Comprehensive Arc Flash Risk Assessments

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Objectives

- Review risk assessments
- AFRA, are you getting it right?
- How difficult is it? Do we understand the words/terms used?
- Incident energy analysis method of AFRA
- Arc Flash PPE Category Method of AFRA
- How do the methods differ?
- Is one better than the other?
- Training the qualified person

Comprehensive AFRA

- Much more than just 130.5 Arc Flash Risk Assessment and 130.7(C)(15) for the Arc Flash PPE Category Method
- Many factors must be considered
- Human error, applying the hierarchy of risk control methods, other risk reduction methods, PPE, other protective equipment, documentation, understanding proper maintenance, normal operation/operating condition, and more
- Comprehensive training is imperative!

NFPA 70E Standard for Electrical Safety in the **Workplace**

- 1000's of different workplaces
- 1000's of different exposures
- 1000's of different means and methods to *"provide a **practical** safe working area for employees relative to the hazards arising from the use of electricity"*
- ***No EASY BUTTON exists!***

Words/Terms, Defined & Undefined

- Article 100 contains 136 definitions
- Not all words/terms used in NFPA 70E are defined
- Estimate?
- Predict?
- Likelihood?

Estimate

: to determine roughly the size, extent or nature of

estimate 1 of 2 verb

es·ti·mate 'e-stə-ˌmāt

estimated; estimating

Synonyms of *estimate* ›

transitive verb

1 a : to judge tentatively or approximately the value, worth, or significance of

b : to determine roughly the size, extent, or nature of

c : to produce a statement of the approximate cost of

Estimate

- 70E requires that we estimate:
  - Likelihood of occurrence
  - Severity
  - Incident energy
  - Maximum available fault current, maximum fault-clearing time and minimum working distance

Predict

: foretell on the basis of observation, experience or scientific reason

predict verb

pre·dict pri-'dikt

predicted; predicting; predicts

Synonyms of *predict* ›

transitive verb

: to declare or indicate in advance

especially **:** foretell on the basis of observation, experience, or scientific reason

Predict

- Arc ratings (materials) predict ATPA & E_{BT} 50% chance 2ND degree burns or breakopen……
- (Article 100) **Incident Energy Analysis.** A component of an arc flash risk assessment used to **predict** the incident energy of an arc flash for a specified set of conditions.

Likelihood

: the chance that something will happen :PROBABILITY

likelihood noun

like·li·hood ˈlī-klē-ˌhu̇d

Synonyms of *likelihood* ›

: the chance that something will happen : PROBABILITY

There's very little *likelihood* of that happening. [=that is very unlikely to happen]

changes that ***in all likelihood*** will be made soon [=changes that are very likely to be

Likelihood

- Travelling, anyone take a flight recently?
- When you step onto the plane, what are you thinking?
- Is it possible the plane goes down with you on it?
  - YES
- Is it likely?
  - NO!

Risk

- **Risk.** A combination of 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 = Likelihood + Severity**

Risk

- **Risk = Likelihood + Severity**
- For example:
- A new apprentice with a box cutter, likelihood/severity?
- High likelihood with low severity
- New LVPCB meeting all requirements in 110.2(B) Exception No. 1 for *"normal operating condition"*, 2000-amp frame, 2000-amp trip unit as service disconnecting means at 480/277-volts. Likelihood/severity?
- Low likelihood with high severity

130.5 Arc Flash Risk Assessment

- **130.5(A) General.** An arc flash risk assessment shall be performed:
- (1) To identify **arc flash hazards** *(when does an arc flash hazard exist? Likelihood?)*
- (2) To estimate the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health
- (3) To determine if additional protective measures are required, including the use of PPE

Does an Arc Flash Hazard Exist

- **Hazard, Arc Flash. (Arc Flash Hazard)** A source of possible injury or damage to health associated with the release of energy caused by an electric arc.
- Informational Note No. 1: ….The likelihood of occurrence of an arc flash incident increases when energized electrical conductors or circuit parts are exposed or when they are within equipment in a guarded or enclosed condition, provided a person is interacting with the equipment in such a manner that could cause an electric arc……..

Does an Arc Flash Hazard Exist

- **Hazard, Arc Flash. (Arc Flash Hazard)**
- Informational Note No. 1: …. …….. An arc flash incident is not likely to occur under normal operating conditions when enclosed energized equipment has been properly installed and maintained.
- Informational Note No. 2: See Table 130.5(C) for examples of tasks that increase the likelihood of an arc flash incident occurring.

Table 130.5(C) Likelihood of Occurrence..

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

Task	Operating Condition[a]	Likelihood of Occurrence[b]
Operation of a CB, switch, contactor or starter	Normal	No
	Abnormal	Yes

The Table Notes are enforceable, and they apply in all arc flash risk assessments!

Table 130.5(C) Likelihood of Occurrence..

Superscript [a]
110.2(B) Exception No.1

Table 130.5(C) Estimate of the Likelihood of Occurrence of an Arc Flash Incident [illegible] and dc Systems

Task	Operating Condition[a]	Likelihood of Occurrence[b]
Operation of a CB, switch, contactor or starter	Normal	[illegible]
	Abnormal	Yes

The Table Notes are enforceable, and they apply in all arc flash risk assessments!

