

NFPA 70E UPDATE – GET READY FOR CHANGES IN 2015

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NFPA 70E

- ◎ **Standard for Workplace Electrical Safety**
 - **Next edition: 2015**
 - proposals & comments have all been submitted
 - final action due in June, 2014
 - Comments mentioned herein are based on the posted second draft report dated 12/17/2013
- ◎ Batteries are primarily addressed in **Article 320**
 - work practices associated with installation and maintenance of batteries containing many cells
- ◎ DC Arc Flash/Shock addressed in **Article 130** and **Annex D**
- ◎ Companion Document: NFPA 70E Handbook
 - To be published Fall of 2014

Article 320 Changes

Safety requirements Related to
Batteries and Battery Rooms

Minor changes

320.2 DEFINITIONS

“Prospective Fault Current” changed to
“Prospective Short Circuit Current”

- Aligns with terminology used throughout the standard
- “...highest level of fault current that could theoretically occur...”

320.3(A)(5): New WARNING SIGNS required to be posted :

- **thermal hazards** added to list of electrical warnings
- Notice prohibiting access to **unauthorized personnel**
- **Additional information concerning arc flash hazard signage**
 - **Arc flash hazard needs to be determined and posted**

320.3(D): **cell flame arresters** to be replaced when necessary

Minor changes (Cont'd)

- ⦿ **DELETED:**

~~320.3(C)(1) Battery Short-Circuit Current. The battery manufacturer shall be consulted regarding the sizing of the battery short-circuit protections and for battery short-circuit current values.~~

- ⦿ **SIGNIFICANCE:** Short circuit current rating for an individual cell or multi-cell unit can be available from the battery mfr
 - The short circuit current rating for an entire battery string or system should be calculated by an engineer or a qualified person based on how the battery system is designed at a particular facility.

Significant changes

- 320.3(A)(1): adds a new requirement for a **risk assessment** associated with battery work.
 - Prior to any work on a battery system, a risk assessment must identify the hazards associated with the type of tasks to be performed and assess the risks associated with the type of tasks to be performed
 - Electric shock
 - Chemical
 - Arc flash
 - Thermal;
 - Light;
 - sound;
 - pressure
- 320.3(A)(3) revised to simplify the requirement for annual testing of **battery alarm functionality**.
(see next slide)

Significant changes (Cont'd)

320.3(A) General Safety Hazards

320.3(A)(3) Abnormal battery conditions

[moves list of alarms for VLA & VRLA to a **new informational note**]:

Battery monitoring systems typically include alarms for such conditions as

- overvoltage
- undervoltage
- overcurrent
- ground fault, and
- overtemperature

The type of conditions monitored will vary depending upon the battery technology.

Reference: IEE 1481, *Battery Monitoring Equipment in Stationary Applications*

Significant changes (Cont'd)

320.3(B)(1): “Batteries with *Liquid Electrolyte*” changed to
“**Battery Activities That Include Handling of Liquid Electrolyte.**”

Handling electrolyte requires portable or stationary
eye wash facilities

within the work area

capable of drenching or flushing of eyes and body
for the duration necessary for the hazard

Capacity of eye wash facilities and **duration** of the flushing
should be specified by the battery or electrolyte manufacturer.

Reference: ANSI/ISEA Z358.1, *Emergency Eye Wash & Shower
Equipment*

Significant changes (Cont'd)

- 320.3(B)(1): “Batteries with *Solid or Immobilized Electrolyte*”
changed to
“**Activities That Do Not Include Handling of Electrolyte.**”
- Wearing of safety glasses is required at all times
- New Informational Note:
“.... Batteries with solid electrolyte (such as most lithium batteries) or immobilized electrolyte(such as VRLA batteries) present little or no electrolyte hazard.

Most modern density meters expose a worker to a quantity of electrolyte too minute to be considered hazardous, if at all.

... If specific gravity readings are taken using a bulb hydrometer, the risk of exposure is higher – this could be considered to be handling electrolyte.

Significant changes (Cont'd)

SIGNIFICANCE of Activities That Do Not Include Handling of Electrolyte.”

