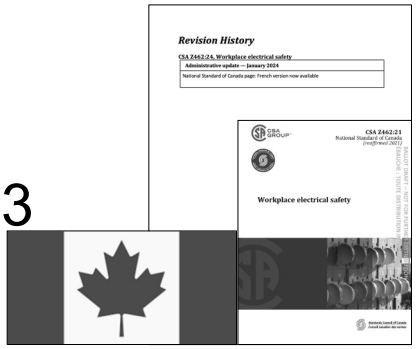
TW BECKER
ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition / CSA Z462 2024 Edition Changes & Updates

Webinar
July 19, 2023



1

TW BECKER
ELECTRICAL SAFETY CONSULTING

Who am I? www.twbesc.ca Check my LinkedIn Profile

- Terry Becker, P.Eng., CESCP, IEEE Senior Member.
- 31 Years experience in Electrical Engineering.
- Mobil Oil, DPH, PanCanadian Energy, EnCana, ESPS, Danatec, TW Becker Electrical Safety Consulting Inc..
- CSA Z462 Workplace electrical safety Standard, First-Past Vice Chair, Voting Member, Clause 4.1 & Annexes WG Leader.
- CSA Z463 Maintenance of electrical systems Standard, Founding Member, Voting Member [Canadian version of NFPA 70B].
- IEEE 1584 Guide for Arc Flash Hazard Calculations Standard. Voting Member. [Also IEEE 1584.1 Sub-Committee]
- 16 years specifically devoted to Electrical Safety Consulting.

2

TW BECKER ELECTRICAL SAFETY CONSULTING

Who am I? www.twbesc.ca Check my LinkedIn Profile

- Implement External Electrical Safety Audits.
- Develop and implement Electrical Safety Programs.
- Develop and provide Electrical Safety Program Roll Out Orientation Training.
- SME and visionary of Electrical Safety Training System (ESTS) e-Learning.
- Develop and deliver 1 & 2 Day Low Voltage & High Voltage Arc Flash & Shock Training.
- Presented at Conferences and Workshops in Canada, USA, Australia, Italy and India on Electrical Safety, CSA Z462 and NFPA 70E.

3

TW BECKER ELECTRICAL SAFETY CONSULTING

Disclaimer

- The information presented is the technical seminar is the opinion and interpretation of the information presented by TW Becker Electrical Safety Consulting Inc., and Terry Becker, P.Eng.. CESCP, IEEE Senior Member.
- TW Becker Electrical Safety Consulting Inc. and Terry Becker, P.Eng. accept no liability for the information provided.
- You are advised to consult the NFPA and the published 2024 Edition of NFPA 70E for specific formal interpretation.
- You are advised to consult CSA Group and the published 2024 Edition of CSA Z462 when it publishes (January 2024) for specific formal interpretation.

4

TW BECKER ELECTRICAL SAFETY CONSULTING Disclaimer

- Not all potential changes will be reviewed.
- Information on the changes with respect to NFPA 70E 2024 Editions can be reviewed in a copy of NFPA 70E. You can consult NFPA's website for specifc First Revision and Second Revision reports and information provided.
- You can purchase a hard copy of NFPA 70E 2024 Edition from NFPA:
- https://catalog.nfpa.org
- You can access a free online review copy of NFPA 70E 2024 Edition:
- https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70E

5

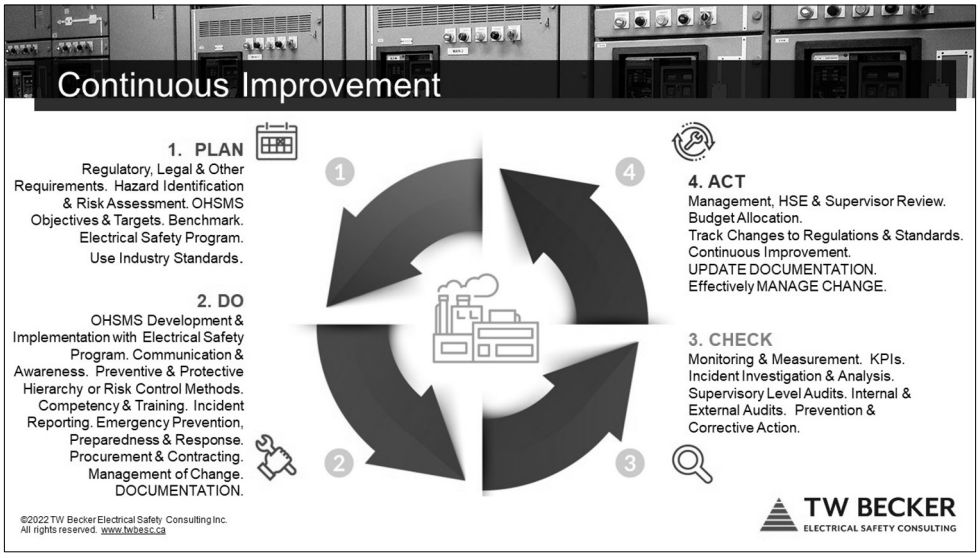
TW BECKER ELECTRICAL SAFETY CONSULTING Disclaimer

- CSA Z462 2024 Edition Public Review open until July 31, 2023.
- https://publicreview.csa.ca/Home/Search

6

TW BECKER
ELECTRICAL SAFETY CONSULTING

Opening Statement



7

TW BECKER
ELECTRICAL SAFETY CONSULTING

Opening Statement

8

TW BECKER
ELECTRICAL SAFETY CONSULTING

Opening Statement

TW BECKER
ELECTRICAL SAFETY CONSULTING

Agenda

- Introduction.
- Introduction to NFPA 70E, NFPA.
- Introduction to CSA Z462, CSA Group.
- Interpretation and Application.
- Technical Harmonization.
- NFPA 70E 2024 Edition Changes & Updates.
- CSA Z462 2024 Expected Changes & Updates.
- Arc Flash & Shock Equipment Labeling.
- Conclusion.
- Questions.