Superscript [b]
Likelihood & Severity

Notes to Table 130.5(C)

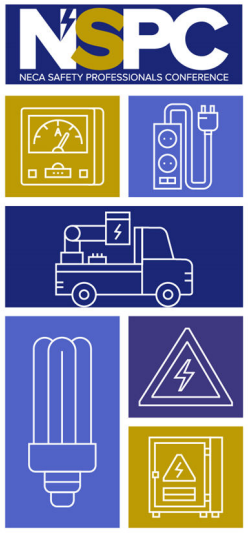
- [b]…The estimate of the likelihood of occurrence contained in this table does not cover every possible condition or situation nor does it address severity of injury or damage to health…….The **likelihood** of occurrence must be combined with the **potential severity** of the arcing incident ……

Notes to Table 130.5(C)

- [b]……. 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).
- In most cases, more than one risk control method can be applied

Risk Assessment *(it is a process)*

- **Risk Assessment.** An overall process that:
- (1) identifies hazards
- (2) **estimates** the **likelihood** of occurrence of injury or damage to health
- (3) estimates the potential severity of injury or damage to health, and
- (4) determines if protective measures are required.
- Informational Note: As used in this standard, *arc flash risk assessment* and *electric shock risk assessment* are types of risk assessments.



Who performs risk assessments?

- Everybody!
- Everyday!
- However, most do not perform them properly
- Most are done subconsciously
- Most are based on experience only
- They can sing dozens of songs, recite the pledge of allegiance, but they cannot tell you what a risk assessment is….

Perfection, is it Achievable?

- In an arc flash risk assessment, is perfection attainable?
- For comparison, consider an employee, trained in PFAS, everything is right….
- If they fall, we are guaranteed ZERO injury right?
- What have we done?????
- Under the circumstances, we did the best we could…..

Arc Flash Risk Assessment

- Many factors come into play, each assessment is different
- Always looking for a quote to help things make sense
- Winston Churchill
- “True genius resides in the capacity for evaluation of uncertain, hazardous, and conflicting information.”
- Alan Jackson & Jimmy Buffet
- “It’s five o'clock somewhere”

Arc Flash Risk Assessment

- Where are we today?
- Do you work exclusively in labeled environments?
- The arc flash PPE category method, when applied, requires the parameters be met
- The incident energy analysis method requires accurate data collection, accurate input and continuous maintenance of the analysis

Arc Flash Risk Assessment Methods

- **130.5(F) Arc Flash PPE.** 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)

Either, but not both, methods shall be permitted to be used on the same piece of equipment. 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. (discussed later)

Incident Energy Analysis

- Requires collection of data
- Software programs produce labels based upon the data provided. Data collected includes but is not limited to:
- Available Fault Current
- Conductor material, length, size, installation (metal/nonmetallic)
- OCPD type, clearing time settings, arc energy reduction methods
- Voltage, System, Arc gap

Incident Energy Analysis, 130.5(G)

- **130.5(G) Incident Energy Analysis Method.** 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……...

Incident Energy Analysis, 130.5(G)

- **130.5(G) Incident Energy Analysis Method…..** 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……

Incident Energy Analysis, 130.5(G)

- **130.5(G) Incident Energy Analysis Method……** 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.
- 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……..

Incident Energy Analysis, 130.5(G)

- **130.5(G) Incident Energy Analysis Method……**
- 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.
- 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.

130.5(H) Equipment Labeling

- **130.5(H) Equipment Labeling.** 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:
  - a. 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
  - b. Minimum arc rating of clothing
  - c. Site-specific level of PPE

130.5(H) Equipment Labeling

- **130.5(H) Equipment Labeling.** …… The method of calculating and the data to support the information for the label shall be documented. The data shall be reviewed for accuracy at intervals not to exceed 5 years. Where the review of the data identifies a change that renders the label inaccurate, the label shall be updated.
- The label shall be of sufficient durability to withstand the environment involved.
- The **owner** of the electrical equipment shall be responsible for the documentation, installation, and maintenance of the marked label.

Arc Flash PPE Category Method

- The arc flash PPE category method is not based on the collection of data and software programs
- It is based on empirical data that came primarily from the petrochemical industry, over several decades
- The parameters in 130.7(C)(15) must be met or an incident energy analysis must be performed
- Still in use by major petrochemical company

Arc Flash PPE Category Method

- **130.7(C)(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.

Arc Flash PPE Category Method

- **130.7(C)(15) Arc Flash PPE Category Method….**
- (a) *Alternating Current (ac) Equipment.* 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. 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)……

Arc Flash PPE Category Method

- **130.7(C)(15) Arc Flash PPE Category Method….**
- (a) *Alternating Current (ac) Equipment*…….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

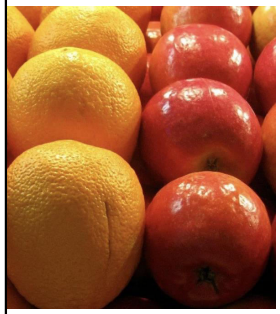
Arc Flash PPE Category Method

- **130.7(C)(15) Arc Flash PPE Category Method.**
- (c) *Protective Clothing and Personal Protective Equipment (PPE).* 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. Table 130.7(C)(15)(c) lists the requirements for PPE based on arc flash PPE categories 1 through 4. This clothing and equipment shall be used when working within the arc flash boundary. The use of PPE other than or in addition to that listed shall be permitted provided it meets 130.7(C)(7).

Arc Flash PPE Category Method

- **130.7(C)(15) Arc Flash PPE Category Method.**
- Informational Note No. 2: …….. 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. …… The PPE requirements of this section do not address protection against physical trauma other than exposure to the thermal effects of an arc flash.

