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2017 NATIONAL ELECTRICAL CODE®

CHANGES IN OVERCURRENT AND SURGE PROTECTION

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240.67: ARC ENERGY REDUCTION

PREVIOUS CODE REQUIREMENTS:

Previous requirements for Arc Energy reduction were only applied to circuit breakers (240.87) rated 1200A and over.

NEW CODE:

240.67 Arc Energy Reduction
Where fuses rated 1200 A or higher are installed, 240.67(A) and (B) shall apply. This requirement shall become effective January 1, 2020.

(A) Documentation. Documentation shall be available to those authorized to design, install, operate, or inspect the installation as to the location of the fuses.

(B) Method to Reduce Clearing Time. A fuse shall have a clearing time of 0.07 seconds or less at the available arcing current, or one of the following shall be provided:

1. Differential relaying
2. Energy-reducing maintenance switching with local status Indicator
3. Energy-reducing active arc flash mitigation system
4. An approved equivalent means

REASONS FOR CHANGES:

Article 240.87 (Arc Energy Reduction for circuit breakers) was first introduced in the 2011 NEC and since that time has proven to reduce arc flash injuries by creating a maintenance mode which reduces clearing times. 0.07 seconds was chosen as it is matches closely to circuit breakers that use zone selective interlocking.

HOW TO COMPLY:

This rule takes effect on January 1, 2020.

HELPFUL PRODUCTS:

None at this time

409.22, 430.99, 440.10, 620.51, AND 670.5: FIELD MARKING OF AVAILABLE FAULT CURRENT

PREVIOUS CODE REQUIREMENTS:

2014 NEC had no previous requirements for field marking of available fault current for several types of equipment.

NEW CODE:

409.22 Short-Circuit Current Rating.

(A) Installation. An industrial control panel shall not be installed where the available short-circuit current exceeds its short-circuit current rating as marked in accordance with 409.110(4).

(B) Documentation. If an industrial control panel is required to be marked with a short-circuit current rating in accordance with 409.110(4), the available short-circuit current at the industrial control panel and the date the short-circuit current calculation was performed shall be documented and made available to those authorized to inspect the installation.

430.99 Available Fault Current. (Motor Control Centers)

The available short circuit current at the motor control center and the date the short circuit current calculation was performed shall be documented and made available to those authorized to inspect the installation.

440.10 Short-Circuit Current Rating. (Air-Conditioning and Refrigerating Equipment)

(A) Installation. Motor controllers of multimotor and combination-load equipment shall not be installed where the available short-circuit current exceeds its short-circuit current rating as marked in accordance with 440.4(B).

(B) Documentation. When motor controllers or industrial control panels of multimotor and combination load equipment are required to be marked with a short circuit current rating, the available short circuit current and the date the short circuit current calculation was performed shall be documented and made available to those authorized to inspect the installation.

620.51 (D)(2) Available Short-Circuit Current Field Marking. (Elevators)

Where an elevator control panel is used, it shall be legibly marked in the field with the maximum available short-circuit current at its line terminals. The field marking(s) shall include the date the short-circuit current calculation was performed and be of sufficient durability to withstand the environment involved.

When modifications to the electrical installation occur that affect the maximum available short-circuit current at the elevator control panel, the maximum available short-circuit current shall be verified or recalculated as necessary to ensure the elevator control panel's short-circuit current rating is sufficient for the maximum available short-circuit current at the line terminals of the equipment. The required field marking(s) shall be adjusted to reflect the new level of maximum available short-circuit current.

409.22, 430.99, 440.10, 620.51, AND 670.5: FIELD MARKING OF AVAILABLE FAULT CURRENT (CONT.)

670.5 Short-Circuit Current Rating. (Industrial machinery)

(1) Industrial machinery shall not be installed where the available short-circuit current exceeds its short-circuit current rating as marked in accordance with 670.3(A)(4).

(2) Industrial machinery shall be legibly marked in the field with the maximum available short-circuit current. The field marking(s) shall include the date the short-circuit current calculation was performed and be of sufficient durability to withstand the environment involved.

REASONS FOR CHANGES:

Typically, manufacturers mark their equipment with a short-circuit current rating (SCCR), however field inspectors often find difficulties enforcing these ratings as available fault current documentation may not be readily available. Previous revisions of the NEC required several types of equipment to be field marked with the available fault current and five more have been added in the 2017 edition. These additions will make it easier to comply with SCCR requirements and to ensure safe installations.

HOW TO COMPLY:

A power system study must be done to determine the available fault current throughout the system and to ensure that the installed equipment has adequate ratings and/or protection.

HELPFUL PRODUCTS:

Properly applied Amp-Trap 2000® current limiting fuses can help to increase SCCR of a panel. Refer to Mersen's Tech Topic, "Achieving Higher Short Circuit Current Ratings for Industrial Control Panels," REF: TT-SCN1-002.

