Public Input No. 1740-NFPA 70-2023 [Definition: Branch Circuit, Motor. (Motor Branch Circuit)]

Branch Circuit, Motor. (Motor Branch Circuit)

The circuit conductors, including equipment, between the motor branch-circuit short-circuit and ground-fault protective device and an individual motor. (CMP-11)

Delete definition, the definition of branch circuit already covers the installation of a single outlet or multiple outlets. If there is no outlet at the motor, then the definition should remain intact.

If definition is to remain in 2026 NEC, add new Informational Note:

Informational Note: Hard-wired equipment has no outlet, only cord-and-plug connected motors have an outlet, see definition of branch circuit, appliance and branch circuit, general purpose.

Statement of Problem and Substantiation for Public Input

I have maintained and always believed there is no outlet, this is nothing more than a termination. If an outlet is present, a substantiation from Code Making Panel 2 of where the outlet is located would be helpful.

Here are some locations to consider - at the circuit breaker, the load side of the disconnecting means, the wiring method itself, at the motor termination, and where the wiring method terminates at the motor (apparently a free floating outlet in an infinite space).

If there is no outlet, 210.8(F), Ex. 2 needs to be completed deleted from the 2026 NEC.

Submitter Information Verification

Submitter Full Name: James Stallcup
Organization: Volt Online Academy
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 31 14:35:43 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Public Input violated Section 4.3.4.1 (C) of the NFPA Regulations for Standard development by not providing proposed new language. The term outlet is frequently misused to mean receptacles. The connection to the utilization equipment is an outlet, see Article 100 definition.

Public Input No. 177-NFPA 70-2023 [Definition: Industrial Control Panel.]

~~**Industrial Control Panel.**~~

~~An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel. (CMP-11)~~

~~Informational Note: The industrial control panel does not include the controlled equipment.~~

Statement of Problem and Substantiation for Public Input

The current definition makes many common installations impossible because of the marking requirements in 409.110. For example a simple start stop station or control station assembled in the field would not comply with those marking requirements, yet the following from the definition "(2) control circuit components only, such as push buttons, pilot lights, selector switches, ..." requires that these field assemblies have the required marking. There is no way to provide the required marking for an assembly built in the field using listed parts.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jan 17 12:56:26 EST 2023
Committee: NEC-P11

Committee Statement

Resolution: Deleting the definition does not change the equipment to which Article 409 applies. The submitter should submit changes to revise Article 409 rather than deleting the definition.

Public Input No. 490-NFPA 70-2023 [Definition: Industrial Control Panel.]

Industrial Control Panel.

An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect ~~switches~~ means , and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel. (CMP-11)

Informational Note: The industrial control panel does not include the controlled equipment.

Statement of Problem and Substantiation for Public Input

"Disconnecting switch" is revised to the defined term "disconnecting means" within this definition of "inductrial control panel" so that this definition is technically correct.

Submitter Information Verification

Submitter Full Name: Palmer Hickman
Organization: Electrical Training Alliance
Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 20 15:14:25 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The term “fused disconnect switch” is being used as an example of a power circuit component in this definition. It is the correct use of the term, as "fused disconnect means" is not consistent with terminology elsewhere in the code.

Public Input No. 1855-NFPA 70-2023 [New Definition after Definition: Motion Picture Studio (Tel...]

Motor Continuous Duty

100 (NEW) “Motor Continuous Duty” extract language from 430.33 “Intermittent and Similar Duty” for this new definition

The language describing what is a continuous duty motor in 430.33 reads like a definition.

Statement of Problem and Substantiation for Public Input

The language describing what is a continuous duty motor in 430.33 reads like a definition and for ease of use should be in Article 100. This important motor distinction is inbedded in a somewhat unrelated section.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sun Aug 06 15:41:58 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Public Input violated Section 4.3.4.1 (C) of the NFPA Regulations for Standard development by not providing new language. The definition is not needed as it is already covered in Article 100 for continuous duty. All motors are considered to be continuous duty unless the driven equipment cannot be run continuously under any conditions.

Public Input No. 2429-NFPA 70-2023 [Section No. 409.1]

409.1 Scope.

This article covers industrial control panels intended for general use and operating at ~~1000 volts or less~~ not over 1000 volts ac, 1500 volts dc, nominal .

Informational Note: See ANSI/UL 508A, *Standard for Industrial Control Panels*, a safety standard for industrial control panels.

Statement of Problem and Substantiation for Public Input

This Public Input is submitted on behalf of a Correlating Committee Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, Donny Cook, Scott Higgins, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, Kevin Rogers, Tony Ricciuti, Paul Knapp, Paul Sullivan, George Smith, Eric Simmon, Kevin Arnold, Larry Wildermuth, and Kyle Krueger.

Requirements are revised to include the same voltage demarcation used in many places throughout the Code.

Submitter Information Verification

Submitter Full Name: Robert Osborne
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 17 09:43:44 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8070-NFPA 70-2024
Statement: Reference to 1000 volts is changed for consistency with other parts of the Code. This change correlates with the correlating committee DC task force work.

Public Input No. 4373-NFPA 70-2023 [Section No. 409.1]

409.1 Scope.

This article covers industrial control panels intended for general use and operating at 1000 volts or less.

Informational Note 1 : See ANSI/UL 508A, *Standard for Industrial Control Panels*, a safety standard for industrial control panels.

Informational Note 2: See IEEE 3001.11 Recommended Practice for Application of Controllers and Automation to Industrial and Commercial Power Systems

Statement of Problem and Substantiation for Public Input

This is another slice of updated content from the legacy "Red Book" IEEE 141 and "Gray Book: IEEE 241 into the new IEEE 3000 Standards Collection. From the project prospectus:

"The selection and application of controllers and automation to industrial and commercial power systems is covered by this recommended practice. It is likely to be of greatest value to the power-oriented engineer with limited experience with this equipment. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems."

https://standards.ieee.org/standard/3001_11-2017.html

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: Standards Michigan LLC
Affiliation: IEEE Industrial Applications Society
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 07 13:20:20 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Sufficient substantiation has not been provided on how the referenced standard provides valuable information specifically with respect to industrial control panels.

Public Input No. 3722-NFPA 70-2023 [Section No. 409.3]

~~**409.3** Other Articles.~~

~~In addition to the requirements of this article, industrial control panels that contain branch circuits for specific loads or components, or are for control of specific types of equipment addressed in other articles of this *Code* , shall be constructed and installed in accordance with the applicable requirements from those articles.~~

Statement of Problem and Substantiation for Public Input

The section should be removed as the requirement is redundant. The other parts of the NEC are applicable and do not need to be restated. The section is also removed for compliance with the NEC Style Manual Section 2.2.1.

Submitter Information Verification

Submitter Full Name: Derrick Atkins
Organization: Minneapolis Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 05 14:53:00 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8073-NFPA 70-2024
Statement: This section is redundant and not in compliance with Section 4.1.1 of the NEC Style Manual.

Public Input No. 2682-NFPA 70-2023 [Section No. 409.21(A)]

(A) General.

Industrial control panels shall be provided with overcurrent protection in accordance with Article 240, Parts ~~land~~ I and II- ~~of Article~~ ~~240~~ .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 09:35:19 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8074-NFPA 70-2024
Statement: Revised to comply with Section 4.1.4 of the NEC Style Manual.

Public Input No. 1759-NFPA 70-2023 [New Section after 409.22]

409.24 Identification of Source of Supply

All Industrial Control Panels supplied by a feeder(s) shall be permanently marked in accordance with the following:

(1) With the identification and physical location of where the power originates

(2) With a label that is permanently affixed and of sufficient durability to withstand the environment involved

(3) Using a method that is not handwritten

.

Statement of Problem and Substantiation for Public Input

This requirement has been in the NEC for Panelboards and Switchboards and has been helpful for installers, service technicians as well as maintenance personnel to quickly identify the location of the power supply. This is sometimes already completed when a facility completes an arc flash study, as some arc flash labels incorporate the power supply location on the arc flash label for worker safety. With this additional label, this will create a safer workplace and if an emergency occurs, the power source location can be quickly identified and deenergized.

Submitter Information Verification

Submitter Full Name: Rudy Garza
Organization: IAEI
Street Address:
City:
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Submittal Date: Tue Aug 01 12:07:40 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8111-NFPA 70-2024

Statement: There is a need for marking or documentation for the location of disconnects, the current language in other areas of the code is not sufficient as industrial control panels can have multiple sources of supply. There is a related FR deleting the existing requirements in 409.110(3) as they are incorporated into this new section.

Public Input No. 3625-NFPA 70-2023 [Section No. 409.22(B)]

(B) ~~Documentation~~ Available Fault Current Field Marking .

If an industrial control panel is required to be marked with a short-circuit current rating in accordance with 409.110(4), the industrial control panel shall be legibly marked in the field with the available fault current~~ at the industrial control panel and the~~ . The field marking(s) shall include the date the available fault current calculation was performed ~~shall be documented and made available to those authorized to inspect, install, or maintain the installation~~ and be of sufficient durability to withstand the environment involved .

Statement of Problem and Substantiation for Public Input

Many end users are not installing industrial control panels properly when it comes to reviewing the SCCR and available fault current. Inadequate equipment SCCR can result in serious electrical hazards such as electrical shock, fire, and shrapnel. To ensure electrical safety and proper installation, verification of the available fault current prior to installation and energizing of the equipment is critical. Being legibly marked allows for easier inspection. Also, because of this issue, NFPA 70 (NEC) requires available fault current be marked on Service Equipment (110.24(A)), switchgear (408.6), switchboards (408.6), panel boards (408.6), DC Busway (480.7(F)), elevator control panels (620.51(D)(1)), Industrial Machinery (670.5(B)), Energy Storage System (ESS) (706.15(C)), stationary standby battery system (706.15(E)(4)). This proposal will reduce misapplications and increase electrical safety for those required to work on and around the panel.

Submitter Information Verification

Submitter Full Name: Joseph Pavia
Organization: Eaton Bussmann Business
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 05 10:12:22 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The existing text aligns with the action taken on PI-3308.

Public Input No. 1518-NFPA 70-2023 [New Section after 409.30]

TITLE OF NEW CONTENT:

409.24 Identification of Source of Supply.

All Industrial Control Panels supplied by a feeder(s) shall be permanently marked in accordance with the following:

(1) With the identification and physical location of where the power originates

(2) With a label that is permanently affixed and of sufficient durability to withstand the environment involved

(3) Using a method that is not handwritten

Statement of Problem and Substantiation for Public Input

This requirement has been in the NEC for Panelboards and Switchboards and has been helpful for installers, service technicians as well as maintenance personnel to quickly identify the location of the power supply. This is sometimes already completed when a facility completes an arc flash study, as some arc flash labels incorporate the power supply location on the arc flash label for worker safety. With this additional label, this will create a safer workplace and if an emergency occurs, the power source location can be quickly identified and deenergized.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1519-NFPA 70-2023 [Section No. 430.98]	

Submitter Information Verification

Submitter Full Name: Robert Fahey
Organization: Town of Union
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 23 13:06:35 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8111-NFPA 70-2024

Statement: There is a need for marking or documentation for the location of disconnects, the current language in other areas of the code is not sufficient as industrial control panels can have multiple sources of supply. There is a related FR deleting the existing requirements in 409.110(3) as they are incorporated into this new section.

Public Input No. 2409-NFPA 70-2023 [New Section after 409.30]

TITLE OF NEW CONTENT

409.xx (New Section between Disconnecting Means (409.30) and Bonding (409.60))

409.xx Absence of Voltage Detection Devices

A listed absence of voltage detection device or listed absence of voltage tester shall be permitted to be connected to the line side of a feeder or branch circuit disconnecting means.

Informational Note No.1: See NFPA 70E, Standard for Electrical Safety in the Workplace, for information on absence of voltage testing and the process for establishing and verifying an electrically safe work condition.

Informational Note No. 2: See UL 61010-1 , *Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements* , and UL 61010-2-030, *Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Testing and Measuring Circuits* for construction and testing requirements for permanently mounted absence of voltage detection devices.

Informational Note No. 3: See UL 1436 , *Outlet Circuit Testers and Other Similar Indicating Devices,* for construction and testing requirements for permanently mounted absence of voltage testers.

Additional Proposed Changes

File Name	Description	Approved
NEC_409.xx_Absence_of_Voltage_Detection_Devices_submitted.docx	Absence of Voltage Detection Devices	

Statement of Problem and Substantiation for Public Input

An absence of voltage detection device is a permanently-mounted device that is used to verify that a circuit is de-energized prior to opening an electrical enclosure that contains energized electrical conductors and circuit parts. An absence of voltage detection device is provided with voltage test points that allow for insertion of meter probes to perform absence of voltage tests from outside an electrical enclosure.

An absence of voltage tester (AVT) is a permanently-mounted test device that is used to verify that a circuit is de-energized prior to opening an electrical enclosure that contains energized electrical conductors and circuit parts. An AVT is provided with a test circuit with active indications to verify the absence of phase-to-phase voltage and phase-to-ground voltage. AVTs are provided with a test circuit and visual indicators to confirm that the tester is functioning properly before and after the process of determining that voltage is absent.

Testing for the absence of voltage is part of the process for establishing and verifying an electrically safe work condition as defined in the Standard for Electrical Safety in the Workplace, NFPA 70E. Section 120.5 defines all of the steps required to be performed in a specific order to establish and verify an electronically safe work condition.

Section 120.5 (7) specifies the use of an adequately rated portable test instrument to test each phase conductor or circuit part to test for the absence of voltage. Each phase conductor or circuit part, both phase-to-phase and phase-to-ground shall be tested. An absence of voltage detection device is provided with voltage test points that facilitate the use of a portable test instrument to perform the required tests. The combination of the absence of voltage detection device and portable test instrument allow the tests to be conducted without opening the electrical enclosure and exposing the

tester to live electrical parts and increasing the risk of an arc flash hazard.
Section 120.5 (7) Exception No. 1 recognizes the use of an AVT for absence of voltage testing. The Exception states “An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location…” The text continues stating the AVT must meet certain requirements which include being listed and labeled for the purpose of testing for the absence of voltage.
Absence of voltage detection devices and AVTs provide a means to verify that a circuit is de-energized prior to opening an electrical enclosure that contains energized electrical conductors and circuit parts. This reduces the likelihood of arc flash and shock hazards as the use of these devices does not require direct contact with energized electrical conductors and circuit parts.
Using an absence of voltage detection device or AVT to verify the absence of voltage in industrial control panel enclosures containing a feeder or branch circuit disconnecting means, would require connecting the device to the supply side of the feeder or branch circuit disconnecting means. This application should be recognized in Article 409. Requiring the device to be listed, would ensure that it has been evaluated specifically for its ability to test for the absence of voltage.
Informational Note No. 1 provides a reference to NFPA 70E, the Standard for Electrical Safety in the Workplace which contains information on absence of voltage testing and the process for establishing and verifying an electrically safe work condition. Informational Notes Nos. 2 and 3 provide references to UL 61010-1, the Standard for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements, and UL 61010-2-030, the Standard for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Testing and Measuring Circuits; and UL 1436, the Standard for Outlet Circuit Testers and Other Similar Indicating Devices which contain construction and testing requirements for absence of voltage detection devices and absence of voltage testers.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2410-NFPA 70-2023 [Definition:]	Adds UL Standards to Annex A for new listing requirement in Article 409
Public Input No. 2410-NFPA 70-2023 [Definition:]	

Submitter Information Verification

Submitter Full Name: John Kovacik
Organization: Trusted Safety Solutions LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 16 20:37:02 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The installation of absence or presence of voltage indication devices is allowed as the current requirements in the NEC do not prohibit the use of these devices.

NEC 409.xx (NEW)

PROPOSAL:

409.xx (New Section between Disconnecting Means (409.30) and Bonding (409.60))

409.xx Absence of Voltage Detection Devices

A listed absence of voltage detection device or listed absence of voltage tester shall be permitted to be connected to the line side of a feeder or branch circuit disconnecting means.

Informational Note No.1: See NFPA 70E, Standard for Electrical Safety in the Workplace, for information on absence of voltage testing and the process for establishing and verifying an electrically safe work condition.

Informational Note No. 2: See UL 61010-1*, Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements,* and UL 61010-2-030, *Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Testing and Measuring Circuits* for construction and testing requirements for permanently mounted absence of voltage detection devices.

Informational Note No. 3: See UL 1436*, Outlet Circuit Testers and Other Similar Indicating Devices,* for construction and testing requirements for permanently mounted absence of voltage testers.

RATIONALE:

An absence of voltage detection device is a permanently-mounted device that is used to verify that a circuit is de-energized prior to opening an electrical enclosure that contains energized electrical conductors and circuit parts. An absence of voltage detection device is provided with voltage test points that allow for insertion of meter probes to perform absence of voltage tests from outside an electrical enclosure.

An absence of voltage tester (AVT) is a permanently-mounted test device that is used to verify that a circuit is de-energized prior to opening an electrical enclosure that contains energized electrical conductors and circuit parts. An AVT is provided with a test circuit with active indications to verify the absence of phase-to-phase voltage and phase-to-ground voltage. AVTs are provided with a test circuit and visual indicators to confirm that the tester is functioning properly before and after the process of determining that voltage is absent.

Testing for the absence of voltage is part of the process for establishing and verifying an electrically safe work condition as defined in the Standard for Electrical Safety in the Workplace, NFPA 70E. Section 120.5 defines all of the steps required to be performed in a specific order to establish and verify an electronically safe work condition.

Section 120.5 (7) specifies the use of an adequately rated portable test instrument to test each phase conductor or circuit part to test for the absence of voltage. Each phase conductor or circuit part, both phase-to-phase and phase-to-ground shall be tested. An absence of voltage detection device is provided with voltage test points that facilitate the use of a portable test instrument to perform the required tests. The combination of the absence of voltage detection device and portable test instrument allow the tests to be conducted without opening the electrical enclosure and exposing the tester to live electrical parts and increasing the risk of an arc flash hazard.

Section 120.5 (7) Exception No. 1 recognizes the use of an AVT for absence of voltage testing. The Exception states "An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location…" The text continues stating the AVT must meet certain requirements which include being listed and labeled for the purpose of testing for the absence of voltage.

Absence of voltage detection devices and AVTs provide a means to verify that a circuit is de-energized prior to opening an electrical enclosure that contains energized electrical conductors and circuit parts. This reduces the likelihood of arc flash and shock hazards as the use of these devices does not require direct contact with energized electrical conductors and circuit parts.

Using an absence of voltage detection device or AVT to verify the absence of voltage in industrial control panel enclosures containing a feeder or branch circuit disconnecting means, would require connecting the device to the supply side of the feeder or branch circuit disconnecting means. This application should be recognized in Article 409. Requiring the device to be listed, would ensure that it has been evaluated specifically for its ability to test for the absence of voltage.

Informational Note No. 1 provides a reference to NFPA 70E, the Standard for Electrical Safety in the Workplace which contains information on absence of voltage testing and the process for establishing and verifying an electrically safe work condition. Informational Notes Nos. 2 and 3 provide references to UL 61010-1, the Standard for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements, and UL 61010-2-030, the Standard for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Testing and Measuring Circuits; and UL 1436, the Standard for Outlet Circuit Testers and Other Similar Indicating Devices which contain construction and testing requirements for absence of voltage detection devices and absence of voltage testers.

Public Input No. 2683-NFPA 70-2023 [Section No. 409.30]

409.30 Disconnecting Means.

Disconnecting means that supply motor loads shall comply with ~~Part IX of~~ Article 430 , Part IX .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 09:36:11 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8093-NFPA 70-2024
Statement: The reference to Part IX of Article 430 in 409.30 is revised to comply with section 4.1.4 of the NEC Style Manual.

Public Input No. 1243-NFPA 70-2023 [New Section after 409.70]

TITLE OF NEW CONTENT

Type your content here ...

409.71. Cybersecurity

Industrial Control Panels that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control the system is limited to a direct connection through a local nonnetworked interface.

(2) The industrial control panel is connected through a networked interface complying with both of the following methods:

a. The industrial control panel and associated software are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment is conducted on the connected system to determine vulnerabilities to cyber attacks.

The cybersecurity assessment shall be conducted when the system configuration changes and at not more than 5-year intervals.

Documentation of the evaluation, assessment, identification, and certification shall be made available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, Cybersecurity Standards series; UL 2900, Cybersecurity Standards series; and the NIST Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, for assessment guidelines.

Informational Note No. 2: Examples of the commissioning certification used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) The ISA Security Compliance Institute (ISCI) conformity assessment program

(2) Certification of compliance by a nationally recognized test laboratory

Statement of Problem and Substantiation for Public Input

Most of the cybersecurity focus has been on IT systems. There has been very little public discussion about cybersecurity for Operational Technology (OT), but cyber attacks on OT, by both domestic and foreign actors, occur on almost a daily basis. Hackers can easily destroy unprotected equipment and shut down entire unprotected facilities. Our adversaries such as Russia, China, North Korea, and Iran, are continuously mounting cyber attacks. They understand their limits and, so far, prohibit catastrophic attacks on our financial/banking system and electrical grid. In the mean time, they attack our infrastructure, such as the southeast gas pipeline. We have the ability, and obligation, to prevent this type of damage to our infrastructure from malicious cyber attacks.

This Public Input is based upon 240.6(D) and 708.7 in the 2023 NEC. Pay particular attention to the word "identified" in (2) a. "Identified" as applied to equipment, is defined in Article 100 as "Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement. Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organization concerned with product evaluation."

This Public Input simply requires that an industrial control panel either not be connected to the internet,

or if it is connected to the internet, that it be identified for cybersecurity and that an assessment is provided.

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jun 30 09:44:19 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Considerations for cyber security should occur during the product development stage, not during installation stage. Entities involved in product development or listing should be responsible for addressing cyber security.

Public Input No. 1190-NFPA 70-2023 [Section No. 409.102]

409.102 Busbars.

Industrial control panels utilizing busbars shall comply with 409.102(A) and (B).

(A) Support and Arrangement.

Busbars shall be protected from physical damage and be held firmly in place.

(B) Phase Arrangement.

The phase arrangement on 3-phase horizontal common power and vertical buses shall be A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the industrial control panel. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta-connected systems. Other busbar arrangements shall be permitted for additions to existing installations, and the phases shall be permanently marked.

(C) Busbar Connections.

Where multiple industrial control panel sections utilizing busbar connections are encountered, the sections shall be installed and torqued to the manufacturers specifications and 110.14 (D).

Statement of Problem and Substantiation for Public Input

This new part "C" will make it clear to the installer that when encountering multiple section industrial control panels utilizing busbars instead of conductors that the bolted connections between sections shall be installed in accordance with both the manufacturers installation instructions and 110.14 (D).

Submitter Information Verification

Submitter Full Name: Charles Littlefield
Organization: Goochland County
Affiliation: International Association of Electrical Inspectors
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jun 22 15:02:42 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: This requirement is covered already in Article 110. Substantiation was not provided to demonstrate an issue specific to industrial control panels, necessitating it to be repeated here.

Public Input No. 1747-NFPA 70-2023 [Section No. 409.110]

409.110 Marking.

An industrial control panel shall have permanent markings that are visible after installation. The markings in 409.110(2) ~~and~~ , (3), and (4) shall be attached to the outside of the enclosure. The markings in 409.110(1), (4), (5), (6), and (7) shall be attached to either the inside or outside of the enclosure. The following markings shall be included:

(1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.

(2) Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.

(3) Where the industrial control panel is supplied by more than one electrical source and where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel, marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.

(4) Short-circuit current rating of the industrial control panel based on one of the following:

(5) Short-circuit current rating of a listed and labeled assembly

(6) Short-circuit current rating established utilizing an approved method

Informational Note: See ANSI/UL 508A, *Standard for Industrial Control Panels*, Supplement SB, for an example of an approved method.

Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(7) If the industrial control panel is intended as service equipment, marked to identify it as being suitable for use as service equipment.

(8) Electrical wiring diagram, the identification number of a separate electrical wiring diagram, or a designation referenced in a separate wiring diagram.

(9) An enclosure type number.

Statement of Problem and Substantiation for Public Input

The short-circuit current rating marking should be moved to the outside of the industrial control panel for several reasons:

1) Proper installation and ease of inspection: SCCR is a critical piece of information when confirming proper installation of industrial control panels, similar to the supply voltage, full-load current and multiple sources of supply which are required to be on the outside of the enclosure. In addition, having these critical safety markings on the outside increases the ease of inspection.

2) Electrical safety considerations: SCCR is a vital piece of information when it comes to electrical safety especially when conducting data collection during an Arc Flash analysis. If the SCCR was on the inside of the industrial control panel, the data collector would be exposed to an electrical hazard just to read the panel SCCR. This can be avoided if the SCCR was marked on the outside of the panel.

3) Code Consistence: 670.3(A) already requires the Short Circuit Current Rating be labeled on the

outside of the equipment enclosure for Industrial Machinery. This change in section 409.110 would allow consistency within the Code and additional safety.

The underlined text under 409.110(4) is mistakenly shown as new text in Terra.

Submitter Information Verification

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Submittal Date: Mon Jul 31 15:43:21 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8126-NFPA 70-2024
Statement: The requirement was changed to facilitate proper application of equipment, which may need to be done while the industrial control panel is in operation.

Public Input No. 4354-NFPA 70-2023 [Section No. 409.110]

409.110 Marking.

An industrial control panel shall have permanent markings that are visible after installation. The ~~markings~~ marking in 409.110(~~2) and~~ (3) shall be attached to the outside of the enclosure. The markings in 409.110(1), (2), (4), (5), (6), and (7) shall be attached to either the inside or outside of the enclosure. The following markings shall be included:

(1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.

(2) Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.

(3) Where the industrial control panel is supplied by more than one electrical source and where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel, marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.

(4) Short-circuit current rating of the industrial control panel based on one of the following:

(5) Short-circuit current rating of a listed and labeled assembly

(6) Short-circuit current rating established utilizing an approved method

Informational Note: See ANSI/UL 508A, *Standard for Industrial Control Panels*, Supplement SB, for an example of an approved method.

Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(7) If the industrial control panel is intended as service equipment, marked to identify it as being suitable for use as service equipment.

(8) Electrical wiring diagram, the identification number of a separate electrical wiring diagram, or a designation referenced in a separate wiring diagram.

(9) An enclosure type number.

Additional Proposed Changes

File Name	Description	Approved
PI_No._4354-NFPA_70_Section_No._409.110_.docx		

Statement of Problem and Substantiation for Public Input

The revisions align the marking requirements for the nameplate with those in UL 508A, The Standard For Industrial Control Panels, 3rd Edition with revisions dated July 28, 2022. The only marking that needs to be attached to the outside of the enclosure is detailed in 409.110(3). "Where the industrial control panel is supplied by more than one electrical source and where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel," All other markings identified in 409.110 should be allowed to be provided on the outside or inside of the enclosure.

The following are just a few UL standards that require product nameplates to be "plainly visible" after installation. This does not mean the product nameplate must be on the outside of the enclosure -

although clearly it can be. These standards have allowances for the product nameplate to be located on the inside of enclosures provided the nameplate is readily visible by opening an enclosure door or removing an enclosure cover.

- UL 67 - Panelboards
- UL 98 - Enclosed and Dead-Front Switches
- UL 218 - Fire Pump Controllers
- UL 347 Series - Medium Voltage Equipment
- UL 508 and UL 60947 Series - Industrial Control Equipment
- UL 845 - Motor Control Centers
- UL 891 - Switchboards
- UL 977 - Fused Power-Circuit Devices
- UL 1008 Series - Transfer Switch Equipment
- UL 6420 - Safety Isolation Equipment
- UL 61800-5-1 - Adjustable Speed Electrical Power Drive Systems

For products certified to all of these UL standards, the focus is on verification/validation of all product markings to ensure the product nameplate is "plainly visible" after installation during the product evaluation. “Plainly visible” is interpreted to mean from either the outside or inside of the product enclosure. The requirements for industrial control panel nameplates should not be any different than the nameplate requirements for the products listed above.

Note: The underlining and renumbering of list items (4)a. and (4)b. was inserted by TerraView and is not part of this Public Input.

Submitter Information Verification

Submitter Full Name: John Kovacik
Organization: Trusted Safety Solutions LLC
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State:
Zip:
Submittal Date: Thu Sep 07 12:35:07 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Industrial control panels are not required to be Listed to UL 508A, therefore alignment is not necessarily required. Also, the requirement does not refer to ratings, it is the actual values of the supply circuit(s).

Public Input No. 4354-NFPA 70-2023 [Section No. 409.110]

409.110 Marking.

An industrial control panel shall have permanent markings that are visible after installation. The marking~~s~~ in 409.110~~(2) and~~ (3) shall be attached to the outside of the enclosure. The markings in 409.110(1), (2), (4), (5), (6), and (7) shall be attached to either the inside or outside of the enclosure. The following markings shall be included:

(1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.

(2) Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.

(3) Where the industrial control panel is supplied by more than one electrical source and where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel, marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.

(4) Short-circuit current rating of the industrial control panel based on one of the following:

a.Short-circuit current rating of a listed and labeled assembly

b.Short-circuit current rating established utilizing an approved method

Informational Note: See ANSI/UL 508A, *Standard for Industrial Control Panels*, Supplement SB, for an example of an approved method.

Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(5) If the industrial control panel is intended as service equipment, marked to identify it as being suitable for use as service equipment.

(6)Electrical wiring diagram, the identification number of a separate electrical wiring diagram, or a designation referenced in a separate wiring diagram.

(7) An enclosure type number.

Statement of Problem and Substantiation for Public Input

The revisions align the marking requirements for the nameplate with those in UL 508A, The Standard for Industrial Control Panels, 3rd Edition with revisions dated July 28, 2022. The only marking that needs to be attached to the outside of the enclosure is detailed in 409.110(3). "Where the industrial control panel is supplied by more than one electrical source and where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel," All other markings identified in 409.110 should be allowed to be provided on the outside or inside of the enclosure.

The following are just a few UL standards that require product nameplates to be "plainly visible" after installation. This does not mean the product nameplate must be on the outside of the enclosure - although clearly it can be. These standards have allowances for the product nameplate to be located on the inside of enclosures provided the nameplate is readily visible by opening an enclosure door or removing an enclosure cover.

- UL 67 - Panelboards
- UL 98 - Enclosed and Dead-Front Switches
- UL 218 - Fire Pump Controllers
- UL 347 Series - Medium Voltage Equipment
- UL 508 and UL 60947 Series - Industrial Control Equipment
- UL 845 - Motor Control Centers
- UL 891 - Switchboards
- UL 977 - Fused Power-Circuit Devices
- UL 1008 Series - Transfer Switch Equipment
- UL 6420 - Safety Isolation Equipment
- UL 61800-5-1 - Adjustable Speed Electrical Power Drive Systems

For products certified to all of these UL standards, the focus is on verification/validation of all product markings to ensure the product nameplate is "plainly visible" after installation during the product evaluation. “Plainly visible” is interpreted to mean from either the outside or inside of the product enclosure. The requirements for industrial control panel nameplates should not be any different than the nameplate requirements for the products listed above.

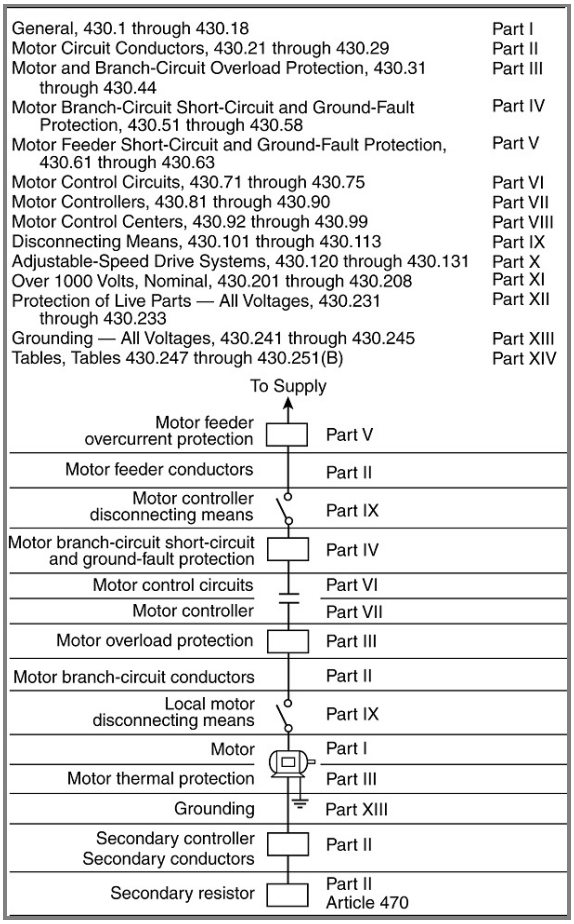
Note: The underlining and renumbering of list items (4)a. and (4)b. was inserted by TerraView and is not part of this Public Input.

Public Input No. 4375-NFPA 70-2023 [Section No. 430.1]

430.1 Scope.

This article covers motors, motor branch-circuit and feeder conductors and their protection, motor overload protection, motor control circuits, motor controllers, and motor control centers.

Figure Informational Note Figure 430.1 Article 430 Contents.



Informational Note No. 1: See Informational Note Figure 430.1 for the arrangement of this article.

Informational Note No. 2: See 110.26(E) for installation requirements for motor control centers.

Informational Note No. 3: See 440.1 for air-conditioning and refrigerating equipment.

Informational Note No. 4: See Part X for additional requirements for motors utilizing adjustable-speed drive systems.

Informational Note No. 5: See Part XI for additional requirements for motors that operate over 1000 volts, nominal.

Informational Note No. 6: Additional guidance on motor supply circuits may be found in IEEE3004.8-2016 - Recommended Practice for Motor Protection in Industrial and Commercial Power Systems

Statement of Problem and Substantiation for Public Input

This is another slice of updated content from the legacy "Red Book" IEEE 141 mapped into the IEEE 3000 Standards Collection. From the project prospectus:

"The protection of motors used in industrial and commercial power systems is covered. It is likely to be of greatest value to the power design engineer with limited experience in the area of protection and control. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems."

It can also inform electrical inspection.

https://standards.ieee.org/standard/3004_8-2016.html

This content might also be appropriately located at the head of Part III Motor and Branch Circuit Overload Protection.

Submitter Information Verification

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Submittal Date: Thu Sep 07 13:27:01 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7922-NFPA 70-2024
Statement: Recommends acceptance of this informational note to the scope of article 430 while recognizing that the correlating committee has responsibility for scopes. Information provided in IEEE 3004.8 would provide additional data for motor & motor control application installations.

Public Input No. 1979-NFPA 70-2023 [Section No. 430.2]

430.~~2~~ 3 Reconditioned Motors.

Reconditioned motors shall be permitted if the reconditioning has been conducted in accordance with the manufacturer's instructions or, if no instructions are provided, nationally recognized standards.

Reconditioned motors ~~identified~~ for use in hazardous (classified) locations shall be ~~listed as reconditioned if installed in hazardous (classified) locations~~ permitted as stated elsewhere in this Code .

Informational Note: See ANSI/EASA AR100-2020, *Recommended Practice for the Repair of Rotating Electrical Apparatus*, for information on the rewinding and repair of motors.

Statement of Problem and Substantiation for Public Input

The language in 430.2 addressing listing of reconditioned motors in hazardous (classified) locations is out of scope for this article and must reside in the Chapter 5 articles which cover hazardous (classified) location requirements. In addition, the 2026 NEC® Style Manual requires this language reside in the ".3" section of the article, so this proposal covers that update as well. Current language in 501.125 and 502.125 allow motors to be identified for the location and doesn't specifically require them to be listed. Insertion of a listing requirement for reconditioned motors will not work because a motor which was never listed when installed could not be listed as reconditioned. As such, the informal CMP14 task group (Rich Holub, Don Ankele, Dave Burns, Bill Lawrence, Mark Goodman, and Evans Massey) has proposed language stating reconditioned motors shall be identified as reconditioned.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1975-NFPA 70-2023 [New Section after 501.1]	
Public Input No. 1976-NFPA 70-2023 [New Section after 502.1]	
Public Input No. 1977-NFPA 70-2023 [New Section after 505.1(B)]	
Public Input No. 1978-NFPA 70-2023 [New Section after 506.1(B)]	

Submitter Information Verification

Submitter Full Name: Richard Holub
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Street Address:
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Zip:
Submittal Date: Wed Aug 09 07:45:34 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7925-NFPA 70-2024

Statement: Relocated for compliance with the NEC Style Manual Section 2.2.1. The change for hazardous duty motors improves clarity and correlates with the hazardous duty articles.

Public Input No. 2610-NFPA 70-2023 [Section No. 430.2]

430. ~~2~~ **3** Reconditioned ~~Motors~~ **Equipment .**

Reconditioned motors shall be permitted to be installed if the reconditioning has been conducted in accordance with the manufacturer's instructions or, if no instructions are provided, nationally recognized standards.