Apples and Oranges



- **130.5(F) Arc Flash PPE…..**
  - (1) incident energy analysis method in accordance with 130.5(G)…….
  - (2) arc flash PPE category method in accordance with 130.7(C)(15)

Either, but not both, methods shall be permitted to be used on the same piece of equipment…….. 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

Apples and Oranges

- An incident energy analysis cannot be used to specify an arc flash PPE category in Table 130.7(C)(15)(c)
- Why?
- Everybody wants an easy button!
- The Arc Flash PPE Category Method is primarily conservative
- For example: an IE result of 7.5 cal/cm^2 cannot be used to specify Arc Flash PPE Category 2 (8 cal/cm^2)
- For example: an IE result of 8.5 cal/cm^2 cannot be used to specify Arc Flash PPE Category 3 (25 cal/cm^2)

Misapplication

- Both methods are easily misapplied
- For example, when applying the Arc Flash PPE Category Method, users may not estimate available fault current and clearing time
- Where an incident energy analysis is performed, was the data collection done properly? Garbage in = garbage out.
- Do you read the executive summary for the incident energy analysis? Was the engineer overly conservative?
- Did they back into an AF PPE Category? Are they keeping up with changes, and reviewing every five years?

Arc Flash Labeling Requirements 2023 NEC

- **110.16(B) Service Equipment and Feeder Supplied Equipment.** In other than dwelling units, in addition to the requirements in 110.16(A), a permanent arc flash label shall be field, or factory applied to service equipment and feeder supplied equipment rated 1000 amperes or more. The arc flash label shall be in accordance with applicable industry practice and *include the date the label* was applied. The label shall meet the requirements of 110.21(B).

Arc Flash PPE Category Method Applying 130.7(C)(15)(a)

- Assume that an ESWC cannot be established, (troubleshooting, voltage testing) in 400-amp panelboard at 208/120-volts
- Justification, 110.2(B) Exceptions
- Normal Operation
- Opening energized disconnect to create an ESWC
- *Infeasibility*
- Additional hazards or increased risk
- Less than 50-volts

Applying 130.7(C)(15)(a)

- Determine equipment category and parameters *(Panelboard at 208/120-volts, 400-amp MCCB)*
- Estimate available fault current (Maximum 25 kA)
- Estimate clearing time (Maximum 2 cycles)
- Estimate working distance (Minimum 18-inches)
- When in compliance, choose PPE from Table 130.7(C)(15)(c)

Applying 130.7(C)(15)(a)

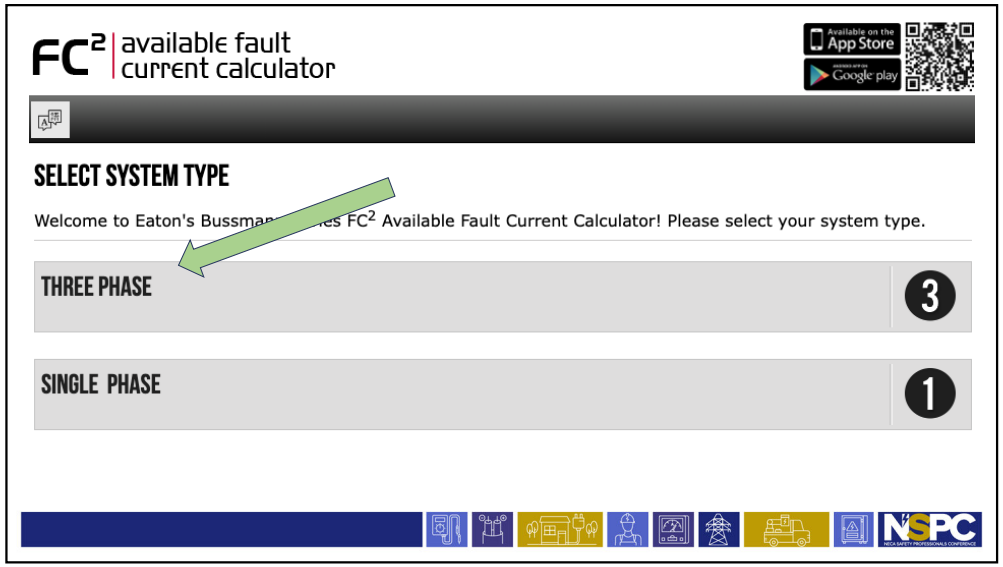
- In addition to the five steps identified, determine:
- Is there more than one risk control method that can be applied?
- Other risk control/reduction methods
- Potential for human error
- Operating condition of equipment and OCPD's
- Condition of maintenance (Annex S)