TW BECKER ELECTRICAL SAFETY CONSULTING

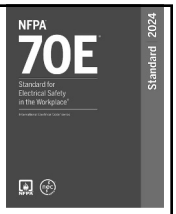
Introduction

- Historically CSA Z462 has been technical harmonized with NFPA 70E.
- The 2024 Editions of NFPA 70E and CSA Z462 will have significant technical divergence.
- CSA Z462 2024 Edition will include changes that will not be included in NFPA 70E.
- Users of NFPA 70E should be aware and may consider the CSA Z462 2024 Edition changes valuable when developing and implementing an Electrical Safety Program.

11

TW BECKER ELECTRICAL SAFETY CONSULTING

Introduction NFPA 70E

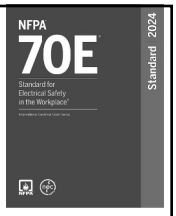


- Public may not be aware of the processes followed.
- NFPA 70E first published in 1979.
- 1979, NFPA 70E Standard for Electrical Safety Requirements for Employee Workplaces.
- 2004, NFPA 70E Standard for Electrical Safety in the Workplace title change (IEEE 1584 published 2002).
- 2024 published early, May 13, 2023, is the 13th Edition of NFPA 70E.

12

TW BECKER ELECTRICAL SAFETY CONSULTING

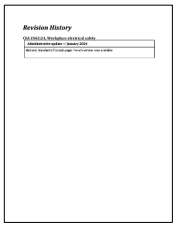
Introduction NFPA 70E



- NFPA 70E 2024 Edition revision cycle:
  - 357 Public Inputs.
  - 166 First Revisions.
  - 168 Public Comments.
  - 73 Second Revisions.
- **GOOD NEWS! The 2024 Edition doesn't include substantial technical changes. Significant changes with content on electrical hazard classification, Chapter 3 submitted by USA DOE.**

TW BECKER ELECTRICAL SAFETY CONSULTING

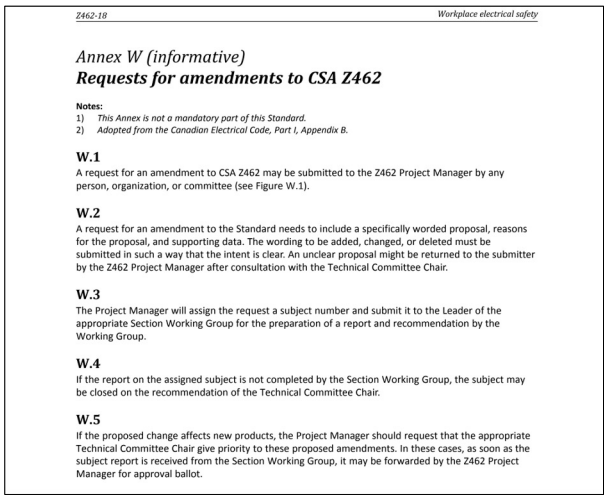
Introduction CSA Z462



- NFPA & CSA sign MOU in 2005.
- Harmonization of Standards for North America.
- NFPA 70E selected.
- CSA Z462 Workplace electrical safety, Technical Committee constituted 2006.
- CSA Z462 1st Edition, December 2008 (70E, 2009).
- CSA Z462, 2012, 2nd Edition some additional Annexes e.g. Annex A Aligning Implementation of this Standard with Occupational Health and Safety Management Standards, Annex Q Equipment Labeling.
- CSA Z462, 2015, 3rd Edition.
- CSA Z462, 2018, 4th Edition.
- CSA Z462, 2021, 5th Edition.
- **CSA Z462, 2024, 6th Edition, Significant Technical Divergence.**

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Group – Request For Amendments Process



Z462-18 Workplace electrical safety

Annex W (informative)
Requests for amendments to CSA Z462

Notes:
1) *This Annex is not a mandatory part of this Standard.*
2) *Adopted from the Canadian Electrical Code, Part I, Appendix B.*

W.1
A request for an amendment to CSA Z462 may be submitted to the Z462 Project Manager by any person, organization, or committee (see Figure W.1).

W.2
A request for an amendment to the Standard needs to include a specifically worded proposal, reasons for the proposal, and supporting data. The wording to be added, changed, or deleted must be submitted in such a way that the intent is clear. An unclear proposal might be returned to the submitter by the Z462 Project Manager after consultation with the Technical Committee Chair.

W.3
The Project Manager will assign the request a subject number and submit it to the Leader of the appropriate Section Working Group for the preparation of a report and recommendation by the Working Group.

W.4
If the report on the assigned subject is not completed by the Section Working Group, the subject may be closed on the recommendation of the Technical Committee Chair.

W.5
If the proposed change affects new products, the Project Manager should request that the appropriate Technical Committee Chair give priority to these proposed amendments. In these cases, as soon as the subject report is received from the Section Working Group, it may be forwarded by the Z462 Project Manager for approval ballot.