Reconditioned motors identified for use in hazardous (classified) locations shall be listed as reconditioned if installed in hazardous (classified) locations.

Informational Note: See ANSI/EASA AR100-2020, *Recommended Practice for the Repair of Rotating Electrical Apparatus*, for information on the rewinding and repair of motors.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to comply with the NEC Style Manual Section 2.2.1 regarding reconditioned equipment.
2.2.1 Parallel Numbering Required. Technical committees shall use the following section numbers for the same purposes within articles. This requirement shall not apply to Articles 90, 100, and 110. If the article does not contain listing or reconditioning requirements, the subdivisions shall not be included in the article.
Required Parallel Numbering Format
XXX.1 Scope.
XXX.2 Listing Requirements.
XXX.3 Reconditioned Equipment.
XXX.3(A) Permitted to be Installed.
XXX.3(B) Not Permitted to be Installed.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
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City:
State:
Zip:
Submittal Date: Wed Aug 23 20:03:01 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7925-NFPA 70-2024
Statement: Relocated for compliance with the NEC Style Manual Section 2.2.1. The change for hazardous duty motors improves clarity and correlates with the hazardous duty articles.

Public Input No. 3746-NFPA 70-2023 [Section No. 430.2]

430.~~2~~ 3 Reconditioned Motors.

Reconditioned motors shall be permitted if the reconditioning has been conducted in accordance with the manufacturer's instructions or, if no instructions are provided, nationally recognized standards.

Reconditioned motors identified for use in hazardous (classified) locations shall be listed as reconditioned if installed in hazardous (classified) locations.

Informational Note: See ANSI/EASA AR100-2020, *Recommended Practice for the Repair of Rotating Electrical Apparatus*, for information on the rewinding and repair of motors.

Statement of Problem and Substantiation for Public Input

The requirement should be relocated for compliance with the NEC Style Manual Section 2.2.1.

Submitter Information Verification

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Zip:
Submittal Date: Tue Sep 05 15:21:49 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7925-NFPA 70-2024
Statement: Relocated for compliance with the NEC Style Manual Section 2.2.1. The change for hazardous duty motors improves clarity and correlates with the hazardous duty articles.

Public Input No. 997-NFPA 70-2023 [Section No. 430.5]

~~**430.5** Other Articles.~~

~~Motors and controllers shall also comply with the applicable provisions of Table 430.5 .~~

~~Table 430.5 Other Articles~~

~~Equipment/Occupancy Article Section Air-conditioning and refrigerating equipment 440 - Capacitors - 460.8, 460.9 Commercial garages; aircraft hangars; motor fuel dispensing facilities; bulk storage plants; spray application, dipping, and coating processes; and inhalation anesthetizing locations 511, 513, 514, 515, 516, and 517 Part IV - Cranes and hoists 610 - Electrically driven or controlled irrigation machines 675 - Elevators, dumbwaiters, escalators, moving walks, wheelchair lifts, and stairway chair lifts 620 - Fire pumps 695 - Hazardous (classified) locations 500–503, 505, and 506 - Industrial machinery 670 - Motion picture projectors - 540.11 and 540.20 Motion picture and television studios and similar locations 530 - Resistors and reactors 470 - Theaters, audience areas of motion picture and television studios, and similar locations - 520.48 Transformers and transformer vaults 450 -~~

Statement of Problem and Substantiation for Public Input

Section 4.1.4 of the NEC(r) Style Manual prohibits reference to an entire article other than Article 100 or where required for context. As such, and given the 90.3 organizational requirements, it is recommended to delete this reference to other articles or the panel alternatively could revise and reference the particular section or part of the article they wish to emphasize.

Submitter Information Verification

Submitter Full Name: Richard Holub
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Zip:
Submittal Date: Thu Jun 08 14:30:09 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7926-NFPA 70-2024
Statement: Section 430.5 deleted per section 4.1.4 of the NEC Style Manual to remove references to an entire article. Removing references to articles would result in a table that would not add to the usability of the Code, so the entire table was deleted.

Public Input No. 2059-NFPA 70-2023 [Section No. 430.6]

430.6 ~~Conductor Ampacity and Motor Rating Determination.~~

~~The size of conductors supplying equipment covered by this article shall be selected from the ampacity tables in 310.15 or shall be calculated in accordance with 310.14(B) . Where flexible cord is used, the size of the conductor shall be selected in accordance with 400.5 . The required conductor ampacity~~

6 Motor Loads, Ratings, and Circuits .

Motor loads, motor circuit conductor ampacity, and motor ratings shall be determined in accordance with 430.6(A), (B), (C), ~~and~~ (D) and (E) .

(A) General Motor Applications.

For general motor applications, motor load and current ratings shall be determined based on 430.6(A)(1) and (A)(2).

(1) Table Values.

Other than for motors built for low speeds (less than 1200 RPM) or high torques, and for multispeed motors, the values given in Table 430.247, Table 430.248, Table 430.249, and Table 430.250 shall be used instead of the actual current rating marked on the motor nameplate to determine the following:

(1) Motor Load

(2) Ampacity of conductors

(3) Current ratings of switches

(4) Current ratings of branch-circuit short-circuit and ground-fault protection

Where a motor is marked in amperes, but not horsepower, the horsepower rating shall be assumed to be that corresponding to the value given in Table 430.247, Table 430.248, Table 430.249, and Table 430.250, interpolated if necessary.

Exception No. 1: Multispeed motors shall be in accordance with 430.22(B) and 430.52.

Exception No. 2: For equipment that employs a shaded-pole or permanent-split capacitor-type fan or blower motor that is marked with the motor typeand the marking on the equipment nameplate is not less than the current marked on the fan or blower motor nameplate, the full-load current marked on the nameplate of the appliance shall be used to determine the ampacity of branch-circuit conductorsin addition to the current ratings of the following:

(1) Disconnecting means

(2) Motor controllers

(3) Short-circuit and ground-fault protective devices

(4) Separate overload protective devices

Exception No. 3: For a listed motor-operated appliance that is marked with both motor horsepower and full-load current, the motor full-load current marked on the nameplate of the appliance shall be used instead of the horsepower rating on the appliance nameplate to determine the ampacity of branch-circuit conductorsin addition to the current ratings of the following:

(1) Disconnecting means

(2) Motor controllers

(3) Short-circuit and ground-fault protective devices

(4) Separate overload protective devices

(2) Nameplate Values.

The motor nameplate current ratings shall be used to determine the values for the following:

(1) Separate motor overload protection

(2) For motors built for low speeds (less than 1200 RPM), high torques, canned pumps, or multispeed motors, the following:

   a. Ampacity of conductors

   b. Current ratings of switches

   c. Current ratings of branch-circuit short-circuit and ground-fault protection

(3) Large motors exceeding the values in Part XIV shall use the nameplate current rating for conductor sizing.

(B) Torque Motors.

For torque motors, the rated current shall be locked-rotor current, and this nameplate current shall be used to determine the ampacity of the branch-circuit conductors covered in 430.22 and 430.24, the current rating of the motor overload protection, and the current rating of motor branch-circuit short-circuit and ground-fault protection in accordance with 430.52(B).

Informational Note: See 430.83(D) and 430.110 for information on motor controllers and disconnecting means.

(C) Alternating-Current Adjustable Voltage Motors.

For motors used in alternating-current, adjustable voltage, variable torque drive systems, the ampacity of conductors, or current ratings of switches, branch-circuit short-circuit and ground-fault protection, and so forth, shall be based on the maximum operating current marked on the motor nameplate or the control nameplate, or both. If the maximum operating current does not appear on the nameplate, the current rating determination shall be based on 150 percent of the values given in Table 430.249 and Table 430.250.

(D) Valve Actuator Motor Assemblies.

For valve actuator motor assemblies (VAMs), the rated current shall be the nameplate full-load current, and this current shall be used to determine the maximum rating or setting of the motor branch-circuit short-circuit and ground-fault protective device and the ampacity of the conductors.

(E) Motor Circuits

The size of conductors supplying equipment covered by this article shall be selected from the ampacity tables in 310.15 or shall be calculated in accordance with 310.14(B) . Where flexible cord is used, the size of the conductor shall be selected in accordance with 400.5 .

Statement of Problem and Substantiation for Public Input

This change is intended to add clarity to code paths without changing technical content. Article 220 clearly separates the calculation of loads from the calculations of branch circuit and feeder sizes in articles 210 and 215. Article 220 refers to Article 430 for calculation of loads, but when the reader goes to Article 430 there is not a paragraph with the word "load" in the title. Almost all of the content of the paragraphs does not mention load either. "Load" is not generally encountered until the tables are reached. As article 430 is presented it jumps right to conductor sizing without addressing load.

The first sentence of a paragraph should be the topic sentence, hence the first two sentences of 430.6 are moved to a separate paragraph.

Submitter Information Verification

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Organization: King County Metro
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Zip:
Submittal Date: Fri Aug 11 13:29:07 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Changes proposed do not provide clarity to the code but did provide confusion. More information on the issue and how the changes proposed would improve the code are needed. The motor ratings indicated do include the motor load. The ampacity of

conductors is determined by Tables 310.15 or 310.14(B) and applies to all parts of 430.6 and should not be relocated to a new subitem (E).

Public Input No. 1778-NFPA 70-2023 [Section No. 430.6(A)(1)]

(1) Table Values.

~~Other than for motors built for low speeds (less than 1200 RPM) or high torques, and for multispeed motors, the~~ The values given in Table 430.247, Table 430.248, Table 430.249, and Table 430.250 shall be used instead of the actual current rating marked on the motor nameplate to determine the following:

(1) Ampacity of conductors

(2) Current ratings of switches

(3) Current ratings of branch-circuit short-circuit and ground-fault protection

Exception No. 1 Low speed, high torque, and multispeed motors shall be in accordance with 430.6(A)2

Where a motor is marked in amperes, but not horsepower, the horsepower rating shall be assumed to be that corresponding to the value given in Table 430.247, Table 430.248, Table 430.249, and Table 430.250, interpolated if necessary.

Exception No. ~~1~~ 2 : Multispeed motors shall be in accordance with 430.22(B) and 430.52.

Exception No. ~~2~~ 3 : For equipment that employs a shaded-pole or permanent-split capacitor-type fan or blower motor that is marked with the motor typeand the marking on the equipment nameplate is not less than the current marked on the fan or blower motor nameplate, the full-load current marked on the nameplate of the appliance shall be used to determine the ampacity of branch-circuit conductorsin addition to the current ratings of the following:

(1) Disconnecting means

(2) Motor controllers

(3) Short-circuit and ground-fault protective devices

(4) Separate overload protective devices

Exception No. ~~3~~ 4 : For a listed motor-operated appliance that is marked with both motor horsepower and full-load current, the motor full-load current marked on the nameplate of the appliance shall be used instead of the horsepower rating on the appliance nameplate to determine the ampacity of branch-circuit conductorsin addition to the current ratings of the following:

(1) Disconnecting means

(2) Motor controllers

(3) Short-circuit and ground-fault protective devices

(4) Separate overload protective devices

Statement of Problem and Substantiation for Public Input

The phrasing at the beginning of 430.6A(1) labeled TABLE VALUES "Other than for motors built for low speeds (less than 1200 RPM) or high torques, and for multispeed motors, the" is duplicated in 430.6A(2) and fits better under NAMEPLATE VALUES

This is a reorganization for clarity and retains the intent of the previous material.

Submitter Information Verification

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Affiliation: IBEW LU 369
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 01 19:58:33 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Creating an exception with the motors listed as not to be used in this section does not improve clarity. While the wording may be improved, the section currently provides the necessary information.

Public Input No. 2477-NFPA 70-2023 [Section No. 430.6(A)(2)]

(2) Nameplate Values.

The motor nameplate current ratings shall be used to determine the values for the following:

(1) Separate motor overload protection

(2) ~~For motors~~ The Ampacity of conductors or ampere ratings of disconnects, branch circuit short-circuit and ground-fault protection devices for:

(3) Motors built for low speeds (less than 1200 RPM), high torques, canned pumps, or

~~multispeed motors, the following:~~

(4) ~~Ampacity of conductors~~

(5) ~~Current ratings of switches~~
~~Current ratings of branch-~~

(6) ~~multi-speed motors~~

(7) Large motors exceeding the values in Part XIV shall use the nameplate current rating for conductor sizing.

(3) Equipment or Appliance Nameplate Values.

The Ampacity of conductors or ampere ratings of disconnects, branch circuit short-circuit and ground-fault protection

- ~~Large motors exceeding the values in Part XIV shall use the nameplate current rating for conductor sizing.~~

~~devices f or:~~

(1) ~~For equipment that employs a shaded-pole or permanent-split capacitor-type fan or blower motor that is marked with the motor type and the marking.....~~

(2) ~~For a listed motor-operated appliances that is marked with both.....~~

Additional Proposed Changes

File Name	Description	Approved
20230818_093817.jpg	exceptions to 430.6A1	

Statement of Problem and Substantiation for Public Input

Much of the information contained in 430.6A1 exceptions is repetitive in nature and can be combined under 430.6A2 Nameplate Values and ADD 430.6A3 Appliance or Equipment Nameplate Values
This is an editorial change and should retain the original intent of when to use NAMEPLATE information for motor circuit calculations
Move 430.6A1 exceptions into an appropriate category
430.6A1 Table Values
430.6A2 Nameplate Values
430.6A3 Equipment or Appliance Values

Submitter Information Verification

Submitter Full Name: Andrew Rolfe
Organization: Louisville Electrical JATC
Affiliation: IBEW LU 369
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 18 09:13:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The changes submitted create confusion and do not improve clarity or readability. Additional information as to why the changes should be made and how it would improve the section need to be included.

(3) Current ratings of branch-circuit short-circuit and ground-fault protection

Where a motor is marked in amperes, but not horsepower, the horsepower rating shall be assumed to be that corresponding to the value given in Table 430.247, Table 430.248, Table 430.249, and Table 430.250, interpolated if necessary.

Exception No. 1: Multispeed motors shall be in accordance with 430.22(B) and 430.52.

Exception No. 2: For equipment that employs a shaded-pole or permanent-split capacitor-type fan or blower motor that is marked with the motor typeand the marking on the equipment nameplate is not less than the current marked on the fan or blower motor nameplate, the full-load current marked on the nameplate of the appliance shall be used to determine the ampacity of branch-circuit conductorsin addition to the current ratings of the following:

(1) Disconnecting means
(2) Motor controllers
(3) Short-circuit and ground-fault protective devices
(4) Separate overload protective devices

Exception No. 3: For a listed motor-operated appliance that is marked with both motor horsepower and full-load current, the motor full-load current marked on the nameplate of the appliance shall be used instead of the horsepower rating on the appliance nameplate to determine the ampacity of branch-circuit conductorsin addition to the current ratings of the following:

(1) Disconnecting means
(2) Motor controllers
(3) Short-circuit and ground-fault protective devices
(4) Separate overload protective devices

(2) Nameplate Values. The motor nameplate current ratings shall be used to determine the values for the following:

(1) Separate motor overload protection
(2) For motors built for low speeds (less than 1200 RPM), high torques, canned pumps, or multispeed motors, the

Public Input No. 3662-NFPA 70-2023 [Section No. 430.6(A)(2)]

(2) Nameplate Values.

The motor nameplate current ratings shall be used to determine the values for the following:

(1) Separate motor overload protection

(2) For motors built for low speeds (less than 1200 RPM), high torques, canned pumps, or multispeed motors, the following:

a. Ampacity of conductors

b. Current ratings of switches

c. Current ratings of branch-circuit short-circuit and ground-fault protection

(3) Large motors exceeding the values in Part XIV, and motors using voltages not listed in Part XIV shall be permitted to use the nameplate current rating for conductor sizing.

Statement of Problem and Substantiation for Public Input

There is more and more equipment that originates in foreign countries being installed under the rules of the NEC. In many cases these motors have operating voltages that are not standard in the US. Without this change there is no code compliant way to install this equipment as the current code only permits the use of the currents shown in the Part XIV Tables to size the motor circuit conductors.

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: none
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 05 12:41:31 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The NEC contains the motor types and voltages approved for applications for the proper installation per this code. The addition of other motors cannot be accepted without further clarification on where they would be used and if they can be protected by the full range of motor controllers.

Public Input No. 1313-NFPA 70-2023 [Section No. 430.7(A)]

(A) Usual Motor Applications.

A motor shall be marked with the following information:

(1) Manufacturer's name.

(2) Rated volts and full-load current. For a multispeed motor, full-load current for each speed, except shaded-pole and permanent-split capacitor motors where amperes are required only for maximum speed.

(3) Rated frequency and number of phases if an ac motor.

(4) Rated full-load speed.

(5) Rated temperature rise or the insulation system class and rated ambient temperature.

(6) Time rating. The time rating shall be 5, 15, 30, or 60 minutes, or continuous.

(7) Rated horsepower if ⅛ hp or more. For a multispeed motor rated ⅛ hp or more, rated horsepower for each speed, except shaded-pole and permanent-split capacitor motors rated ⅛ hp or more where rated horsepower is required only for maximum speed. Motors of arc welders are not required to be marked with the horsepower rating.

(8) Code letter or locked-rotor amperes if an alternating-current motor rated ½ hp or more. On polyphase wound-rotor motors, the code letter shall be omitted.

Informational Note No. 1: See 430.7(B).

(9) Design letter for ~~design~~ Design A, B, BE, C, CE, or D motors.

Informational Note No. 2: See ANSI/NEMA MG 1-2016, *Motors and Generators*, Part 1, Definitions, for information on motor design letter definition.

(10) Secondary volts and full-load current if a wound-rotor induction motor.

(11) Field current and voltage for dc excited synchronous motors.

(12) Winding — straight shunt, stabilized shunt, compound, or series, if a dc motor. Fractional horsepower dc motors 175 mm (7 in.) or less in diameter shall not be required to be marked.

(13) A motor provided with a thermal protector complying with 430.32(A)(2) or (B)(2) shall be marked "thermally protected." Thermally protected motors rated 100 watts or less and complying with 430.32(B)(2) shall be permitted to use the abbreviated marking "T.P."

(14) A motor complying with 430.32(B)(4) shall be marked "impedance protected." Impedance-protected motors rated 100 watts or less and complying with 430.32(B)(4) shall be permitted to use the abbreviated marking "Z.P."

(15) Motors equipped with electrically powered condensation prevention heaters shall be marked with the rated heater voltage, number of phases, and the rated power in watts.

(16) Motors that are electronically protected from overloads in accordance with 430.32(A)(2) and (B)(2) shall be marked "electronically protected" or "E.P."

Statement of Problem and Substantiation for Public Input

This Public Input is a companion to the NEMA Public Input proposing a new Table 430.251(C). Also, editorially, it is appropriate for the word Design is to be capitalized.

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 07 17:34:04 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7936-NFPA 70-2024

Statement: This correlates with the addition of two new motor designs in Table 430.251(C). These new designs are to meet increase efficiencies as specified by the DOE and because of differences in motor characteristics such as LRC. A new design is needed to make sure motor protection and control solutions are safely applied.

Public Input No. 485-NFPA 70-2023 [Section No. 430.7(D)(1)]

(1) Factory-Wired.

Multimotor and combination-load equipment shall be provided with a visible nameplate marked with the manufacturer's name, the rating in volts, frequency, number of phases, minimum supply circuit conductor ampacity, the equivalent horsepower rating, and the maximum ampere rating of the circuit short-circuit and ground-fault protective device. The conductor ampacity shall be calculated in accordance with 430.24 and counting all of the motors and other loads that will be operated at the same time. The short-circuit and ground-fault protective device rating shall not exceed the value calculated in accordance with 430.53. ~~Multimotor~~ The equivalent horsepower rating shall be calculated in accordance with 430.110(C). Multimotor equipment for use on two or more circuits shall be marked with the preceding information for each circuit.

Additional Proposed Changes

File Name	Description	Approved
equivalent_HP_ratings.pdf	HP rating of multi motor equipment	

Statement of Problem and Substantiation for Public Input

This PI is in conjunction with PI 486. This important information should be provided by the manufacturer so installers can choose the correct disconnect in accordance with 430.110(C)

Related Public Inputs for This Document

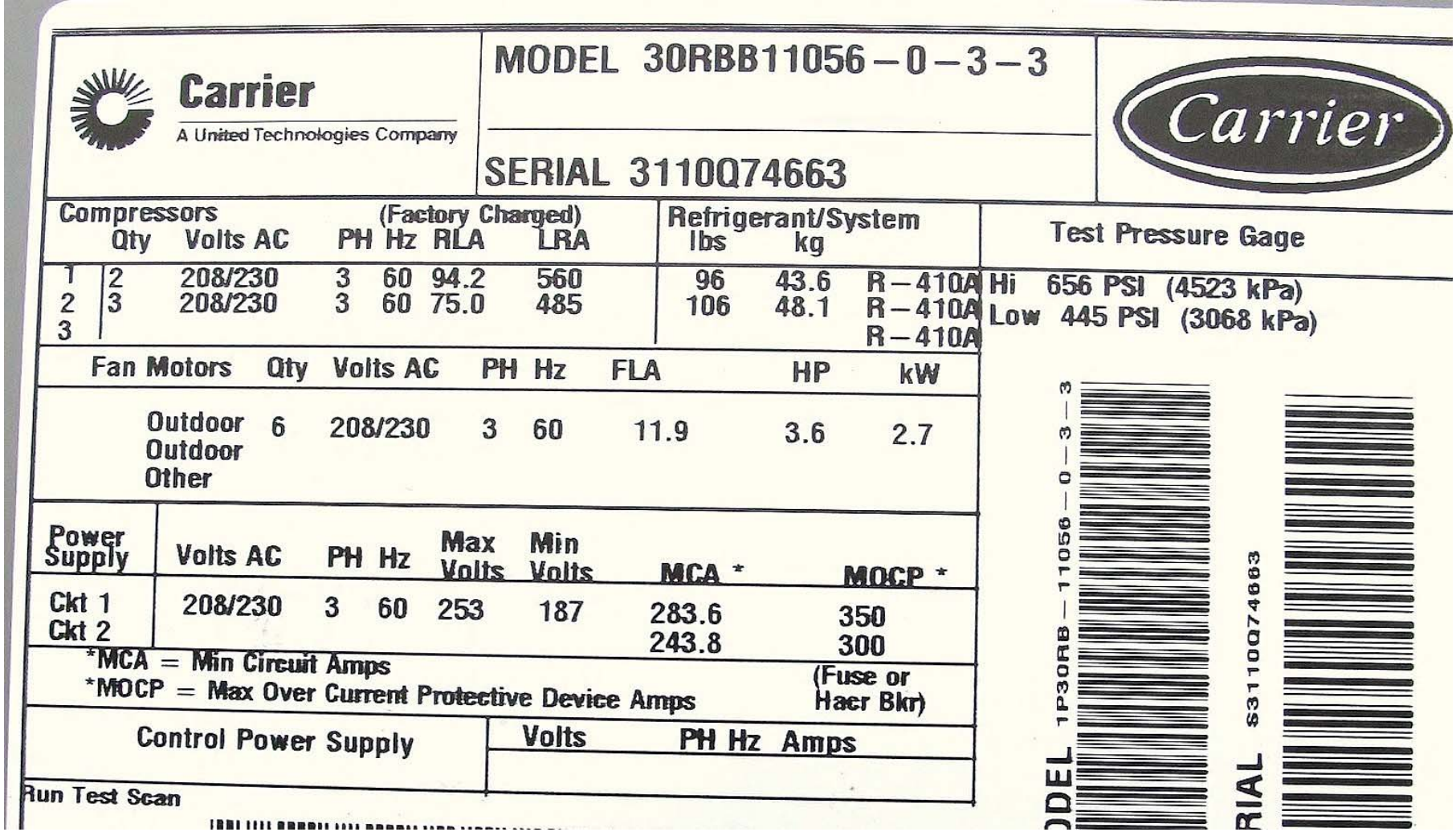
Related Input	Relationship
Public Input No. 486-NFPA 70-2023 [Section No. 430.110(C)]	HP rating of factory wired multi motor equipment
Public Input No. 486-NFPA 70-2023 [Section No. 430.110(C)]	
Public Input No. 487-NFPA 70-2023 [Section No. 440.4(B)]	
Public Input No. 488-NFPA 70-2023 [Section No. 440.12(B)(1)]	

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sat Mar 18 08:13:00 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The inclusion of maximum overcurrent protection and minimum circuit conductor ampacity provides the information needed for a proper installation. The addition of an equivalent HP rating would not improve the safety of the installation.



Carrier
A United Technologies Company

MODEL 30RBB11056–0–3–3

SERIAL 3110Q74663

Carrier

Compressors	Qty	Volts AC	PH	Hz	RLA	LRA	(Factory Charged) Refrigerant/System lbs	kg	
1	2	208/230	3	60	94.2	560	96	43.6	R–410A
2	3	208/230	3	60	75.0	485	106	48.1	R–410A
3									R–410A

Test Pressure Gage
Hi 656 PSI (4523 kPa)
Low 445 PSI (3068 kPa)

Fan Motors	Qty	Volts AC	PH	Hz	FLA	HP	kW
Outdoor Outdoor Other	6	208/230	3	60	11.9	3.6	2.7

Power Supply	Volts AC	PH	Hz	Max Volts	Min Volts	MCA *	MOCP *
Ckt 1	208/230	3	60	253	187	283.6	350
Ckt 2						243.8	300

*MCA = Min Circuit Amps
*MOCP = Max Over Current Protective Device Amps (Fuse or Haer Bkr)

Control Power Supply	Volts	PH	Hz	Amps

Run Test Scan

MODEL 1P30RB–11056–0–3–3

SERIAL S3110Q74663

The equivalent HP rating should be marked by manufacturer!

TRANE

2

MODEL: CVHF1300 DATE OF MFG (DD/MM/YY): 02-03-09
MODEL NO:
CVHF130FA3U0PCZ298EJ8LEH9A00000002E1G040LS00004A100A
SERIAL NO: L09B06386 S.O. NO: A1R013B

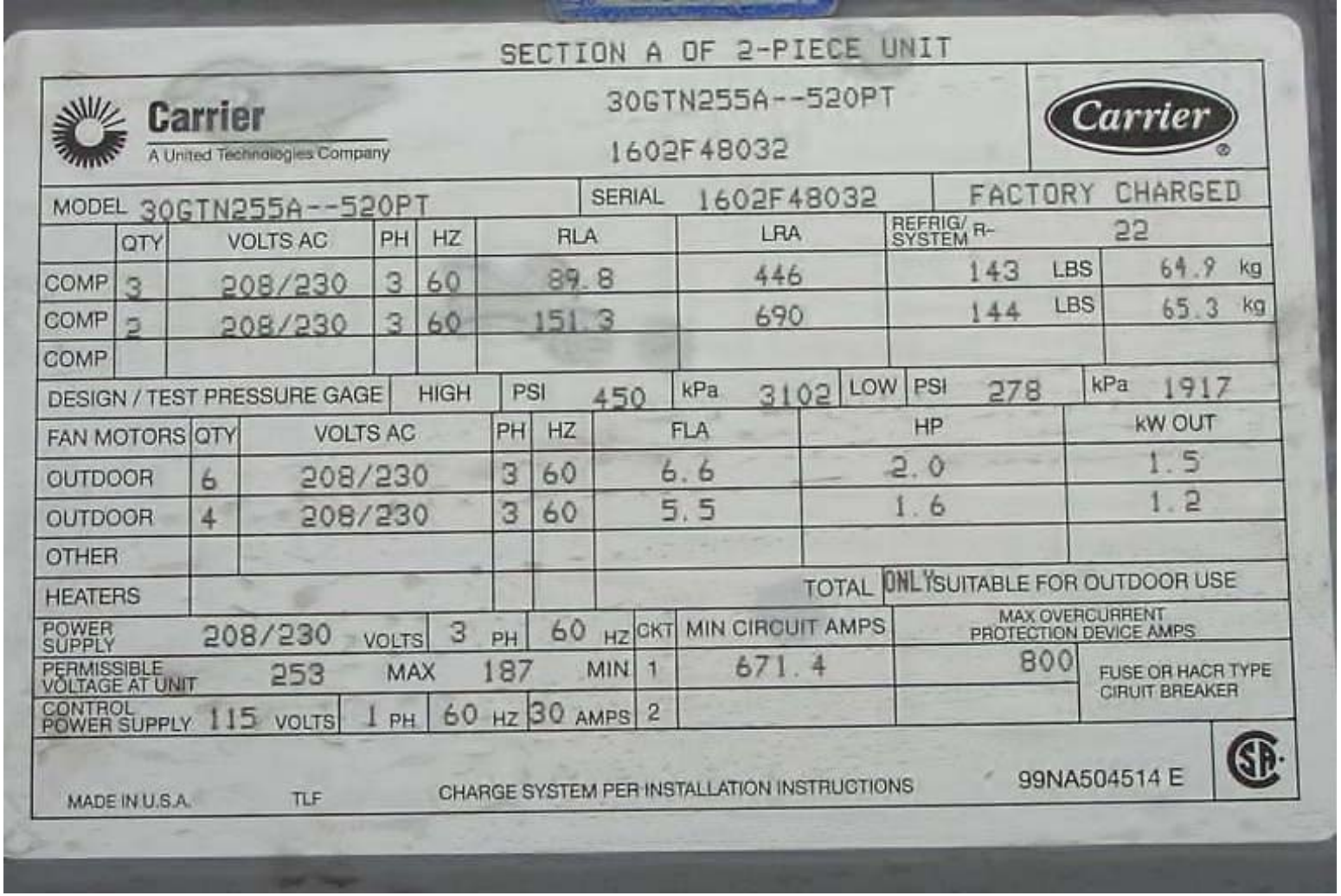
ELECTRICAL CHARACTERISTICS
RATED VOLTAGE: 460 VOLTS 60HZ 3 PH
NAMEPLATE NMKW: 783 KW
VOLTAGE UTILIZATION RANGE: 414- 506 VAC
MINIMUM CIRCUIT AMPACITY: 1308 AMPS
MAXIMUM OVERCURRENT PROTECTIVE DEVICE: 2000 AMPS

2

	VOLTS-AC	HZ	PH	RLA	MAX LRAY	MAX LRAD
COMPRESSOR MOTOR	460	60	3	1039	2257	6989
OIL TANK HEATER	115	60	1		750	WATTS
CONTROL CIRCUIT	115	60	1		4000	VA MAX
CARBON TANK HEATER	115	60	1	1.7		
PUMPOUT COMPRESSOR	115	60/50	1	1.55		
PURGE COMP MTR	115/110	60/50	1	8	34.6	LRA

WHEN MOTOR CONTROLLER PROVIDED BY OTHERS
TRANE ENGINEERING SPEC. S6516-0513 APPLIES
REFRIGERANT SYSTEM

The equivalent HP rating should be marked by manufacturer!



SECTION A OF 2-PIECE UNIT

Carrier
A United Technologies Company

30GTN255A--520PT
1602F48032

Carrier

MODEL 30GTN255A--520PT | SERIAL 1602F48032 | FACTORY CHARGED

	QTY	VOLTS AC	PH	HZ	RLA	LRA	REFRIG/SYSTEM R- 22	
COMP	3	208/230	3	60	89.8	446	143 LBS	64.9 kg
COMP	2	208/230	3	60	151.3	690	144 LBS	65.3 kg
COMP								

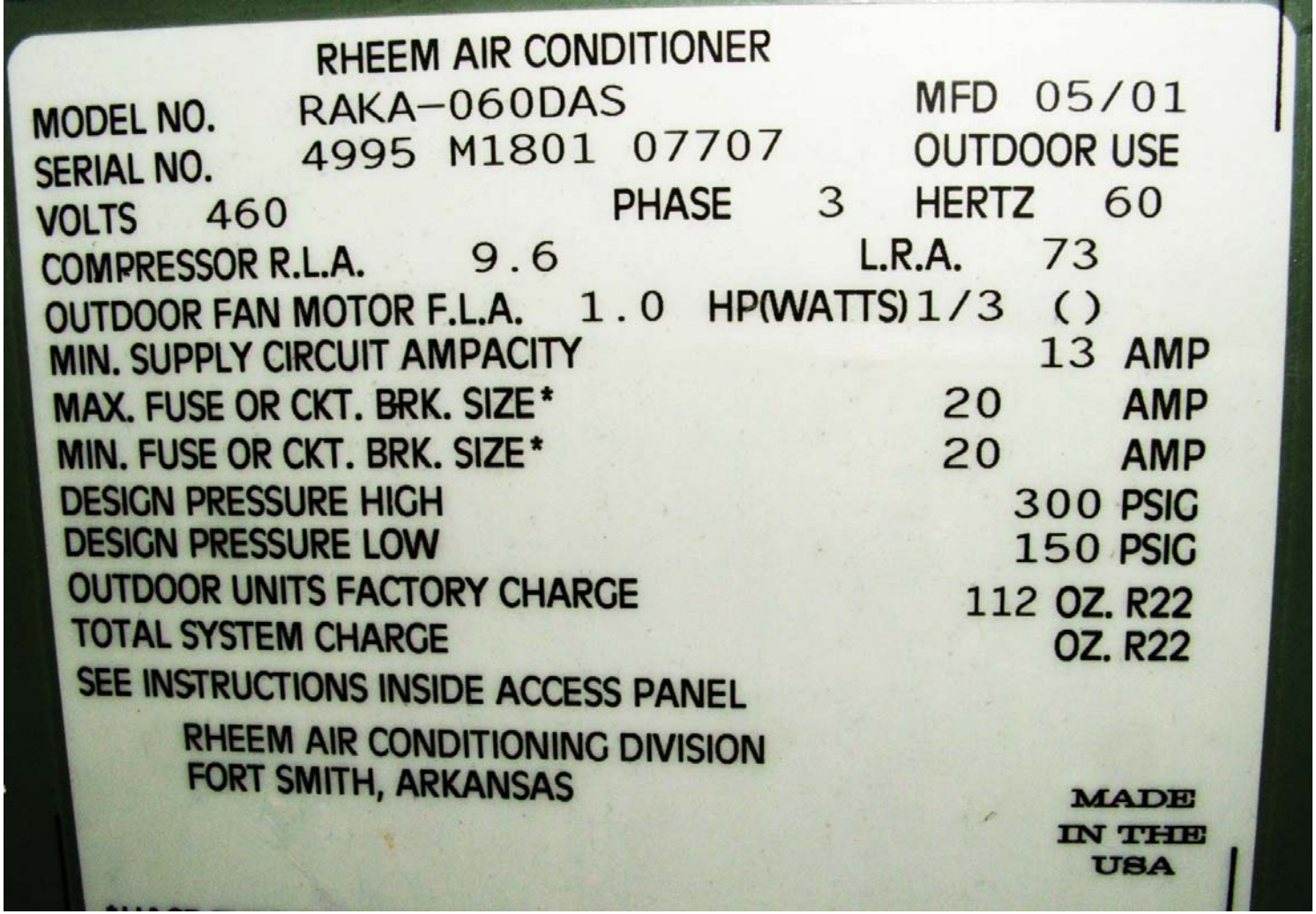
DESIGN / TEST PRESSURE GAGE | HIGH | PSI 450 | kPa 3102 | LOW | PSI 278 | kPa 1917

FAN MOTORS	QTY	VOLTS AC	PH	HZ	FLA	HP	kW OUT
OUTDOOR	6	208/230	3	60	6.6	2.0	1.5
OUTDOOR	4	208/230	3	60	5.5	1.6	1.2
OTHER							
HEATERS					TOTAL	ONLY SUITABLE FOR OUTDOOR USE	