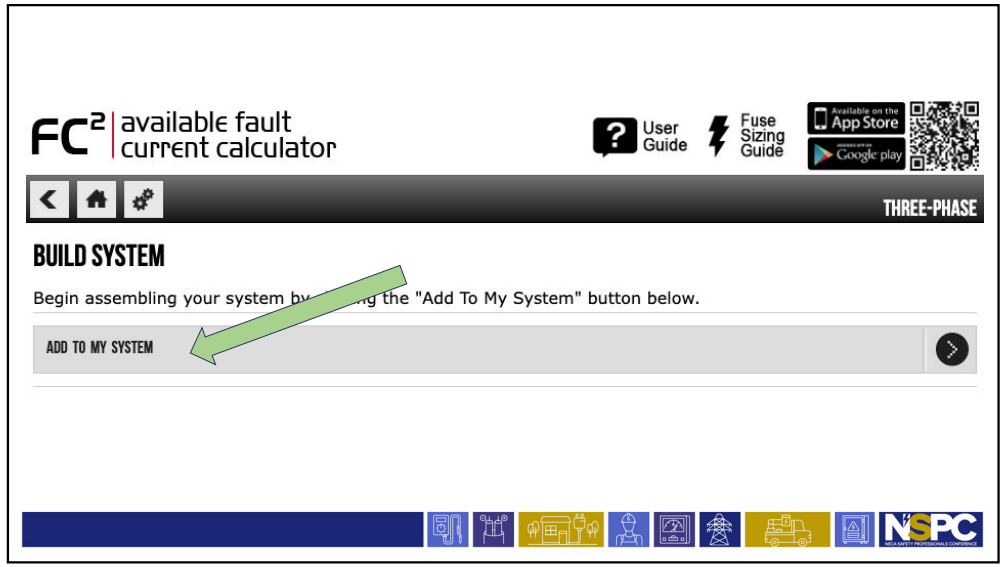
Estimate Available Fault Current

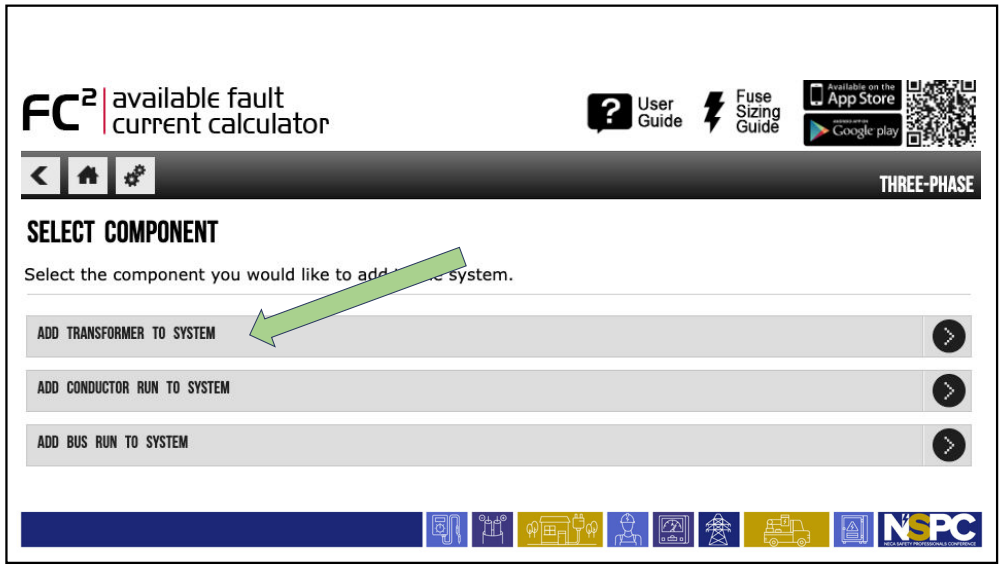
- Use an available fault current calculator app
- Bussmann FC² Available Fault Current Calculator
- Start at next transformer upstream. If over the AFC parameter go further upstream or get utility AFC values
- Create, store and document AFC values on one line diagram, just click “create label”

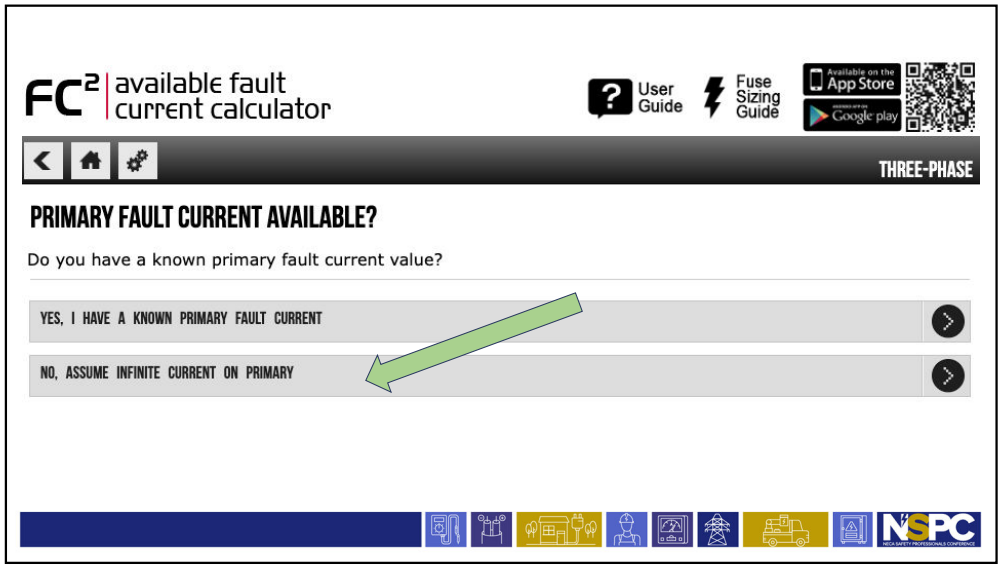
Estimate Available Fault Current

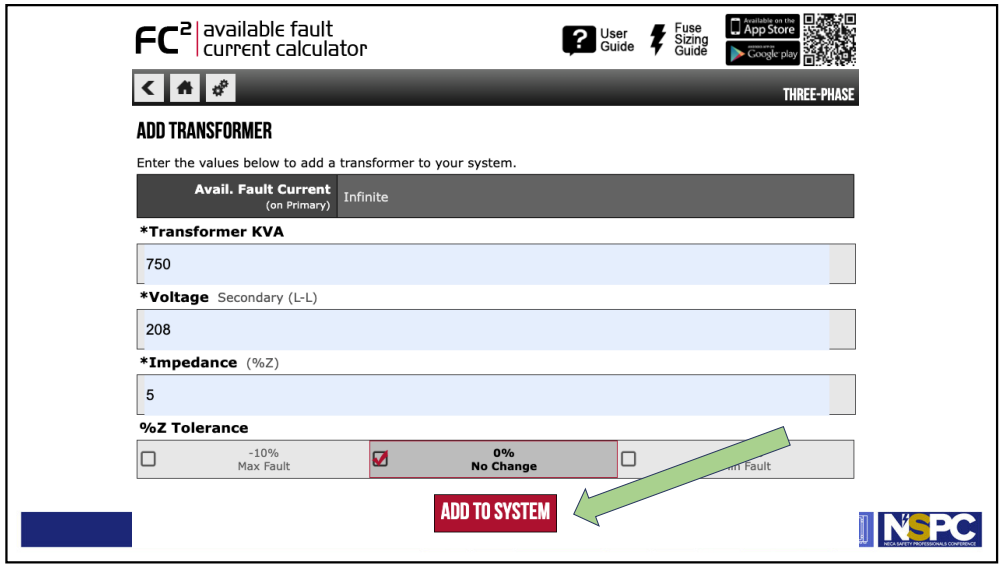
- Begin at 750 kVA transformer, 208/120-volt secondary, (Z = 5%), supplied from service equipment at 12.7 kV
- Switchboard immediately adjacent to transformer
- In the switchboard, 400-amp MCCB, good operating condition and maintenance
- Assume 500-kcmil cu (110-feet conductor length) in EMT (as seen) to MLO panelboard