- Formal process.
- Not as structured as NFPA 70E process, website.
- All “Requests for Amendments” reviewed by CSA Z462 Technical Committee.
- Review NFPA 70E Public Comments for inclusion.

TW BECKER ELECTRICAL SAFETY CONSULTING

Interpretation & Application

- NFPA 70E and CSA Z462 are NOT adopted into OHSA or OH&S Regulations.
- Industry accepted best practices Standard. Benchmarking.
- Due diligence approach for application.
- Interpretation important.
- **Requires Electrical Safety Program to be developed and implemented.**
- Policy, elimination. Establish and Electrically Safe Work Condition (LOTO).
- Justification for energized electrical work.

TW BECKER
ELECTRICAL SAFETY CONSULTING

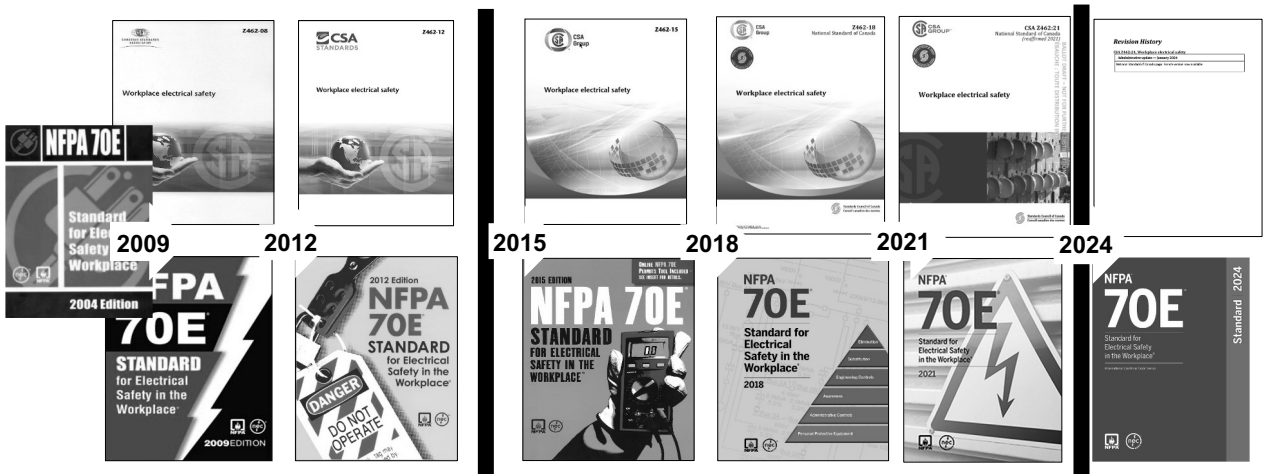
Interpretation & Application

- **Requires Electrical Safety Program to be developed and implemented.**
- Risk Assessment Procedure.
  - Hierarchy or Risk Control Methods.
  - Human Performance/Error.
- Normal Operating/Equipment Condition.
- Energized Electrical Job Safety Plan documented.
- Work task based.
- Qualified Person.
- Energized Electrical Work Permit Policy.
- Shock and Arc Flash Risk Assessments, risk assessment processes. ”Additional Protective Measures.”
- Arc Flash & Shock PPE, Tools & Equipment.
- Maintenance Requirements (recommended referencing NFPA 70B, 2023 now a Standard).
- Special Equipment.

17

TW BECKER
ELECTRICAL SAFETY CONSULTING

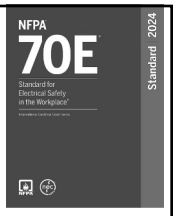
Technical Harmonization



18

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

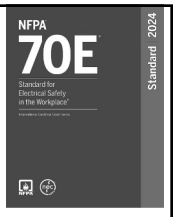


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- Global change: “shock” to “electric shock.”
- Global change: “leather protectors” to “protectors” (other gloves now approved for use).
- USA DOE Public Comments accepted related to Chapter 3 Safety Requirements for Special Equipment electrical hazard classification: batteries, lasers, power electronics.
  - Most significant changes related to this.

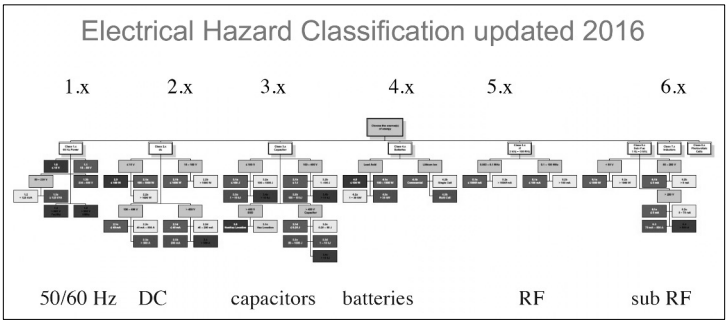
19

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



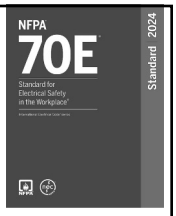
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- USA DOE Public Comments accepted related to Chapter 3 Safety Requirements for Special Equipment electrical hazard classification: batteries, lasers, power electronics.