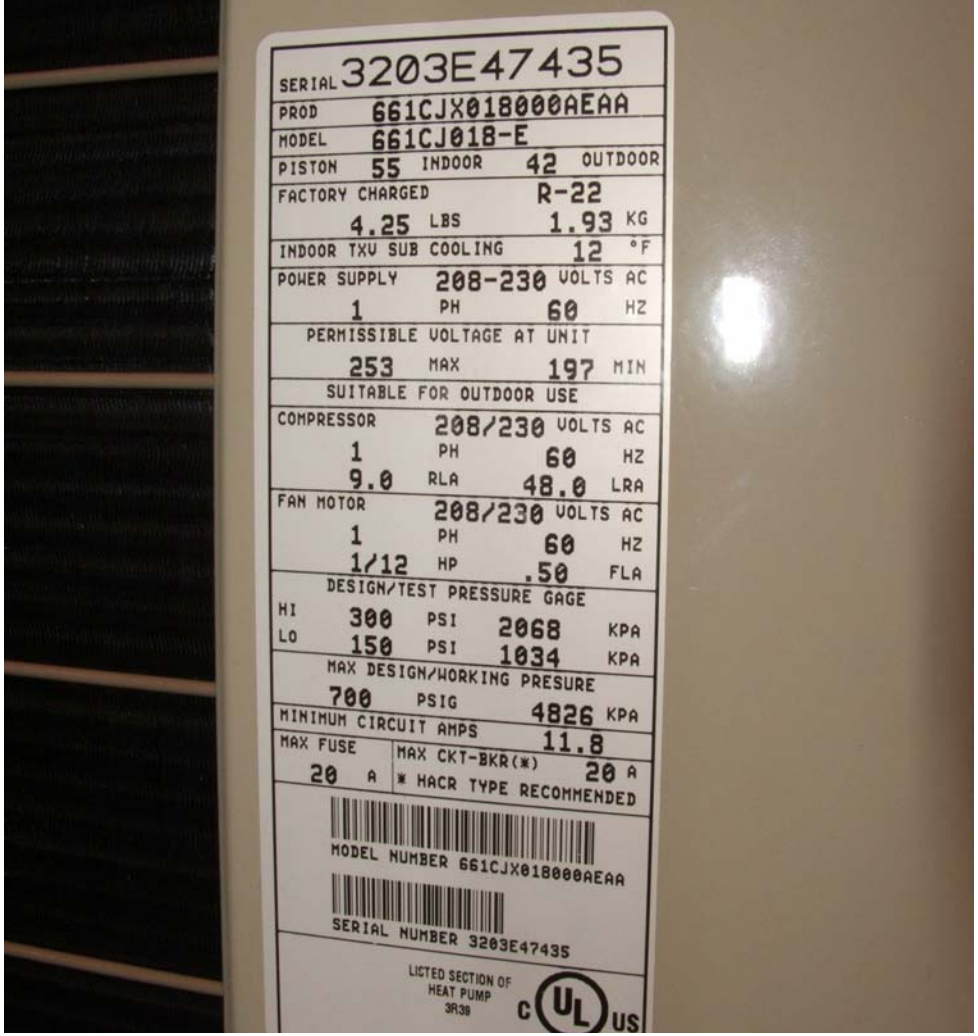
POWER SUPPLY	208/230 VOLTS	3 PH	60 HZ	CKT	MIN CIRCUIT AMPS	MAX OVERCURRENT PROTECTION DEVICE AMPS	
PERMISSIBLE VOLTAGE AT UNIT	253 MAX	187 MIN		1	671.4	800	FUSE OR HACR TYPE CIRUIT BREAKER
CONTROL POWER SUPPLY	115 VOLTS	1 PH	60 HZ	30 AMPS	2		

MADE IN U.S.A. TLF CHARGE SYSTEM PER INSTALLATION INSTRUCTIONS 99NA504514 E

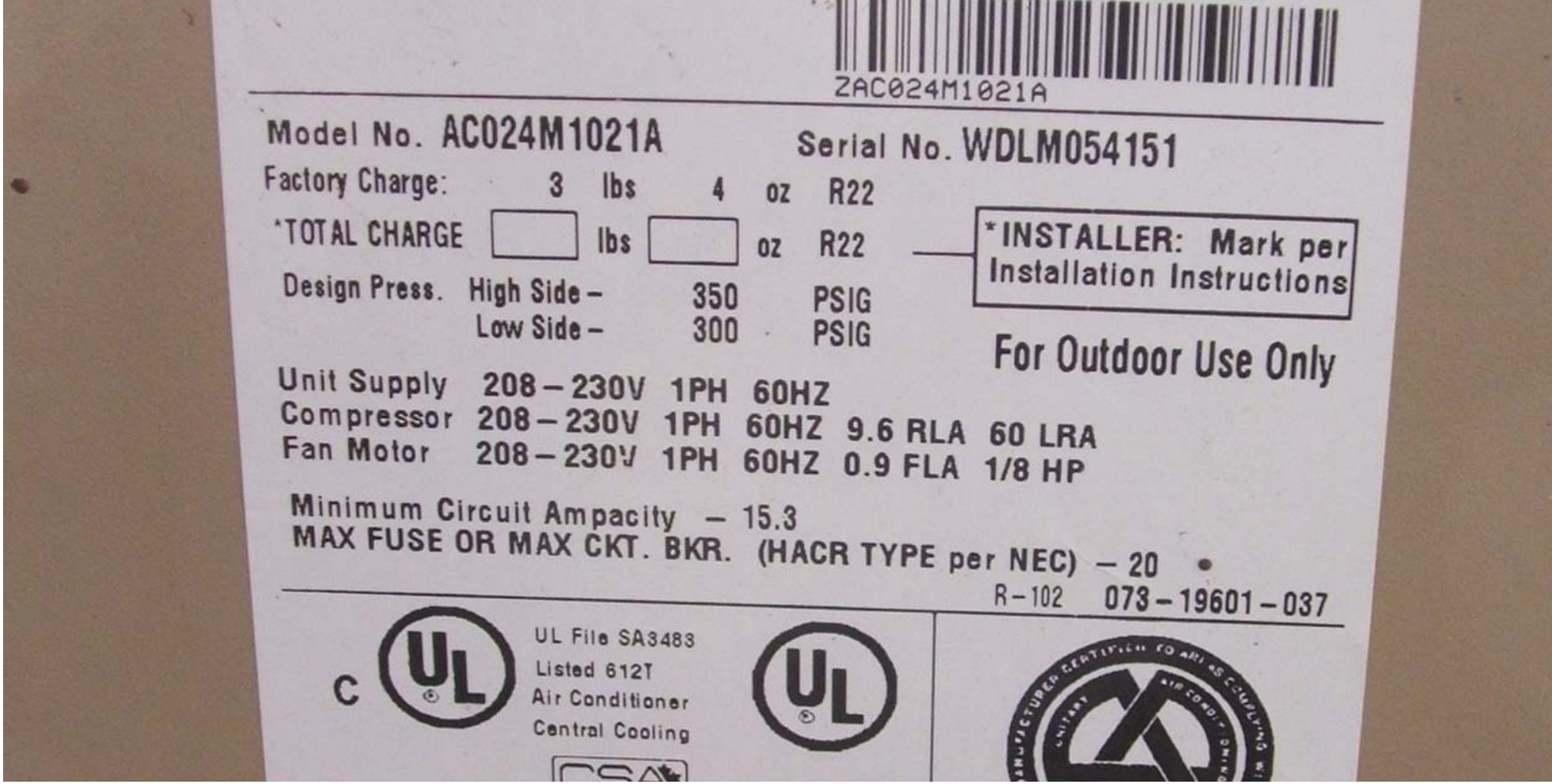
The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!

Public Input No. 1523-NFPA 70-2023 [Section No. 430.10(A)]

(A) General.

Enclosures for motor controllers and disconnecting means shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to the other apparatus unless designs are employed that provide adequate space for this purpose.

Informational Note: See 312.8 for switch and ~~overcurrent-device~~ overcurrent device enclosures.

Statement of Problem and Substantiation for Public Input

This is editorial only and very nit-picky, but there was a dash between "overcurrent" and "device". This PI aligns the use of the two words with the rest of the code.

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Corp.
Affiliation: Associated Builders and Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 23 22:22:06 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7938-NFPA 70-2024
Statement: Editorial change provides correct spelling for overcurrent device as used elsewhere in the code.

Public Input No. 1260-NFPA 70-2023 [New Section after 430.18]

TITLE OF NEW CONTENT

Type your content here ...

430.19. Cybersecurity

Motors, Motor Circuits, and Controllers that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control the system is limited to a direct connection through a local nonnetworked interface.

(2) The Motor, Motor Circuit, and Controller is connected through a networked interface complying with both of the following methods:

a. The Motor, Motor Circuit, and Controller and associated software are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment is conducted on the connected system to determine vulnerabilities to cyber attacks.

The cybersecurity assessment shall be conducted when the system configuration changes and at not more than 5-year intervals.

Documentation of the evaluation, assessment, identification, and certification shall be made available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, Cybersecurity Standards series; UL 2900, Cybersecurity Standards series; and the NIST Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, for assessment guidelines.

Informational Note No. 2: Examples of the commissioning certification used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) The ISA Security Compliance Institute (ISCI) conformity assessment program

(2) Certification of compliance by a nationally recognized test laboratory

Statement of Problem and Substantiation for Public Input

Most of the cybersecurity focus has been on IT systems. There has been very little public discussion about cybersecurity for Operational Technology (OT), but cyber attacks on OT, by both domestic and foreign actors, occur on almost a daily basis. Hackers can easily destroy unprotected equipment and shut down entire unprotected facilities. Our adversaries such as Russia, China, North Korea, and Iran, are continuously mounting cyber attacks. They understand their limits and, so far, prohibit catastrophic attacks on our financial/banking system and electrical grid. In the mean time, they attack our infrastructure, such as the southeast gas pipeline. We have the ability, and obligation, to prevent this type of damage to our infrastructure from malicious cyber attacks. This Public Input is based upon 240.6(D) and 708.7 in the 2023 NEC. Pay particular attention to the word "identified" in (2) a. "Identified" as applied to equipment, is defined in Article 100 as "Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement. Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organization concerned with product

evaluation." This Public Input simply requires that a Motor, Motor Circuit, or Controller either not be connected to the internet, or if they are connected to the internet, that they be identified for cybersecurity and that an assessment is provided.

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jun 30 15:56:22 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Considerations for cyber security should occur during the product development stage, not during installation stage. Entities involved in product development or listing should be responsible for addressing cyber security.

Public Input No. 445-NFPA 70-2023 [Section No. 430.24]

430.24 Several Motors or a Motor(s) and Other Load(s).

Conductors supplying several motors, or a motor(s) and other load(s), shall have an ampacity not less than the sum of each of the following:

(1) 125 percent of the full-load current rating of the highest rated motor, as determined by 430.6(A)

(2) Sum of the full-load current ratings of all the other motors in the group, as determined by 430.6(A)

(3) 100 percent of the noncontinuous non-motor load

(4) 125 percent of the continuous non-motor load.

When determining the highest rated motor, where two or more of the motors have the same highest full-load current rating, only one of the motors shall be considered the highest rated for the above calculations.

Informational Note: See Informative Annex D, Example No. D8.

Exception No. 1: Where one or more of the motors of the group are used for short-time, intermittent, periodic, or varying duty, the ampere rating of such motors to be used in the summation shall be determined in accordance with 430.22(E). For the highest rated motor, the greater of either the ampere rating from 430.22(E) or the largest continuous duty motor full-load current multiplied by 1.25 shall be used in the summation.

Exception No. 2: The ampacity of conductors supplying motor-operated fixed electric space-heating equipment shall comply with 424.4(B).

Exception No. 3: Where the circuitry is interlocked so as to prevent simultaneous operation of selected motors or other loads, the conductor ampacity shall be permitted to be based on the summation of the currents of the motors and other loads to be operated simultaneously that results in the highest total current.

Statement of Problem and Substantiation for Public Input

This revision is needed to clarify calculations for circuits where there is more than 1 "highest rated motor". For example: Motor 1 FLC = 8 amps, Motor 2 FLC = 8 amps, Motor 3 FLC = 8. Which one of these motors is considered the "highest rated"? Should they all be calculated at 125%? Perhaps NONE of them should be calculated at 125% since we could also say they are all the smallest rated motor too? Here's another example: Motor 1 FLC = 5.4 amps, Motor 2 FLC = 5.4 amps, motor 3 FLC = 4.0 amps. Which one of these motors is considered the "highest rated"? Should we calculated BOTH 5.4-amp motors at 125%? In each case, it needs to clear that ONLY 1 motor needs to be calculated at 125%.
The 2nd paragraph of 430.62 uses this similar type of clarification for sizing feeder protection when the same rating of branch-circuit, short-circuit and ground-fault protective devices is used on 2 or more branch circuits. 440.7 also uses this similar type of clarification when performing calculations for compressors. I believe a similar clarification is needed here at 430.24 as I have proposed.

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:

City:
State:
Zip:
Submittal Date: Sat Mar 11 06:35:33 EST 2023
Committee: NEC-P11

Committee Statement

Resolution: The addition of the specific language on which motors of the same FLC are considered the highest rated does not improve clarity and usability of this code.

Public Input No. 2702-NFPA 70-2023 [Section No. 430.32(D)(2)]

(2) Not Permanently Installed.

(1) *Within Sight from Controller.* Overload protection shall be permitted to be furnished by the branch-circuit short-circuit and ground-fault protective device; such device, however, shall not be larger than that specified in ~~Part IV of~~ Article 430 , Part IV .

Exception: Any such motor shall be permitted on a nominal 120-volt branch circuit protected at not over 20 amperes.

(2) *Not Within Sight from Controller.* Overload protection shall be in accordance with 430.32(B).

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 17:31:13 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7945-NFPA 70-2024
Statement: Editorial change made for section to meet NEC Style manual section 4.1.4.

Public Input No. 2236-NFPA 70-2023 [New Section after 430.33]

430.34 Continuous Duty

Any motor application shall be considered to be for continuous duty unless the nature of the apparatus it drives is such that the motor cannot operate continuously with load under and condition of use.

Statement of Problem and Substantiation for Public Input

430.34 (NEW) - “Continuous Duty” extract language from 430.33 “Intermittent and Similar Duty” for this new article.

Continuous duty motors are so prevalent that they should not be embedded almost as an afterthought in an article dedicated to intermittent and similar duty motors.

Submitter Information Verification

Submitter Full Name: Gary Hein
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 15 12:46:35 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: This is an attempt to define a continuous duty motor which would put it in conflict with the already defined Continuous Duty in Article 100. Proposed language duplicates text located in 430.33.

Public Input No. 4378-NFPA 70-2023 [Section No. 430.51]

430.51 General.

Part IV specifies devices intended to protect the motor branch-circuit conductors, the motor control apparatus, and the motors against overcurrent due to short circuits or ground faults. The devices specified in Part IV do not include the types of devices required by 210.8, 230.95, and 590.6.

Informational Note No. 1: See Informative Annex D, Example D8, for an example of motor branch-circuit short-circuit and ground-fault protection selection.

Part IV shall not apply to motor circuits rated over 1000 volts, nominal.

Informational Note No. 2: See Part XI for over 1000 volts, nominal.

Informational Note 3: See IEEE 3004.8 Recommended Practice for Motor Protection inIndustrial and Commercial Power Systems

Informational Note 4: See IEEE 3002.7 Recommended Practice for Conducting Motor-StartingStudies and Analysis of Industrial and Commercial Power Systems

Statement of Problem and Substantiation for Public Input

Content that formerly existed in the legacy Color Books (Red Book Std. 141 and Gray Book Std. 241) have been mapped into smaller titles such as these two. IEEE Color Books have been in the process of this transformation for at least two NEC cycles now. The transformation into smaller blocks of content is similar to the IEC best practice titles and aligns with the scope of this section of the NEC.

From the prospectus of these titles:

3004.8-2016: The protection of motors used in industrial and commercial power systems is covered. It is likely to be of greatest value to the power-oriented engineer with limited experience in the area of protection
and control. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

https://standards.ieee.org/standard/3004_8-2016.html

3002.7 2018: Activities related to motor-starting studies including design considerations for new systems, analytical studies for existing systems, as well as operational and model-validation considerations for industrial and commercial power systems are described. Motor-starting analysis includes evaluation of motor-starting current and voltage drop. Accuracy of calculation results primarily relies on system modeling assumptions and methods used. The use of computer-aided analysis software, with a list of desirable capabilities recommended to conduct a modern motor-starting study, is emphasized. Examples of system data requirements and result-analysis techniques are presented. Benefits obtained from motor-starting studies are discussed, and various types of computer-aided motor-starting studies are examined. Data or information required for these studies, as well as the expected results of a motor-starting study effort, are also reviewed
.
https://standards.ieee.org/standard/3002_7-2018.html

Article 430 is the NEC's longest article. This proposal is intended to align IEEE and NFPA electrical safety standards and to support electrical inspection activity.

Submitter Information Verification

Submitter Full Name: Michael Anthony
Organization: Standards Michigan LLC
Affiliation: IEEE Industrial Applications Society
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 07 13:33:07 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: IEEE 3004.8 was added as an informational note into the scope of 430 and adequate substantiation on inclusion of IEEE 3002.7 was not provided.

Public Input No. 1471-NFPA 70-2023 [Section No. 430.52(C)(1)]

(1) In Accordance with Table 430.52(C)(1).

A protective device that has a rating or setting not exceeding the value calculated according to the values given in Table 430.52(C)(1) shall be used unless otherwise permitted in 430.52(C)(1)(a) or (C)(1)(b).

Table 430.52(C)(1) Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protective Devices

Type of Motor	Percentage of Full-Load Current			
	Nontime Delay Fuse[1]	Dual Element (Time-Delay) Fuse[1]	Instantaneous-Trip Breaker	Inverse Time Breaker[2]
Single-phase motors	300	175	800	250
AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D	300	175	800	250
~~Squirrel cage — other than Design B energy~~ Standard -efficient ~~— and~~ Design B ~~premium efficiency~~ , C, or D	300	175	800	250
Design B or C energy-efficient ~~and~~ or Design B or C premium efficiency	300	175	1100	250
	300	175	1750	250
Design BE or CE				
Synchronous[3]	300	175	800	250
Wound-rotor	150	150	800	150
DC (constant voltage)	150	150	250	150

Note: See 430.54 for certain exceptions to the values specified.

[1]The values in the Nontime Delay Fuse column apply to time-delay Class CC fuses.

[2]The values given in the last column also cover the ratings of nonadjustable inverse time types of circuit breakers that can be modified as in 430.52(C)(1)(a) and (C)(1)(b).

[3]Synchronous motors of the low-torque, low-speed type (usually 450 rpm or lower), such as those used to drive reciprocating compressors, pumps, and so forth, that start unloaded, do not require a fuse rating or circuit-breaker setting in excess of 200 percent of full-load current.

(a) Where the values as determined by Table 430.52(C)(1) do not correspond to the standard ampere ratings and settings provided in 240.6, the next higher standard rating or setting shall be permitted.

(b) Where the rating specified in Table 430.52(C)(1), or the rating modified by 430.52(C)(1)(a), is not sufficient for the starting current of the motor, any of the following shall apply:

(3) The rating of a nontime-delay fuse not exceeding 600 amperes or a time-delay Class CC fuse shall be permitted to be increased but shall in no case exceed 400 percent of the full-load current.

(4) The rating of a time-delay (dual-element) fuse shall be permitted to be increased but shall in no case exceed 225 percent of the full-load current.

(5) The rating of an inverse time circuit breaker shall be permitted to be increased but shall in no case exceed 400 percent for full-load currents of 100 amperes or less or 300 percent for full-load currents greater than 100 amperes.

(6) The rating of a fuse of 601–6000 ampere classification shall be permitted to be increased but shall in no case exceed 300 percent of the full-load current.

Informational Note: See Informative Annex D, Example D8, for an example of motor branch-circuit short-circuit and ground-fault rating and setting and Informational Note Figure 430.1 for an example location.

Statement of Problem and Substantiation for Public Input

This is a companion to the NEMA Public Input proposing new Table 430.251(C). This Public Input proposes an Instantaneous-Trip Breaker rating or setting of 1750% of full-load current for the new BE and CE design letters because the maximum locked-rotor current values proposed in Table 430.251(C) for these design letters are, for most horsepower ratings, approximately 1.6 times as large as the corresponding values for the B and C design letters in Table 430.251(B). Multiplying 1.6 by the 1100% instantaneous-trip breaker value in Table 430.52(C)(1) for Design B or C energy-efficient or premium efficiency motors results in 1760% which has been rounded to 1750% in Table 430.52(C)(1).

The motor type in Table 430.52(C)(1) of “AC polyphase motors other than wound-rotor” has been corrected to “AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D” because synchronous, wound rotor and Designs B, BE, C, CE, and D are AC polyphase motor types which have values defined elsewhere in this table.

The motor type in Table 430.52(C)(1) of “Design B energy-efficient and Design B premium efficiency” is proposed to change to “Design B or C energy-efficient or Design B or C premium efficiency” since the locked-rotor current and full-load current values defined in Article 430 for Design C energy-efficient or premium efficiency motors is the same as that defined for Design B energy-efficient or premium efficiency motors.

The motor type in Table 430.52(C)(1) of “Squirrel cage – other than Design B energy-efficient – and Design B premium efficiency” is proposed to change to “Standard-efficient Design B, C, or D” because all other AC polyphase squirrel-cage motor types, except the newly defined Design BE and CE, fall under the category of “AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D”.

Submitter Information Verification

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Submittal Date: Thu Jul 20 03:31:37 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7971-NFPA 70-2024

Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation providing details on how the protection of the motor circuit components will function properly, including sizing of other components in the motor branch circuit including motor disconnects.

Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]

(1) In Accordance with Table 430.52(C)(1).

A protective device that has a rating or setting not exceeding the value calculated according to the values given in Table 430.52(C)(1) shall be used unless otherwise permitted in 430.52(C)(1)(a) or (C)(1)(b).

Table 430.52(C)(1) Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protective Devices

Type of Motor	Percentage of Full-Load Current			
	Nontime Delay Fuse[1]	Dual Element (Time-Delay) Fuse[1]	Instantaneous-Trip Breaker	Inverse Time Breaker[2]
Single-phase motors	300	175	800	250
AC polyphase motors other than wound-rotor	300	175	800	250
Squirrel cage — other than Design B energy-efficient — and Design B premium efficiency	300	175	800	250
Design B energy-efficient and Design B premium efficiency	300	175	1100	250
Synchronous[3]	300	175	800	250
Wound-rotor	150	150	800	150
DC (constant voltage)	150	150	250	150

Note: See 430.54 for certain exceptions to the values specified.

[1]The values in the Nontime Delay Fuse column apply to time-delay Class CC fuses.

[2]The values given in the last column also cover the ratings of nonadjustable inverse time types of circuit breakers that can be modified as in 430.52(C)(1)(a) and (C)(1)(b).

[3]Synchronous motors of the low-torque, low-speed type (usually 450 rpm or lower), such as those used to drive reciprocating compressors, pumps, and so forth, that start unloaded, do not require a fuse rating or circuit-breaker setting in excess of 200 percent of full-load current.

[4] A Design B or C standard-efficient motor within the horsepower range of 1 to 500 has a full load efficiency less than that specified in ANSI/NEMA MG 1-2021, Table 12-11 for rated voltages less than or equal to 600 volts or a full load efficiency less than that specified in ANSI/NEMA MG 1-2021, Table 12-13 for rated voltages within the range of 601 to 5000 volts. A Design B or C standard-efficient motor with a horsepower rating of less than 1 and a voltage rating less than or equal to 600 volts has a full load efficiency less than that specified in either ANSI/NEMA MG 1-2021, Table 12-21 or the polyphase table in 10 CFR 431.446 of the United States Code of Federal Regulations. Design B or C motors with a rated voltage within the range of 601 to 5000 volts and a horsepower rating of less than 250 are standard-efficient.

[5] A Design B or C energy-efficient motor within the horsepower range of 1 to 500 has a full load efficiency equal to or greater than that specified in ANSI/NEMA MG 1-2021, Table 12-11, but less than that specified in ANSI/NEMA MG 1-2021, Table 12-12.

[6] A Design B or C premium efficiency motor within the horsepower range of 1 to 500 has a full load efficiency greater than or equal to that specified in ANSI/NEMA MG 1-2021, Table 12-12 for rated voltages less than or equal to 600 volts or a full load efficiency greater than or equal to that specified in ANSI/NEMA MG 1-2021, Table 12-13 for rated voltages within the range of 601 to 5000 volts. A Design B or C premium efficiency motor with a horsepower rating of less than 1 and a voltage rating less than or equal to 600 volts has a full load efficiency greater than or

equal to that specified in either ANSI/NEMA MG 1-2021, Table 12-21 or the polyphase table in 10 CFR 431.446 of the United States Code of Federal Regulations.

(a) Where the values as determined by Table 430.52(C)(1) do not correspond to the standard ampere ratings and settings provided in 240.6, the next higher standard rating or setting shall be permitted.

(b) Where the rating specified in Table 430.52(C)(1), or the rating modified by 430.52(C)(1)(a), is not sufficient for the starting current of the motor, any of the following shall apply:

(3) The rating of a nontime-delay fuse not exceeding 600 amperes or a time-delay Class CC fuse shall be permitted to be increased but shall in no case exceed 400 percent of the full-load current.

(4) The rating of a time-delay (dual-element) fuse shall be permitted to be increased but shall in no case exceed 225 percent of the full-load current.

(5) The rating of an inverse time circuit breaker shall be permitted to be increased but shall in no case exceed 400 percent for full-load currents of 100 amperes or less or 300 percent for full-load currents greater than 100 amperes.

(6) The rating of a fuse of 601–6000 ampere classification shall be permitted to be increased but shall in no case exceed 300 percent of the full-load current.

Informational Note: See Informative Annex D, Example D8, for an example of motor branch-circuit short-circuit and ground-fault rating and setting and Informational Note Figure 430.1 for an example location.

Additional Proposed Changes

File Name	Description	Approved
Table_430.52_C_1_rev_for_PI_3583.docx	Revised Table 430.52(C)(1) for PI 3583; updates and replaces table included in PI 1471	

Statement of Problem and Substantiation for Public Input

This is a companion to the NEMA Public Input proposing new Table 430.251(C). This Public Input proposes an Instantaneous-Trip Breaker rating or setting of 1750% of full-load current for the new BE and CE design letters because the maximum locked-rotor current values proposed in Table 430.251(C) for these design letters are, for most horsepower ratings, approximately 1.6 times as large as the corresponding values for the B and C design letters in Table 430.251(B). Multiplying 1.6 by the 1100% instantaneous-trip breaker value in Table 430.52(C)(1) for Design B or C energy-efficient or premium efficiency motors results in 1760% which has been rounded to 1750% in Table 430.52(C)(1).

The motor type in Table 430.52(C)(1) of “AC polyphase motors other than wound-rotor” has been corrected to “AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D” because synchronous, wound rotor and Designs B, BE, C, CE, and D are AC polyphase motor types which have values defined elsewhere in this table.

The motor type in Table 430.52(C)(1) of “Design B energy-efficient and Design B premium efficiency” is proposed to change to “Design B or C energy-efficient or Design B or C premium efficiency” since the locked-rotor current and full-load current values defined in Article 430 for Design C energy-efficient or premium efficiency motors is the same as that defined for Design B energy-efficient or premium efficiency motors.

The motor type in Table 430.52(C)(1) of “Squirrel cage – other than Design B energy-efficient – and Design B premium efficiency” is proposed to change to “Design B or C standard-efficient or Design D” because all other AC polyphase squirrel-cage motor types, except Design B or C energy-efficient, Design B or C premium efficiency, Design BE, and Design CE, fall under the category of “AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D”.

This Public Input is intended to be correlated in conjunction with NEMA Public Input No. 1471 which this Public Input is identical to except that:
1. The Type of Motor in the third row of the table is “Design B or C standard-efficient4 or Design D” instead of “Standard-efficient Design B, C, or D”
2. Notes 4, 5, and 6 have been added which provide information on the requirements for a motor to be classified as “Design B or C standard-efficient”, “Design B or C energy-efficient”, or “Design B or C premium efficiency”

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 1472-NFPA 70-2023 [Part XIV.]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	

Submitter Information Verification

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Submittal Date: Mon Sep 04 20:46:01 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: References to standards outside of NFPA in normative text is prohibited per NEC Style manual 4.2. References to NEMA MG1 would have to be as informational notes.

Table 430.52(C)(1) Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protective Devices

Type of Motor	Percentage of Full-Load Current			
	Nontime Delay Fuse[1]	**Dual Element (Time-Delay) Fuse[1]**	**Instantaneous-Trip Breaker**	**Inverse Time Breaker[2]**
Single-phase motors	300	175	800	250
AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D	300	175	800	250
~~Squirrel cage other than Design B energy-efficient and Design B premium efficiency~~ Design B, C standard-efficient[4] or Design D	300	175	800	250
Design B or C energy-efficient[5] ~~and~~ or Design B or C premium efficiency[6]	300	175	1100	250
Design BE or CE	300	175	1750	250
Synchronous[3]	300	175	800	250
Wound-rotor	150	150	800	150
DC (constant voltage)	150	150	250	150

Note: See 430.54 for certain exceptions to the values specified.

[1]The values in the Nontime Delay Fuse column apply to time-delay Class CC fuses.

[2]The values given in the last column also cover the ratings of nonadjustable inverse time types of circuit breakers that can be modified as in 430.529(C)(1)(a) and (C)(1)(b).

[3]Synchrounous motors of the low-torque, low-speed type (usually 450 rpm or lower), such as those used to drive reciprocating compressors, pumps, and so forth, that start unloaded, do not require a fuse rating or circuit-breaker setting in excess of 200 percent of full-load current.

[4]A Design B or C standard-efficient motor within the horsepower range of 1 to 500 has a full load efficiency less than that specified in ANSI/NEMA MG 1-2021, Table 12-11 for rated voltages less than or equal to 600 volts or a full load efficiency less than that specified in ANSI/NEMA MG 1-2021, Table 12-13 for rated voltages within the range of 601 to 5000 volts. A Design B or C standard-efficient motor with a horsepower rating of less than 1 and a voltage rating less than or equal to 600 volts has a full load efficiency less than that specified in either ANSI/NEMA MG 1-2021, Table 12-21 or the polyphase table in 10 CFR 431.446 of the United States Code of Federal Regulations. Design B or C motors with a rated voltage within the range of 601 to 5000 volts and a horsepower rating of less than 250 are standard-efficient.

[5]A Design B or C energy-efficient motor within the horsepower range of 1 to 500 has a full load efficiency equal to or greater than that specified in ANSI/NEMA MG 1-2021, Table 12-11, but less than that specified in ANSI/NEMA MG 1-2021, Table 12-12.

[6]A Design B or C premium efficiency motor within the horsepower range of 1 to 500 has a full load efficiency greater than or equal to that specified in ANSI/NEMA MG 1-2021, Table 12-12 for rated voltages less than or equal to 600 volts or a full load efficiency greater than or equal to that specified in ANSI/NEMA MG 1-2021, Table 12-13 for rated voltages within the range of 601 to 5000 volts. A Design B or C premium efficiency motor with a horsepower

Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]

(3) Instantaneous-Trip Circuit Breaker.

An instantaneous-trip circuit breaker shall be permitted if the conditions of 430.52(C)(3)(a) and (C)(3)(b) are met.

(a) *Application.* Instantaneous-trip circuit breakers shall be adjustable and part of a listed combination motor controller having coordinated motor overload and short-circuit and ground-fault protection in each conductor.

Informational Note No. 1: Instantaneous-trip circuit breakers are also known as motor-circuit protectors (MCPs).

Informational Note No. 2: For the purpose of this article, instantaneous-trip circuit breakers could include a damping means to accommodate a transient motor inrush current without nuisance tripping of the circuit breaker.

(b) *Setting.* The instantaneous-trip circuit breaker shall be adjusted to a setting in accordance with one of the following:

(3) No greater than the value specified in Table 430.52(C)(1)

(4) Where the value specified in Table 430.52(C)(1) is not sufficient for the starting current of the motor, one of the following settings shall be permitted:

~~Motors other than design B energy-efficient and Design B premium efficiency~~

(1)

a. Single phase, synchronous, wound rotor, DC (constant voltage), Design B or C standard-efficient, or Design D motors shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current.

b. Design B or C energy-efficient

~~and~~

(1)

a. or Design B or C premium efficiency motors shall be permitted to be increased but shall in no case exceed 1700 percent of the motor full-load current.

b. Design BE or CE motors shall be permitted to be increased but shall in no case exceed 2750 percent of the motor full-load current.

c. AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current.

d. Where an engineering analysis determines the value is not sufficient for the starting current of the motor, it shall not be necessary to first apply the value specified in Table 430.52(C)(1).

~~Informational Note No. 3: See NEMA MG 1-2016, *Motors and Generators* , Part 12.59 for additional information on the requirements for a motor to be classified "energy efficient."~~

(1) Where the motor full-load current is 8 amperes or less, the setting of the instantaneous-trip circuit breaker with a continuous current rating of 15 amperes or less in a listed combination motor controller that provides coordinated motor branch-circuit overload and short-circuit and ground-fault protection shall be permitted to be increased to the value marked on the motor controller.

Additional Proposed Changes

File Name	Description	Approved
PI_1470_430.52_C_3_b_2_.docx	Legislative format for proposed PI 1470	

Statement of Problem and Substantiation for Public Input

This is a companion to the NEMA Public Input that propose changes to Table 430.52(C)(1) and the NEMA Public Input No. 1472 that proposes new Table 430.251(C).

The Design BE and CE motors introduced to those tables are proposed in item c. to have an adjustable instantaneous-trip setting that is not in excess of 2750 percent of the motor full-load current. This value was chosen based on the following:

(i) the highest ratio of locked-rotor current for a given Design BE or CE rating in the newly proposed Table 430.251(C) to the full-load current in Table 430.250 is 9.83*, which equates to 983%;
(ii) ANSI/NEMA MG 1-2021, Motors and Generators, Part 12.36 states that the instantaneous peak value of inrush current can be up to 2.8 times as large as the rms symmetrical value of locked-rotor-current; and
(iii) 983% multiplied by 2.8 is equal to 2752% which rounds to 2750%.

* This highest ratio is for the 30 Hp rating

In 430.52(C)(3)(b)(2)b. of the 2023 National Electrical Code, a value not in excess of 1700 percent of the motor full-load current is specified for Design B energy-efficient and Design B premium efficiency motors. It is proposed to expand this value to Design C energy-efficient and Design C premium efficiency motors because, per Table 430.251(B), the maximum locked-rotor current is the same for Design B and C motors, and Design C motors are supplied as both energy-efficient and premium efficiency motors.

In 430.52(C)(3)(b)(2)a. of the 2023 National Electrical Code, a value of 1300 percent is specified for all motor types in Table 430.52(C)(1) other than Design B energy efficient and Design B premium efficiency. Since the introduction of Design BE and CE introduces a new exception to the 1300 percent specification, it is proposed to specify a value for each of the motor types shown in Table 430.52(C)(1) instead of specifying a single value with a list of exceptions. This does not change the adjustable instantaneous-trip setting specified in 430.52(C)(3)(b)(2) of the 2023 National Electrical Code for any motor type with the exception of the Design BE and CE, energy-efficient Design C, and premium efficiency Design C motor types already mentioned.

The informational Note No. 3 is proposed to be removed because information on the requirements for a motor to be classified as "Design B or C standard-efficient", "Design B or C energy-efficient", or "Design B or C premium efficiency" has been proposed in one of the companion NEMA public inputs for Table 430.52(C)(1).

As explained in the substantiation for the NEMA Public Input No. 1472 for new Table 430.251(C), the new Design letters BE and CE are preferred to the existing Design A because they define an upper limit for locked-rotor current as opposed to being non-constrained, which promotes safety by aiding in the proper sizing of equipment in the motor branch circuit. New Design letters BE and CE and their maximum locked-rotor currents will be proposed in a revision to ANSI/NEMA MG 1-2021 during this Code cycle.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1472-NFPA 70-2023 [Part XIV.]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	
Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	

Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]

Submitter Information Verification

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Submittal Date: Thu Jul 20 03:06:43 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7975-NFPA 70-2024
Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation that the 2750% adjustment will provide the protection of the motor circuit components including sizing of controllers, conductors, inst. Trip CB, and motor disconnects.

Proposed Text of Public Input #1470 for 430.52(C)(3)(b)(2)

(2) Where the value specified in Table 430.52(C)(1) is not sufficient for the starting current of the motor, one of the following settings shall be permitted:

a. Single phase, synchronous, wound rotor, DC (constant voltage), Design B or C standard-efficient or Design D motors ~~Motors other than design B energy-efficient and Design B premium efficiency motors~~ shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current.

b. Design B or C energy-efficient ~~and~~ or Design B or C premium efficiency motors shall be permitted to be increased but shall in no case exceed 1700 percent of the motor full-load current.

c. ~~Where an engineering analysis determines the value is not sufficient for the starting current of the motor, it shall not be necessary to first apply the value specified in Table 430.52(C)(1).~~Design BE or CE motors shall be permitted to be increased but shall in no case exceed 2750 percent of the motor full-load current.

d. AC polyphase motors other than synchronous, wound-rotor or Design B, BE, C, CE, or D shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current.

~~c.~~c. Where an engineering analysis determines the value is not sufficient for the starting current of the motor, it shall not be necessary to first apply the value specified in Table 430.52(C)(1).

~~Informational Note No. 3: See NEMA MG 1-2016, *Motors and Generators*, Part 12.59 for additional information on the requirements for a motor to be classified "energy efficient".~~

Public Input No. 913-NFPA 70-2023 [Section No. 430.52(C)(3)]

(3) Instantaneous-Trip Circuit Breaker.

An instantaneous-trip circuit breaker shall be permitted if the conditions of 430.52(C)(3)(a) and (C)(3)(b) are met.

(a) *Application.* Instantaneous-trip circuit breakers shall be adjustable and part of a listed combination motor controller having coordinated motor overload and short-circuit and ground-fault protection in each conductor.