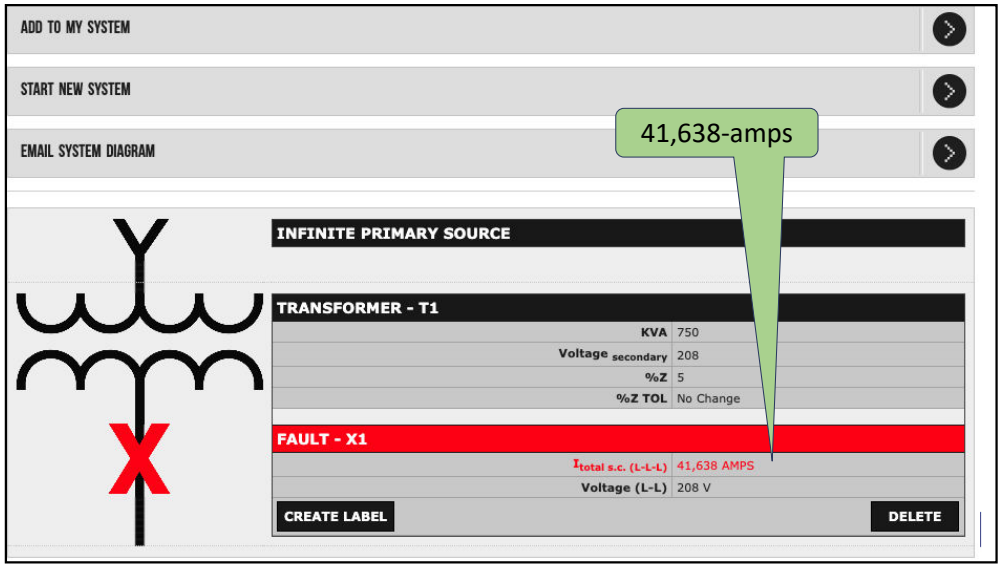


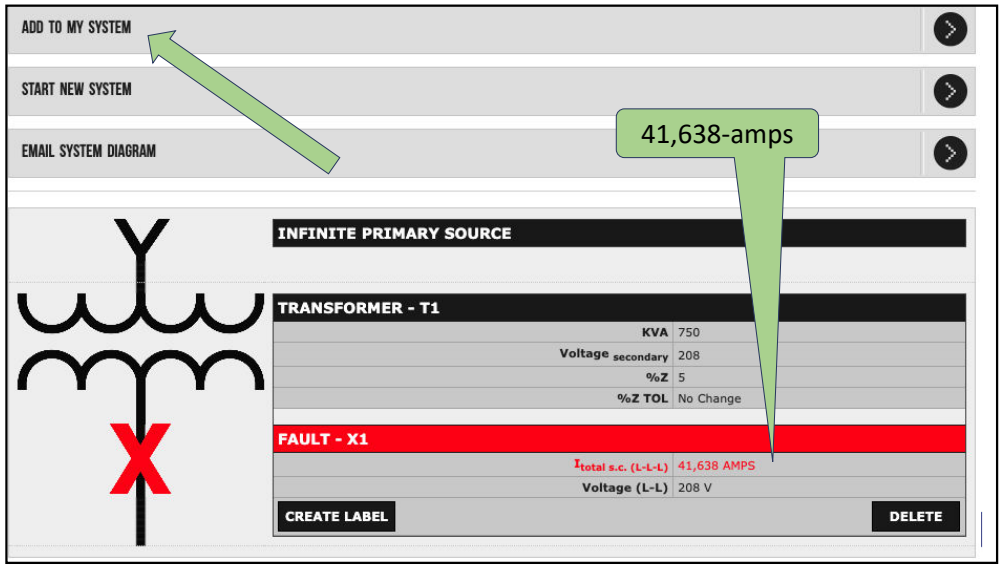


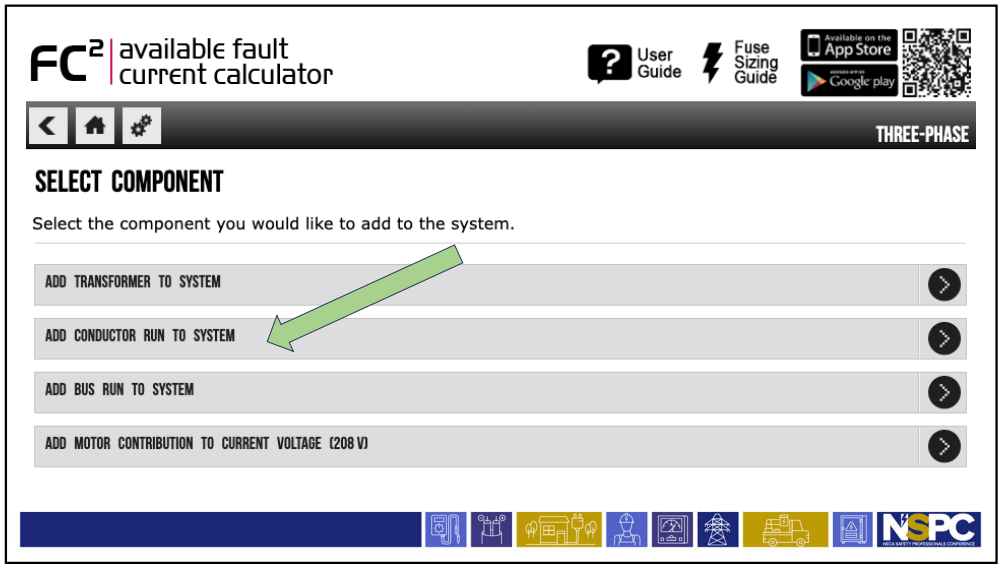

FC² available fault current calculator
User Guide
Fuse Sizing Guide
Available on the App Store
Google play
THREE-PHASE
SELECT COMPONENT
Select the component you would like to add
system.
ADD TRANSFORMER TO SYSTEM
ADD CONDUCTOR RUN TO SYSTEM
ADD BUS RUN TO SYSTEM
NSPC

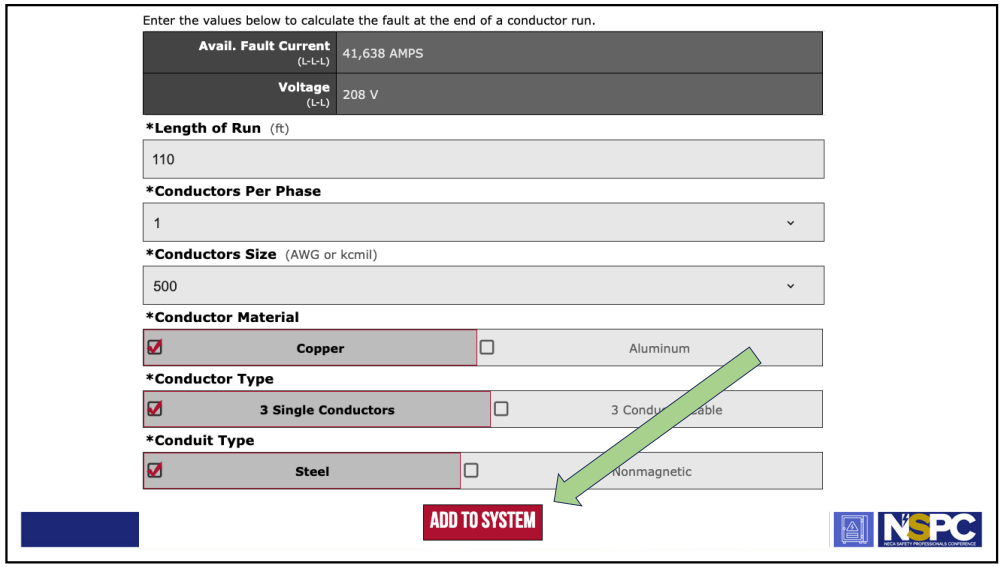

FC² available fault current calculator
User Guide
Fuse Sizing Guide
Available on the App Store
Google play
THREE-PHASE