430.130: BRANCH CIRCUIT AND GROUND FAULT PROTECTION FOR SINGLE MOTOR POWER CONVERSION EQUIPMENT

PREVIOUS CODE REQUIREMENTS:

There was no previous requirement to define the over-current protective device in single motor power conversion equipment.

NEW CODE:

430.130 Branch-Circuit Short-Circuit and Ground-Fault Protection for Single Motor Circuits Containing Power Conversion Equipment (A)

(4) Where an instantaneous trip circuit breaker or semiconductor fuses are permitted in accordance with the drive manufacturer's instructions for use as the branch-circuit short-circuit and ground-fault protective device for listed power conversion equipment, they shall be provided as an integral part of a single listed assembly incorporating both the protective device and power conversion equipment.

REASONS FOR CHANGES:

While semiconductor fuses or instantaneous trip circuit breakers were allowed to be used as branch circuit protection they were not permitted to be installed separately. This change provides clear guidelines that they must be installed as a single unit.

HOW TO COMPLY:

If the power conversion equipment manufacturer requires semiconductor fuses or instantaneous trip circuit breaker for branch circuit and ground fault protection it must be contained within the equipment.

HELPFUL PRODUCTS:

Mersen is one of the largest supplier of semiconductor fuses in the world and offers a wide variety of voltage and amperage ratings in many different shapes, sizes, and mounting configurations.

620.16: SHORT-CIRCUIT CURRENT RATING FOR ELEVATOR CONTROL PANELS

PREVIOUS CODE REQUIREMENTS:

There were no previous requirements for marking elevator control panels with a short-circuit current rating.

NEW CODE:

620.16 Short-Circuit Current Rating
(A) Marking. Where an elevator control panel is installed, it shall be marked with its short-circuit current rating, based on one of the following:

1. (1) Short-circuit current rating of a listed assembly
2. (2) Short-circuit current rating established utilizing an approved method

Informational Note: UL 508A-2013, Supplement SB, is an example of an approved method.

(B) Installation. The elevator control panel shall not be installed where the available short-circuit current exceeds its short-circuit current rating, as marked in accordance with 620.16(A).

REASONS FOR CHANGES:

With no previous requirement for elevator control panels there was no way to know if a panel was suitable for the available fault current. Even if individual components inside a panel are marked with an SCCR it would impossible to see that external to the panel. Having the SCCR marked on the outside of the panel will aid the Authority Having Jurisdiction (AHJ) in determining if it is applied correctly.

Part (B) also ensures that panels will not be installed in a location where the available fault current does not exceed the panel SCCR and create a potential hazard.

HOW TO COMPLY:

As indicated in the informational note, using supplement SB from UL 508A will provide information on determining the SCCR. Using current limiting fuses in the panel feeder could protect components that are not marked or have a low SCCR and allow for the overall panel SCCR to be higher than an individual component.

HELPFUL PRODUCTS:

The Amp-Trap 2000® family delivers current-limiting fuses that can increase the SCCR of industrial control panels. Products such as the UltraSafe™ USFM fuse holder directly replace circuit breakers having the same width as type IEC motor starters. Surge-Trap® surge protective devices protect against voltage spikes and have a built-in rating of up to 200kA SCCR. The finger-safe power distribution blocks (FSPDBs) can also have a 200kA rating with feeder fuses.

620.51 (E): SURGE PROTECTION FOR EMERGENCY ELEVATOR, DUMBWAITER, ESCALATOR, MOVING WALK, PLATFORM LIFT, OR STAIRWAY CHAIRLIFT

PREVIOUS CODE REQUIREMENTS:

There were no previous requirements for surge protection in elevator type circuits.

NEW CODE:

620.51 (E) Surge Protection. (Elevators)
Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, surge protection shall be provided.

REASONS FOR CHANGES:

From 2013 to 2014 NFPA sponsored a survey to determine the damaging effects of voltage surges in various applications. 24% of responders to the survey reported damage to elevator circuits from voltage surges. Surge Protection is not solely designed to protect against lighting but also surges that are created by other equipment within a facility.

HOW TO COMPLY:

Using type 1 SPD's either internally or externally ensure that emergency elevator circuits are protected from damaging surges.

HELPFUL PRODUCTS:

Mersen has full line of Type 1-listed SPDs for all applications. The Mersen models are designed to protect service entrances, panels, and point-of-use equipment.

645.18: SURGE PROTECTION FOR CRITICAL OPERATIONS DATA SYSTEMS
670.6: SURGE PROTECTION FOR INDUSTRIAL MACHINERY

6. Surge Protection for Critical Operations Data Systems

PREVIOUS CODE REQUIREMENTS:

There were no previous requirements for surge protection in critical operations data systems. However, the previous code does require surge protection at a distribution level for critical operations per article 708.20 (D).