Informational Note No. 1: Instantaneous-trip circuit breakers are also known as motor-circuit protectors (MCPs).

Informational Note No. 2: For the purpose of this article, instantaneous-trip circuit breakers could include a damping means to accommodate a transient motor inrush current without nuisance tripping of the circuit breaker.

(b) *Setting.* The instantaneous-trip circuit breaker shall be adjusted to a setting in accordance with one of the following:

(3) No greater than the value specified in Table 430.52(C)(1)

(4) Where the value specified in Table 430.52(C)(1) is not sufficient for the starting current of the motor, one of the following settings shall be permitted:

(5) Motors other than design B energy-efficient and Design B premium efficiency motors shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current.

(6) Design B energy-efficient and Design B premium efficiency motors shall be permitted to be increased but shall in no case exceed 1700 percent of the motor full-load current.

(7) Where an engineering analysis determines the value is not sufficient for the starting current of the motor, it shall not be necessary to first apply the value specified in Table 430.52(C)(1).

Informational Note No. 3: See NEMA MG 1-2016, *Motors and Generators*, Part 12.59 for additional information on the requirements for a motor to be classified “energy efficient.”

(8) Where the motor full-load current is 8 amperes or less, the setting of the instantaneous-trip circuit breaker with a

~~continuous~~

(1) marked current rating of 15 amperes or less in a listed combination motor controller that provides coordinated motor branch-circuit overload and short-circuit and ground-fault protection shall be permitted to be

~~increased~~

(1) set to the

~~value marked on the motor controller.~~

(1) lowest setting, if the lowest setting on the instantaneous-trip circuit breaker exceeds the values calculated in accordance with Table 430.52(C)(1).

Additional Proposed Changes

File Name	Description	Approved

TCC_for_430.52_C_3_.pdf	TCC for MCP 15A and smaller with associated motors
PI_Short-Circuit_Current_Wisthstand_Rating.docx	Time vs Current curve for MCP 15A with a clearing time of 1 cycle
NEC_2026_PI_-_430.52_C_3_Instantaneous-Trip_Circuit_Breaker_.1685632251041.1685633215782.pdf	PI Form Populated 06122023

Statement of Problem and Substantiation for Public Input

Instantaneous-trip circuit-breakers do not have a continuous ampere rating. The wording is misleading and from a technical perspective wrong. Instantaneous-trip circuit-breakers have a magnetic trip unit only which is one of the reasons why they are UL recognized only and need to be installed in a listed combination / assembly. Furthermore, the referenced section outlines that the trip setting may be set to the “the value marked on the motor controller”. The word “Value” is not further defined. Is the value the continuous amps rating of the NEMA starter? Or the short circuit current rating? Art 430.8 Marking on Motor Controllers does not require a marking with a “value” for the MCP trip settings. This forces the “user” to go back to UL testing standards to provide adequate motor circuit protection.
With no marking on the controller, the assumption can be made that the contactor in the listed starter assembly is rated for an SCCR of 5000A for up to 50HP. This would allow a max trip setting leaving the conductor in many cases unprotected. Since many users are not familiar with UL listing standards, often times MCPs that have a trip setting range exceeding the calculated trip setting for the motor circuit being protected, are simply replaced in the listed starter assembly. This leads to a violation of NEC 90.7, 110.3(B) and (C).

Submitter Information Verification

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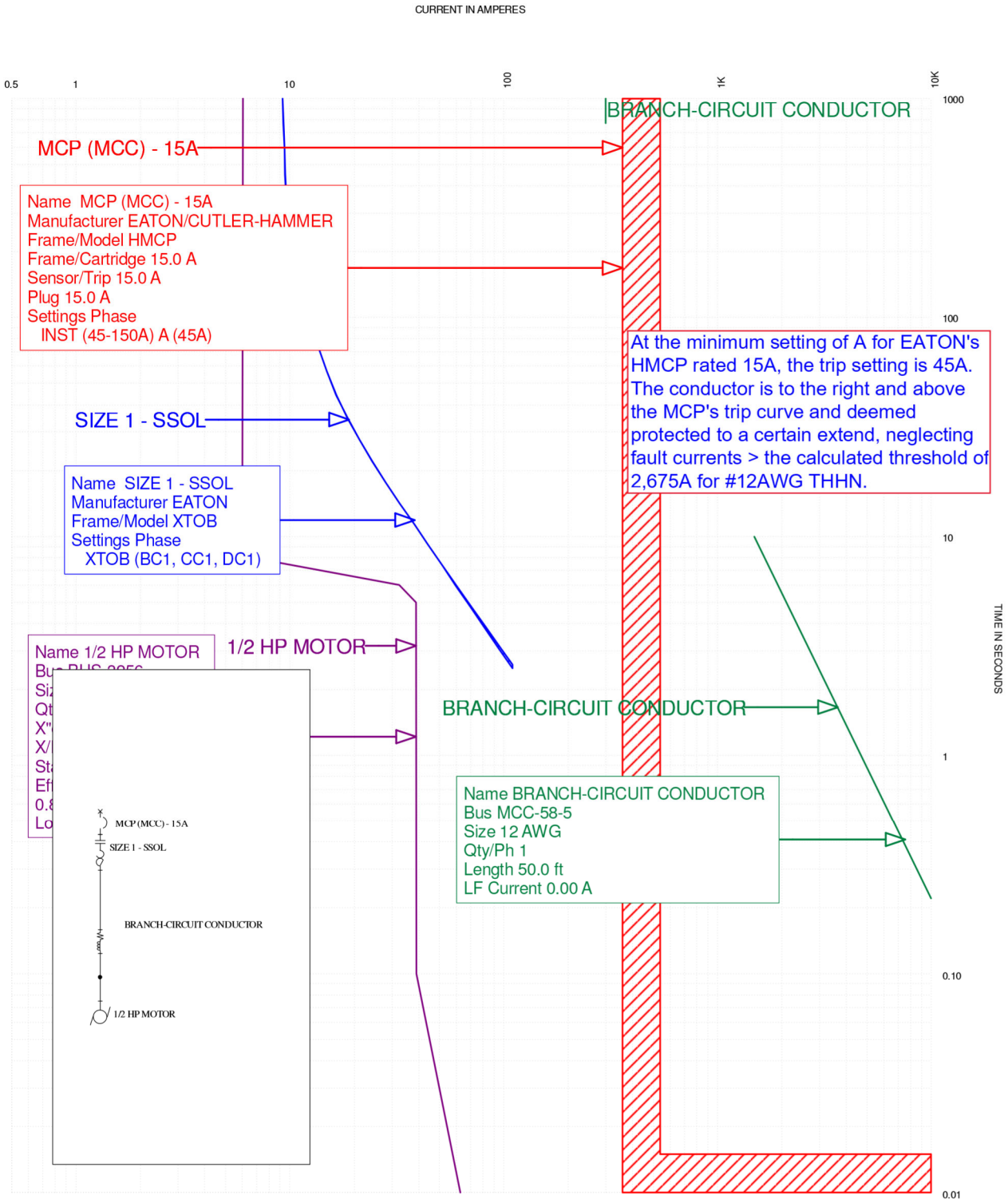
Submittal Date: Thu Jun 01 11:04:47 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Instantaneous trip circuit breakers do have a continuous current rating as marked on the handle. Setting the mag level to the lowest setting does not correspond to UL testing requirements for highest setting.



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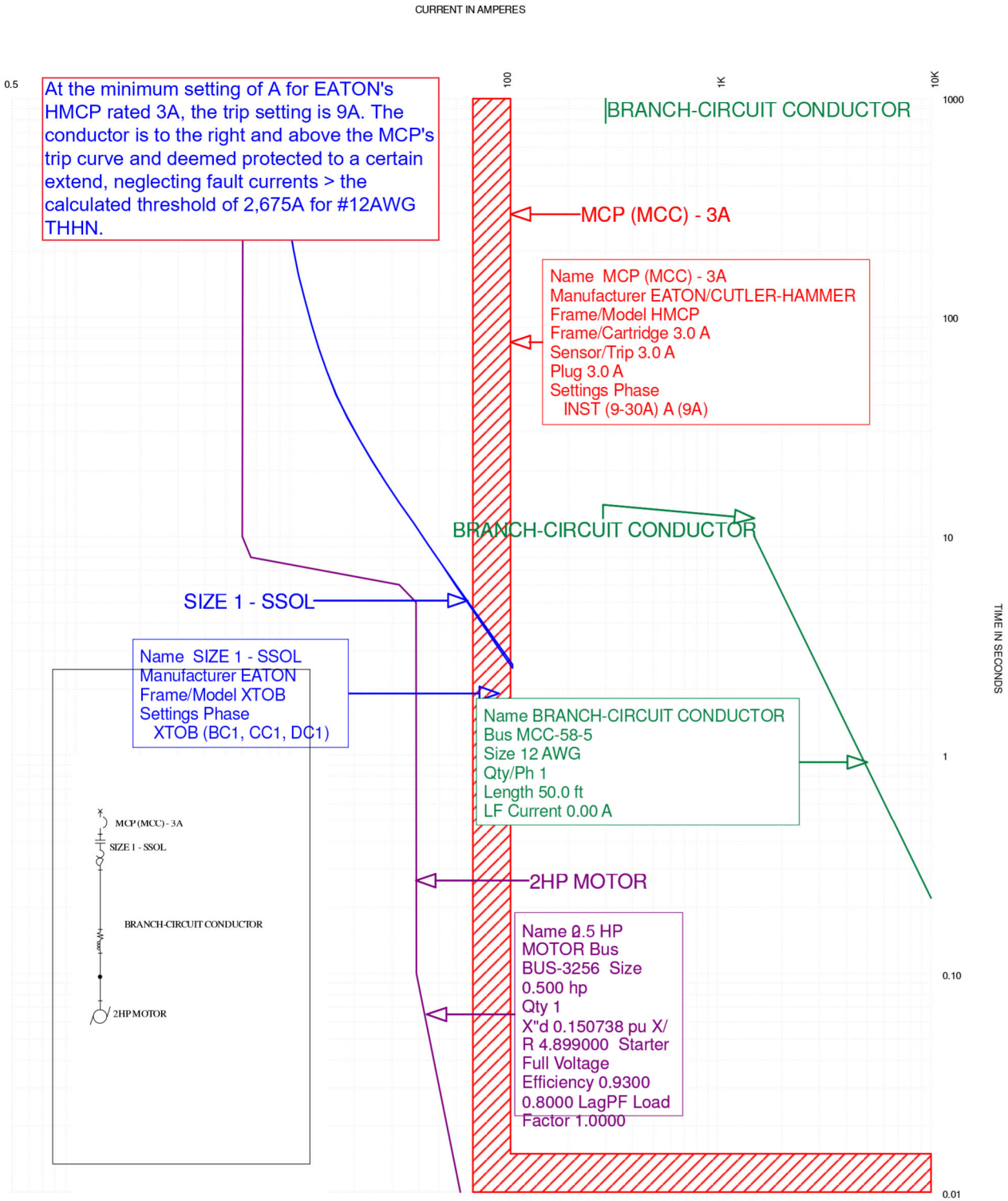

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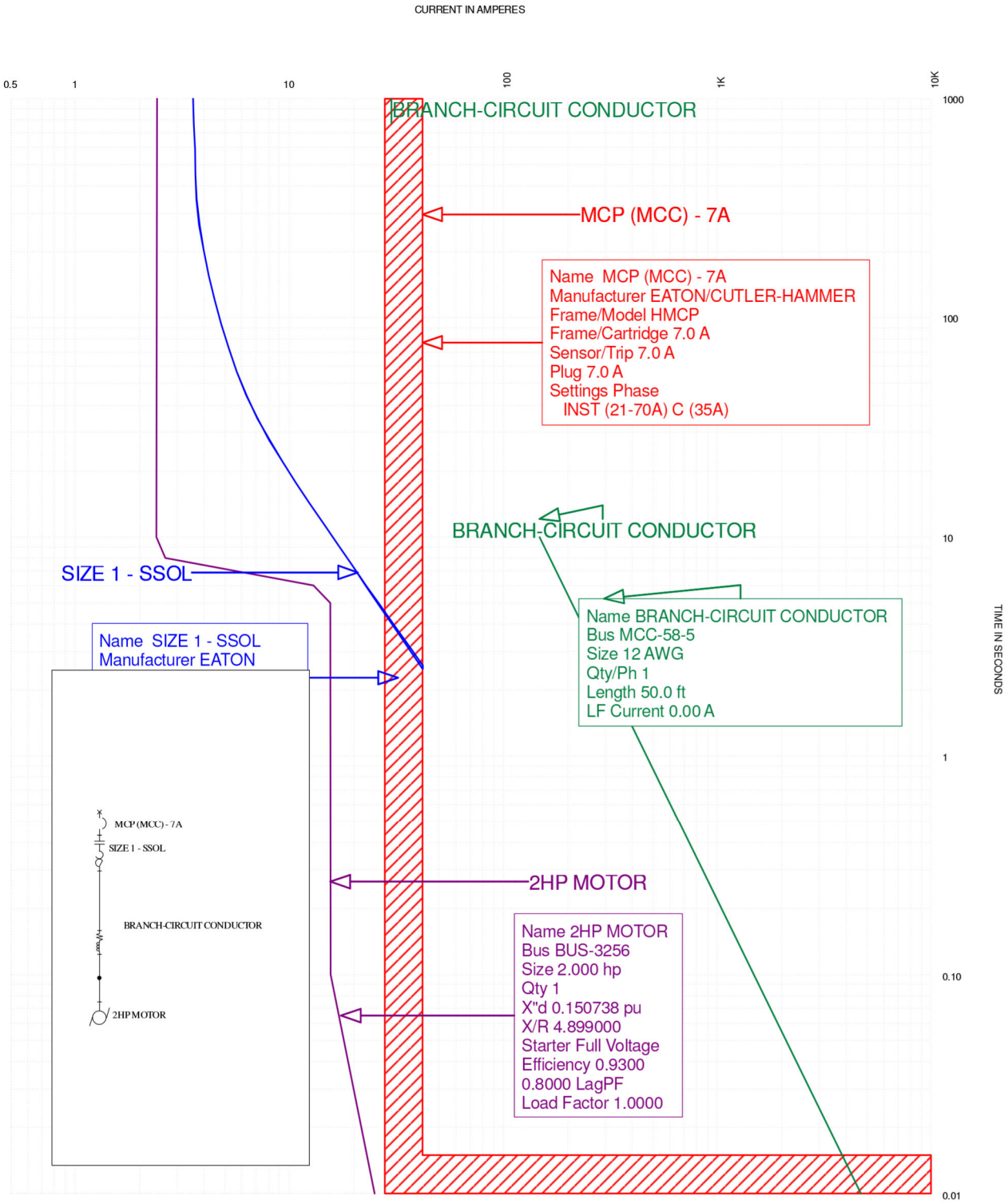
Oneline: _MOTORS

Current x 0.1

Reference Voltage: 480

Date: Mav 12. 2023 10:48 AM

SKM Svstems Analvsis. Inc.



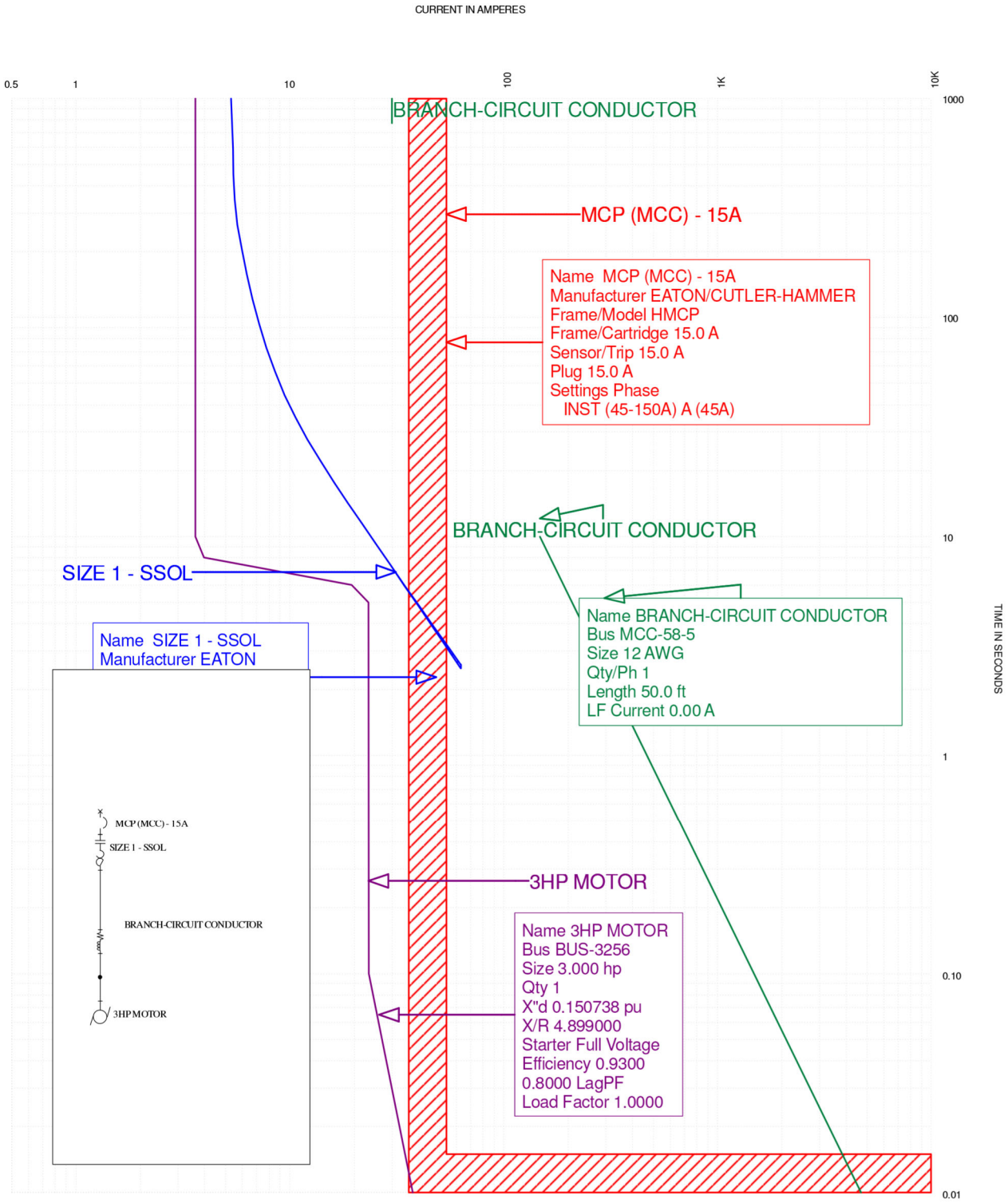
TCC Name: _MOTORS
Oneline: _MOTORS

Current x 1

Reference Voltage: 480

Date: Mav 12. 2023 10:46 AM

SKM Svstems Analvsis. Inc.



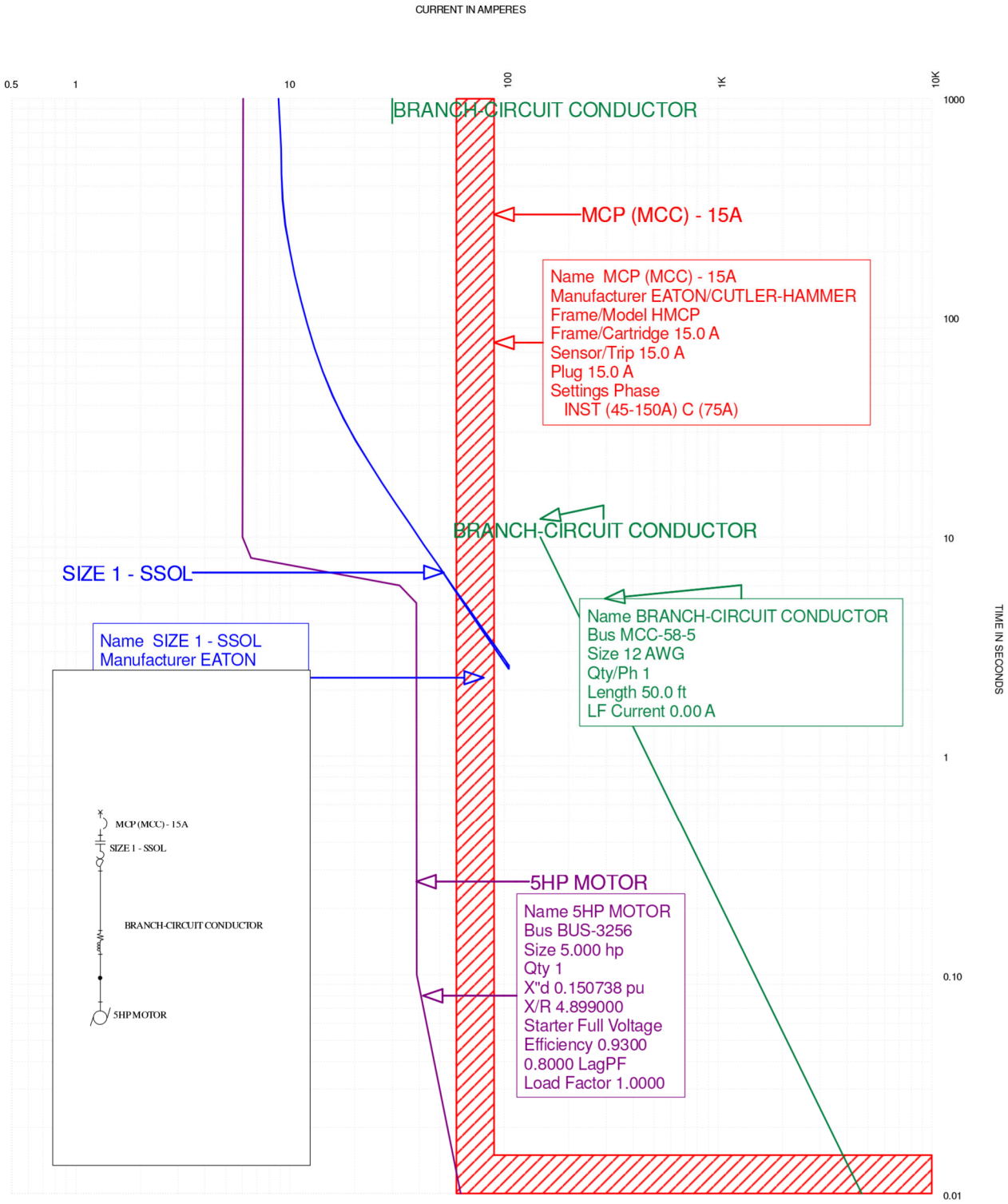
TCC Name: _MOTORS
Oneline: _MOTORS

Current x 1

Reference Voltage: 480

Date: Mav 12. 2023 10:44 AM

SKM Svstems Analvsis. Inc.



TCC Name: _MOTORS
Oneline: _MOTORS

Current x 1

Reference Voltage: 480

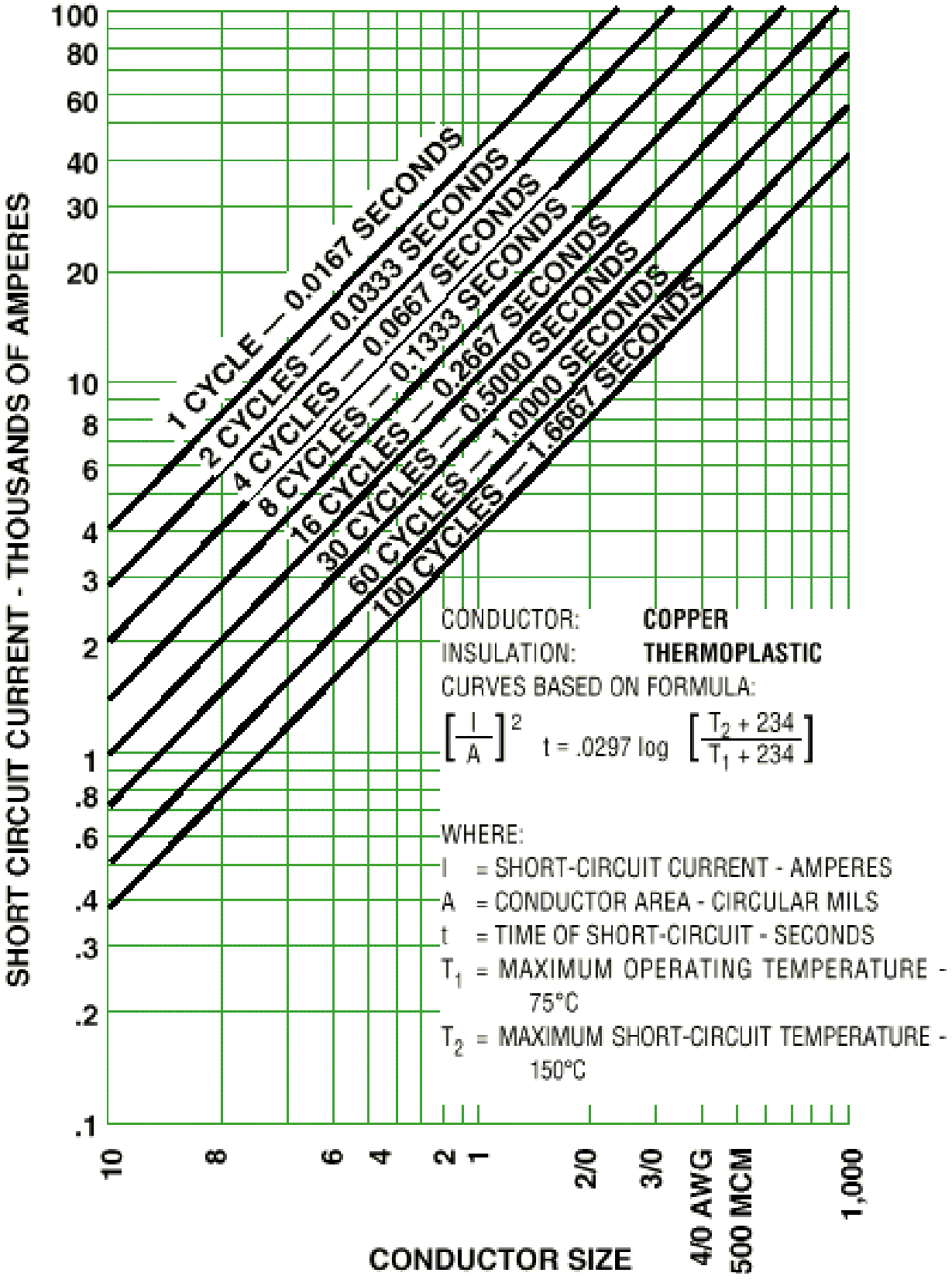
Date: Mav 12. 2023 10:42 AM

SKM Svstems Analvsis. Inc.

Short-Circuit Current Withstand Chart for Copper Cables

Short-Circuit Current Withstand Chart for Copper Cables with Thermoplastic Insulation

Allowable Short-Circuit Currents for Insulated Copper Conductors*



Short-Circuit Current Withstand Chart for Copper Cables

Per 240.92(B) the maximum short-circuit withstand rating for a #12AWG conductor, which is the standard minimum wire size for industrial facilities in North America, is:

2,675.2 A for 1 cycle

1,891.7 A for 2 cycles

Even though the MCP clearing times shows 1 cycle, a conservative approach has been taken to illustrate the currents.

Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]

(6) Self-Protected Combination Motor Controller.

A listed self-protected combination motor controller shall be permitted in lieu of the devices specified in Table 430.52(C)(1). Adjustable instantaneous-trip settings shall ~~not exceed 1300 percent of~~ be in accordance with the following:

a. Single-phase, synchronous, wound-rotor, DC (constant voltage), Design B or C standard-efficient, or Design D motors: not in excess of 1300 percent of the full-load motor current ~~for other than~~ .

b. Design B or C energy-efficient ~~and~~ or Design B or C premium efficiency motors ~~and not more than 1700 percent of~~ : not in excess of 1700 percent of the full-load motor current ~~for Design B energy-efficient and Design B premium efficiency motors~~ .

c. Design BE or CE motors: not in excess of 2760 percent of the full-load motor current.

d. AC polyphase motors other than synchronous, wound-rotor, or Design B, BE, C, CE, or D: not in excess of 1300 percent of the motor full-load current .

Informational Note: Proper application of self-protected combination motor controllers on 3-phase systems, other than solidly grounded wye, particularly on corner grounded delta systems, considers the self-protected combination motor controllers' individual pole-interrupting capability.

Statement of Problem and Substantiation for Public Input

This is a companion to the NEMA Public Inputs that propose changes to Table 430.52(C)(1) and the NEMA Public Input No. 1472 that proposes new Table 430.251(C).

The Design BE and CE motors introduced to those tables are proposed to have an adjustable instantaneous-trip setting that is not in excess of 2750 percent of the full-load motor current. This value was chosen based on the following:

(i) the highest ratio of locked-rotor current for a given Design BE or CE rating in the newly proposed Table 430.251(C) to the full-load current in Table 430.250 is 9.83* which equates to 983%;
(ii) ANSI/NEMA MG 1-2021, Motors and Generators, Part 12.36 states that the instantaneous peak value of inrush current can be up to 2.8 times as large as the rms symmetrical value of locked-rotor-current; and
(iii) 983% multiplied by 2.8 is equal to 2752% which rounds to 2750%.

* This highest ratio is for the 30 Hp rating.

In 430.52(C)(6) of the 2023 NEC, a value of not in excess of 1700 percent of the full-load motor current is specified for Design B energy-efficient and Design B premium efficiency motors. It is proposed to expand this value to Design C energy-efficient and Design C premium efficiency motors because, per Table 430.251(B), the maximum locked-rotor current is the same for Design B and C motors and Design C motors are supplied as both energy-efficient and premium efficiency motors.

In 430.52(C)(6) of the 2023 NEC, a value of 1300 percent is specified for all motor types in Table 430.52(C)(1) other than Design B energy efficient and Design B premium efficiency. Since the introduction of Design BE and CE introduces a new exception to the 1300 percent specification, it is proposed to specify a value for each of the motor types shown in Table 430.52(C)(1) instead of specifying a single value with a list of exceptions. This does not change the adjustable instantaneous-trip setting specified in 430.52(C)(6) of the 2023 NEC for any motor type with the exception of the Design BE and CE, energy-efficient Design C, and premium efficiency Design C motor types already

mentioned.

As explained in the substantiation for NEMA Public Input No. 1472 for new Table 430.251(C), the new Design letters BE and CE are preferred to the existing Design A because they define an upper limit for locked-rotor current as opposed to being non-constrained, which promotes safety by aiding in the proper sizing of equipment in the motor branch circuit. New Design letters BE and CE and their maximum locked-rotor currents will be proposed in a revision to ANSI/NEMA MG 1-2021 during this Code cycle.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 1472-NFPA 70-2023 [Part XIV.]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	
Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]	
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	
Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]	

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 04 19:48:23 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7976-NFPA 70-2024

Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation that the 2750% adjustment will provide the protection of the motor circuit components including sizing of controllers, conductors, inst. Trip CB, and motor disconnects.

Public Input No. 1469-NFPA 70-2023 [Section No. 430.52(C)(7)]

(7) Motor Short-Circuit Protector.

A motor short-circuit protector shall be permitted in lieu of devices listed in Table 430.52(C)(1) if the motor short-circuit protector is part of a listed combination motor controller having coordinated motor overload protection and short-circuit and ground-fault protection in each conductor and it will open the circuit at currents exceeding ~~1300 percent of the motor~~ the following:

(a) Single phase, synchronous, wound rotor, DC (constant voltage), or standard-efficient Design B, C, or D motors: 1300 percent of the full-load ~~current for other than~~ motor current.

(b) Design B or C energy-efficient ~~and~~ or Design B or C premium efficiency motors ~~and 1700 percent~~ : 1700 percent of the full-load motor current.

(c) Design BE or CE motors: 2750 percent of the full-load ~~current for Design B energy-efficient and Design B premium efficiency motors~~ motor current.

(d) AC polyphase motors other than synchronous, wound-rotor, or Design B, BE,C, CE or D: 1300 percent of the full-load motor current .

Informational Note: A motor short-circuit protector, as used in this section, is a fused device and is not an instantaneous-trip circuit breaker.

Statement of Problem and Substantiation for Public Input

This is a companion to the NEMA Public Input that proposes changes to 430.52(C)(6). The proposed motor types corresponding to the various short-circuit protection values are proposed to be the same as the motor types corresponding to these same values of instantaneous-trip settings as proposed in the NEMA Public Input for 430.52(C)(6).

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
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Submittal Date: Thu Jul 20 02:43:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7977-NFPA 70-2024
Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation that the 2750% adjustment will provide the protection of the motor circuit components including sizing of controllers, conductors, inst. Trip CB, and motor disconnects.

Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]

(7) Motor Short-Circuit Protector.

A motor short-circuit protector shall be permitted in lieu of devices listed in Table 430.52(C)(1) if the motor short-circuit protector is part of a listed combination motor controller having coordinated motor overload protection and short-circuit and ground-fault protection in each conductor and it will open the circuit at currents exceeding ~~1300 percent of the motor~~ the following:

(a) Single phase, synchronous, wound-rotor, DC (constant voltage), Design B or C standard-efficient, or Design D motors: 1300 percent of the full-load ~~current for other than~~ motor current.

(b) Design B or C energy-efficient ~~and~~ or Design B or C premium efficiency motors ~~and 1700 percent~~ : 1700 percent of the full-load motor current.

(c) Design BE or CE motors: 2750 percent of the full-load ~~current for Design B energy-efficient and Design B premium efficiency motors~~ motor current.

(d) AC polyphase motors other than synchronous, wound-rotor, or Design B, BE, C, CE, or D: 1300 percent of the motor full-load current .

Informational Note: A motor short-circuit protector, as used in this section, is a fused device and is not an instantaneous-trip circuit breaker.

Statement of Problem and Substantiation for Public Input

This is a companion to the NEMA Public Inputs that propose changes to 430.52(C)(6). The proposed motor types corresponding to the various short-circuit protection values are proposed to be the same as the motor types corresponding to these same values of instantaneous-trip settings as proposed in the NEMA Public Inputs for 430.52(C)(6).

This Public Input is intended to be correlated in conjunction with NEMA Public Input No. 1479 which this Public Input is identical to except that, in 430.52(C)(7)a, the phrase “or standard-efficient Design B, C, or D” has changed to “Design B or C standard-efficient, or Design D”. This change is necessary to create compatibility with the information on the requirements for a motor to be classified as “Design B or C standard-efficient” which has been proposed in one of the companion NEMA public inputs for Table 430.52(C)(1).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 1472-NFPA 70-2023 [Part XIV.]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]	
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]	

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 04 20:20:48 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The expansion of standard efficiency motor requirements does not improve readability or clarity.

Public Input No. 2703-NFPA 70-2023 [Section No. 430.53(C)(5)]

(5) Overcurrent Protection.

Loads other than motor loads shall be protected in accordance with Part I through ~~Part VII of~~ Article 240 , Part VII .

Informational Note: See 110.10 for circuit impedance and other characteristics.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:50:52 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7949-NFPA 70-2024
Statement: Editorial change for compliance with NEC Style manual section 4.1.4.

Public Input No. 1524-NFPA 70-2023 [Section No. 430.62(A)]

(A) Specific Load.

A feeder supplying a specific group of fixed motor ~~load(s) and consisting~~ loads consisting of conductor sizes in accordance with 430.24 shall be provided with ~~a protective~~ an overcurrent protective device having a rating or setting not greater than the largest rating or setting of the branch-circuit short-circuit and ground-fault protective device for any motor supplied by the feeder [based on the maximum permitted value for the specific type of protective device in accordance with 430.52, or 440.22(A) for hermetic refrigerant motor-compressors], plus the sum of the full-load currents of the other ~~motors of~~ motors of the group.

Where the same rating or setting of the branch-circuit short-circuit and ground-fault protective device is used on two or more of the branch circuits supplied by the feeder, one of the protective devices shall be considered the largest for the above calculations.

Exception No. 1: Where one or more instantaneous-trip circuit breakers or motor short-circuit protectors are used for motor branch-circuit short-circuit and ground-fault protection as permitted in 430.52(C), the maximum rating of each instantaneous-trip circuit breaker or motor short-circuit protector shall be assumed to have a rating not exceeding the maximum percentage of motor full-load current permitted by Table 430.52(C)(1) for the type of feeder protective device employed.

Exception No. 2: Where the feeder overcurrent protective device also provides overcurrent protection for a motor control center, the provisions of 430.94 shall apply.

Informational Note: See Informative Annex D, Example D8, for an example of motor feeder circuit short-circuit and ground-fault protection rating and setting.