PRIMARY FAULT CURRENT AVAILABLE?
Do you have a known primary fault current value?
YES, I HAVE A KNOWN PRIMARY FAULT CURRENT
NO, ASSUME INFINITE CURRENT ON PRIMARY
NSPC

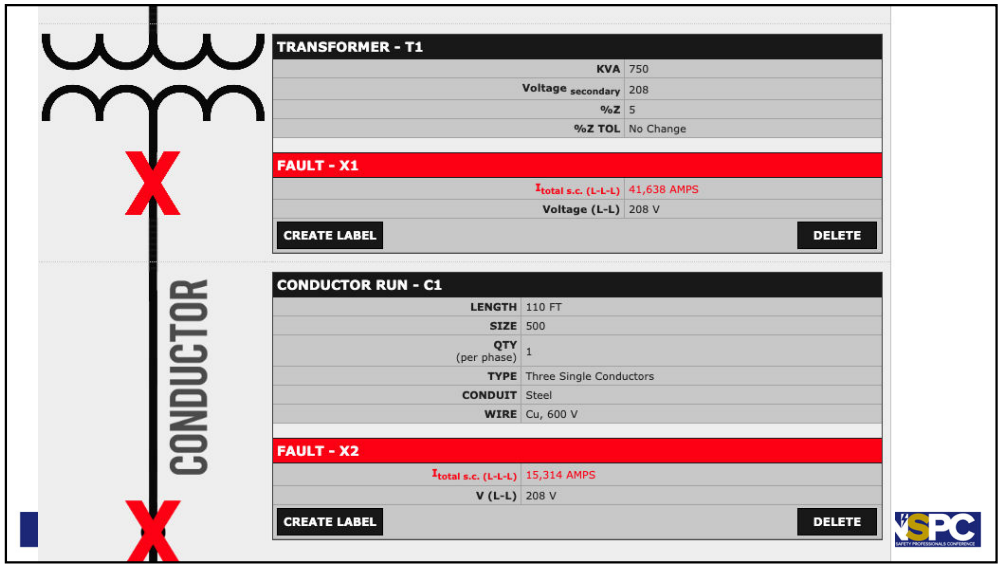

FC² available fault current calculator
User Guide
Fuse Sizing Guide
Available on the App Store
Google play
THREE-PHASE
ADD TRANSFORMER
Enter the values below to add a transformer to your system.
Avail. Fault Current (on Primary)
Infinite
*Transformer KVA
750
*Voltage Secondary (L-L)
208
*Impedance (%Z)
5
%Z Tolerance
-10% Max Fault
0% No Change
ADD TO SYSTEM
NSPC