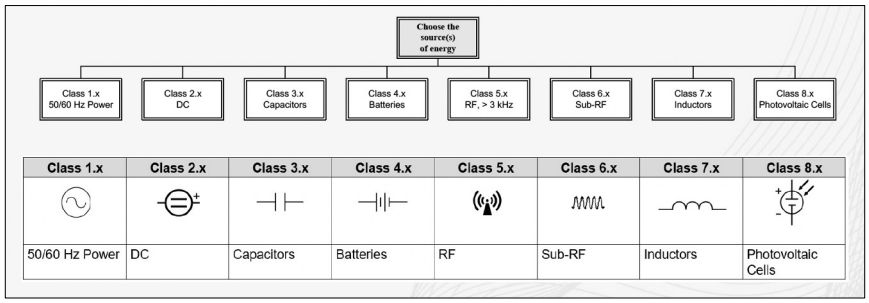
20

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

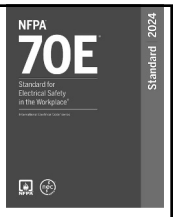


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- USA DOE Public Comments accepted related to Chapter 3 Safety Requirements for Special Equipment electrical hazard classification: batteries, lasers, power electronics.

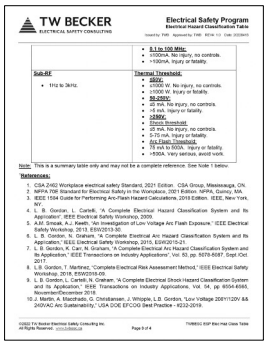


TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

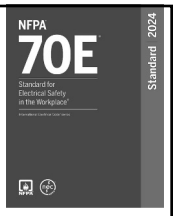


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- TWBESC Electrical Hazard Classification Table, summary information.



TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

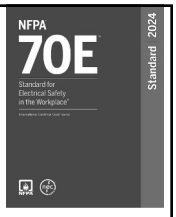


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Scope updated [article number in parentheses following the definition indicates that the definition only applies to that article (e.g. need to different some definitions for capacitors to generic arc flash hazard definitions, (360)).
- Added definitions related to Chapter 3 content e.g. Article 360 Safety-Related Requirements for Capacitors.

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

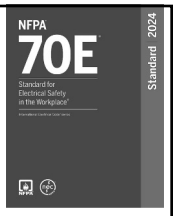


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Authorized Personnel (320).
- Battery (320).
- Battery Effect (310).
- Battery Room (320).
- Boundary, Hearing Protection (360).
- Boundary, Lung Protection (360).

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



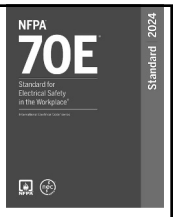
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Cell (320).
- Cell, VLRA (320).
- Cell, Vented (320).
- Charge Transfer (360).
- Competent Person (350).
- Dielectric Absorption (360).

25

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



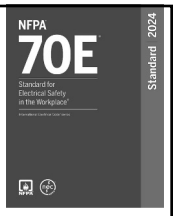
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Discharge Time (360).
- Electrolyte (320).
- Field Evaluated (330, 350).
- Ground Stick (360).
- Grounding, Hard (360).
- Grounding, Soft (360).

26

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



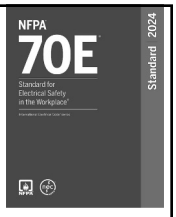
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Hazard, Arc Blast (as applied to capacitors) (Arc Blast Hazard) (360).
- Laboratory (350).
- Laser (330).
- Laser Energy Source (330).
- Laser Radiation (330).
- Laser System (330).

27

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



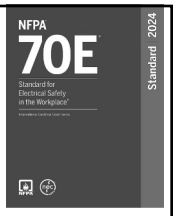
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Pilot Cell (320).
- Protective Barrier (330).
- Protector (was “leather protector” related to rubber insulating gloves).
- Radiation, Ionizing (340).
- Radiation, Non-Ionizing (340).

28

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

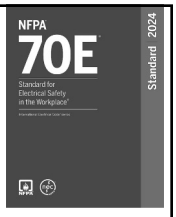


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 100 Definitions:
- Research and Development (R&D) (350).
- Resistor, Bleeder (360).
- Safeguarding (310).
- Short Circuit Current Prospective (320).
- Time Constant (360).
- Voltage, Nominal (as applied to a cell or battery) (320).

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

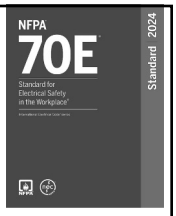


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 110 General Requirements Electrical Safety-Related Work Practices:
- Policy, updated “An employer shall establish, document and implement an electrically safe work condition policy that does both of the following:”
  - “Requires hazard elimination to be the first priority in the implementation of safety-related work practices.
  - Complies with 110.2(B) (Electrically Safe Work Condition).”
  - Informative notes minor updates.

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

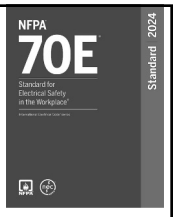


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- Chapter 1, Article 110 General Requirements Electrical Safety-Related Work Practices:
- Job Safety Planning.
  - Added requirement to document Emergency Response Plan.

31

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

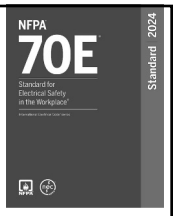


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- Chapter 1, Article 120 Establishing an Electrically Safe Work Condition:
- In the 8-step procedure, Step 7 wording change “Use an adequately rated portable test instrument to test each phase conductor or circuit point at each point of work to test for absence of voltage.