Statement of Problem and Substantiation for Public Input

The language as it exists today implies that a "feeder" can supply a specific (single) motor load by the use of the parentheses on the word "motor(s)" in the first sentence. Where a specific single motor is supplied with power it is a "motor branch-circuit", not a "feeder". For many years the term "motor feeder" has been misused when referring to the conductors supplying a single motor. It is not a "motor feeder" where there is only one motor. The proposed language makes it clear that a feeder are conductors supplying more than one motor and/or other loads.

Submitter Information Verification

Submitter Full Name: Paul Guidry
Organization: Fluor Corp.
Affiliation: Associated Builders and Contractors
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 23 22:33:23 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Proposed change does not improve clarity or readability of this section.

Public Input No. 4133-NFPA 70-2023 [Section No. 430.62(A)]

(A) Specific Load.

(1) Feeder Short-Circuit and Ground-Fault Protective Device. A feeder supplying a specific fixed motor load(s) and consisting of conductor sizes in accordance with 430.24 shall be provided with a protective device having a rating or setting not greater than the largest rating or setting of the branch-circuit short-circuit and ground-fault protective device for any motor supplied by the feeder [based on the maximum permitted value for the specific type of protective device in accordance with 430.52, or 440.22(A) for hermetic refrigerant motor-compressors], plus the sum of the full-load currents of the other motors of the group.

(2) Largest Motor Full-Load Current. Where the same rating or setting of the branch-circuit short-circuit and ground-fault protective device is used on two or more of the branch circuits supplied by the feeder, one of the protective devices shall be considered the largest for the above calculations.

Exception No. 1: Where one or more instantaneous-trip circuit breakers or motor short-circuit protectors are used for motor branch-circuit short-circuit and ground-fault protection as permitted in 430.52(C), the maximum rating of each instantaneous-trip circuit breaker or motor short-circuit protector shall be assumed to have a rating not exceeding the maximum percentage of motor full-load current permitted by Table 430.52(C)(1) for the type of feeder protective device employed.

Exception No. 2: Where the feeder overcurrent protective device also provides overcurrent protection for a motor control center, the provisions of 430.94 shall apply.

Informational Note: See Informative Annex D, Example D8, for an example of motor feeder circuit short-circuit and ground-fault protection rating and setting.

Statement of Problem and Substantiation for Public Input

Breaking up 430.62(A) into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 18:02:31 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The changes proposed create style manual issue with the exceptions. The existing wording meets the current requirements for the code.

Public Input No. 2704-NFPA 70-2023 [Section No. 430.72(C)(1)]

(1) Class 1 Power-Limited, Class 2, or Class 3 Circuits.

Where the transformer supplies a Class 1 power-limited circuit, the circuit shall comply with 724.30 through 724.52. Where the transformer supplies a Class 2 or Class 3 remote-control circuit, the circuit shall comply with the requirements of ~~Part II of~~ Article 725 , Part II .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:52:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7951-NFPA 70-2024
Statement: Editorial change for compliance with NEC Style Manual section 4.1.4.

Public Input No. 1786-NFPA 70-2023 [Section No. 430.83(A)(1)]

(1) Horsepower Ratings.

Motor controllers, other than inverse time circuit breakers and molded case switches, shall have horsepower ratings at the application voltage not lower than the horsepower rating of the motor and not less than the horsepower rating required for the locked rotor current of the motor .

Statement of Problem and Substantiation for Public Input

If the locked rotor current of the motor is greater than the corresponding locked rotor current for the horsepower rating of the motor the horsepower rating of the controller would not be sufficient. The horsepower rating of the controller would need to be increased to accommodate the additional locked rotor current. The suggested language would require the controller horsepower rating to accommodate the locked rotor current of the motor.

Submitter Information Verification

Submitter Full Name: Dennis Querry
Organization: Trinity River Authority
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 02 14:59:25 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The additional language does not improve usability of the code. There are existing motors with higher LRC’s that are addressed in sections related to Design A motor calculations.

Public Input No. 1787-NFPA 70-2023 [Section No. 430.83(A)(1)]

(1) Horsepower Ratings.

Motor controllers, other than inverse time circuit breakers and molded case switches, shall have horsepower ratings at the application voltage not lower than the horsepower rating of the motor and not less than the horsepower rating required for the locked rotor current of the motor .

Statement of Problem and Substantiation for Public Input

If the locked rotor current of the motor is greater than the corresponding locked rotor current for the horsepower rating of the motor the horsepower rating of the controller would not be sufficient. The horsepower rating of the controller would need to be increased to accommodate the additional locked rotor current. The suggested language would require the controller horsepower rating to accommodate the locked rotor current of the motor.

Submitter Information Verification

Submitter Full Name: IEC National
Organization: IEC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 02 15:42:43 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The additional language does not improve usability of the code. There are existing motors with higher LRC's that are addressed in sections related to Design A motor calculations.

Public Input No. 2705-NFPA 70-2023 [Section No. 430.94]

430.94 Overcurrent Protection.

Motor control centers shall be provided with overcurrent protection in accordance with Article 240, Parts I, II, and VIII ~~of Article 240~~ . The ampere rating or setting of the overcurrent protective device shall not exceed the rating of the common power bus. This protection shall be provided by (1) an overcurrent protective device located ahead of the motor control center or (2) a main overcurrent protective device located within the motor control center.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:53:01 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7954-NFPA 70-2024
Statement: Editorial change for compliance with NEC Style manual section 4.1.4.

Public Input No. 1414-NFPA 70-2023 [Section No. 430.95]

430.95 Service Equipment.

Where used as service equipment, each motor control center shall be provided with a single main disconnecting means to disconnect all ungrounded service conductors.

Exception No. 1: A second service disconnect shall be permitted to supply additional ~~equipment.~~ equipment and shall conform to the requirements of 230.71(B)(6).

Where a grounded conductor is provided, the motor control center shall be provided with a main bonding jumper, sized in accordance with 250.28(D), within one of the sections for connecting the grounded conductor, on its supply side, to the motor control center equipment ground bus.

Exception No. 2: High-impedance grounded neutral systems shall be permitted to be connected as provided in 250.36.

Statement of Problem and Substantiation for Public Input

Changes to NEC 230.71(B) in the 2023 edition of the NEC permit service disconnects in motor control centers where there is only one service disconnect in a motor control center unit and a maximum of two service disconnects provided in a single motor control center with barriers provided between each motor control center unit or compartment containing a service disconnect. 430.95 permits a MCC to be used as service equipment with a single main disconnecting means with an exception to permit a second service disconnect to supply additional equipment. Since Chapter 7 can modify Chapter 2, text could be added to 430.95 Exception No. 1 to clarify the second disconnect shall conform with NEC 230.71(B)(6).

Submitter Information Verification

Submitter Full Name: Brad McVey
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 14 20:53:25 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: This section was removed by action taken on PI-4028. See action taken on PI-4028.

Public Input No. 4028-NFPA 70-2023 [Section No. 430.95]

430.~~95~~ 95 Bonding of Service Equipment.

Where ~~used as service equipment, each motor control center shall be provided with~~ a ~~single main disconnecting means to disconnect all ungrounded service conductors.~~

~~*Exception No. 1: A second service disconnect shall be permitted to supply additional equipment.*~~

~~Where a~~ grounded conductor is provided, the motor control center shall be provided with a main bonding jumper, sized in accordance with 250.28(D), within one of the sections for connecting the grounded conductor, on its supply side, to the motor control center equipment ground bus.

~~*Exception No. 2*~~ *Exception : High-impedance grounded neutral systems shall be permitted to be connected as provided in 250.36.*

Statement of Problem and Substantiation for Public Input

Article 230 includes general requirements for service equipment, including the number of service disconnects allowed for motor control centers (230.71(B)(6)). The first portion of Section 430.95 should be removed as the subject is already addressed in Article 230.

A similar proposal was made in the 2023 Code cycle. Although CMP11 agreed with the proposal, the changes were not made as the panel was waiting for CMP10 to take action in Article 230. CMP10 did address the service disconnect requirements of motor control centers (including allowance of a second service disconnect), however the update to 430.95 was missed inadvertently.

Submitter Information Verification

Submitter Full Name: Danish Zia
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 14:27:56 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7962-NFPA 70-2024
Statement: This section is redundant with other requirements in the code and therefore is not in compliance with NEC Style Manual 4.1.1.

Public Input No. 2838-NFPA 70-2023 [Section No. 430.96]

~~430.96~~ **96 Equipment** Grounding Conductor .

Multisection motor control centers shall be connected together with an equipment grounding conductor or an equivalent equipment grounding bus sized in accordance with Table 250.122. Equipment grounding conductors shall be connected to this equipment grounding bus or to a grounding termination point provided in a single-section motor control center.

Statement of Problem and Substantiation for Public Input

The section title must be revised to match the technical requirement. In accordance with NEC style manual section 2.1.3.2 the title must be descriptive and concise with the intent of the requirement. See 215.6 Feeder Equipment Grounding Conductor, 320.108 Equipment Grounding Conductor, 330.108 Equipment Grounding Conductor, 334.108 Equipment Grounding Conductor, 410.182 Equipment Grounding Conductor, 547.27 Separate Equipment Grounding Conductor, 555.37 Equipment Grounding Conductor, and 690.45 Size of Equipment Grounding Conductors.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 25 14:28:24 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The section refers to equipment grounding conductors and bussing. The more general heading provides a better introduction to the section.

Public Input No. 1519-NFPA 70-2023 [Section No. 430.98]

430.98 Marking.

(A) Motor Control Centers.

Motor control centers shall be marked according to 110.21, and the marking shall be plainly visible after installation. Marking shall also include common power bus current rating and motor control center short-circuit current rating.

(B) All Motor Control Centers supplied by a feeder(s) shall be permanently marked in accordance with the following:

(1) With the identification and physical location of where the power originates

(2) With a label that is permanently affixed and of sufficient durability to withstand the environment involved

(3) Using a method that is not handwritten

(C) Motor Control Units.

Motor control units in a motor control center shall comply with 430.8.

Statement of Problem and Substantiation for Public Input

This requirement has been in the NEC for Panelboards and Switchboards and has been helpful for installers, service technicians as well as maintenance personnel to quickly identify the location of the power supply. This is sometimes already completed when a facility completes an arc flash study, as some arc flash labels incorporate the power supply location on the arc flash label for worker safety. With this additional label being required by the NEC for all new installations, this will create a safer workplace and if an emergency occurs, the power source location can be quickly identified and deenergized.

Would propose to create a new subsection (C) to relocate the existing subsection (B) Code text.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1518-NFPA 70-2023 [New Section after 409.30]	

Submitter Information Verification

Submitter Full Name: Robert Fahey
Organization: Town of Union
Street Address:
City:
State:
Zip:
Submittal Date: Sun Jul 23 13:09:21 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7981-NFPA 70-2024

Statement: This will allow for quicker identification of power sources in the event of an emergency.

Public Input No. 1760-NFPA 70-2023 [Section No. 430.98]

430.98 Marking.

(A) Motor Control Centers.

Motor control centers shall be marked according to 110.21, and the marking shall be plainly visible after installation. Marking shall also include common power bus current rating and motor control center short-circuit current rating.

(B) All Motor Control Centers supplied by a feeder(s) shall be permanently marked in accordance with the following:

(1) With the identification and physical location of where the power originates

(2) With a label that is permanently affixed and of sufficient durability to withstand the environment involved

(3) Using a method that is not handwritten

(C) Motor Control Units.

Motor control units in a motor control center shall comply with 430.8.

Statement of Problem and Substantiation for Public Input

This requirement has been in the NEC for Panelboards and Switchboards and has been helpful for installers, service technicians as well as maintenance personnel to quickly identify the location of the power supply. This is sometimes already completed when a facility completes an arc flash study, as some arc flash labels incorporate the power supply location on the arc flash label for worker safety. With this additional label, this will create a safer workplace and if an emergency occurs, the power source location can be quickly identified and deenergized.

Would propose to create a new subsection (C) to relocate the existing subsection (B) Code text.

Submitter Information Verification

Submitter Full Name: Rudy Garza
Organization: IAEI
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 01 12:51:50 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7981-NFPA 70-2024
Statement: This will allow for quicker identification of power sources in the event of an emergency.

Public Input No. 3308-NFPA 70-2023 [Section No. 430.99]

430.99 Available Fault Current.

The available fault current at the motor control center and the date the available fault current calculation was performed shall be documented and made available to those authorized to inspect, install, or maintain the installation. A motor control center shall not be installed where the available fault current exceeds the motor control center's short-circuit current rating.

Additional Proposed Changes

File Name	Description	Approved
PC_1257_CMP_11.pdf	NEC_PC1257	

Statement of Problem and Substantiation for Public Input

NOTE: This Public Input appeared as “Reject but Hold” in Public Comment No. 1257 of the (A2022) Second Draft Report for NFPA 70 and per the Regs. at 4.4.8.3.1.

Substantiation: PI 393 and FR-8034 added a requirement that a motor controller shall not be installed where the available
fault current exceeds the motor controller’s short-circuit current rating. This public comment proposes similar language for motor control centers. Motor control centers are often located near the service entrance equipment where the available fault current can be high. Assuring the motor control center SCCR is adequate for the available fault current enhances safety.

Submitter Information Verification

Submitter Full Name: CMP ON NEC-P11
Organization: Code-Making Panel 11
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 31 17:17:34 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8043-NFPA 70-2024
Statement: This changes the language to more clearly reflect other parts of the code for consistency.

Public Comment No. 1257-NFPA 70-2021 [Section No. 430.99]

430.99 Available Fault Current.

The available fault current at the motor control center and the date the available fault current calculation was performed shall be documented and made available to those authorized to inspect, install, or maintain the installation. A motor control center shall not be installed where the available fault current exceeds the motor control center's short-circuit current rating.

Statement of Problem and Substantiation for Public Comment

PI 393 and FR-8034 added a requirement that a motor controller shall not be installed where the available fault current exceeds the motor controller's short-circuit current rating. This public comment proposes similar language for motor control centers. Motor control centers are often located near the service entrance equipment where the available fault current can be high. Assuring the motor control center SCCR is adequate for the available fault current enhances safety.

Related Item

• Public Input No. 393 • FR-8034

Submitter Information Verification

Submitter Full Name: Daniel Neeser
Organization: Eaton's Bussmann Division
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 11 13:59:28 EDT 2021
Committee: NEC-P11

Committee Statement

Committee Action: Rejected but held

Resolution: The PC provides new material for the motor control center section that has not had full public review.

Copyright Assignment

I, Daniel Neeser, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

☑ By checking this box I affirm that I am Daniel Neeser, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

Public Input No. 1634-NFPA 70-2023 [Section No. 430.102]

430.102 Location.

(A) Motor Controller.

An individual disconnecting means shall be provided for each motor controller and shall disconnect the motor controller. The disconnecting means shall be located in sight from ~~the~~ and readily accessible from the motor controller location.

Exception No. 1: For motor circuits over 1000 volts, nominal, a motor controller disconnecting means lockable in accordance with 110.25 shall be permitted to be out of sight of the motor controller if the motor controller is marked with a label giving the location of the disconnecting means.

Exception No. 2: A single disconnecting means shall be permitted for a group of coordinated motor controllers that drive several parts of a single machine or piece of apparatus. The disconnecting means shall be located in sight from the motor controllers, and both the disconnecting means and the motor controllers shall be located in sight from the machine or apparatus.

Exception No. 3: The disconnecting means shall not be required to be in sight from valve actuator motor (VAM) assemblies containing the motor controller where such a location introduces additional or increased hazards to persons or property and the following conditions are met:

(1) The valve actuator motor assembly is marked with a label giving the location of the disconnecting means.

(2) The disconnecting means is lockable in accordance with 110.25.

(B) Motor.

A disconnecting means meeting the requirements in 110.29 shall be provided for a motor in accordance with 430.102(B)(1) or (B)(2).

(1) Separate Motor Disconnect.

A disconnecting means for the motor shall be located in sight from and readily accessible from the motor location and the driven machinery location.

(2) Motor Controller Disconnect.

The motor controller disconnecting means required in accordance with 430.102(A) shall be permitted to serve as the disconnecting means for the motor if it is in sight from and readily accessible from the motor location and the driven machinery location.

Exception to (1) and (2): The disconnecting means for the motor shall not be required under either of the following conditions if the motor controller disconnecting means required in 430.102(A) is lockable in accordance with 110.25:

(1) Where such a location of the disconnecting means for the motor is impracticable or introduces additional or increased hazards to persons or property

Informational Note No. 1: Some examples of increased or additional hazards include, but are not limited to, motors rated in excess of 100 hp, multimotor equipment, submersible motors, motors associated with adjustable-speed drives, and motors located in hazardous (classified) locations.

(2) In industrial installations, with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment

Informational Note No. 2: See NFPA *70E*-2021, *Standard for Electrical Safety in the Workplace*, for information on lockout/tagout procedures.

Informational Note No. 3: See the definition of "Accessible, Readily" in Article 100.

Statement of Problem and Substantiation for Public Input

The revisions to Sections 430.102(A) and (B) are intended to correlate directly with revised text in Section 110.29 and the existing text in 440.14 regarding the “readily accessible from” requirement. The correlation should enhance clarity relative to the literal meaning of the “in sight from” rule and reinforce the existing “readily accessible from” language of this section and the general rules in Article 110. The revisions in 110.29 are intended to apply to all rules requiring disconnecting means “in sight from” the equipment they supply so that the same rules do not have to be repeated throughout the Code. This revision should also improve electrical safety in the workplace compliance with the general principles of establishing electrically safe work conditions further protecting electrical worker/installers and service and maintenance personnel.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1635-NFPA 70-2023 [Section No. 440.14]	
Public Input No. 1597-NFPA 70-2023 [Section No. 110.29]	
Public Input No. 1597-NFPA 70-2023 [Section No. 110.29]	
Public Input No. 1635-NFPA 70-2023 [Section No. 440.14]	

Submitter Information Verification

Submitter Full Name: Kyle Krueger
Organization: NECA
Affiliation: NECA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 27 15:21:31 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The substantiation did not provide details on what problem this PI is attempting to fix and could create enforcement issues in the future.

Public Input No. 2535-NFPA 70-2023 [Section No. 430.102]

430.102 Location.

(A) Motor Controller.

An individual disconnecting means shall be provided for each motor controller and shall disconnect the motor controller. The disconnecting means shall be located in sight from the motor controller location.

Exception No. 1: For motor circuits over 1000 volts, nominal, a motor controller disconnecting means lockable open in accordance with 110.25 shall be permitted to be out of sight of the motor controller if the motor controller is marked with a label giving the location of the disconnecting means.

Exception No. 2: A single disconnecting means shall be permitted for a group of coordinated motor controllers that drive several parts of a single machine or piece of apparatus. The disconnecting means shall be located in sight from the motor controllers, and both the disconnecting means and the motor controllers shall be located in sight from the machine or apparatus.

Exception No. 3: The disconnecting means shall not be required to be in sight from valve actuator motor (VAM) assemblies containing the motor controller where such a location introduces additional or increased hazards to persons or property and the following conditions are met:

(1) The valve actuator motor assembly is marked with a label giving the location of the disconnecting means.

(2) The disconnecting means is lockable open in accordance with 110.25.

(B) Motor.

A disconnecting means shall be provided for a motor in accordance with 430.102(B)(1) or (B)(2).

(1) Separate Motor Disconnect.

A disconnecting means for the motor shall be located in sight from the motor location and the driven machinery location.

(2) Motor Controller Disconnect.

The motor controller disconnecting means required in accordance with 430.102(A) shall be permitted to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

Exception to (1) and (2): The disconnecting means for the motor shall not be required under either of the following conditions if the motor controller disconnecting means required in 430.102(A) is lockable open in accordance with 110.25:

(1) Where such a location of the disconnecting means for the motor is impracticable or introduces additional or increased hazards to persons or property

Informational Note No. 1: Some examples of increased or additional hazards include, but are not limited to, motors rated in excess of 100 hp, multimotor equipment, submersible motors, motors associated with adjustable-speed drives, and motors located in hazardous (classified) locations.

(2) In industrial installations, with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment

Informational Note No. 2: See NFPA *70E*-2021, *Standard for Electrical Safety in the Workplace*, for information on lockout/tagout procedures.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when a disconnecting means is required to be lockable open elsewhere in the code. The text is revised to comply with the NEC Style Manual. The NEC Style Manual Section 3.2.5 Consistent Application of Terms, 3.2.5.3 Lockable Open. Where a requirement specifies that a disconnecting means be capable of being locked in the open position, the phrase lockable open in accordance with 110.25 shall be used.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 19 21:51:46 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7988-NFPA 70-2024
Statement: Editorial change made to meet NEC Style Manual section 3.2.5.3.

Public Input No. 2345-NFPA 70-2023 [Section No. 430.102(A)]

(A) Motor Controller.

An individual disconnecting means shall be provided for each motor controller and shall disconnect the motor controller. The disconnecting means shall be readily accessible - and located in sight from the motor controller location. The disconnecting means shall meet the working space requirements of 110.26(A).

Exception No. 1: For motor circuits over 1000 volts, nominal, a motor controller disconnecting means lockable in accordance with 110.25 shall be permitted to be out of sight of the motor controller if the motor controller is marked with a label giving the location of the disconnecting means.

Exception No. 2: A single disconnecting means shall be permitted for a group of coordinated motor controllers that drive several parts of a single machine or piece of apparatus. The disconnecting means shall be located in sight from the motor controllers, and both the disconnecting means and the motor controllers shall be located in sight from the machine or apparatus.

Exception No. 3: The disconnecting means shall not be required to be in sight from valve actuator motor (VAM) assemblies containing the motor controller where such a location introduces additional or increased hazards to persons or property and the following conditions are met:

(1) The valve actuator motor assembly is marked with a label giving the location of the disconnecting means.

(2) The disconnecting means is lockable in accordance with 110.25.

Statement of Problem and Substantiation for Public Input

Adding language to make it clear the disconnecting means for the motor controller must be readily accessible as required in accordance with 408.4(A). Adding same language of 440.14 to 430.102(A) because it relieves the AHJ from interpreting that the motor controller disconnecting means must have the required working space in 110.26(A). This increases safety for the safe operation and maintenance of such equipment.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 16 13:46:56 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Proposed change referencing a section in chapters 1 thru 4 violates the NEC Style manual section 4.1.1. Readily accessible requirements are located in 430.107.

Public Input No. 3585-NFPA 70-2023 [Section No. 430.102(A)]

(A) Motor Controller.

An individual disconnecting means shall be provided for each motor controller and shall disconnect the motor controller. The disconnecting means shall be located in sight from and be readily accessible from the motor controller location.

Exception No. 1: For motor circuits over 1000 volts, nominal, a motor controller disconnecting means lockable in accordance with 110.25 shall be permitted to be out of sight of the motor controller if the motor controller is marked with a label giving the location of the disconnecting means.

Exception No. 2: A single disconnecting means shall be permitted for a group of coordinated motor controllers that drive several parts of a single machine or piece of apparatus. The disconnecting means shall be located in sight from the motor controllers, and both the disconnecting means and the motor controllers shall be located in sight from the machine or apparatus.

Exception No. 3: The disconnecting means shall not be required to be in sight from valve actuator motor (VAM) assemblies containing the motor controller where such a location introduces additional or increased hazards to persons or property and the following conditions are met:

(1) The valve actuator motor assembly is marked with a label giving the location of the disconnecting means.

(2) The disconnecting means is lockable in accordance with 110.25.

Statement of Problem and Substantiation for Public Input

I propose to add the text "and readily accessible" to this section as well as 430.102(B) due to the fact the question has come up at various IAEI meetings in regards to if the disconnect is visible thru a glass wall or thru a window, does this meet the Code requirement. As presently written, this would be difficult to enforce, if the disconnect was visible and within 50 feet of the motor controller. The other issue brought forth in these same discussions, is the disconnect that is visible in a locked room, thereby making the disconnect inaccessible. This added text will hopefully eliminate the gray area in this requirement and require the disconnect to be readily accessible and not be allowed in a room where you may be able to see it, but cannot access this disconnect due to a locked room.

Submitter Information Verification

Submitter Full Name: Robert Fahey
Organization: Town of Union
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 04 21:00:46 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Enforceability in an industrial environment makes this change problematic. Readily accessible requirements exist in 430.107. The substantiation needs more work on how it relates to readily accessible in article 110 and is different than seen in industry.

Public Input No. 2346-NFPA 70-2023 [Section No. 430.102(B)]

(B) Motor.

A disconnecting means shall be provided for a motor in accordance with 430.102(B)(1) or (B)(2).

(1) Separate Motor Disconnect.

A disconnecting means for the motor shall be readily accessible and located in sight from the motor location and the driven machinery location. The disconnecrting means shall meet the working space requirements of 110.26(A).

(2) Motor Controller Disconnect.

The motor controller disconnecting means required in accordance with 430.102(A) shall be permitted to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

Exception to (1) and (2): The disconnecting means for the motor shall not be required under either of the following conditions if the motor controller disconnecting means required in 430.102(A) is lockable in accordance with 110.25:

(1) Where such a location of the disconnecting means for the motor is impracticable or introduces additional or increased hazards to persons or property

Informational Note No. 1: Some examples of increased or additional hazards include, but are not limited to, motors rated in excess of 100 hp, multimotor equipment, submersible motors, motors associated with adjustable-speed drives, and motors located in hazardous (classified) locations.

(2) In industrial installations, with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment

Informational Note No. 2: See NFPA *70E*-2021, *Standard for Electrical Safety in the Workplace*, for information on lockout/tagout procedures.

Statement of Problem and Substantiation for Public Input

Adding language to make it clear the disconnecting means for the motor must be readily accessible as required in accordance with 408.4(A). Adding same language of 440.14 to 430.102(B)(1) because it relieves the AHJ from interpreting that the motor disconnecting means must have the required working space in 110.26(A). This increases safety for the safe operation and maintenance of such equipment.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 16 13:49:03 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Proposed change referencing a section in chapters 1 thru 4 violates the NEC Style manual section 4.1.1. Readily accessible requirements are located in 430.107.

Public Input No. 3586-NFPA 70-2023 [Section No. 430.102(B)(1)]

(1) Separate Motor Disconnect.

A disconnecting means for the motor shall be located in sight from ~~the~~ and readily accessible from the motor location and the driven machinery location.

Statement of Problem and Substantiation for Public Input

I propose to add the text "and readily accessible" to this section as well as 430.102(A) due to the fact the question has come up at various IAEI meetings in regards to if the disconnect is visible thru a glass wall or thru a window, does this meet the Code requirement. As presently written, this would be difficult to enforce, if the disconnect was visible and within 50 feet of the motor controller. The other issue brought forth in these same discussions, is the disconnect that is visible in a locked room, thereby making the disconnect inaccessible. This added text will hopefully eliminate the gray area in this requirement and require the disconnect to be readily accessible and not be allowed in a room where you may be able to see it, but cannot access this disconnect due to a locked room.

Submitter Information Verification

Submitter Full Name: Robert Fahey
Organization: Town of Union
Street Address:
City:
State:
Zip:
Submittal Date: Mon Sep 04 21:08:57 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Enforceability in an industrial environment makes this change problematic. Readily accessible requirements exist in 430.107. The substantiation needs more work on how it relates to readily accessible in article 110 and is different than seen in industry.

Public Input No. 209-NFPA 70-2023 [Section No. 430.102(B)(2)]

(2) Motor Controller Disconnect.

The motor controller disconnecting means required in accordance with 430.102(A) shall be permitted to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

Exception to (1) and (2): The disconnecting means for the motor shall not be required under either of the following conditions if the motor controller disconnecting means required in 430.102(A) is lockable in accordance with 110.25:

(1) Where such a location of the disconnecting means for the motor is impracticable or introduces additional or increased hazards to persons or property

Informational Note No. 1: Some examples of increased or additional hazards include, but are not limited to, motors rated in excess of 100 hp, multimotor equipment,

~~submersible motors, motors~~
motors associated with adjustable-speed drives, and motors located in hazardous (classified) locations.

(2) In industrial installations, with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment

Informational Note No. 2: See NFPA *70E*-2021, *Standard for Electrical Safety in the Workplace*, for information on lockout/tagout procedures.

Additional Proposed Changes

File Name	Description	Approved
Code_making_panel_1_and_11_submital.docx		

Statement of Problem and Substantiation for Public Input

Article 430.102 Location

430.102 (B)(2)Exception (1); Informational note. Remove the words “submersible motors” Exception (2) states only qualified person’s service the equipment, written safety procedures and supervision. My experiences are that these procedures are not followed in most instances. Article 100 Definitions: In Sight From (Within Sight From, Within Sight) tells the installer what the parameters are for the location of the disconnecting means and a maximum of 15m (50 feet).

the terms “submersible motors” in the note pose a hazard to pump mechanics by including this note.

Submitter Information Verification

Submitter Full Name: Raymond smiseck
Organization: [Not Specified]
Street Address:
City:
State:
Zip:

Submittal Date: Sat Jan 21 13:17:13 EST 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation does not document where the existing text has created a hazard. In response to the substantiation in PI-3322, informational notes are not enforceable.

Public Input No. 3322-NFPA 70-2023 [Section No. 430.102(B)(2)]

(2) Motor Controller Disconnect.

The motor controller disconnecting means required in accordance with 430.102(A) shall be permitted to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

Exception to (1) and (2): The disconnecting means for the motor shall not be required under either of the following conditions if the motor controller disconnecting means required in 430.102(A) is lockable in accordance with 110.25:

(1) Where such a location of the disconnecting means for the motor is impracticable or introduces additional or increased hazards to persons or property

Informational Note No. 1: Some examples of increased or additional hazards include, but are not limited to, motors rated in excess of 100 hp, multimotor equipment, submersible motors, motors associated with adjustable-speed drives, and motors located in hazardous (classified) locations.

(2) In industrial installations, with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment

Informational Note No. 2: See NFPA *70E*-2021, *Standard for Electrical Safety in the Workplace*, for information on lockout/tagout procedures.

Additional Proposed Changes

File Name	Description	Approved
souric_controls_NFPA.pdf	DELETE SUBMERSABLE MOTORS	

Statement of Problem and Substantiation for Public Input

Professional Engineers are using the note to eleminate the disconnecting means on submersable pumps. This creates a danger to pump mehanics who are required to service the motors. Most often the controlles are not visible due to being inside a building and not within sight. Art 90.5 "such notes are informational only and are not inforeable as requirements of this code." The note is being used as means not to requre the disconnect.
Even on the top of a water well casing ther is room for a cord and plug connection to disconnect the motor.

Submitter Information Verification

Submitter Full Name: Raymond smiseck
Organization: City of Akron, Ohio
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 01 08:22:34 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation does not document where the existing text has created a hazard. In response to the substantiation in PI-3322, informational notes are not enforceable.

Public Input No. 484-NFPA 70-2023 [Section No. 430.107]

430.107 Readily Accessible.

~~At least one of the~~ The disconnecting means required by 430.102(B) shall be readily accessible from the motor location .

Statement of Problem and Substantiation for Public Input

As worded, the disconnect AT the motor is required to be "in sight from" but not necessarily readily accessible as long as A disconnecting means is readily accessible (430.107). While the requirement is adequate for personnel working on the equipment it is not sufficient for personnel who might need to de-energize the motor but cannot gain access.
An example would be many roof top exhaust fans where the disconnect is behind a shroud requiring a tool for access. Personnel working on the equipment will have access to the disconnect only after they access the motor. In the event of an equipment malfunction nearby personnel who do not have tools should be able to de-energize the equipment while being in sight

Submitter Information Verification

Submitter Full Name: a Bryan
Organization: State Of Tennessee Inspector (retired)
Street Address:
City:
State:
Zip:
Submittal Date: Fri Mar 17 15:00:35 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The existing language provides the necessary requirement for being readily accessible. The substantiation does not provide details on how the change would improve safety.

Public Input No. 525-NFPA 70-2023 [Section No. 430.110(A)]

(A) ~~General~~ **Single Motor** .

A disconnecting means serving a single motor circuit shall be selected on the basis of the full-load current and locked-rotor current, respectively, of the motor as follows.

(1) Ampere Rating. The disconnecting means for motor circuits rated 1000 volts, nominal, or less shall have a current rating not less than 115 percent of the full-load current rating of the motor.

Exception: A listed unfused motor-circuit switch having a horsepower rating not less than the motor horsepower shall be permitted to have a current rating less than 115 percent of the full-load current rating of the motor.

(2) Equivalent Horsepower.

To determine the equivalent horsepower in complying with the requirements of 430.109, the horsepower rating shall be selected from Table 430.248, Table 430.249, or Table 430.250 corresponding to the full-load current, and also the horsepower rating from table 430.251(A) or Table 430.251(B) corresponding to the locked-rotor current. In case the full-load current and locked-rotor current do not correspond to the currents shown in Table 430.248, Table 430.249, Table 430.250, Table 430.251(A), or Table 430.251(B), the horsepower rating corresponding to the next higher value shall be selected. In case different horsepower ratings are obtained when applying these tables, a horsepower rating at least equal to the larger of the values obtained shall be selected.

Statement of Problem and Substantiation for Public Input

This change would clarify and substantiate the intentions of Section 430.110(A), comply with the requirements of 430.109, and also create consistency between the requirements for disconnecting means in Articles 430 and 440. The exception in 430.110(A) mentions HP rating but the section does not describe an acceptable means to determine HP rating. This change would clarify intentions of the section and provide means. Article 430.109 states that where a motor circuit switch is used, is shall be rated in HP. This change would emphasize that requirement. In addition, this would create consistency with requirements for disconnecting means in Article 440. The proposed change is structurally based on 440.12 to create this consistency.

Submitter Information Verification

Submitter Full Name: Steven Gibson
Organization: Electrical Training Alliance of Western Oklahoma
Street Address:
City:
State:
Zip:
Submittal Date: Mon Apr 03 10:03:51 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The concerns brought up are currently covered in 430.110(C)(1).

Public Input No. 486-NFPA 70-2023 [Section No. 430.110(C)]

(C) For Combination Loads.

Where two or more motors are used together or where one or more motors are used in combination with other loads, such as resistance heaters, and where the combined load can be simultaneous on a single disconnecting means, the current and horsepower ratings of the combined load shall be determined in accordance with 430.110(C)(1) through (C)(3).

(1) Horsepower Rating.

The rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the full-load condition and also at the locked-rotor condition. The combined full-load current and the combined locked-rotor current so obtained shall be considered as a single motor for the purpose of this requirement.

The full-load current equivalent to the horsepower rating of each motor shall be selected from Table 430.247, Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

The locked-rotor current equivalent to the horsepower rating of each motor shall be selected from Table 430.251(A) or Table 430.251(B). The locked-rotor currents shall be added to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads cannot be started simultaneously, the largest sum of locked-rotor currents of a motor or group of motors that can be started simultaneously and the full-load currents of other concurrent loads shall be permitted to be used to determine the equivalent locked-rotor current for the simultaneous combined loads. In cases where different ~~current ratings~~ horsepower ratings are obtained when applying these tables, the largest value obtained shall be used.

The horsepower rating of the disconnecting means for factory-wired multimotor and combination-load equipment shall not be less than the equivalent horsepower rating marked on the nameplate in accordance with 430.7(D)(1).

Exception No. 1: The locked-rotor current equivalent to the horsepower rating of each polyphase motor with design letter A shall be one of following:

(1) If available, the motor's marked value of locked-rotor amperes

(2) In the absence of a marked value of locked-rotor amperes for the motor, the value calculated from Equation 430.110(C)(1)a:

$$\text{locked-rotor amperes} = \left(\frac{kVA}{hp}\right) \times \frac{(1000 \times \text{motor's marked value of rated horsepower})}{(\text{motor's marked value of rated volts}) \times (\sqrt{3})}$$ ***[430.110(C)(***

where:

kVA/hp = maximum range value of kilovolt-amperes per horsepower with locked rotor in Table 430.7(B) associated with the motor's marked locked-rotor indicating code letter

Informational Note: Equation 430.110(C)(1)a is obtained by solving for locked-rotor amperes in the formula for "kilovolt-amperes per horsepower with locked rotor," as follows:

$$\frac{kVA}{hp} = \frac{(\sqrt{3}) \times (\text{motor's marked value of rated volts}) \times (\text{locked-rotor amperes})}{(1000 \times \text{motor's marked value of rated horsepower})}$$ ***[430.110(C)(***

The numerator of Equation 430.110(C)(1)b for kilovolt-amperes per horsepower is the apparent power input to a three-phase motor with locked rotor in units of volt-amperes. The factor of 1000 VA/kVA in the denominator converts this value to units of kilovolt-amperes and "(marked value of rated horsepower)" in the denominator converts this to kilovolt-amperes per horsepower. Note that "motor's marked value of rated volts" is a line-to-line value and "locked-rotor amperes" is a line value as opposed to a phase value.

Exception No. 2: Where part of the concurrent load is resistance load, and where the disconnecting means is a switch rated in horsepower and current, the switch used shall be permitted to have a horsepower rating not less than the combined load of the motor(s) if the current rating of the switch is not less than the locked-rotor current of the motor(s) plus the resistance load.