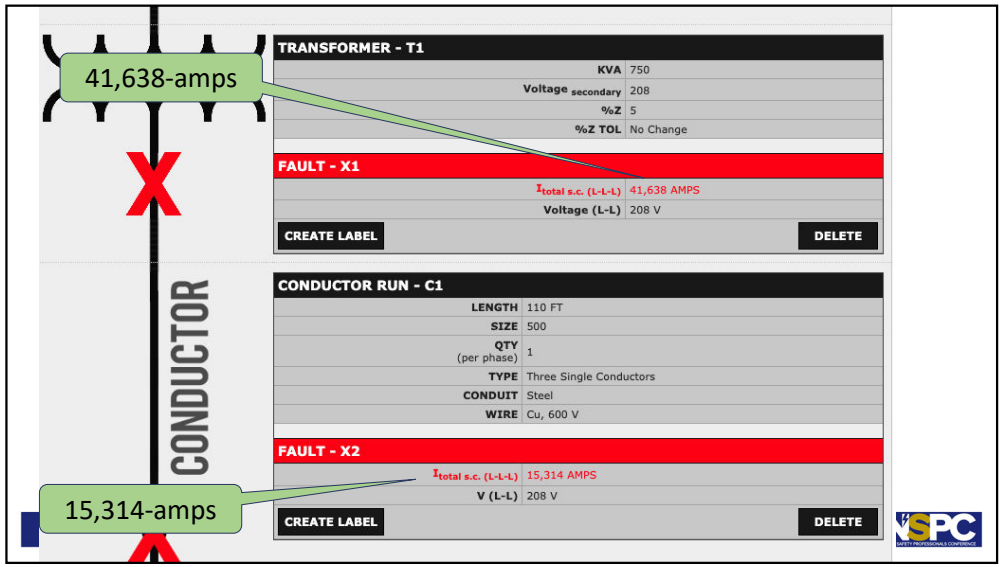

ADD TO MY SYSTEM
START NEW SYSTEM
EMAIL SYSTEM DIAGRAM
41,638-amps
INFINITE PRIMARY SOURCE
TRANSFORMER - T1
KVA 750
Voltage secondary 208
%Z 5
%Z TOL No Change
FAULT - X1
I total s.c. (L-L) 41,638 AMPS
Voltage (L-L) 208 V
CREATE LABEL
DELETE

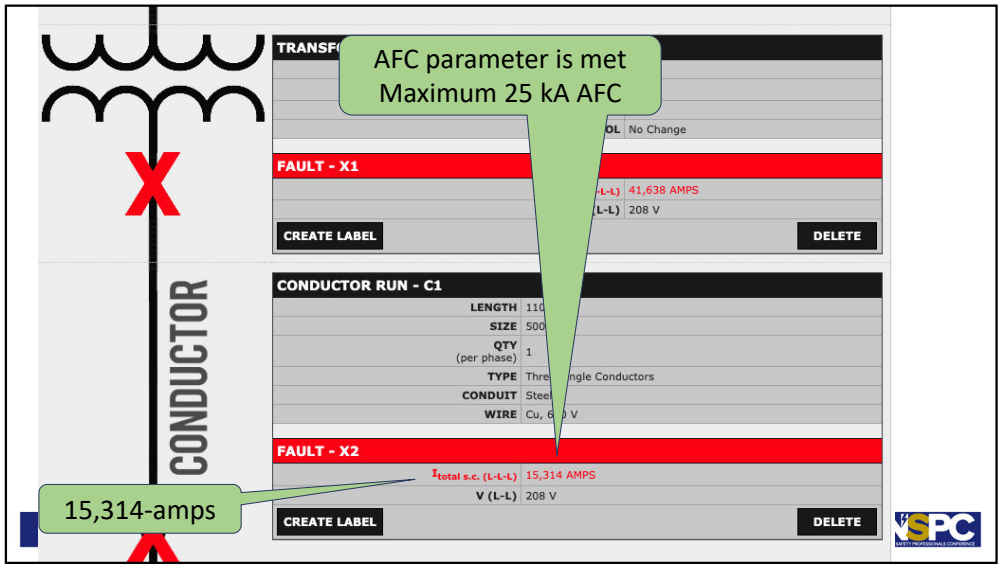

ADD TO MY SYSTEM
START NEW SYSTEM
EMAIL SYSTEM DIAGRAM
41,638-amps
INFINITE PRIMARY SOURCE
TRANSFORMER - T1
KVA 750
Voltage secondary 208
%Z 5
%Z TOL No Change
FAULT - X1
Itotal s.c. (L-L-L) 41,638 AMPS
Voltage (L-L) 208 V
CREATE LABEL
DELETE

