried out by an ISO 17025, General requirements for the competence of testing and calibration laboratories, accredited testing laboratory. A supplier Declaration of Conformity for each product is required to be made available for examination upon request. Level 3 conformity is where the products are certified by an ISO 17065, Conformity assessment — Requirements for bodies certifying products, processes and services, accredited independent third-party certification organization (CO). All product testing is directed by the CO, and all changes to the product must be reviewed and retested if necessary. Compliant products are issued a Declaration of Conformity by the CO and products are marked with the CO's mark or label.

Section	This Public Comment	Add other PCs included with this revision/reject (CART)	MOTION
H.4.3	82	Alternative SR	☐ Create Second Revision ☒ Reject
Proposed Text (from PC)	**DO NOT REVISE THIS TEXT.** Revisions must be in the second revision text field (grey) below. ~~H.4.3 Equivalence.~~		

	~~While there are three levels of conformity assessment described in ANSI/ISEA 125, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*, the levels are not to be considered as equivalent. Users are cautioned that the level of rigor required to demonstrate conformity should be based on the potential safety and health consequence of using a product that does not meet a stated performance standard. A higher potential safety and health consequence associated with the use of a noncompliant product should necessitate a higher level of conformity assessment.~~
Second Revision (SR)	**See below for revised text. Only use the revision field at the end of this table for any changes to the section provided**.
Statement	**Technical reason for revision.**
Response	**Technical reason for rejecting or not making some of the proposed changes.**
	The proposed deletion of text in H.4.3 is not accepted in order to align with the requirements in 130.7(C)(14).
Proposed Second Revision Text (SR) Clean first revision text is provided to be revised. **Do not delete**	**Revision must be shown in track changes**.
	H.4.3 Equivalence. While there are three levels of conformity assessment described in ANSI/ISEA 125, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, the levels are not to be considered as equivalent. Users are cautioned that the level of rigor required to demonstrate conformity should be based on the potential safety and health consequence of using a product that does not meet a stated performance standard. A higher potential safety and health consequence associated with the use of a noncompliant product should necessitate a higher level of conformity assessment.