(2) Current Rating.

The current rating of the disconnecting means shall not be less than 115 percent of the sum of all currents at the full-load condition determined in accordance with 430.110(C)(1).

Exception: A listed nonfused motor-circuit switch having a horsepower rating equal to or greater than the equivalent horsepower of the combined loads, determined in accordance with 430.110(C)(1), shall be permitted to have a current rating less than 115 percent of the sum of all currents at the full-load condition.

(3) Small Motors.

For small motors not covered by Table 430.247, Table 430.248, Table 430.249, or Table 430.250, the locked-rotor current shall be assumed to be six times the full-load current.

Additional Proposed Changes

File Name	Description	Approved
equivalent_HP_ratings.pdf	HP rating of multi motor equipment	

Statement of Problem and Substantiation for Public Input

This PI is in conjunction with PI 485 addressing the horsepower rating for factory-wired multimotor and combination-load equipment. I believe these revisions are necessary to help installers, designers, and inspectors ensure the correct disconnecting means for factory-wired equipment is used. Determining the equivalent horsepower rating for factory-wired equipment is often overlooked. If the manufacturer does the calculations and provides that information on the equipment nameplate, then installers, designers, and inspectors will have a much easier time verifying that the correct disconnect rating is used.

Also, changing the word “current” to “horsepower” in the last sentence of the 3rd paragraph is needed to clarify exactly what where doing here. We are finding equivalent HORSEPOWER ratings! When using the FLC tables and LRC tables, often the equivalent HP ratings determined from each table are different! 440.13(A)(2) correctly uses the term “horsepower” instead of “current” rating. Users need to know which equivalent HP rating to use! My revision clarifies this intent and provides consistency with the wording in 440.12(A)(2).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 485-NFPA 70-2023 [Section No. 430.7(D)(1)]	HP rating of factory wired multi motor equipment
Public Input No. 485-NFPA 70-2023 [Section No. 430.7(D)(1)]	
Public Input No. 487-NFPA 70-2023 [Section No. 440.4(B)]	
Public Input No. 488-NFPA 70-2023 [Section No. 440.12(B)(1)]	

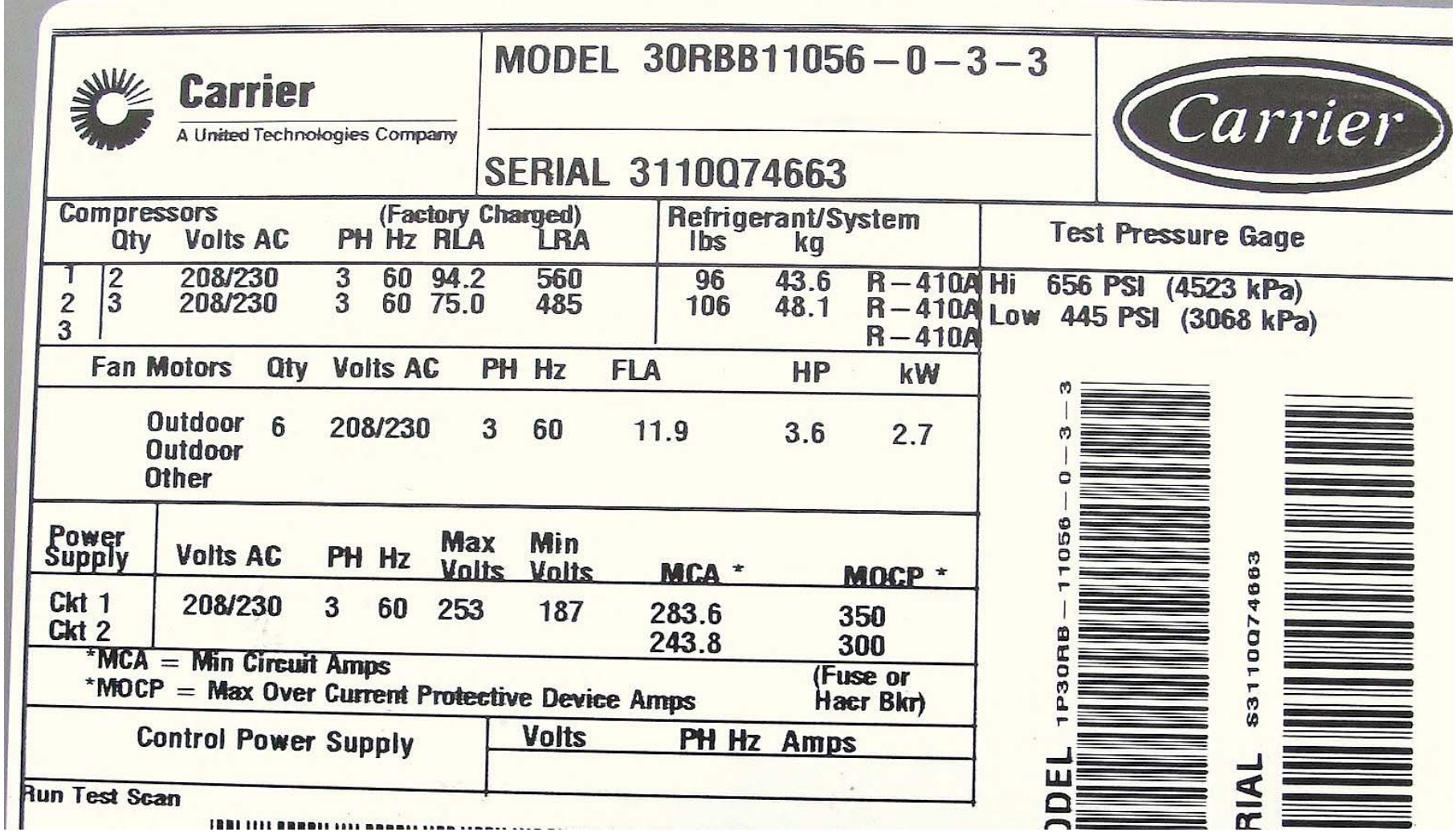
Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sat Mar 18 08:20:54 EDT 2023

Committee: NEC-P11

Committee Statement

Resolution: The addition of an equivalent HP rating disconnect requirement would not improve the installation. The substantiation did not provide facts related to how the change would improve safety.



Carrier
A United Technologies Company

MODEL 30RBB11056–0–3–3

SERIAL 3110Q74663

Carrier

Compressors	Qty	Volts AC	PH	Hz	RLA	LRA	(Factory Charged) Refrigerant/System lbs	kg	
1	2	208/230	3	60	94.2	560	96	43.6	R–410A
2	3	208/230	3	60	75.0	485	106	48.1	R–410A
3									R–410A

Test Pressure Gage
Hi 656 PSI (4523 kPa)
Low 445 PSI (3068 kPa)

Fan Motors	Qty	Volts AC	PH	Hz	FLA	HP	kW
Outdoor Outdoor Other	6	208/230	3	60	11.9	3.6	2.7

Power Supply	Volts AC	PH	Hz	Max Volts	Min Volts	MCA *	MOCP *
Ckt 1	208/230	3	60	253	187	283.6	350
Ckt 2						243.8	300

*MCA = Min Circuit Amps
*MOCP = Max Over Current Protective Device Amps (Fuse or Haer Bkr)

Control Power Supply	Volts	PH	Hz	Amps

Run Test Scan

MODEL 1P30RB–11056–0–3–3

SERIAL S3110Q74663

The equivalent HP rating should be marked by manufacturer!

TRANE

2

MODEL: CVHF1300 DATE OF MFG (DD/MM/YY): 02-03-09
MODEL NO:
CVHF130FA3U0PCZ298EJ8LEH9A00000002E1G040LS00004A100A
SERIAL NO: L09B06386 S.O. NO: A1R013B

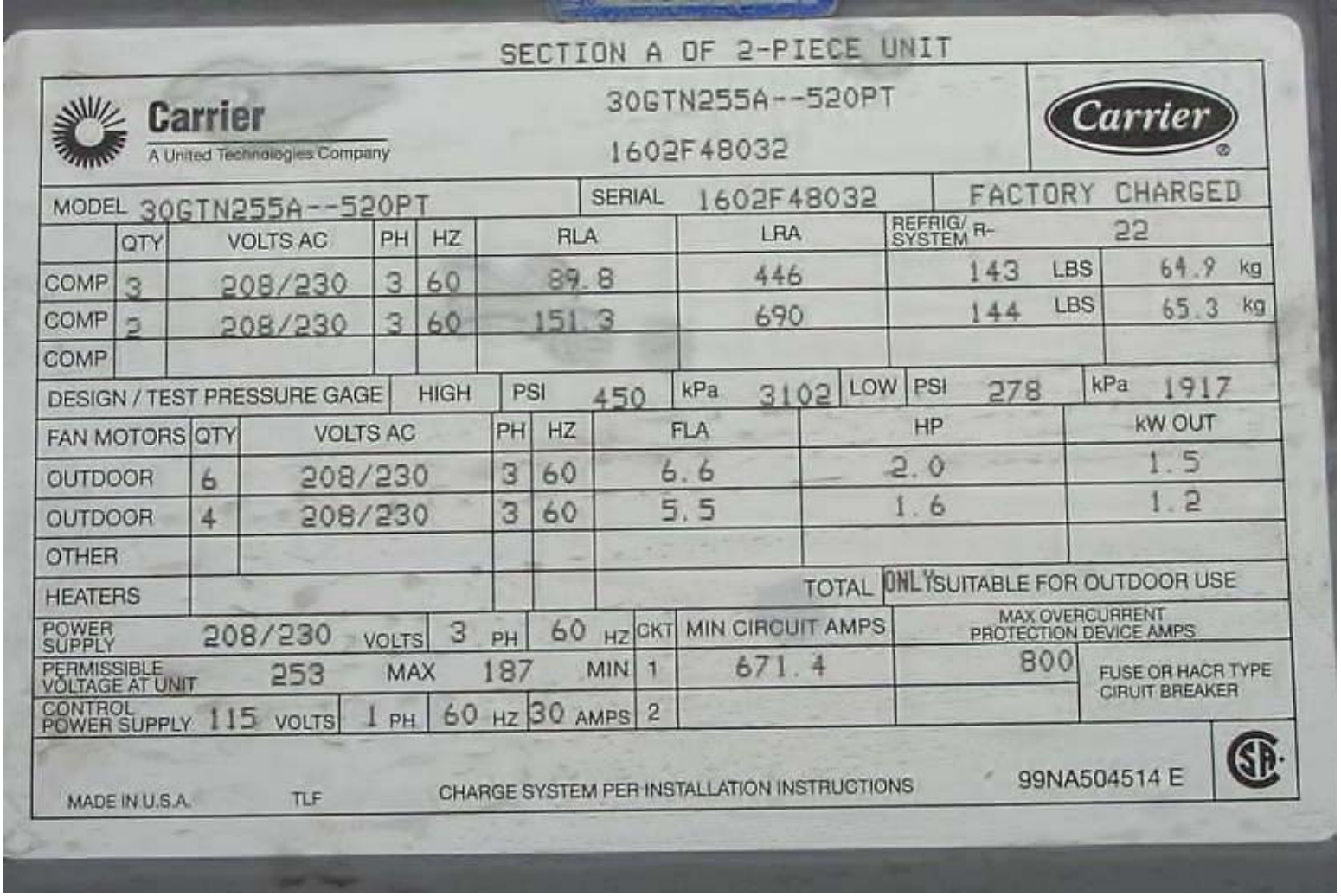
ELECTRICAL CHARACTERISTICS
RATED VOLTAGE: 460 VOLTS 60HZ 3 PH
NAMEPLATE NMKW: 783 KW
VOLTAGE UTILIZATION RANGE: 414- 506 VAC
MINIMUM CIRCUIT AMPACITY: 1308 AMPS
MAXIMUM OVERCURRENT PROTECTIVE DEVICE: 2000 AMPS

2

	VOLTS-AC	HZ	PH	RLA	MAX LRAY	MAX LRAD
COMPRESSOR MOTOR	460	60	3	1039	2257	6989
OIL TANK HEATER	115	60	1		750	WATTS
CONTROL CIRCUIT	115	60	1		4000	VA MAX
CARBON TANK HEATER	115	60	1	1.7		
PUMPOUT COMPRESSOR	115	60/50	1	1.55		
PURGE COMP MTR	115/110	60/50	1	8	34.6	LRA

WHEN MOTOR CONTROLLER PROVIDED BY OTHERS
TRANE ENGINEERING SPEC. S6516-0513 APPLIES
REFRIGERANT SYSTEM

The equivalent HP rating should be marked by manufacturer!



SECTION A OF 2-PIECE UNIT

Carrier
A United Technologies Company

30GTN255A--520PT
1602F48032

Carrier

MODEL 30GTN255A--520PT | SERIAL 1602F48032 | FACTORY CHARGED

	QTY	VOLTS AC	PH	HZ	RLA	LRA	REFRIG/SYSTEM R- 22	
COMP	3	208/230	3	60	89.8	446	143 LBS	64.9 kg
COMP	2	208/230	3	60	151.3	690	144 LBS	65.3 kg
COMP								

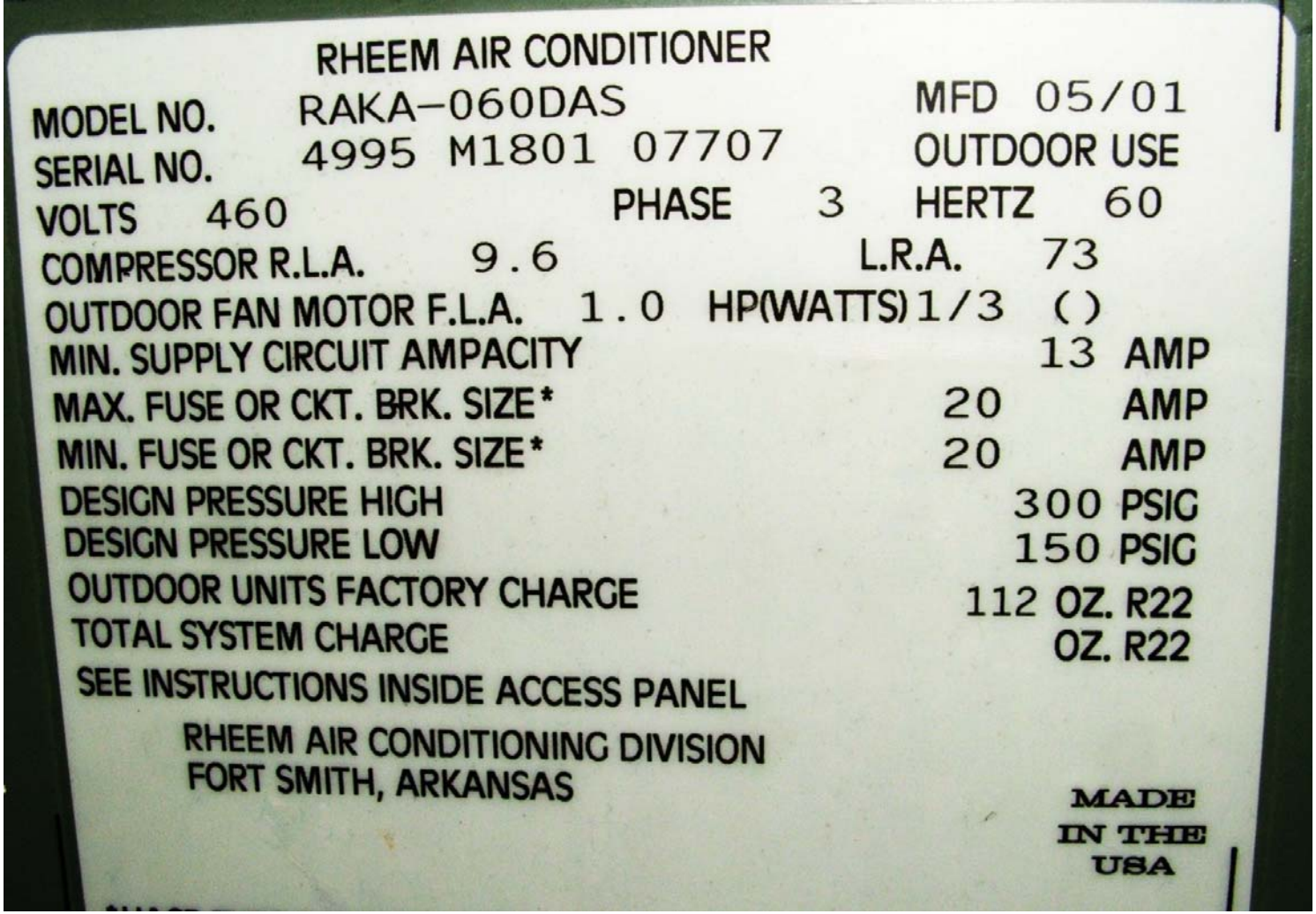
DESIGN / TEST PRESSURE GAGE | HIGH | PSI 450 | kPa 3102 | LOW | PSI 278 | kPa 1917

FAN MOTORS	QTY	VOLTS AC	PH	HZ	FLA	HP	kW OUT
OUTDOOR	6	208/230	3	60	6.6	2.0	1.5
OUTDOOR	4	208/230	3	60	5.5	1.6	1.2
OTHER							
HEATERS					TOTAL	ONLY SUITABLE FOR OUTDOOR USE	

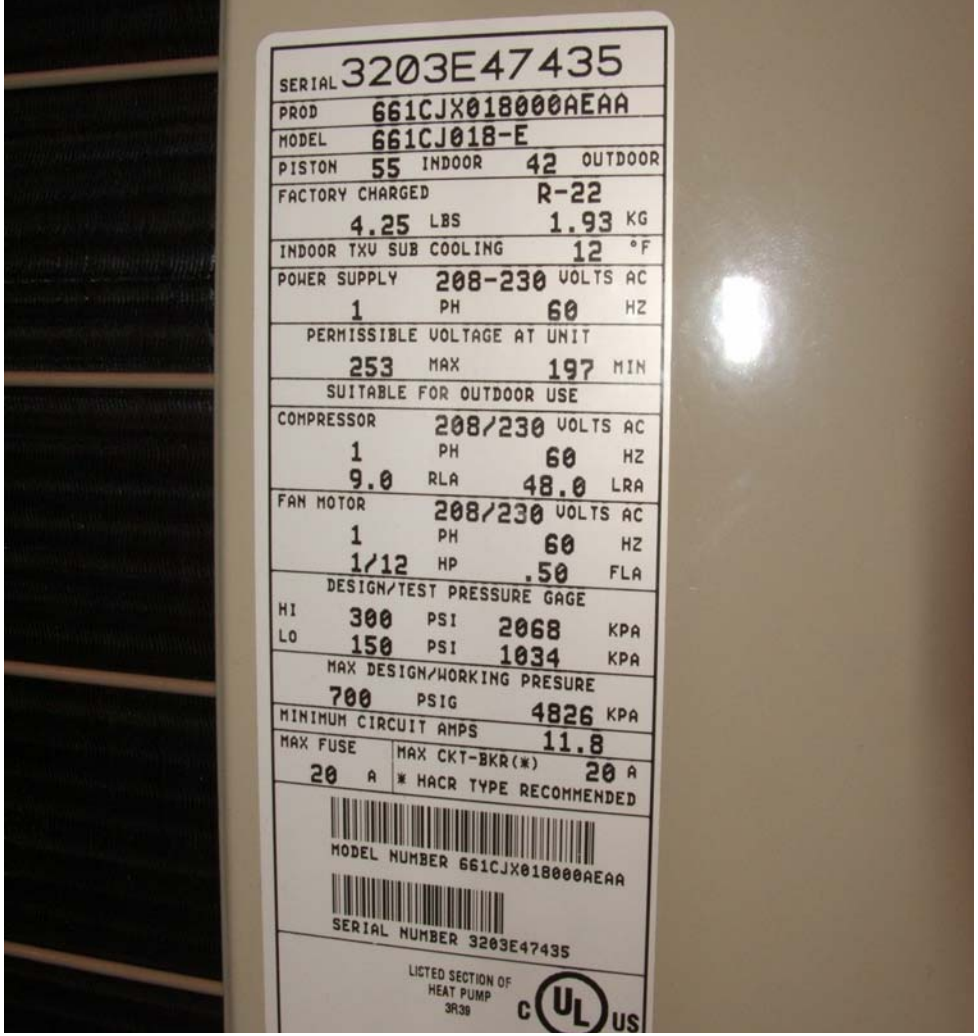
POWER SUPPLY	208/230 VOLTS	3 PH	60 HZ	CKT	MIN CIRCUIT AMPS	MAX OVERCURRENT PROTECTION DEVICE AMPS	
PERMISSIBLE VOLTAGE AT UNIT	253 MAX	187 MIN		1	671.4	800	FUSE OR HACR TYPE CIRUIT BREAKER
CONTROL POWER SUPPLY	115 VOLTS	1 PH	60 HZ	30 AMPS	2		

MADE IN U.S.A. TLF CHARGE SYSTEM PER INSTALLATION INSTRUCTIONS 99NA504514 E

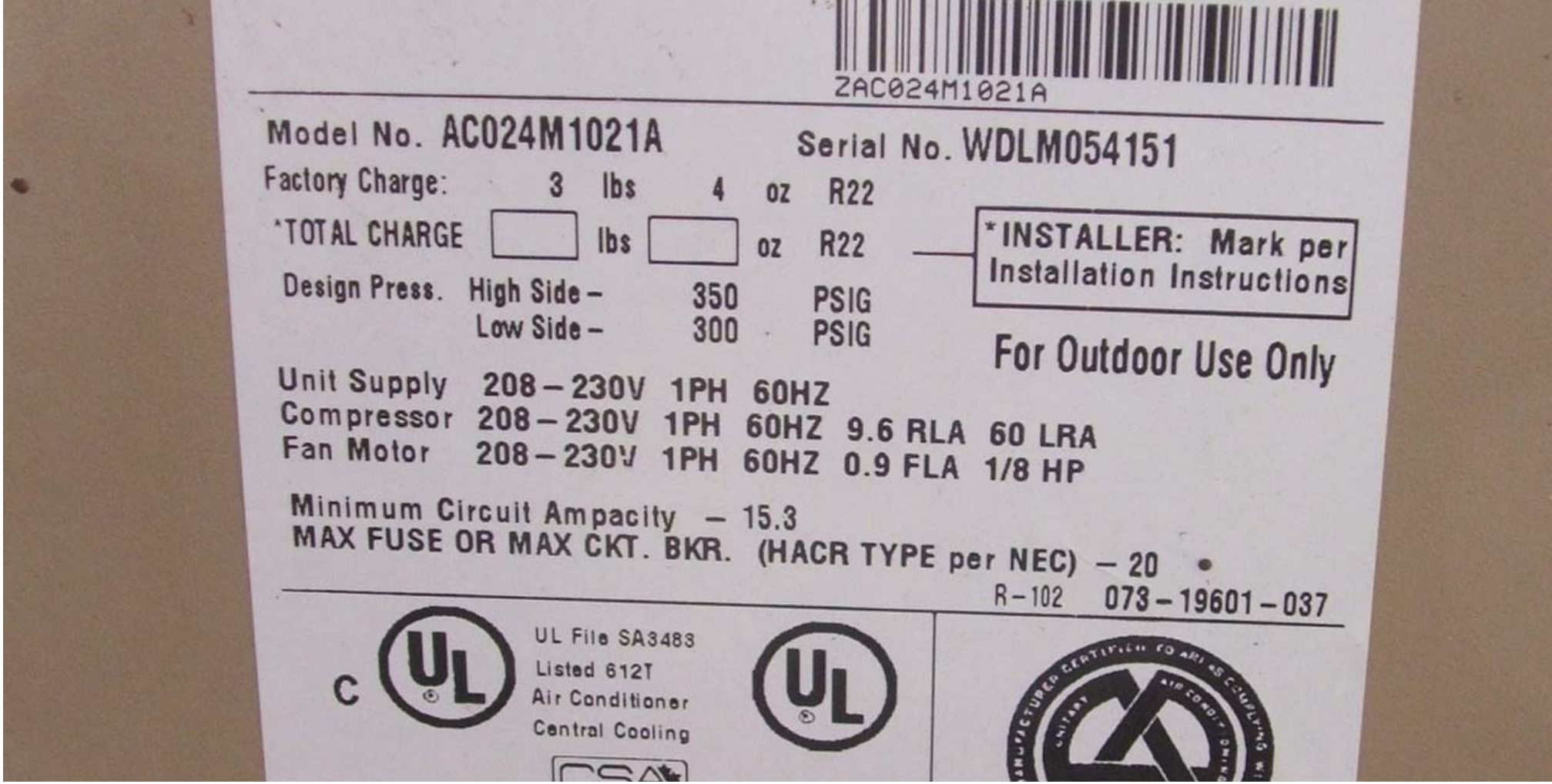
The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!

Public Input No. 1314-NFPA 70-2023 [Section No. 430.110(C)(1)]

(1) Horsepower Rating.

The rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the full-load condition and also at the locked-rotor condition. The combined full-load current and the combined locked-rotor current so obtained shall be considered as a single motor for the purpose of this requirement.

The full-load current equivalent to the horsepower rating of each motor shall be selected from Table 430.247, Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

The locked-rotor current equivalent to the horsepower rating of each motor shall be selected from Table 430.251(A) ~~or~~ , Table 430.251(B), or Table 430 . 251(C) . The locked-rotor currents shall be added to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads cannot be started simultaneously, the largest sum of locked-rotor currents of a motor or group of motors that can be started simultaneously and the full-load currents of other concurrent loads shall be permitted to be used to determine the equivalent locked-rotor current for the simultaneous combined loads. In cases where different current ratings are obtained when applying these tables, the largest value obtained shall be used.

Exception No. 1: The locked-rotor current equivalent to the horsepower rating of each polyphase motor with design letter A shall be one of following:

(1) If available, the motor's marked value of locked-rotor amperes

(2) In the absence of a marked value of locked-rotor amperes for the motor, the value calculated from Equation 430.110(C)(1)a:

$$\text{locked-rotor amperes} = \left(\frac{kVA}{hp}\right) \times \frac{(1000 \times \text{motor's marked value of rated horsepower})}{(\text{motor's marked value of rated volts}) \times (\sqrt{3})}$$ ***[430.110(C)(***

where:

kVA/hp = maximum range value of kilovolt-amperes per horsepower with locked rotor in Table 430.7(B) associated with the motor's marked locked-rotor indicating code letter

Informational Note: Equation 430.110(C)(1)a is obtained by solving for locked-rotor amperes in the formula for "kilovolt-amperes per horsepower with locked rotor," as follows:

$$\frac{kVA}{hp} = \frac{(\sqrt{3}) \times (\text{motor's marked value of rated volts}) \times (\text{locked-rotor amperes})}{(1000 \times \text{motor's marked value of rated horsepower})}$$ ***[430.110(C)(***

The numerator of Equation 430.110(C)(1)b for kilovolt-amperes per horsepower is the apparent power input to a three-phase motor with locked rotor in units of volt-amperes. The factor of 1000 VA/kVA in the denominator converts this value to units of kilovolt-amperes and "(marked value of rated horsepower)" in the denominator converts this to kilovolt-amperes per horsepower. Note that "motor's marked value of rated volts" is a line-to-line value and "locked-rotor amperes" is a line value as opposed to a phase value.

Exception No. 2: Where part of the concurrent load is resistance load, and where the disconnecting means is a switch rated in horsepower and current, the switch used shall be permitted to have a horsepower rating not less than the combined load of the motor(s) if the current rating of the switch is not less than the locked-rotor current of the motor(s) plus the resistance load.

Statement of Problem and Substantiation for Public Input

This Public Input is a companion to the NEMA Public Input proposing to add new Table 430.251(C).

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 07 17:37:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7996-NFPA 70-2024
Statement: The addition of the new table 250.251 (C) created the need to include it in this section to maintain readability and clarity.

Public Input No. 521-NFPA 70-2023 [Section No. 430.110(C)(1)]

(1) Horsepower Rating.

The rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the full-load condition and also at the locked-rotor condition. The combined full-load current and the combined locked-rotor current so obtained shall be considered as a single motor ~~for the purpose of this requirement.~~ as required by 430.110(C)(1)(a) and 430.110(C)(1)(b).

(a) The full-load current equivalent to the horsepower rating of each motor shall be selected from Table 430.247, Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

(b) The locked-rotor current equivalent to the horsepower rating of each motor shall be selected from Table 430.251(A) or Table 430.251(B). The locked-rotor currents shall be added to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads cannot be started simultaneously, the largest sum of locked-rotor currents of a motor or group of motors that can be started simultaneously and the full-load currents of other concurrent loads shall be permitted to be used to determine the equivalent locked-rotor current for the simultaneous combined loads.

In cases where different ~~current~~ horsepower ratings are obtained when applying these tables, ~~the largest value~~ a horsepower rating at least equal to the larger of the values obtained shall be ~~used~~ selected .

Exception No. 1: The locked-rotor current equivalent to the horsepower rating of each polyphase motor with design letter A shall be one of following:

(1) If available, the motor's marked value of locked-rotor amperes

(2) In the absence of a marked value of locked-rotor amperes for the motor, the value calculated from Equation 430.110(C)(1)a:

$$\text{locked-rotor amperes} = \left(\frac{kVA}{hp}\right) \times \frac{(1000 \times \text{motor's marked value of rated horsepower})}{(\text{motor's marked value of rated volts}) \times (\sqrt{3})}$$ ***[430.110(C)(***

where:

kVA/hp = maximum range value of kilovolt-amperes per horsepower with locked rotor in Table 430.7(B) associated with the motor's marked locked-rotor indicating code letter

Informational Note: Equation 430.110(C)(1)a is obtained by solving for locked-rotor amperes in the formula for "kilovolt-amperes per horsepower with locked rotor," as follows:

$$\frac{kVA}{hp} = \frac{(\sqrt{3}) \times (\text{motor's marked value of rated volts}) \times (\text{locked-rotor amperes})}{(1000 \times \text{motor's marked value of rated horsepower})}$$ ***[430.110(C)(***

The numerator of Equation 430.110(C)(1)b for kilovolt-amperes per horsepower is the apparent power input to a three-phase motor with locked rotor in units of volt-amperes. The factor of 1000 VA/kVA in the denominator converts this value to units of kilovolt-amperes and "(marked value of rated horsepower)" in the denominator converts this to kilovolt-amperes per horsepower. Note that "motor's marked value of rated volts" is a line-to-line value and "locked-rotor amperes" is a line value as opposed to a phase value.

Exception No. 2: Where part of the concurrent load is resistance load, and where the disconnecting means is a switch rated in horsepower and current, the switch used shall be permitted to have a horsepower rating not less than the combined load of the motor(s) if the current rating of the switch is not less than the locked-rotor current of the motor(s) plus the resistance load.

Statement of Problem and Substantiation for Public Input

In regards to the proposed change of adding "In cases where different horsepower ratings are obtained when applying these tables, a HP rating at least equal to the larger of thevalues obtained shall be selected." It seems the intention of this sentence is to clarify that if different HP values are obtained using the FLC equivalent and the LRC equivalent, the larger HP rating shall be used. Looking at the 2008 ROPs 11-76 Log #2131, it seems this was the intention of the original submitter and the word “horsepower” was changed to “current” by the CMP. As it is written this sentence does not make sense as the LRC will always be significantly higher than the FLC. However, the equivalent HP rating using each method may not be equal. If the sentence was added for clarification regarding simultaneous loads, then it is redundant as the section states “the largest sum of locked-rotor currents that can be started simultaneously and the full-load currents of other concurrent loads…”

For example, consider a disconnect serving a 10 amp load and a 10 HP 460v 3 phase squirrel cage motor. Using FLC Table 430.250, the motor FLC and added 10 amp load would result in an equivalent full-load current for the combined load of 24 amps and 20 HP rating. Using the LRC Table 430.251(B) the motor LRC and added 10 amp load would result in an equivalent locked-rotor current for the combined load of 91 amps and 15 HP rating. In this case the current rating is higher but the HP rating is lower using LRC compared to FLC.

The proposed change of adding (a) and (b) is an effort to create consistency between requirements in Articles 430 and 440 regarding HP rating and capacity for disconnecting means serving combination loads. Structurally, the proposed change is based on 440.12(B)(1).

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 526-NFPA 70-2023 [Section No. 440.12(B)(1)]	

Submitter Information Verification

Submitter Full Name: Steven Gibson
Organization: Electrical Training Alliance of Western Oklahoma
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 30 08:30:19 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The proposed changes impact is unclear. Additional clarification on how it would impact disconnect selection with the addition of new BE and CE motors.

Public Input No. 2536-NFPA 70-2023 [Section No. 430.113]

430.113 Energy from More Than One Source.

Motor and motor-operated equipment receiving electric energy from more than one source shall be provided with disconnecting means from each source of electric energy immediately adjacent to the equipment served. Each source shall be permitted to have a separate disconnecting means. Where multiple disconnecting means are provided, a permanent warning sign shall be provided on or adjacent to each disconnecting means indicating that multiple sources must be shut off to remove all power to the equipment. The sign at each disconnect shall identify the other specific circuits.

Exception No. 1: Where a motor receives electric energy from more than one source, the disconnecting means for the main power supply to the motor shall not be required to be immediately adjacent to the motor if the motor controller disconnecting means is lockable open in accordance with 110.25.

Exception No. 2: A separate disconnecting means shall not be required for a Class 2 remote-control circuit complying with Parts I and II of Article 725, rated not more than 30 volts, and isolated and ungrounded.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when a disconnecting means is required to be lockable open elsewhere in the code. The text is revised to comply with the NEC Style Manual. The NEC Style Manual Section 3.2.5 Consistent Application of Terms, 3.2.5.3 Lockable Open. Where a requirement specifies that a disconnecting means be capable of being locked in the open position, the phrase lockable open in accordance with 110.25 shall be used.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 19 21:56:29 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7998-NFPA 70-2024
Statement: Editorial change made for section to meet NEC Style Manual sections 3.2.5.3 and 4.1.4.

Public Input No. 2706-NFPA 70-2023 [Section No. 430.113]

430.113 Energy from More Than One Source.

Motor and motor-operated equipment receiving electric energy from more than one source shall be provided with disconnecting means from each source of electric energy immediately adjacent to the equipment served. Each source shall be permitted to have a separate disconnecting means. Where multiple disconnecting means are provided, a permanent warning sign shall be provided on or adjacent to each disconnecting means indicating that multiple sources must be shut off to remove all power to the equipment. The sign at each disconnect shall identify the other specific circuits.

Exception No. 1: Where a motor receives electric energy from more than one source, the disconnecting means for the main power supply to the motor shall not be required to be immediately adjacent to the motor if the motor controller disconnecting means is lockable in accordance with 110.25.

Exception No. 2: A separate disconnecting means shall not be required for a Class 2 remote-control circuit complying with ~~Parts~~ Article 725, Parts I and II ~~of Article 725~~, rated not more than 30 volts, and isolated and ungrounded.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:54:15 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7998-NFPA 70-2024
Statement: Editorial change made for section to meet NEC Style Manual sections 3.2.5.3 and 4.1.4.

Public Input No. 4446-NFPA 70-2023 [Section No. 430.122(A)]

(A) Branch/Feeder Circuit Conductors.

Circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system shall have an ampacity not less than 125 percent of the rated input current of the connected motor horsepower to the power conversion equipment.

Informational Note: Power conversion equipment can have multiple power ratings and corresponding input currents.

Statement of Problem and Substantiation for Public Input

Adjustable speed drive systems can have different input current ratings depending on the connected motor horsepower. The proposed text will make Code users have to size the conductors to the power conversion equipment at 125% of the rated input current of the connected motor horsepower.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Sep 07 15:30:45 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Proper sizing of the conductors is based on the rated input current of the power conversion equipment not the motor HP connected. This is due to the function of the drive system. The input voltage and output voltage could be different as an example.

Public Input No. 845-NFPA 70-2023 [Section No. 430.122(B)]

(B) Output Conductors.

(1) Non-Suitable for Output Motor Conductor Protection. The conductors between the power conversion equipment and the motor shall have an ampacity equal to or larger than 125 percent of the motor full-load current as determined by 430.6(A) or (B).

~~Exception: If the power conversion equipment is~~

(2) Suitable for Output Motor Conductor Protection. Power conversion equipment listed and marked as

~~"Suitable~~

"Suitable for Output Motor Conductor Protection,

"

" the

~~conductor between~~

conductors between the power conversion equipment and the motor shall have an ampacity equal to or greater than the larger of the following:

(1) 125 percent of the motor full-load current as determined by 430.6(A) or (B)

(2) The ampacity of the minimum conductor size marked on the power conversion equipment

Informational Note No. 1: See 430.130 and 430.131 for branch circuit protection requirements. The minimum ampacity required of output conductors is often different than that of the conductors supplying the power conversion equipment.