32

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

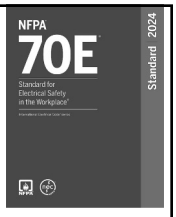


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 130 Work Involving Electrical Hazards:
- Table 130.5(C) updated Informational Notes 1 through 6.
- Incident Energy Analysis Method, Information 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 change to protective settings."
- Equipment Labelling:
  - "The label shall be of sufficient durability to withstand the environment involved."
- Hearing Protection:
  - "Employees inside the arc flash boundary shall wear hearing protection."

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

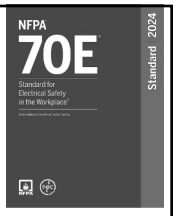


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 130 Work Involving Electrical Hazards:
- Updates to Shock Protection Approach Boundary Tables 130.4 (E)(a) and 130.4(E)(b), changed reference from IEEE 4 and IEEE 516 to OSHA 29 CFR 1910.269, Table R-6 for Column 4.
  - E.g. new 751V to 5kV added.
- Reference updates to Annex C Limits of Approach, C.2.1 General Statement, air insulation distances based on OSHA 29 CFR 1910.269, Table R-3.

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



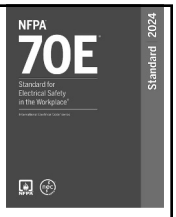
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 130 Work Involving Electrical Hazards:
- Foot Protection:
  - Electrical hazard (EH) footwear can provide secondary source of electric shock protection under dry conditions.
- Arc Flash PPE Category Method:
  - "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."

35

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



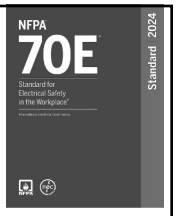
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Chapter 1, Article 130 Work Involving Electrical Hazards:
- **SIGNIFCANT CHANGE, DC abnormal arcing fault sustainability:**
- New data, cannot sustain for 125VDC, unless 17kA.
- Table 130.7(C)(15)(b), New Informational Note:
  - Was two rows, not a single row.
  - OLD (two rows): ≥100V ≤250V and >250V ≤600V.
  - NEW (single row): >150 and ≤600VDC.
  - "Informational Note: "See the following references for dc voltages below 150 volts nominal." New research.

36

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

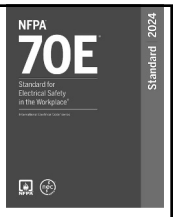


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- Chapter 2 Safety-Related Maintenance Requirements:
- NFPA 70B Recommended Practice for Electrical Equipment Maintenance updated and publish as NFPA 70B Standard for Electrical Equipment Maintenance.
- Major rewrite.
- "Maintenance for Safety."

37

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition

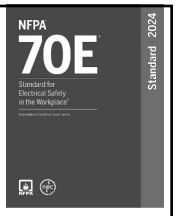


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- Chapter 3 Safety Requirements for Special Equipment:
- Major content updates based on USA DOE Public Comments with respect to electrical hazard classification.
- Most of new definitions relate to the changes in Chapter 3.

38

TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



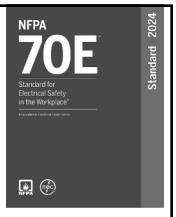
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.

- Annexes:
- Annex A – Informative Publications, minor revisions.
- Annex C – Limits of Approach, C.2.1 updated to reference OSHA 29 CFR 1910.269, Table R-6 instead of IEEE 4 and IEEE 516 (depending on nominal high voltage)
  - Updates to Tables 130.4(E)(a) and 130.4(E)(b).
- NEW Annex S – Assessing the Condition of Maintenance

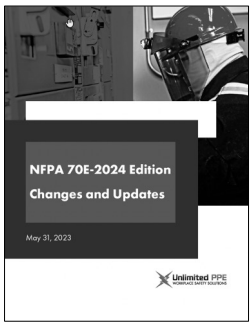
39

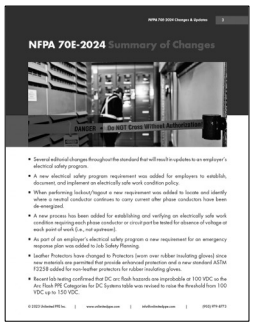
TW BECKER ELECTRICAL SAFETY CONSULTING

NFPA 70E 2024 Edition



- Reference NFPA 70E – 2024 Edition Changes & Updates document from Unlimited PPE (www.unlimitedppe.com).
- Jim Pollard, CESCP and Cindy Tedd.

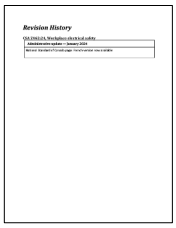




40

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition



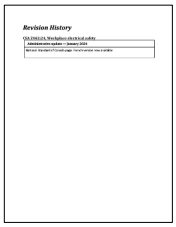
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**
- **Single most significant change:**

- **Deleting the term "arc flash PPE category."**
- Renaming tables to "arc flash PPE table selection method."
- No reference to CAT #, deletes the incorrect reference of arc flash PPE by an HRC #, CAT #, Level "letter" etc..
- All arc flash PPE selected based on its' ATPV.
- Two arc-rated arc flash PPE levels for incident energy analysis or when using the "arc flash PPE table selection method." ATPV.

41

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition



- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**
- **Single most significant change:**

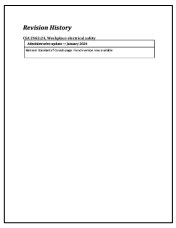
Arc Flash PPE Category #	Arc-rating of Arc Flash PPE (ATPV)
1	Minimum 4 cal/cm^2, ESP Level 1 everyday wear/task wear arc flash PPE.
2	Minimum 8 cal/cm^2, ESP Level 1 everyday wear/task wear arc flash PPE.
3	Minimum 25 cal/cm^2, ESP Level 2 arc flash suit.
4	Minimum 40 cal/cm^2, ESP Level 2 arc flash suit.
5	Minimum 75 cal/cm^2, ESP Level 2 arc flash suit. Note arc flash suits are available with an ATPV of 140 cal/cm^2.