- ⦿ Battery maintenance activities usually do not involve handling electrolyte.
- ⦿ Even with VLA batteries, if the user is not handling electrolyte, only safety glasses are required....
- ⦿ (B)(1) states that Goggles/face shield shall be available BUT are only required when handling electrolyte

Significant changes (Cont'd)

- 320.3(C)(2)(c):
 - “*hazard identification and risk assessment*”
changed to
“*risk assessment*”.
- Recognizing that:
 - Hazards are there or they are not there
 - Risk** varies depending upon the activity
 - how close are you?
 - and what are you doing?

Article 130 Changes

As it Relates to
DC Shock and Arc Flash

Practical DC guidance (new)

- **Table 130.7(C)(15)(A)(a)**
- **Arc Flash PPE is not required for:**
 - Voltage testing on individual battery cells or individual multi-cell units
 - Removing battery intercell connector covers
 - Performing infrared thermography and other noncontact inspections outside the restricted approach boundary.
 - ...When this activity does not include opening of doors or covers.

Practical DC guidance (continued)

- **Arc Flash PPE is not required on dc systems for:**
 - Insertion or removal of individual cells or multi-cell units of a battery system in an open rack
 - Maintenance on a single cell of a battery system or multi-cell units in an open rack

Practical DC guidance (continued)

⦿ Arc Flash **PPE IS required** on DC Systems for:

- Work on energized electrical conductors and circuit parts of series-connected battery cells, including voltage testing
 - *Such as measuring overall voltage on a string*
- Removal of bolted covers (to expose bare energized electrical conductors and circuit parts)
 - this includes bolted covers, such as battery terminal covers

Practical DC guidance (continued)

● Arc Flash PPE **IS Required** on DC Systems For:

- Insertion or removal of individual cells or multi-cell units of a battery system **in an enclosure**
- Work **on exposed energized electrical conductors and circuit parts** of utilization equipment directly supplied by a dc source

Arc Flash PPE – DC table (changed)

Table 130.7(C)(15)(B)

- Applicable for 100 – 600 volts
- ⦿ Changed from “arcing current” to “short circuit current”
 - (arcing current = 50% of short circuit current)
- ⦿ Existing table (70E-2012) is incorrect
 - Corrected one now requires even higher PPE
- ⦿ No minimum short circuit current is identified
 - PPE 1 is always required
- ⦿ Changed
 - From: “if acid exposure is possible”
 - To: apparel “that can be expected to be exposed”
(needs to be acid resistant)

Arc Flash PPE – DC table (continued)

Notes that:

- ⦿ Short-circuit current includes effects of cables and other circuit impedances
- ⦿ Battery unit short-circuit currents can be obtained from the manufacturer
- ⦿ The values in the table are for open air
 - battery enclosures can increase incident energy as much as 3 times
 - i.e., “arc in a box”

PPE

- ⦿ No Hazard Risk Category 0
- ⦿ PPE Category 1
 - Arc-Rated Clothing, Minimum Arc Rating of 4 cal/cm²
 - Arc-rated long-sleeve shirt and pants or arc-rated coverall
 - Arc-rated face shield (see Note 2) or arc flash suit hood
 - Arc-rated jacket, parka, rainwear, or hard hat liner (AN)
 - **Protective Equipment**
 - Hard hat
 - Safety glasses or safety goggles (SR)
 - Hearing protection (ear canal inserts)
 - Heavy duty leather gloves
 - Leather footwear (AN)

(Note 2) 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.

DC Shock Threshold

- Remains the same
- Lower DC threshold is 100 volts

TABLE 130.4(D)(b)

Approach Boundaries to Energized Electrical Conductors or
Circuit Parts for Shock Protection
Direct-Current Voltage Systems

(1)	(2)	(3)	(4)
	Limited Approach Boundary		Restricted Approach Boundary
Nominal Potential Difference	Exposed Movable Conductor	Exposed Fixed Circuit Part	Includes inadvertent Movement Adder
< 100V	Not Specified	Not Specified	Not Specified

Annex D

Incident Energy & Arc Flash Boundary Calculations

- Minor changes including relocating text
- Added note:

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.

THANK YOU

END