Informational Note No. 2: Circuit conductors on the output of an adjustable-speed drive system are susceptible to breakdown under certain conditions due to the characteristics of the output waveform of the drive. Factors affecting the conductors include, but are not limited to, the output voltage, frequency, and current; the length of the conductors; the spacing between the conductors; and the dielectric strength of the conductor insulation. Methods to mitigate breakdown include consideration of one or more of these factors.

Statement of Problem and Substantiation for Public Input

Remove the Exception and place this language in positive text of 430.122. Since this exception as written seems to be mandatory it should be placed in positive text. Otherwise if calculations were done and the power conversion equipment listed a larger conductor size than the calculation, why would one use the exception? This is why this exception should be brought into positive or mandatory text to require the larger of the two calculations.

Submitter Information Verification

Submitter Full Name: Darryl Hill
Organization: Wichita Electrical JATC
Street Address:
City:
State:
Zip:

Submittal Date: Wed May 17 15:09:57 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7999-NFPA 70-2024
Statement: Movement of the exception to normative text is to create better clarity.

Public Input No. 2537-NFPA 70-2023 [Section No. 430.208]

430.208 Disconnecting Means.

The motor controller disconnecting means shall be a switch or circuit breaker having a voltage rating not less than that of the circuit involved, and shall be lockable open in accordance with 110.25. The disconnecting means shall have a current rating of not less than 100 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have a current rating not less than 100 percent of the rated input current of the power conversion equipment.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when a disconnecting means is required to be lockable open elsewhere in the code. The text is revised to comply with the NEC Style Manual. The NEC Style Manual Section 3.2.5 Consistent Application of Terms, 3.2.5.3 Lockable Open. Where a requirement specifies that a disconnecting means be capable of being locked in the open position, the phrase lockable open in accordance with 110.25 shall be used.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 19 21:58:02 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8000-NFPA 70-2024
Statement: Editorial change made for section to meet NEC Style manual section 3.2.5.3.

Public Input No. 3072-NFPA 70-2023 [Section No. 430.208]

430.208 Disconnecting Means.

~~The motor~~
Disconnecting means in motor circuits over 1000 Volts AC, 1500 V dc, shall comply with 430.208(A) through 430.208(E)

(A) Motor controller disconnecting means shall comply with 430.102 and shall be

~~a switch or circuit breaker having a~~
lockable in accordance with 110.25.

(B) All disconnecting means in motor circuits shall comply with 430.103, 430.104, 430.105, 430.107, 430.112, and 430.113.

(C) All disconnecting means in motor circuits shall have a voltage rating not less than that of the circuit involved

~~, and shall be lockable in accordance with 110.25 . The disconnecting means~~
.

(D) All disconnecting means in motor circuits shall be one of the devices in (1) through (3)

(1) A switch with make and break current ratings no less than the full load current of the circuit involved.

(2) An isolating switch, in series with a contactor or circuit breaker, that is interlocked with a contactor or circuit breaker such that the contactor or circuit breaker must be in the open position before the isolating switch is opened or closed.

(3) A draw-out-type contactor or circuit breaker, interlocked such that it must be in the open position before it can be moved out of or into the connected position.

(E) All disconnecting means in motor circuits shall have a current rating of not less than

~~100 percent of the full-load current rating of the motor.~~
the ultimate overload trip current setting of overcurrent (overload) relays or other motor-protective devices used.

Exception to (E): For adjustable-speed drive systems, the disconnecting means on the line side of the adjustable-speed drive shall have a current rating not less than

~~100 percent~~
100 percent of the rated maximum input current of the power conversion equipment , regardless of the current setting of motor protective devices .

Additional Proposed Changes

File Name	Description	Approved
PI_for_430.208.docx	Due to formatting issues in Terraview, a Word version of the PI is provided.	

Statement of Problem and Substantiation for Public Input

This Public Input is submitted on behalf of a Correlating Committee Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, Donny Cook, Scott Higgins, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, Kevin Rogers, Tony Ricciuti, Paul Knapp, Paul Sullivan, George Smith, Eric Simmon, Kevin Arnold, Larry Wildermuth, and Kyle Krueger.

As noted in 430.201, Part XI of Article 430 adds to or amends the other provisions of Article 430. As currently written, it is unclear if Section 430.208 adds to, revises, or replaces some or all of the requirements for disconnect switches in Part IX of Article 430. This proposal replaces all of 430.208 with text that clearly details which requirements from Parts IX are applicable and provides the additional requirements necessary for disconnecting means in motor circuits above 1000 V ac, 1500 V dc, including appropriate interlocking when a disconnect is not rated for making or breaking current in a motor circuit.

Submitter Information Verification

Submitter Full Name: Robert Osborne
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 29 10:56:22 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The proposed language violates the NEC style manual in several areas with the largest 2.1.6.3.2. The pointer to 430.102 is incomplete. The technical changes listed in 3(D) need to have further identification of the problem and how this addition would improve the code. The addition of product standard language needs better clarification. The term ultimate overload setting is undefined.

PI for 430.208

430.208 Disconnecting Means.

~~The motor controller disconnecting means shall be a switch or circuit breaker having a voltage rating not less than that of the circuit involved, and shall be lockable in accordance with 110.25. The disconnecting means shall have a current rating of not less than 100 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have a current rating not less than 100 percent of the rated input current of the power conversion equipment.~~

Disconnecting means in motor circuits over 1000 Volts AC, 1500 V dc, shall comply with 430.208(A) through 430.208(E)

(A) Motor controller disconnecting means shall comply with 430.102 and shall be lockable in accordance with 110.25.

(B) All disconnecting means in motor circuits shall comply with 430.103, 430.104, 430.105, 430.107, 430.112, and 430.113.

(C) All disconnecting means in motor circuits shall have a voltage rating not less than that of the circuit involved.

(D) All disconnecting means in motor circuits shall be one of the devices in (1) through (3)

(1) A switch with make and break current ratings no less than the full load current of the circuit involved.

(2) An isolating switch, in series with a contactor or circuit breaker, that is interlocked with a contactor or circuit breaker such that the contactor or circuit breaker must be in the open position before the isolating switch is opened or closed.

(3) A draw-out-type contactor or circuit breaker, interlocked such that it must be in the open position before it can be moved out of or into the connected position.

(E) All disconnecting means in motor circuits shall have a current rating of not less than the ultimate overload trip current setting of overcurrent (overload) relays or other motor-protective devices used.

Exception to (E): For adjustable-speed drive systems, the disconnecting means on the line side of the adjustable-speed drive shall have a current rating not less than 100 percent of the rated maximum input current of the power conversion equipment, regardless of the current setting of motor protective devices.

Substantiation:

This Public Input is submitted on behalf of a Correlating Committee Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, Donny Cook, Scott Higgins, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, Kevin Rogers, Tony Ricciuti, Paul Knapp, Paul Sullivan, George Smith, Eric Simmon, Kevin Arnold, Larry Wildermuth, and Kyle Krueger.

As noted in 430.201, Part XI of Article 430 adds to or amends the other provisions of Article 430. As currently written, it is unclear if Section 430.208 adds to, revises, or replaces some or all of the requirements for disconnect switches in Part IX of Article 430. This proposal replaces all of 430.208 with text that clearly details which requirements from Parts IX are applicable and provides the additional requirements necessary for disconnecting means in motor circuits above 1000 V ac, 1500 V dc, including appropriate interlocking when a disconnect is not rated for making or breaking current in a motor circuit.

Public Input No. 2707-NFPA 70-2023 [Section No. 430.245 [Excluding any Sub-Sections]]

Connection to the equipment grounding conductor shall be done in accordance with ~~Part VI of~~ Article 250 , Part VI .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:55:24 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8001-NFPA 70-2024
Statement: Editorial change made for section to meet NEC Style manual section 4.1.4.

Public Input No. 3370-NFPA 70-2023 [New Section after 440.1]

440.3 Cybersecurity

A HVAC System that is connected to a communication network and permits control shall comply with the following:

(1) Connected directly through a local nonnetworked interface.

(2) Connected through a networked interface complying with one of the following methods:

a.The HVAC System and associated software for adjusting the settings are identified as being evaluated for cybersecurity.

b.A cybersecurity assessment of the network is completed. Documentation of the assessment and certification shall be made available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, *Cybersecurity Standards series* , UL 2900 *Cybersecurity Standard series* , or the NIST *Framework for Improving Critical Infrastructure Cybersecurity* , Version 1.1 for assessment requirements.

Informational Note No. 2: Examples of the commissioning certification used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) Certification of compliance by a nationally recognized test laboratory

(2) Manufacturer certification for the specific type and brand of system provided

Informational Note No. 3: Cybersecurity is a specialized field requiring constant, vigilant attention to security vulnerabilities that could arise due to software defects, system configuration changes, or user interactions. Installation of devices that can be secured is an important first step but not sufficient to guarantee a secure system .

Statement of Problem and Substantiation for Public Input

HVAC Systems have been the subject of Cybersecurity attacks that have lead to safety issues for people and buildings. All connected devices are standing under the risk of cyberattacks. Smart HVAC systems are no exception, either. IoT sensors viewing from your computer they do need to connect to the internet for data gathering, remote control and analytics. Their direct access to the internet does make them a targets of cyber attackers, posing serious security threats for buildings.

A key example is the Target cyber attack: it was national news for months on end. Ultimately, it was determined that a third party HVAC system company was the entry point for the hackers.

Another example is from the Boston area where HVAC incident is said to affect Boston area hospitals. https://www.healthcareinfosecurity.com/alleged-hvac-hack-shines-spotlight-on-ot-risks-to-healthcare-a-17320

https://www.ashrae.org/news/ashraejournal/protecting-hvac-systems-from-cybersecurity-threats This article published in the ASHRAE Journal Newsletter in September of 2021 provides a broad view of why Cybersecurity protection is needed for HVAC Systems. Each incident can cause in excess of $7.5M which has a major impact on government entities and large corporations. However over small and medium size businesses are also being attacked. In 2019 43% of online attacks were aimed as small businesses.

Cyber Attacks on Critical Infrastructure – June 2016
https://commercial.allianz.com/news-and-insights/expert-risk-articles/cyber-attacks-on-critical-infrastructure.html

Operational Technology Cyberattacks and the 2023 Threat Landscape – S. Singh April 2023
https://blogs.blackberry.com/en/2023/04/operational-technology-cyberattacks-and-2023-threat-landscape

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
State:
Zip:
Submittal Date: Fri Sep 01 15:18:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Considerations for cyber security should occur during the product development stage, not during installation stage. Entities involved in product development or listing should be responsible for addressing cyber security.

Public Input No. 3909-NFPA 70-2023 [New Section after 440.1]

440.2 Listing Requirements.

(A) Listing Required. Factory-assembled electric motor-driven air-conditioning equipment and refrigerating equipment shall be listed.

(B) Field Installed Electric Heaters. Electric heaters field installed within the enclosure of listed electric motor-driven air-conditioning equipment shall be identified as a listed field installable accessory as part of the listed equipment.

Statement of Problem and Substantiation for Public Input

Rationale: EPA Significant New Alternative Policy Program (SNAP) rules regarding low-GWP refrigerants will essentially require the use of refrigerants with higher flammability safety classifications per ASHRAE 34. These refrigerants introduce new hazards compared to those used previously. These concerns are addressed in the standards used to evaluate this equipment for listing (UL 60335-2-40 for air-conditioning equipment, and UL 60335-2-89 for refrigerating equipment). Requiring listing of factory-built equipment is consistent with mechanical code requirements.

Field installed electric heaters within the enclosure of listed air-conditioning (which includes heat pumps) are covered by the scope of the end product standard (UL 60335-2-40). The heaters are required to be evaluated and tested as part of the equipment. The product standard requires that the equipment be marked to identify which field installed accessories are approved as part of the equipment listing.

Because the heaters addressed by this proposal are installed in the enclosure of heat pump and air conditioning equipment, these heaters are not clearly in scope of Article 422 (which covers gas and electric furnaces) or Article 424 (which covers duct heaters). The most appropriate location is Article 440 since the heaters are installed within the equipment covered by this Article. Due to the high levels of energy available in these circuits and equipment, there is a need for more clearly defined requirements.

The HVAC industry has seen an increase in installation of third-party manufactured electric heaters. These heaters are not approved by the equipment manufacturer and are not evaluated by the listing of the equipment. As a result, manufacturers have received numerous reports of fire incidents resulting from these installations.

The wording offered here is similar to wording in 312.8(B)(1), which addresses installation of power monitoring and energy monitoring equipment in enclosures for switches or overcurrent devices (such as panelboards), ensuring appropriate listing requirements are applied. The option for a listed third-party kit evaluated for field installation presently does not exist for electric heaters, therefore that provision from 312.8(B)(1) is not included in this public input.

Submitter Information Verification

Submitter Full Name: Chris Mobley
Organization: UL Solutions
Street Address:
City:
State:
Zip:

Submittal Date: Wed Sep 06 10:06:35 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The requirement for this equipment to be Listed is better suited in the mechanical code. This is addressed by 110.3(B). Air conditioning equipment is required to be listed by the mechanical code, any accessories installed within the enclosure for listed equipment should be within the listing of the air conditioning equipment. Section 110.3(B) requires that listed equipment be in accordance with listing instructions.

Public Input No. 468-NFPA 70-2023 [Section No. 440.4]

440.4 Marking on Hermetic Refrigerant Motor-Compressors and Equipment.

(A) Hermetic Refrigerant Motor-Compressor Nameplate.

A hermetic refrigerant motor-compressor shall be provided with ~~a~~ an accessible and visible nameplate that shall indicate the manufacturer's name, trademark, or symbol; identifying designation; phase; voltage; and frequency. The rated-load current in amperes of the motor-compressor shall be marked by the equipment manufacturer on either or both the motor-compressor nameplate and the nameplate of the equipment in which the motor-compressor is used. The locked-rotor current of each single-phase motor-compressor having a rated-load current of more than 9 amperes at 115 volts, or more than 4.5 amperes at 230 volts, and each polyphase motor-compressor shall be marked on the motor-compressor nameplate. Where a thermal protector complying with 440.52(A)(2) and (B)(2) is used, the motor-compressor nameplate or the equipment nameplate shall be marked with the words "thermally protected." Where a protective system complying with 440.52(A)(4) and (B)(4) is used and is furnished with the equipment, the equipment nameplate shall be marked with the words, "thermally protected system." Where a protective system complying with 440.52(A)(4) and (B)(4) is specified, the equipment nameplate shall be appropriately marked.

(B) Multimotor and Combination-Load Equipment.

Multimotor and combination-load equipment shall be provided with ~~a~~ an accessible and visible nameplate marked with the maker's name, the rating in volts, frequency and number of phases, minimum supply circuit conductor ampacity, the maximum rating of the branch-circuit short-circuit and ground-fault protective device, and the short-circuit current rating of the motor controllers or industrial control panel. The ampacity shall be calculated by using Part IV and counting all the motors and other loads that will be operated at the same time. The branch-circuit short-circuit and ground-fault protective device rating shall not exceed the value calculated by using Part III. Multimotor or combination-load equipment for use on two or more circuits shall be marked with the above information for each circuit.

Exception No. 1: Multimotor and combination-load equipment that is suitable under the provisions of this article for connection to a single 15- or 20-ampere, 120-volt, or a 15-ampere, 208- or 240-volt, single-phase branch circuit shall be permitted to be marked as a single load.

Exception No. 2: The minimum supply circuit conductor ampacity and the maximum rating of the branch-circuit short-circuit and ground-fault protective device shall not be required to be marked on a room air conditioner complying with 440.62(A).

Exception No. 3: Multimotor and combination-load equipment used in one- and two-family dwellings or cord-and-attachment-plug-connected equipment shall not be required to be marked with a short-circuit current rating.

(C) Branch-Circuit Selection Current.

A hermetic refrigerant motor-compressor, or equipment containing such a compressor, having a protection system that is approved for use with the motor-compressor that it protects and that permits continuous current in excess of the specified percentage of nameplate rated-load current given in 440.52(B)(2) or (B)(4) shall also be marked with a branch-circuit selection current that complies with 440.52(B)(2) or (B)(4). This marking shall be provided by the equipment manufacturer and shall be on the nameplate(s) where the rated-load current(s) appears.

Statement of Problem and Substantiation for Public Input

Equipment is often installed I the field in a manner where the nameplate information is not accessible of visible for inspection or application of important NEC rules that address nameplate values. As an

example, HVAC equipment installed with the nameplate up against a wall other obstacle, impeding its use and visibility. The revision will assist installers and maintainers in attaining Code compliance where this situation creates field problems. Nameplate information is also critical for proper Code application during installation, but also for servicing and maintaining equipment after installation.

Submitter Information Verification

Submitter Full Name: Mark Earley
Organization: Alumni Code Consulting
Affiliation: Self
Street Address:
City:
State:
Zip:
Submittal Date: Wed Mar 15 13:11:58 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8023-NFPA 70-2024
Statement: In order to facilitate ease of inspection, maintenance, and service, the nameplate for hermetic refrigerant motor-compressors is being required to be visible. The submitter did not provide specific substantiation for the requirement to make the nameplates accessible.

Public Input No. 487-NFPA 70-2023 [Section No. 440.4(B)]

(B) Multimotor and Combination-Load Equipment.

Multimotor and combination-load equipment shall be provided with a visible nameplate marked with the maker's name, the rating in volts, frequency and number of phases, minimum supply circuit conductor ampacity, the maximum rating of the branch-circuit short-circuit and ground-fault protective device, the equivalent horsepower rating, and the short-circuit current rating of the motor controllers or industrial control panel. The ampacity shall be calculated by using Part IV and counting all the motors and other loads that will be operated at the same time. The branch-circuit short-circuit and ground-fault protective device rating shall not exceed the value calculated by using Part III. ~~Multimotor~~ The equivalent horsepower rating shall be calculated in accordance with 440.12(B)(1). Multimotor or combination-load equipment for use on two or more circuits shall be marked with the above information for each circuit.

Exception No. 1: Multimotor and combination-load equipment that is suitable under the provisions of this article for connection to a single 15- or 20-ampere, 120-volt, or a 15-ampere, 208- or 240-volt, single-phase branch circuit shall be permitted to be marked as a single load.

Exception No. 2: The minimum supply circuit conductor ampacity and the maximum rating of the branch-circuit short-circuit and ground-fault protective device shall not be required to be marked on a room air conditioner complying with 440.62(A).

Exception No. 3: Multimotor and combination-load equipment used in one- and two-family dwellings or cord-and-attachment-plug-connected equipment shall not be required to be marked with a short-circuit current rating.

Additional Proposed Changes

File Name	Description	Approved
equivalent_HP_ratings.pdf	HP rating of multi motor equipment	

Statement of Problem and Substantiation for Public Input

This PI is in conjunction with PI 485 and 486 addressing the horsepower rating for factory-wired multimotor and combination-load equipment. I believe these revisions are necessary to help installers, designers, and inspectors ensure the correct disconnecting means for factory-wired equipment is used. Determining the equivalent horsepower rating for factory-wired equipment is often overlooked. If the manufacturer does the calculations and provides that information on the equipment nameplate, then installers, designers, and inspectors will have a much easier time verifying that the correct disconnect rating is used.

Related Public Inputs for This Document

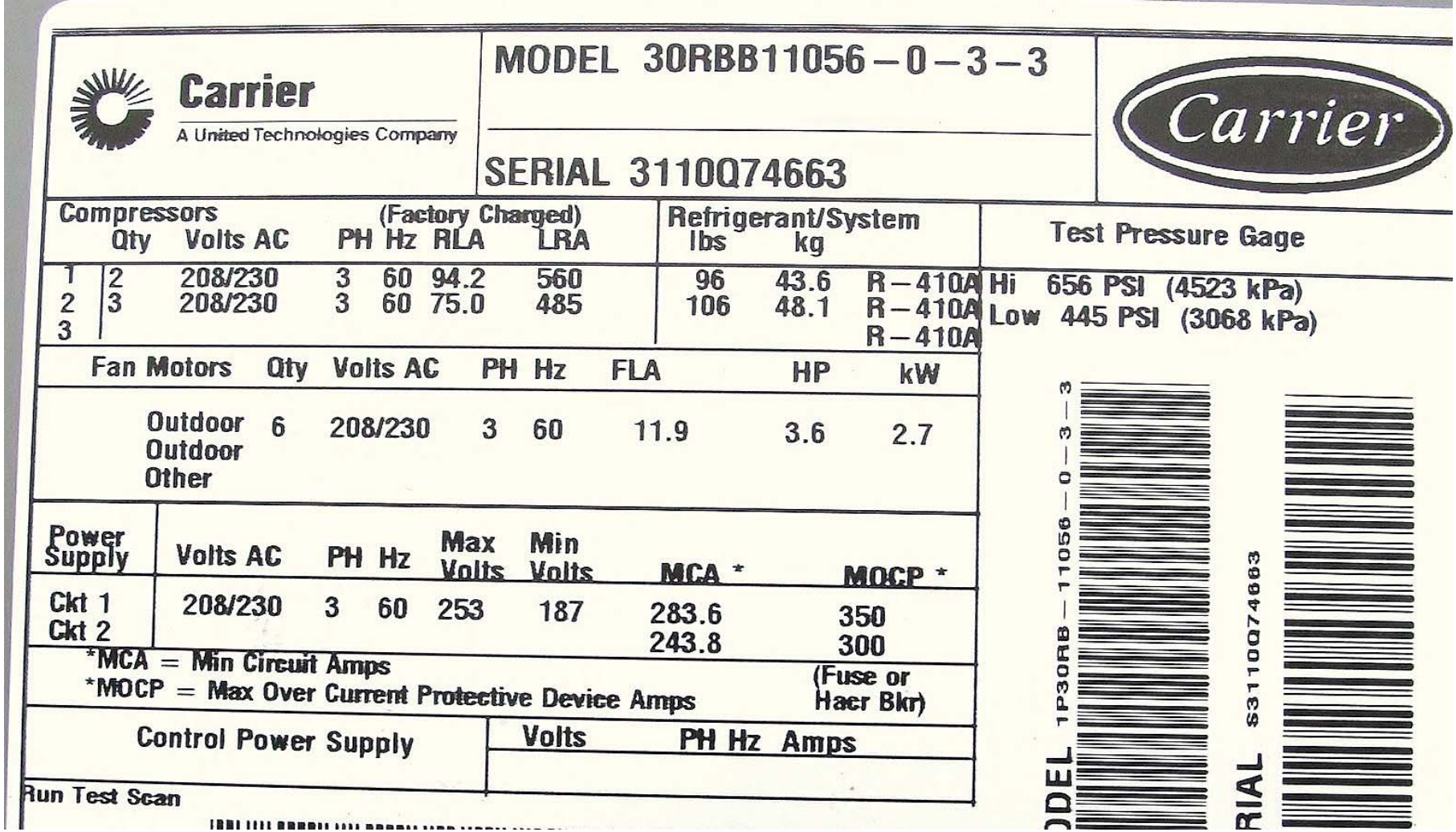
Related Input	Relationship
Public Input No. 486-NFPA 70-2023 [Section No. 430.110(C)]	HP rating of factory wired equipment
Public Input No. 485-NFPA 70-2023 [Section No. 430.7(D)(1)]	HP rating of factory wired equipment
Public Input No. 488-NFPA 70-2023 [Section No. 440.12(B)(1)]	

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sat Mar 18 08:42:04 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Maximum overcurrent and other information necessary for the correct sizing of the disconnect is already provided on the nameplate. Also, it is unclear if an equivalent horsepower rating is needed for non-motor loads.



Carrier
A United Technologies Company

MODEL 30RBB11056–0–3–3

SERIAL 3110Q74663

Carrier

Compressors	Qty	Volts AC	PH	Hz	RLA	LRA	(Factory Charged) Refrigerant/System lbs	kg	
1	2	208/230	3	60	94.2	560	96	43.6	R–410A
2	3	208/230	3	60	75.0	485	106	48.1	R–410A
3									R–410A

Test Pressure Gage
Hi 656 PSI (4523 kPa)
Low 445 PSI (3068 kPa)

Fan Motors	Qty	Volts AC	PH	Hz	FLA	HP	kW
Outdoor Outdoor Other	6	208/230	3	60	11.9	3.6	2.7

Power Supply	Volts AC	PH	Hz	Max Volts	Min Volts	MCA *	MOCP *
Ckt 1	208/230	3	60	253	187	283.6	350
Ckt 2						243.8	300

*MCA = Min Circuit Amps
*MOCP = Max Over Current Protective Device Amps (Fuse or Haer Bkr)

Control Power Supply	Volts	PH	Hz	Amps

Run Test Scan

MODEL 1P30RB–11056–0–3–3

SERIAL S3110Q74663

The equivalent HP rating should be marked by manufacturer!

TRANE

2

MODEL: CVHF1300 DATE OF MFG (DD/MM/YY): 02-03-09
MODEL NO:
CVHF130FA3U0PCZ298EJ8LEH9A00000002E1G040LS00004A100A
SERIAL NO: L09B06386 S.O. NO: A1R013B

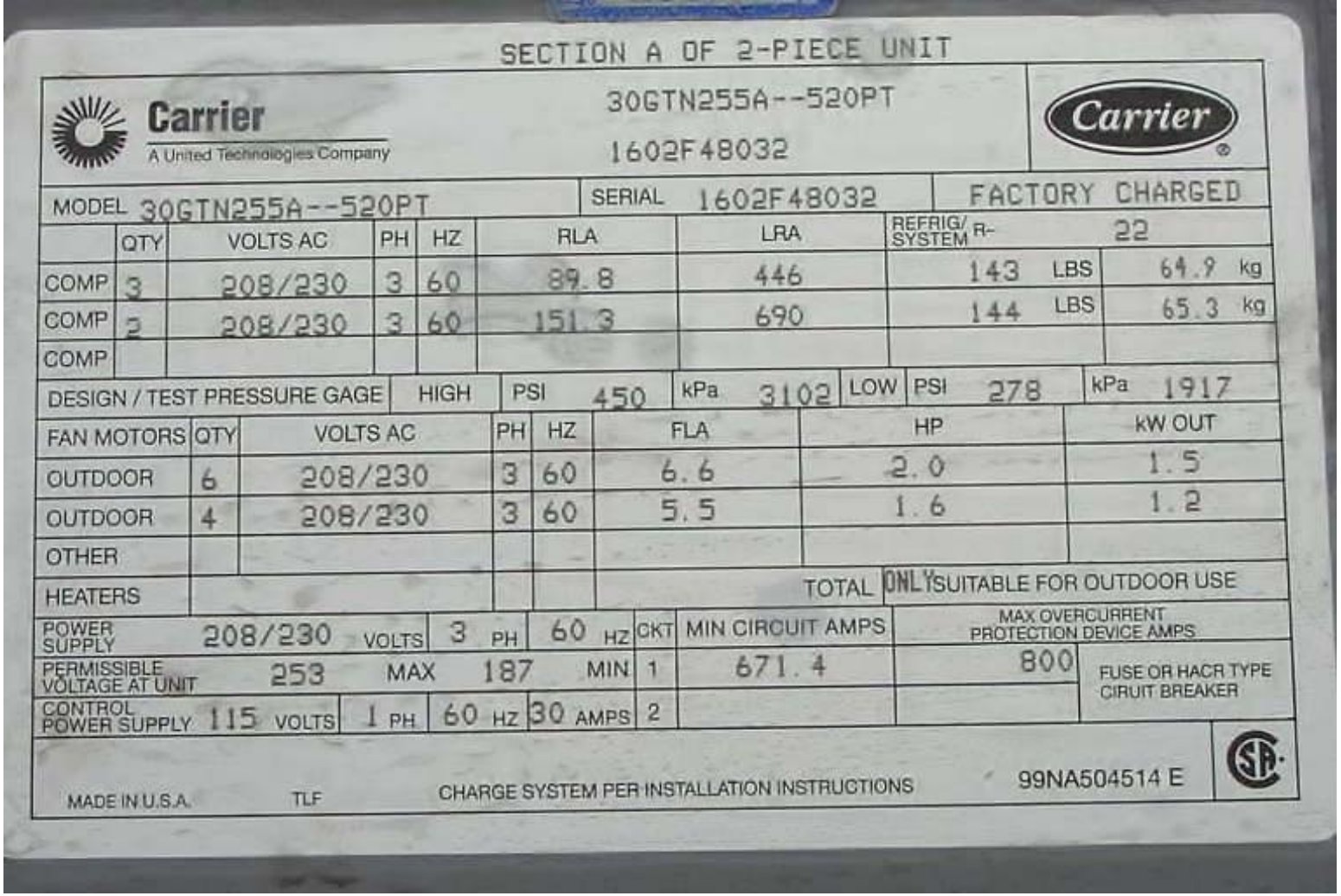
ELECTRICAL CHARACTERISTICS
RATED VOLTAGE: 460 VOLTS 60HZ 3 PH
NAMEPLATE NMKW: 783 KW
VOLTAGE UTILIZATION RANGE: 414- 506 VAC
MINIMUM CIRCUIT AMPACITY: 1308 AMPS
MAXIMUM OVERCURRENT PROTECTIVE DEVICE: 2000 AMPS

2

	VOLTS-AC	HZ	PH	RLA	MAX LRAY	MAX LRAD
COMPRESSOR MOTOR	460	60	3	1039	2257	6989
OIL TANK HEATER	115	60	1		750	WATTS
CONTROL CIRCUIT	115	60	1		4000	VA MAX
CARBON TANK HEATER	115	60	1	1.7		
PUMPOUT COMPRESSOR	115	60/50	1	1.55		
PURGE COMP MTR	115/110	60/50	1	8	34.6	LRA

WHEN MOTOR CONTROLLER PROVIDED BY OTHERS
TRANE ENGINEERING SPEC. S6516-0513 APPLIES
REFRIGERANT SYSTEM

The equivalent HP rating should be marked by manufacturer!



SECTION A OF 2-PIECE UNIT

Carrier
A United Technologies Company

30GTN255A--520PT
1602F48032

Carrier

MODEL 30GTN255A--520PT | SERIAL 1602F48032 | FACTORY CHARGED

	QTY	VOLTS AC	PH	HZ	RLA	LRA	REFRIG/SYSTEM R- 22	
COMP	3	208/230	3	60	89.8	446	143 LBS	64.9 kg
COMP	2	208/230	3	60	151.3	690	144 LBS	65.3 kg
COMP								

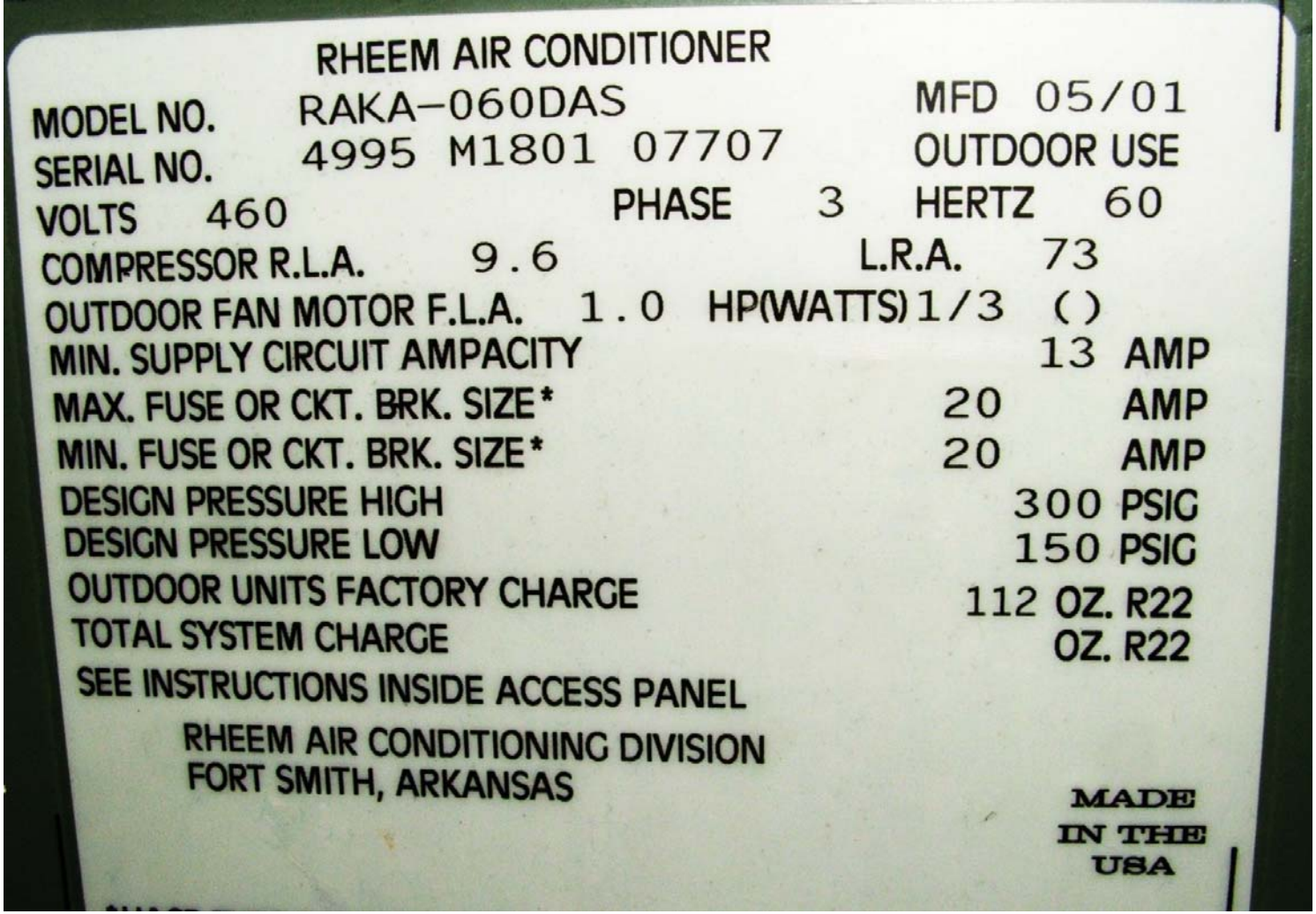
DESIGN / TEST PRESSURE GAGE | HIGH | PSI 450 | kPa 3102 | LOW | PSI 278 | kPa 1917

FAN MOTORS	QTY	VOLTS AC	PH	HZ	FLA	HP	kW OUT
OUTDOOR	6	208/230	3	60	6.6	2.0	1.5
OUTDOOR	4	208/230	3	60	5.5	1.6	1.2
OTHER							
HEATERS					TOTAL	ONLY SUITABLE FOR OUTDOOR USE	

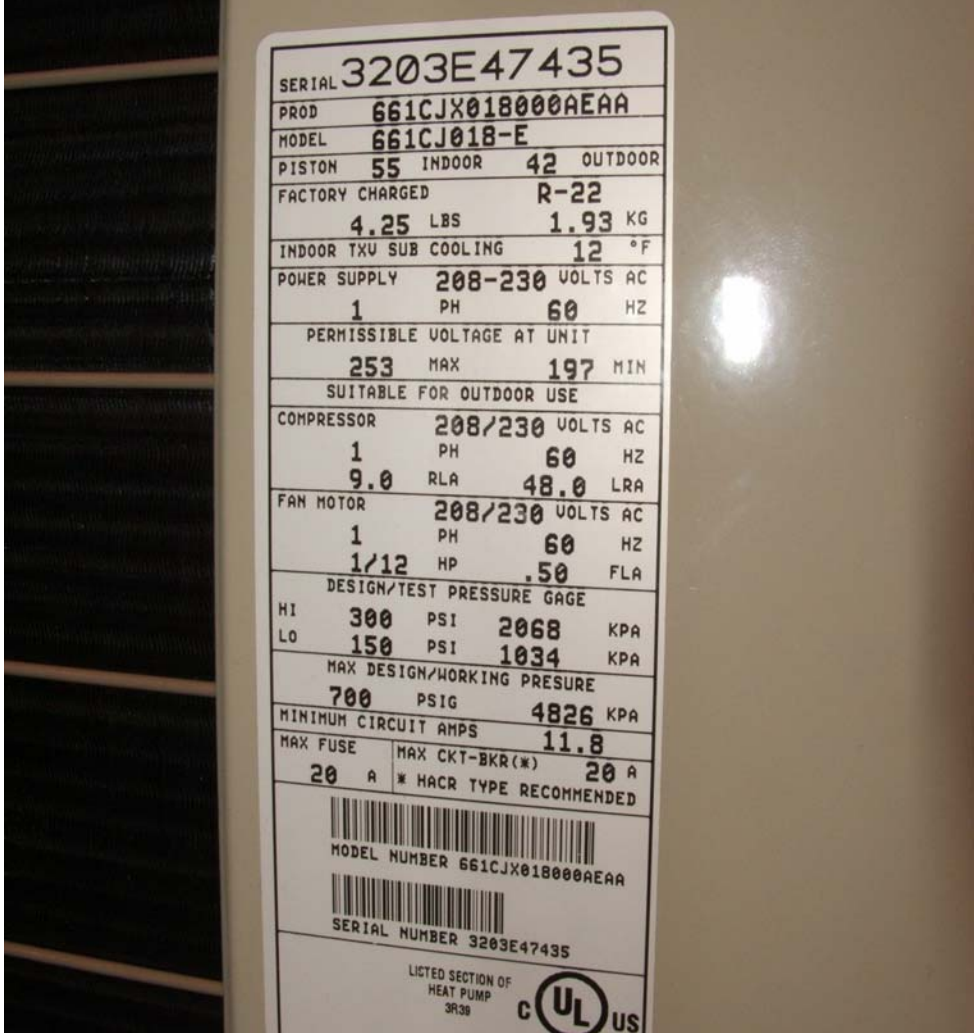
POWER SUPPLY	208/230 VOLTS	3 PH	60 HZ	CKT	MIN CIRCUIT AMPS	MAX OVERCURRENT PROTECTION DEVICE AMPS	
PERMISSIBLE VOLTAGE AT UNIT	253 MAX	187 MIN		1	671.4	800	FUSE OR HACR TYPE CIRUIT BREAKER
CONTROL POWER SUPPLY	115 VOLTS	1 PH	60 HZ	30 AMPS	2		

MADE IN U.S.A. TLF CHARGE SYSTEM PER INSTALLATION INSTRUCTIONS 99NA504514 E

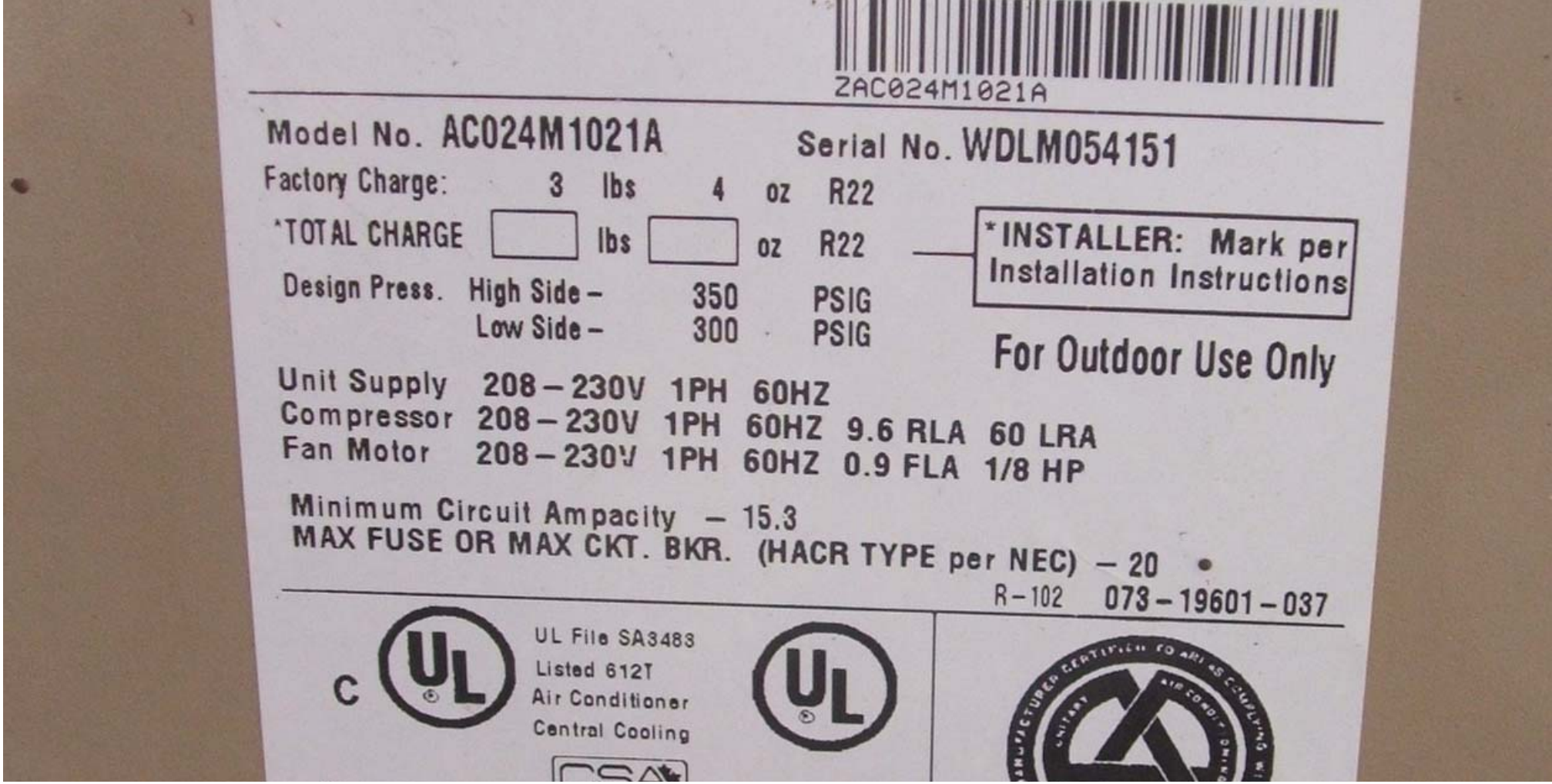
The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!