CSA Z462, 2021 Edition added Cat 5 related to LV SWGR, IEEE 1584 2018 Edition. NOT in NFPA 70E.

42

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition


Revision History

- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**
- **Single most significant change (is NFPA 70E Table 130.5(G):**

Table 23
Selection of arc-rated clothing and other PPE when the incident energy analysis method or an arc flash PPE selection table method is used
(See Clauses 4.3.5.6.2 and Q.4.)

Incident energy exposures equal to 1.2 cal/cm² (5 J/cm²) up to and including 12 cal/cm² (50 J/cm²)
Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy*
• Arc-rated long-sleeve shirt and pants or arc-rated coverall or arc flash suit (SR)
• Arc-rated faceshield and arc-rated balaclava or arc flash suit hood (SR) †
• Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner, high-visibility apparel) (AN)‡
Heavy duty leather gloves, arc-rated gloves or rubber insulating gloves with leather protectors (SR) §
Hard hat
Safety glasses or safety goggles (SR)
Hearing protection
Leather footwear**
Incident energy exposures greater than 12 cal/cm² (50 J/cm²)
Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy *

43

TW BECKER ELECTRICAL SAFETY CONSULTING

Arc Flash PPE Arc-Rating Arc Thermal Performance Value

130.6 ARTICLE 130 — WORK INVOLVING ELECTRICAL HAZARDS

N **Table 130.5(G) Selection of Arc-Rated Clothing and Other PPE When the Incident Energy Analysis Method Is Used**

Incident energy exposures equal to 1.2 cal/cm² up to 12 cal/cm²
Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy[a]
Long-sleeve shirt and pants or coverall or arc flash suit (SR)
Arc-rated face shield and arc-rated balaclava or arc flash suit hood (SR)[b]
Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner) (AN)
Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with leather protectors (SR)[c]
Hard hat
Safety glasses or safety goggles (SR)
Hearing protection
Leather footw
Incident energ
Arc-rated clot
Long-sleeve sh
Arc-rated arc f
Arc-rated oute
Arc-rated glov
Hard hat
Safety glasses
Hearing prote
Leather footw

SR: Selection o
AN: As needed.
[a]Arc ratings car
a multi-layer sy
suit.
[b]Face shields wi
by 130.7(C)(10
hood shall be r
[c]Rubber insulating gloves with leather protectors provide arc flash protection in addition to shock protection. Higher class rubber insulating gloves with leather protectors, due to their increased material thickness, provide increased arc flash protection.

CSA Z462 2024 is deleting the term "arc flash PPE category."

Table 2
Selection of arc-rated clothing and other PPE when the incident energy analysis method or an arc flash PPE selection table method is used
(See Clauses 4.3.5.6.2 and Q.4.)

Incident energy exposures equal to 1.2 cal/cm² (5 J/cm²) up to and including 12 cal/cm² (50 J/cm²)
Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy*
• Arc-rated long-sleeve shirt and pants or arc-rated coverall or arc flash suit (SR)
• Arc-rated face shield and arc-rated balaclava or arc flash suit hood (SR) †
• Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner, high-visibility apparel) (AN)‡
Heavy duty leather gloves, arc-rated gloves or rubber insulating gloves with protectors (SR) §
Hard hat
Safety glasses or safety goggles (SR)
Hearing protection
Leather footwear**
Incident energy exposures greater than 12 cal/cm² (50 J/cm²)
Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy *
• Arc-rated long-sleeve shirt and pants or arc-rated coverall or arc flash suit (SR)
• Arc-rated arc flash suit hood
• Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner, high-visibility apparel) (AN)‡
Arc-rated gloves or rubber insulating gloves with protectors (SR)§
Hard hat
Safety glasses or safety goggles (SR)
Hearing protection
Leather footwear**

44

TW BECKER ELECTRICAL SAFETY CONSULTING

Arc Flash PPE Two ATPV Levels

1.2 – 12.0 cal/cm^2 Arc Thermal Performance Value

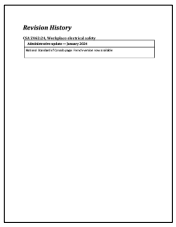
> 12.0 to 140 cal/cm^2 Arc Thermal Performance Value

Photo Credit Oberon Company

45

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition

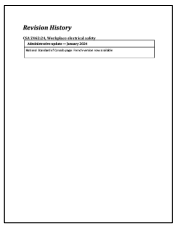


- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**
- Clause 4.1 deleted descriptive justifications and replaced with “demonstrate that it is not practicable.”
- Clause 4.1 Normal Equipment Condition is an element of the Risk Assessment Procedure.
- Clause 4.3 Energized Electrical Work Permit, for Part II deleted detailed list of content, replace with content documented on Energized Electrical Job Safety Planning form.

46

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition


Revision History

- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**
- Clause 4.3 Added additional exemptions for the Energized Electrical Work Permit (e.g. due to equipment design, isolation related).