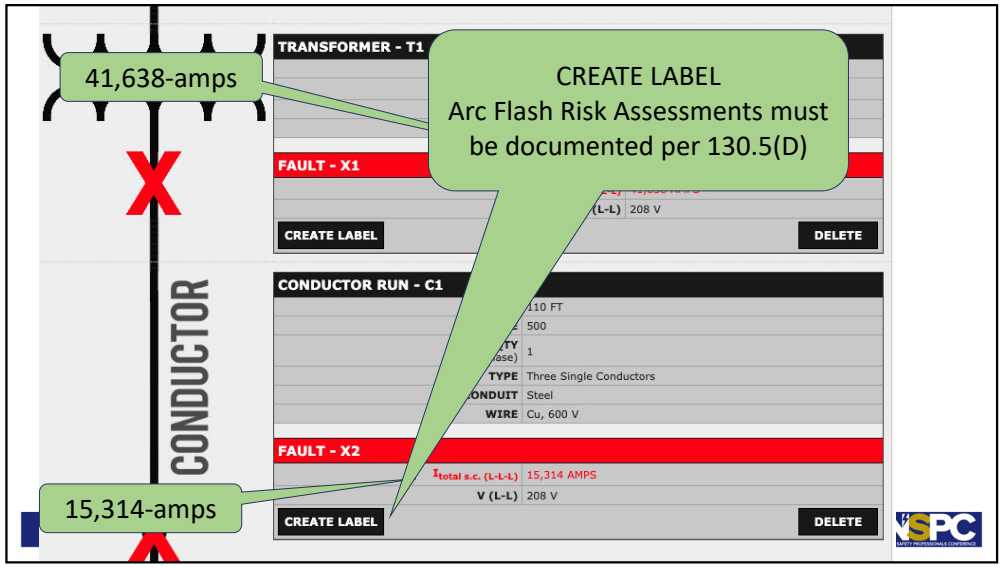

FC² available fault current calculator
User Guide
Fuse Sizing Guide
Available on the App Store
Google play
THREE-PHASE
SELECT COMPONENT
Select the component you would like to add to the system.
ADD TRANSFORMER TO SYSTEM
ADD CONDUCTOR RUN TO SYSTEM
ADD BUS RUN TO SYSTEM
ADD MOTOR CONTRIBUTION TO CURRENT VOLTAGE (208 V)
NSPC


Enter the values below to calculate the fault at the end of a conductor run.
Avail. Fault Current (L-L-L) 41,638 AMPS
Voltage (L-L) 208 V
*Length of Run (ft)
110
*Conductors Per Phase
1
*Conductors Size (AWG or kcmil)
500
*Conductor Material
Copper
Aluminum
*Conductor Type
3 Single Conductors
*Conduit Type
Steel
Nonmagnetic
ADD TO SYSTEM
NSPC


TRANSFORMER - T1
KVA 750
Voltage secondary 208
%Z 5
%Z TOL No Change
FAULT - X1
Itotal s.c. (L-L-L) 41,638 AMPS
Voltage (L-L) 208 V
CREATE LABEL
DELETE
CONDUCTOR
CONDUCTOR RUN - C1
LENGTH 110 FT
SIZE 500
QTY (per phase) 1
TYPE Three Single Conductors
CONDUIT Steel
WIRE Cu, 600 V
FAULT - X2
Itotal s.c. (L-L-L) 15,314 AMPS
V (L-L) 208 V
CREATE LABEL
DELETE
NSPC







Estimate Fault Clearing Time

- Are we training qualified persons to make that estimation?
- Fuses
- Non-adjustble MCCB
- MCCB with adjustable instantaneous
- Electronic trip MCCB
- ICCB
- LVPCB

Estimate Fault Clearing Time

- If we were to place each of these devices on a table in class, could your qualified persons discuss:
- Typical applications
- Typical clearing times
- Which devices have an instantaneous override
- Which devices can be set without an instantaneous trip setting?

Estimate Fault Clearing Time

- Are qualified persons trained to always determine the operating condition of OCPD's and their condition of maintenance?
- Which need maintenance?
- How often?
- What type of device are they typically working on the load side of?

Estimate Fault Clearing Time

- 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.

Estimate Fault Clearing Time

- Informational Note No. 1 to Table 130.7(C)(15)(a):
- (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.
- (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").

Estimate Fault Clearing Time

- Informational Note No. 1 to Table 130.7(C)(15)(a):
- (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.
- (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.

Applying 130.7(C)(15)(a)

- Parameters are met
- AFC, maximum of 25 kA, (15,314-amps)
- Clearing time maximum 2 cycles (MCCB estimated 1.5 cycles)
- Minimum working distance 18-inches (Task, troubleshooting, testing, estimated 18-inches or more)
- Go to Table 130.7(C)(15)(c) for PPE

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 flash suit hood
	Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[f]
	Protective Equipment
	Hard hat
	Safety glasses or safety goggles (SR)
	Hearing protection (ear canal inserts)[c]
	Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with protectors (SR)[d]
	Leather footwear[e] (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 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)[f]
	Protective Equipment
	Hard hat
	Safety glasses or safety goggles (SR)
	Hearing protection (ear canal inserts)[c]
	Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with protectors (SR)[d]
	Leather footwear[e]

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)[d]
	Arc-rated jacket, parka, high-visibility apparel, rainwear, or hard hat liner (AN)[f]
	Protective Equipment
	Hard hat
	Safety glasses or safety goggles (SR)
	Hearing protection (ear canal inserts)[c]
	Leather footwear[e]
	Leather footwear[e]

Applying more than one Risk Control Method

- Engineering Controls
- Arc energy reduction methods can be applied
- Remote switching
- Remote racking
- Insulating/shielding materials

Documenting Risk Assessments

- Both shock and arc flash risk assessments must be documented
- See 130.4(D) and 130.5(D)
- The fault current calculator plays a big role
- NECA safety meeting app
- Necessary for field audits

Summary

- Both methods work well
- Both methods need to be constantly monitored
- Get everyone exposed out of flammable clothing
- Document, document, document
- Audit all risk assessments and EEWP’s
- Take the next step!
- Thanks!

Please complete the Online Evaluation

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