NEW CODE:

645.18 Surge Protection for Critical Operations Data Systems.
Surge protection shall be provided for critical operations data systems.

REASONS FOR CHANGES:

While Article 708.20 (D) does require surge protection it is only at the high level of power distributions for critical operations. For Surge Protection to be most effective, a cascading protection scheme should be used through an entire system. This added requirement ensures that protection will be installed as close as possible to critical operations data systems and provide multi-level protection in conjuction with 708.20 (D).

HOW TO COMPLY:

Use only a Type 1 SPD for general field additions to ensure they are self-protected. Type 1 component assemblies can be used but need to be installed in an enclosure.

HELPFUL PRODUCTS:

Mersen has a large variety of type 1 surge protective devices to cover most rating requirements for field additions. Mersen also has several type 1 component assemblies for installation in control panels.

7. Surge Protection for Industrial Machinery

PREVIOUS CODE REQUIREMENTS:

There were no previous requirements for surge protection for industrial machinery.

NEW CODE:

670.6 Surge Protection
Industrial machinery with safety interlock circuits shall have surge protection installed.

REASONS FOR CHANGES:

Industrial machinery safety interlocks are required per NFPA 79 primarily to protect operators against serious injury or possible death. A 2013 and 2014 survey of facility managers commissioned by NFPA found that a significant amount of responses (26%) reported damage to safety interlocks from surge events.

HOW TO COMPLY:

Select listed SPDs with manufacturer instructions that include minimum wire sizing.

HELPFUL PRODUCTS:

Mersen has a large variety of Type 1 surge protective devices to cover most rating requirements for field additions. Mersen also has several Type 1 component assemblies for installation in control panels.

695.15: SURGE PROTECTION FOR FIRE PUMP CONTROLLERS

PREVIOUS CODE REQUIREMENTS:

There were no previous requirements for surge protection for a fire pump controller.

NEW CODE:

695.15 Surge Protection
A listed surge protection device shall be installed in or on the fire pump controller.

REASONS FOR CHANGES:

In 2014 surge protection requirements were added for emergency systems at a distribution level for switchboards and panelboards. 2017 expands on this further requiring another level of protection directly at the fire pump controller. NFPA survey results from 2013-2014 showed that 12% of participants reported damage to fire pump controllers from surge issues.

HOW TO COMPLY:

Use only a Type 1 SPD for general field additions to ensure they are self-protected. Type 1 component assemblies can be used but need to be installed in an enclosure.

HELPFUL PRODUCTS:

Mersen has a large variety of Type 1 surge protective devices to cover most rating requirements for field additions. Mersen also has several Type 1 component assemblies for installation in control panels.

700.5, 701.5, 702.5, 708.24: SHORT-CIRCUIT CURRENT RATING DOCUMENTATION AND FIELD MARKING

PREVIOUS CODE REQUIREMENTS:

New Requirements were added to various articles to address documenting and field marking of short-circuit ratings for emergency, legally required standby and critical operation powers systems.

NEW CODE:

700.5 Transfer Equipment. (Emergency Systems)
(E) Documentation. The short-circuit current rating of the transfer equipment, based on the specific overcurrent protective device type and settings protecting the transfer equipment, shall be field marked on the exterior of the transfer equipment.

701.5 Transfer Equipment. (Legally Required Standby Systems)
(D) Documentation. The short-circuit current rating of the transfer equipment, based on the specific overcurrent protective device type and settings protecting the transfer equipment, shall be field marked on the exterior of the transfer equipment.

702.5 Transfer Equipment. (Optional Standby Systems)
The short-circuit current rating of the transfer equipment, based on the specific overcurrent protective device type and settings protecting the transfer equipment, shall be field marked on the exterior of the transfer equipment.

708.24 Transfer Equipment. (Critical Operations Power Systems [COPS])
(E) Documentation. The short-circuit current rating of the transfer equipment, based on the specific overcurrent protective device type and settings protecting the transfer equipment, shall be field marked on the exterior of the transfer equipment.

REASONS FOR CHANGES:

Transfer switches typically have several different SCCRs depending on the over current protective device used. This can lead to confusion for inspectors on which rating is correct as there was no previous requirement for external marking of the equipment.

HOW TO COMPLY

Check manufacturer instructions and select over-current protective devices that achieve and application appropriate SCCR. Using current-limiting fuses may help to gain the highest SCCR possible.

HELPFUL PRODUCTS:

The Amp-Trap 2000® family delivers current-limiting fuses that may increase the SCCR of transfer switches per the manufacturer's instructions.

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BR-NEC17-001 | 03.17 | PDF |