4.3.2.3 Exemptions to work permit

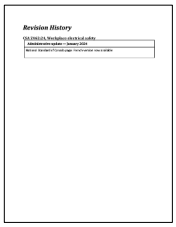
Electrical work may be performed without an energized electrical work permit if a qualified person is provided with and uses appropriate safe work practices and PPE in accordance with Clause 4 under any of the following conditions:

a) testing, troubleshooting, or voltage or current measuring;
b) thermography, ultrasound, or visual inspections if the restricted approach boundary is not crossed;
c) normal operation of electrical equipment;
d) access and egress to an area with energized electrical equipment if no electrical work is performed and the restricted approach boundary is not crossed; ~~and~~
ed) general housekeeping and miscellaneous non-electrical tasks if the restricted approach boundary is not crossed;
f) performance of tasks that do not involve repairs, modifications, or any alterations of the electrical equipment;
g) performance of tasks involved in establishing an electrically safe work condition, including the verifying absence of voltage and the installation of temporary protective grounding equipment; and
h) opening hinged covers for the purposes of inspection provided the restricted approach boundary is not crossed.

47

TW BECKER ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition


Revision History

- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**
- Clause 4.3 arc flash risk assessment, moved Table 2 (NFPA 70E, Table 130.5(C) to Annex F, new Table F.2).

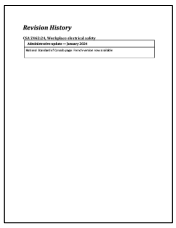
~~**Table 2**~~
~~**Estimate of the likelihood of occurrence of an arc flash incident for ac and dc systems**~~
~~(See Clauses 3, 4.1.7.8.4, and 4.3.5.3.)~~

Task	Equipment condition*	Likelihood of occurrence†
~~Reading a panel meter while operating a meter switch.~~	Any	No
~~Performing infrared thermography and other non-contact 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 V ac or dc, or below without any other exposed energized equipment over nominal 125 V 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.~~		
~~For ac systems, work on energized electrical conductors and circuit parts, including electrical testing.~~		

48

TW BECKER
ELECTRICAL SAFETY CONSULTING

CSA Z462 2024 Edition



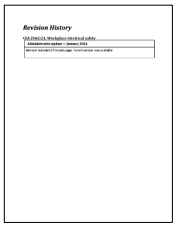
- NOT ALL POTENTIAL CHANGES WILL BE REVIEWED.
- **Significant Divergence with NFPA 70E, 2024 Edition.**

- CSA Z462 Clause 4.3.7.3.15 Arc flash PPE category method DELETED; content moved to NORMATIVE Annex V.
- Renamed to “Arc Flash PPE Table Selection Method.”
- CSA Z462 Table 6A, Table 6B relocated to Annex V Arc Flash PPE Table Selection Method, renamed Table V.2 and Table V.3.
- CSA Z462 Table 6C (NFPA 70E, Table 130.7(C)(15)(c)) DELETED.

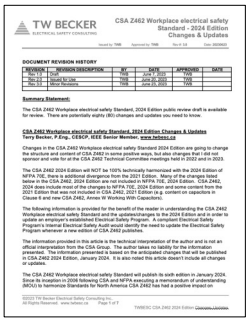
49

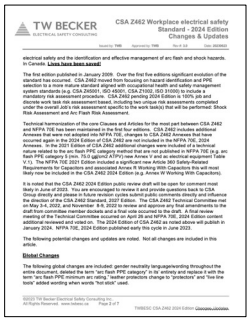
TW BECKER
ELECTRICAL SAFETY CONSULTING

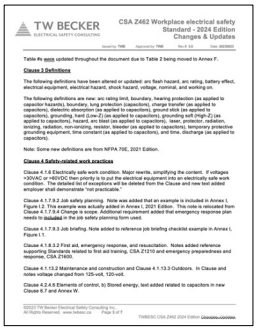
CSA Z462 2024 Edition



- Reference TWBESC CSA Z462 Workplace electrical safety Standard 2024 Changes & Updates (www.twbesc.ca).
- Terry Becker, P.Eng., CESCP, IEEE Senior Member.





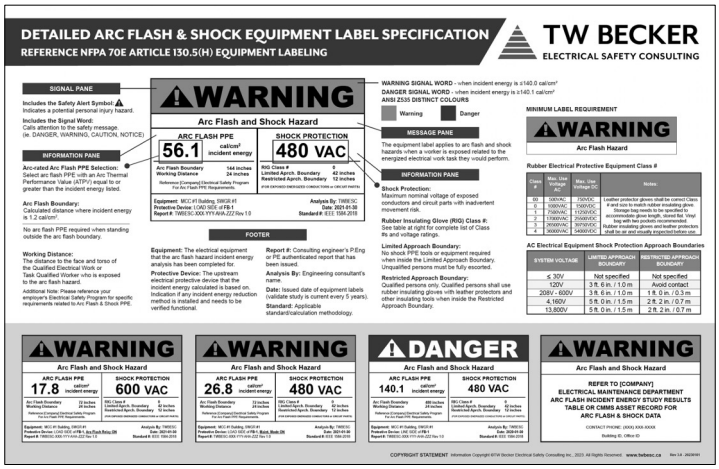


50

TW BECKER ELECTRICAL SAFETY CONSULTING

Arc Flash & Shock Equipment Labeling

- Specification for compliant arc flash & shock equipment labels.



TW BECKER ELECTRICAL SAFETY CONSULTING

Arc Flash & Shock Equipment Labeling

- Examples of compliant arc flash & shock equipment labels.

WARNING

Arc Flash and Shock Hazard

ARC FLASH PPE	SHOCK PROTECTION
56.1 cal/cm² incident energy	**480 VAC**
Arc Flash Boundary 144 inches **Working Distance** 24 inches	**RIG Class #** 0 **Limited Aprch. Boundary** 42 inches **Restricted Aprch. Boundary** 12 inches
Reference [Company] Electrical Safety Program For Arc Flash PPE Requirements.	(FOR EXPOSED ENERGIZED CONDUCTORS or CIRCUIT PARTS)

Equipment: MCC #1 Building, SWGR #1
Protective Device: LOAD SIDE of **FB-1**
Report #: TWBESC-XXX-YYY-AHA-ZZZ Rev 1.0

Analysis By: TWBESC
Date: **2021-01-30**
Standard #: IEEE 1584-2018

DANGER

Arc Flash and Shock Hazard

ARC FLASH PPE	SHOCK PROTECTION
345.7 cal/cm² incident energy	**480 VAC**
Arc Flash Boundary 480 inches **Working Distance** 24 inches	**RIG Class #** 0 **Limited Aprch. Boundary** 42 inches **Restricted Aprch. Boundary** 12 inches
Reference [Company] Electrical Safety Program For Arc Flash PPE Requirements.	(FOR EXPOSED ENERGIZED CONDUCTORS or CIRCUIT PARTS)

Equipment: MCC #1 Building, SWGR #1
Protective Device: LINE SIDE of **FB-1**
Report #: TWBESC-XXX-YYY-AHA-ZZZ Rev 1.0

Analysis By: TWBESC
Date: **2020-01-30**
Standard #: IEEE 1584-2018

TW BECKER ELECTRICAL SAFETY CONSULTING

Arc Flash & Shock Equipment Labeling

- Examples of compliant arc flash & shock equipment labels.

WARNING

Arc Flash and Shock Hazard

ARC FLASH PPE	SHOCK PROTECTION
26.8 cal/cm² incident energy	**480 VAC**
Arc Flash Boundary 72 inches Working Distance 24 inches	RIG Class # 0 Limited Aprch. Boundary 42 inches Restricted Aprch. Boundary 12 inches
Reference [Company] Electrical Safety Program For Arc Flash PPE Requirements.	(FOR EXPOSED ENERGIZED CONDUCTORS or CIRCUIT PARTS)

Equipment: MCC #1 Building, SWGR #1
Protective Device: LOAD SIDE of FB-1, Maint. Mode ON
Report #: TWBESC-XXX-YYY-AHA-ZZZ Rev 1.0
Analysis By: TWBESC
Date: 2021-01-30
Standard #: IEEE 1584-2018

WARNING

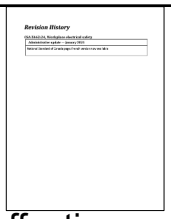
Arc Flash and Shock Hazard

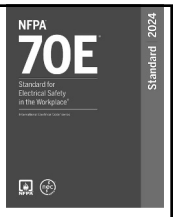
ARC FLASH PPE	SHOCK PROTECTION
17.8 cal/cm² incident energy	**600 VAC**
Arc Flash Boundary 72 inches Working Distance 24 inches	RIG Class # 0 Limited Aprch. Boundary 42 inches Restricted Aprch. Boundary 12 inches
Reference [Company] Electrical Safety Program For Arc Flash PPE Requirements.	(FOR EXPOSED ENERGIZED CONDUCTORS or CIRCUIT PARTS)

Equipment: MCC #1 Building, SWGR #1
Protective Device: LOAD SIDE of FB-1, Arc Flash Relay ON
Report #: TWBESC-XXX-YYY-AHA-ZZZ Rev 1.0
Analysis By: TWBESC
Date: 2021-01-30
Standard #: IEEE 1584-2018

TW BECKER ELECTRICAL SAFETY CONSULTING

Conclusion

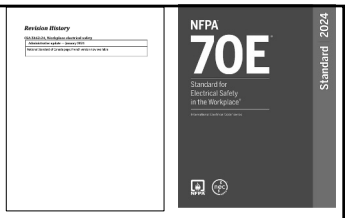




- NFPA 70E and CSA Z462 require interpretation and effective implementation, not adopted into OSHA or OH&S law.
- PLAN-DO-CHECK-ACT!
- **GOOD NEWS, 2024 NFPA 70E quantity and significance of changes is reduced. More clarity on electrical hazard classification.**
- **CSA Z462 2024 Edition, 80 changes pending, and many are significant technical divergence from NFPA 70E 2024 Edition.**
- **NFPA 70E users should look to what has changed in CSA Z462, 2024 Edition.**

TW BECKER ELECTRICAL SAFETY CONSULTING

Conclusion



- **Employer's need to audit their Electrical Safety Program and update them appropriately.**
- **Employer's need to train their workers on their Electrical Safety Program and the changes reflected from NFPA 70E 2024 or CSA Z462 2024 (when published).**

TW BECKER ELECTRICAL SAFETY CONSULTING

Closing & Questions

- **<u>THANK YOU for attending?</u>**
- <u>www.twbesca</u>.

TW BECKER
ELECTRICAL SAFETY CONSULTING

Closing & Questions

- **THANK YOU for attending?**
- **Questions?**

- Terry Becker, P.Eng., CESCP, IEEE Senior Member
- terry.becker@twbesc.ca
- 1-587-433-3777
- www.twbesc.ca BLOG & Publications.
- LinkedIn: https://www.linkedin.com/in/twbecker/ Posts, Articles, Company Page.