Public Input No. 4029-NFPA 70-2023 [Section No. 440.4(C)]

(C) Branch-Circuit Selection Current.

A hermetic refrigerant motor-compressor, or equipment containing such a compressor, having a protection system that is approved for use with the motor-compressor that it protects and that permits continuous current in excess of the specified percentage of nameplate rated-load current given in 440.52(B)(2) or (B)(4) shall also be marked with a branch-circuit selection current that complies with 440.52(B)(2) or (B)(4). This marking shall be provided by the equipment manufacturer and shall be on the nameplate(s) where the rated-load current(s) appears.

(D) Listed equipment shall be marked with statements which shall include the substance of one of the following:

(1) "WARNING: RISK OF ELECTRICAL SHOCK. CAN CAUSE INJURY OR DEATH: System contains oversize protective grounding terminal which shall be properly connected."

(2) "WARNING: RISK OF ELECTRIC SHOCK. CAN CAUSE INJURY OR DEATH: System contains two independent protective grounding terminals which both shall be properly connected and secured.".

(3) "System contains a factory-installed monitoring device that interrupts all supply conductors when it detects an open circuit on the protective earth (ground)."

(4) "System does not exceed touch current of 3.5 mA."

(5) "System does not exceed touch current of 2 mA RMS per kilowatt rated power, up to 5 mA for all frequencies."

(6) "System does not exceed touch current of 2 mA RMS per kilowatt rated power, up to 5 mA at 60Hz, and for all other frequencies the protective earth (ground) complies with requirements for Class 2 Power-Limited Circuits in accordance with the NEC."

(7) "System protective earth (ground) complies with requirements for Class 2 Power-Limited Circuits for all frequencies, in accordance with the NEC."

Statement of Problem and Substantiation for Public Input

Adding marking requirements for listed HVAC equipment when the listed alternate protective grounding options are utilized by an HVAC manufacturer on equipment. This provides visual information to the inspector that the equipment is using an alternate method and the inspector can ensure that these alternate methods are properly installed. Also adding marking requirements for other listed products indicating the results of certification testing showing the product complies with Class 2 Power-Limited Circuits and hence has touch current below concerning levels.

Note: This public input is related to AHRI's 4 other public inputs in Article 100 (Public Input 3901), Section 210.8 (Public Input 4026), Section 440.9 (Public Input 4030), and Table A.1(a) (Public Input 4031), which provide important context. The public input in Section 210.8(F) provides exceptions where GFCI protection is not required. The public input in Section 440.9 adds listed alternate protective grounding options that can be utilized by an HVAC manufacturer on equipment in lieu of adding GFCI protection in the field. The public input in Table A.1 (a) adds UL 60335-2-40 as a referenced standard because Section 210.8(F) references "listed HVAC equipment," and this is the applicable reference for listed HVAC equipment. The public input in Article 100 adds definitions for "touch current" and "protective grounding current" that provide important context to the reader.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3901-NFPA 70-2023 [New Article after 100]	
Public Input No. 4031-NFPA 70-2023 [Definition:]	
Public Input No. 4026-NFPA 70-2023 [Section No. 210.8(F)]	
Public Input No. 4030-NFPA 70-2023 [Section No. 440.9]	
Public Input No. 3901-NFPA 70-2023 [New Article after 100]	
Public Input No. 4026-NFPA 70-2023 [Section No. 210.8(F)]	
Public Input No. 4030-NFPA 70-2023 [Section No. 440.9]	
Public Input No. 4031-NFPA 70-2023 [Definition:]	

Submitter Information Verification

Submitter Full Name: Thomas Deary
Organization: AHRI
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 14:28:28 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The submitter has not provided substantiation as to what these methods are an alternate for. This proposal needs further clarification on the need for these changes.

Public Input No. 2224-NFPA 70-2023 [Section No. 440.8]

440.8 Air-Conditioning Mini-Splits.

(A) Single Machine

~~and Location~~

.

~~An air-conditioning or refrigerating system shall be considered to be a single machine under the provisions of 430.87 , Exception No. 1, and 430.112 , Exception. The motors shall be permitted to be located remotely from each other and a single disconnecting means shall be permitted to serve all motors .~~

~~(B) Location. Air-conditioning and refrigeration equipment shall not be installed within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of a bathtub rim or shower stall threshold. The zone shall be all-encompassing and include the space directly over the tub or shower stall.~~

Statement of Problem and Substantiation for Public Input

Changing the title of this section to make it a more common term used in the electrical industry and easier for Code user to find this requirement. Added text to clarify for Code users that a single disconnecting means is permitted for AC mini-split units. In accordance with NEC Style Manual section 3.5.1.2 multiple requirements within a single subdivision shall be avoided. Additional subdivisions or lists shall be used to express independent requirements.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 15 12:12:00 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Changing the title to “Air-conditioning mini-splits” will narrow the scope of the requirement, which may leave out equipment and installations that this should apply to such as window type A/C units or through-the-wall type heat pumps. It is not necessary to clarify that a single disconnecting means can service multiple motors, this is addressed already elsewhere in the code. And the requirements all pertain to the title, there isn’t a need to split in order to comply with the style manual.

Public Input No. 2839-NFPA 70-2023 [Section No. 440.9]

440.9 Equipment Grounding ~~and Bonding~~ Conductor .

Where equipment is installed outdoors on a roof, an equipment grounding conductor of the wire type shall be installed in outdoor portions of metallic raceway systems that use compression-type fittings.

Statement of Problem and Substantiation for Public Input

The section title must be revised to match the technical requirement. In accordance with NEC style manual section 2.1.3.2 the title must be descriptive and concise with the intent of the requirement. See 215.6 Feeder Equipment Grounding Conductor, 320.108 Equipment Grounding Conductor, 330.108 Equipment Grounding Conductor, 334.108 Equipment Grounding Conductor, 410.182 Equipment Grounding Conductor, 547.27 Separate Equipment Grounding Conductor, 555.37 Equipment Grounding Conductor, and 690.45 Size of Equipment Grounding Conductors.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 25 14:29:34 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The submitter did not provide substantiation on how the current title of the section is not descriptive or concise. The equipment grounding conductor's purpose is for bonding the equipment through the raceway, therefore the title of 440.9 is accurate. Further, the section covers not only the conductor, but location, fittings, etc.

Public Input No. 4030-NFPA 70-2023 [Section No. 440.9]

440.9 Grounding and Bonding equipment .

440.9.1 **Grounding and Bonding equipment located on roofs.**

Where equipment is installed outdoors on a roof, an equipment grounding conductor of the wire type shall be installed in outdoor portions of metallic raceway systems that use compression-type fittings.

440.9.2 Grounding and bonding equipment (all locations)

Protective grounding conductor . If listed HVAC equipment is provided with one of the following options, and marked in accordance with 440.4(D)(1), (2), or (3), GFCI protection is not required.

(1) A protective grounding conductor one standard size larger than the minimum size required by the electrical code shall be installed when marked in accordance with 440.4(D)(1); or

(2) An additional protective grounding conductor sized in accordance with the minimum conductor size required by the electrical code shall be installed when marked in accordance with 440.4(D)(2); or

(3) A monitoring device that interrupts all supply conductors when it detects an open circuit on the protective grounding conductor shall be installed when marked in accordance with 440.4(D)(3).

Statement of Problem and Substantiation for Public Input

Adding listed alternate protective grounding options that can be utilized by an HVAC manufacturer on equipment in lieu of adding GFCI protection in the field. The labeling requirements in 440.4(D)(1), (2), or (3) provide visual information to the inspector that the equipment is using an alternate method and the inspector can ensure that these alternate methods are properly installed.

Note: This public input is related to AHRI's 4 other public inputs in Article 100 (Public Input 3901), Section 210.8 (Public Input 4026), Section 440.4 (Public Input 4030), and Table A.1(a) (Public Input 4031), which provide important context. The public input in Section 210.8(F) provides exceptions where GFCI protection is not required. The public input in Section 440.4 provides marking requirements for listed HVAC equipment when the listed alternate protective grounding options are utilized by an HVAC manufacturer on equipment. The public input in Table A.1 (a) adds UL 60335-2-40 as a referenced standard because Section 210.8(F) references "listed HVAC equipment," and this is the applicable reference for listed HVAC equipment. The public input in Article 100 adds definitions for "touch current" and "protective grounding current" that provide important context to the reader.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 3901-NFPA 70-2023 [New Article after 100]	
Public Input No. 4029-NFPA 70-2023 [Section No. 440.4(C)]	
Public Input No. 4031-NFPA 70-2023 [Definition:]	
Public Input No. 4026-NFPA 70-2023 [Section No. 210.8(F)]	
Public Input No. 3901-NFPA 70-2023 [New Article after 100]	
Public Input No. 4026-NFPA 70-2023 [Section No. 210.8(F)]	
Public Input No. 4029-NFPA 70-2023 [Section No. 440.4(C)]	

Public Input No. 4031-NFPA 70-2023 [Definition:]

Submitter Information Verification

Submitter Full Name: Thomas Deary
Organization: AHRI
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 14:30:33 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation has not been provided on how the alternate methods provide equivalent protection to a GFCI.

Public Input No. 2452-NFPA 70-2023 [Section No. 440.10(A)]

(A) Installation.

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

Exception: Current-limiting overcurrent protective devices shall be permitted to be used where the let-through current, based on the available fault current, is equal to or less than the marked industrial control panel SCCR provided the equipment does not contain overcurrent protective devices with an interrupting rating less than the available fault current.

Statement of Problem and Substantiation for Public Input

HVAC equipment is often not installed properly when it comes to reviewing the equipment SCCR and available fault current. Inadequate equipment SCCR can result in serious electrical hazards such as electrical shock, fire, and shrapnel.

In these cases, the use of current-limiting overcurrent protective devices are considered an acceptable engineering method by AHJs because they can reduce the available fault current to a value equal or less than the marked SCCR of the equipment. The use of current-limiting overcurrent protective devices has been commonly used for improving protection of other types of equipment and should be acceptable for improving protection of HVAC equipment under the conditions of the exception.

The added exception provides an engineering method to address the issue with installed equipment with inadequate equipment SCCR without having to replace or modify the equipment while improving protection of equipment.

Submitter Information Verification

Submitter Full Name: Daniel Neeser
Organization: Eatons Bussmann Division
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 17 12:32:25 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The wording of the exception takes a complex subject and oversimplifies it (for reference, see Supplement SB of UL 508A). There are concerns with having series protective devices that have not been tested as a series. Also, the proposed method does not work for certain components such as variable frequency drives. Further, what this proposal attempts to achieve is already allowed for an industrial control panel using Supplement SB of UL 508A, as referenced in the informational note to 409.110(4)(b).

Public Input No. 1262-NFPA 70-2023 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts ~~when open~~ shall ~~require a tool to open or~~ be capable of being locked in accordance with 110 .25.

Statement of Problem and Substantiation for Public Input

The current language is confusing by requiring either a disconnect to be locked or allowing for the disconnect to be "capable of being locked". This really doesn't make sense and can be difficult to enforce. By citing the use of 110.25 (much as in 690.15(C), the language would be consistent with language already required and in use by this code. This will make the enforcement of this section more user-friendly to inspectors and code officials by a more simplistic approach.

Submitter Information Verification

Submitter Full Name: Charles Littlefield
Organization: Goochland County
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 03 13:29:12 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8025-NFPA 70-2024
Statement: For the purpose of clarification, 440.11 is being revised to have similar language as 690.13(A)(2).

Public Input No. 1413-NFPA 70-2023 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall require a tool to open or be capable of being locked.

In other than one- and two-family dwellings, in addition to the requirements of 110.22(A), the disconnecting means located at the exterior unit of a split-system HVAC shall identify the location of all indoor units supplied by the disconnect.

Statement of Problem and Substantiation for Public Input

It can be difficult for inspectors and installers to determine which disconnect located at an exterior unit of a split-system HVAC, controls the interior unit of the split-system when the exterior and interior units are located far apart or when multiple systems are located at a commercial site. NEC 440.8 states an air-conditioning system shall be considered a single machine under the provisions of 430.112, Exception and permits the motors to be located remotely from each other. NEC 110.22(A) requires each disconnecting means to be marked to indicate its purpose and location of the circuit source. The additional text in NEC 440.11 would, in addition to the requirements of 110.22(A), require the location of the interior unit to be identified at the exterior disconnect.

Submitter Information Verification

Submitter Full Name: Brad McVey
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 14 20:40:35 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8026-NFPA 70-2024
Statement: This would allow inspectors and installers to more quickly locate disconnect equipment for split-system HVAC interior units.

Public Input No. 1765-NFPA 70-2023 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall require a tool to open or be capable of being locked.

In other than one- and two-family dwellings, in addition to the requirements of 110.22(A), the disconnecting means located at the exterior unit of a split-system HVAC shall identify the location of all indoor units supplied by the disconnect.

Statement of Problem and Substantiation for Public Input

It can be difficult for inspectors and installers to determine which disconnect located at an exterior unit of a
split-system HVAC, controls the interior unit of the split-system when the exterior and interior units are located far apart or when multiple systems are located at a commercial site. NEC 440.8 states an air conditioning system shall be considered a single machine under the provisions of 430.112, Exception and
permits the motors to be located remotely from each other. NEC 110.22(A) requires each disconnecting
means to be marked to indicate its purpose and location of the circuit source. The additional text in NEC
440.11 would, in addition to the requirements of 110.22(A), require the location of the interior unit to be identified at the exterior disconnect.

Submitter Information Verification

Submitter Full Name: Rudy Garza
Organization: IAEI
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 01 14:00:35 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8026-NFPA 70-2024
Statement: This would allow inspectors and installers to more quickly locate disconnect equipment for split-system HVAC interior units.

Public Input No. 2033-NFPA 70-2023 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall require a tool to open or ~~be capable of being locked~~ be locked .

Statement of Problem and Substantiation for Public Input

This public input is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 12-state field inspectors, 2-virtual inspectors and 50 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

This proposed change in this language would more closely align with the requirements in 404.30 and would promote consistent enforcement. In our opinion, the same safety hazard exists when opening a switch or HVAC disconnect door when unqualified persons are exposed to uninsulated live parts. The change would require the use of a tool for access or the disconnect equipment door would be required to be locked. Having a disconnect "capable of being locked" doesn't mandate that a lock be used to restrict access when unqualified persons are present.

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 11 11:02:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8025-NFPA 70-2024
Statement: For the purpose of clarification, 440.11 is being revised to have similar language as 690.13(A)(2).

Public Input No. 582-NFPA 70-2023 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from ~~the circuit~~ their ungrounded supply conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall require a tool to open or be capable of being locked.

Statement of Problem and Substantiation for Public Input

There is no reason to require the disconnecting means to open the grounded conductor of the circuit.

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Self-employed
Street Address:
City:
State:
Zip:
Submittal Date: Mon Apr 10 14:23:23 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: There may be instances where the disconnect would be used to disconnect from an ungrounded supply conductor, such as allowed in 430.105 for motor branch circuits.

Public Input No. 1311-NFPA 70-2023 [Section No. 440.12(A)(2)]

(2) Equivalent Horsepower.

To determine the equivalent horsepower in complying with the requirements of 430.109, the horsepower rating shall be selected from Table 430.248, Table 430.249, or Table 430.250 corresponding to the rated-load current or branch-circuit selection current, whichever is greater, and also the horsepower rating from Table 430.251(A) ~~or~~ , Table 430.251(B), or 430.251(C) corresponding to the locked-rotor current. In case the nameplate rated-load current or branch-circuit selection current and locked-rotor current do not correspond to the currents shown in Table 430.248, Table 430.249, Table 430.250, Table 430.251(A), ~~or~~ Table 430.251(B), or Table 430.251(C), the horsepower rating corresponding to the next higher value shall be selected. In case different horsepower ratings are obtained when applying these tables, a horsepower rating at least equal to the larger of the values obtained shall be selected.

Statement of Problem and Substantiation for Public Input

This Public Input is a companion to the NEMA Public Input proposing to add new Table 430.251(C).

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 07 17:21:05 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8045-NFPA 70-2024
Statement: A reference to Table 430.251(C) is being added to be consistent with revisions in Article 430 which adds a new Table 430.251(C).

Public Input No. 1308-NFPA 70-2023 [Section No. 440.12(B)(1)]

(1) Horsepower Rating.

The horsepower rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the rated-load condition and also at the locked-rotor condition. The combined rated-load current and the combined locked-rotor current so obtained shall be considered as a single motor for the purpose of this requirement as required by 440.12(B)(1)(a) and (B)(1)(b).

(a) The full-load current equivalent to the horsepower rating of each motor, other than a hermetic refrigerant motor-compressor, and fan or blower motors as covered in 440.6(B) shall be selected from Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the motor-compressor rated-load current(s) or branch-circuit selection current(s), whichever is greater, and to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

(b) The locked-rotor current equivalent to the horsepower rating of each motor, other than a hermetic refrigerant motor-compressor, shall be selected from Table 430.251(A) ~~or~~ , Table 430.251(B), or Table 430.251(C), and, for fan and blower motors of the shaded-pole or permanent split-capacitor type marked with the locked-rotor current, the marked value shall be used. The locked-rotor currents shall be added to the motor-compressor locked-rotor current(s) and to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads such as resistance heaters, or both, cannot be started simultaneously, appropriate combinations of locked-rotor and rated-load current or branch-circuit selection current, whichever is greater, shall be an acceptable means of determining the equivalent locked-rotor current for the simultaneous combined load.

Exception: Where part of the concurrent load is a resistance load and the disconnecting means is a switch rated in horsepower and amperes, the switch used shall be permitted to have a horsepower rating not less than the combined load to the motor-compressor(s) and other motor(s) at the locked-rotor condition, if the ampere rating of the switch is not less than this locked-rotor load plus the resistance load.

Statement of Problem and Substantiation for Public Input

This Public Input is a companion to the NEMA Public Input proposing to add new Table 430.251(C).

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 07 16:52:12 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8046-NFPA 70-2024

Statement: A reference to Table 430.251(C) is being added to be consistent with revisions in Article 430 which adds a new Table 430.251(C).

Public Input No. 488-NFPA 70-2023 [Section No. 440.12(B)(1)]

(1) Horsepower Rating.

The horsepower rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the rated-load condition and also at the locked-rotor condition. The combined rated-load current and the combined locked-rotor current so obtained shall be considered as a single motor for the purpose of this requirement as required by 440.12(B)(1)(a) and (B)(1)(b).

The horsepower rating of the disconnecting means for factory-wired multimotor and combination-load equipment shall not be less than the equivalent horsepower rating marked on the nameplate in accordance with 440.4(B)

(a) The full-load current equivalent to the horsepower rating of each motor, other than a hermetic refrigerant motor-compressor, and fan or blower motors as covered in 440.6(B) shall be selected from Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the motor-compressor rated-load current(s) or branch-circuit selection current(s), whichever is greater, and to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

(b) The locked-rotor current equivalent to the horsepower rating of each motor, other than a hermetic refrigerant motor-compressor, shall be selected from Table 430.251(A) or Table 430.251(B), and, for fan and blower motors of the shaded-pole or permanent split-capacitor type marked with the locked-rotor current, the marked value shall be used. The locked-rotor currents shall be added to the motor-compressor locked-rotor current(s) and to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads such as resistance heaters, or both, cannot be started simultaneously, appropriate combinations of locked-rotor and rated-load current or branch-circuit selection current, whichever is greater, shall be an acceptable means of determining the equivalent locked-rotor current for the simultaneous combined load.

Exception: Where part of the concurrent load is a resistance load and the disconnecting means is a switch rated in horsepower and amperes, the switch used shall be permitted to have a horsepower rating not less than the combined load to the motor-compressor(s) and other motor(s) at the locked-rotor condition, if the ampere rating of the switch is not less than this locked-rotor load plus the resistance load.

Additional Proposed Changes

File Name	Description	Approved
equivalent_HP_ratings.pdf	HP rating of multi motor equipment	

Statement of Problem and Substantiation for Public Input

This PI is in conjunction with PI 485, 486, and 487 addressing the horsepower rating for factory-wired multimotor and combination-load equipment. I believe these revisions are necessary to help installers, designers, and inspectors ensure the correct disconnecting means for factory-wired equipment is used. Determining the equivalent horsepower rating for factory-wired equipment is often overlooked. If the manufacturer does the calculations and provides that information on the equipment nameplate, then installers, designers, and inspectors will have a much easier time verifying that the correct disconnect rating is used.

Related Public Inputs for This Document

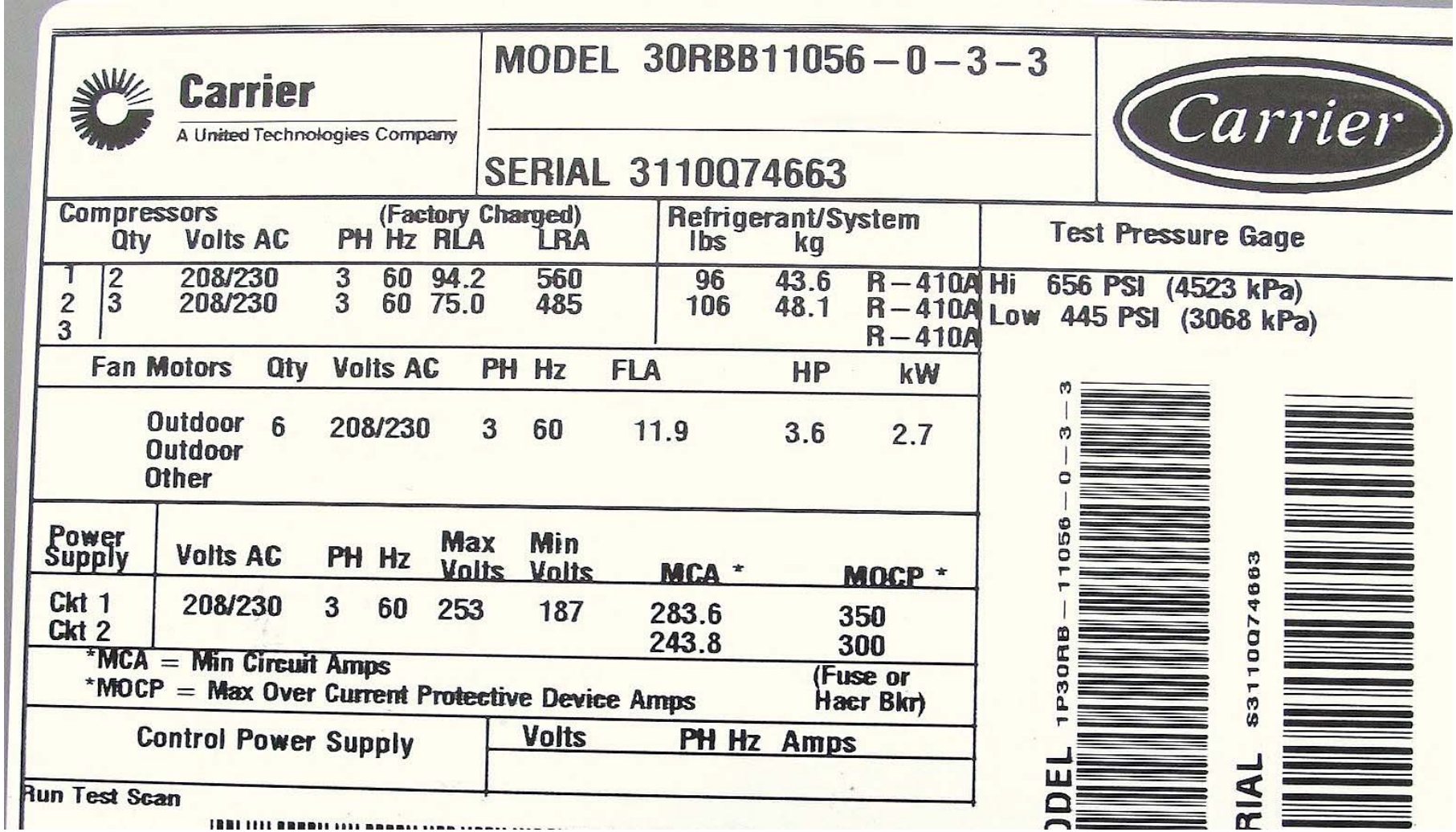
Related Input	Relationship
Public Input No. 485-NFPA 70-2023 [Section No. 430.7(D)(1)]	HP rating of factory wired equipment
Public Input No. 486-NFPA 70-2023 [Section No. 430.110(C)]	HP rating of factory wired equipment
Public Input No. 487-NFPA 70-2023 [Section No. 440.4(B)]	HP rating of factory wired equipment

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sat Mar 18 08:59:50 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The inclusion of maximum overcurrent protection and minimum circuit conductor ampacity provides the information needed for a proper installation. The addition of an equivalent HP rating would not improve the installation process.



Carrier
A United Technologies Company

MODEL 30RBB11056–0–3–3

SERIAL 3110Q74663

Carrier

Compressors	Qty	Volts AC	PH	Hz	RLA	LRA	(Factory Charged) Refrigerant/System lbs	kg	
1	2	208/230	3	60	94.2	560	96	43.6	R–410A
2	3	208/230	3	60	75.0	485	106	48.1	R–410A
3									R–410A

Test Pressure Gage
Hi 656 PSI (4523 kPa)
Low 445 PSI (3068 kPa)

Fan Motors	Qty	Volts AC	PH	Hz	FLA	HP	kW
Outdoor Outdoor Other	6	208/230	3	60	11.9	3.6	2.7

Power Supply	Volts AC	PH	Hz	Max Volts	Min Volts	MCA *	MOCP *
Ckt 1	208/230	3	60	253	187	283.6	350
Ckt 2						243.8	300

*MCA = Min Circuit Amps
*MOCP = Max Over Current Protective Device Amps (Fuse or Haer Bkr)

Control Power Supply	Volts	PH	Hz	Amps

Run Test Scan

MODEL 1P30RB–11056–0–3–3

SERIAL S3110Q74663

The equivalent HP rating should be marked by manufacturer!

TRANE

2

MODEL: CVHF1300 DATE OF MFG (DD/MM/YY): 02-03-09
MODEL NO:
CVHF130FA3U0PCZ298EJ8LEH9A00000002E1G040LS00004A100A
SERIAL NO: L09B06386 S.O. NO: A1R013B

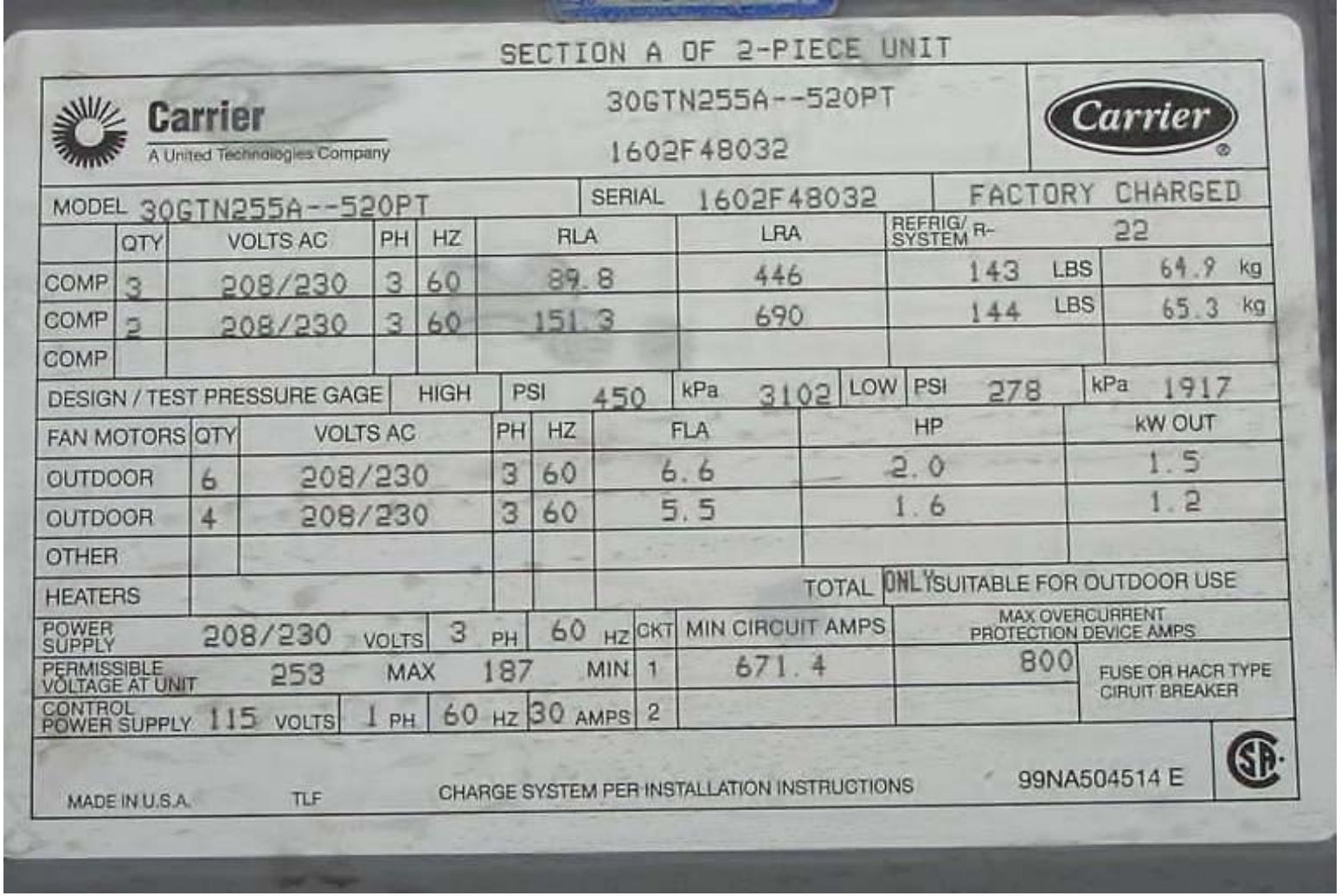
ELECTRICAL CHARACTERISTICS
RATED VOLTAGE: 460 VOLTS 60HZ 3 PH
NAMEPLATE NMKW: 783 KW
VOLTAGE UTILIZATION RANGE: 414- 506 VAC
MINIMUM CIRCUIT AMPACITY: 1308 AMPS
MAXIMUM OVERCURRENT PROTECTIVE DEVICE: 2000 AMPS

2

	VOLTS-AC	HZ	PH	RLA	MAX LRAY	MAX LRAD
COMPRESSOR MOTOR	460	60	3	1039	2257	6989
OIL TANK HEATER	115	60	1		750	WATTS
CONTROL CIRCUIT	115	60	1		4000	VA MAX
CARBON TANK HEATER	115	60	1	1.7		
PUMPOUT COMPRESSOR	115	60/50	1	1.55		
PURGE COMP MTR	115/110	60/50	1	8	34.6	LRA

WHEN MOTOR CONTROLLER PROVIDED BY OTHERS
TRANE ENGINEERING SPEC. S6516-0513 APPLIES
REFRIGERANT SYSTEM

The equivalent HP rating should be marked by manufacturer!



SECTION A OF 2-PIECE UNIT

Carrier
A United Technologies Company

30GTN255A--520PT
1602F48032

Carrier

MODEL 30GTN255A--520PT | SERIAL 1602F48032 | FACTORY CHARGED

	QTY	VOLTS AC	PH	HZ	RLA	LRA	REFRIG/SYSTEM R- 22	
COMP	3	208/230	3	60	89.8	446	143 LBS	64.9 kg
COMP	2	208/230	3	60	151.3	690	144 LBS	65.3 kg
COMP								

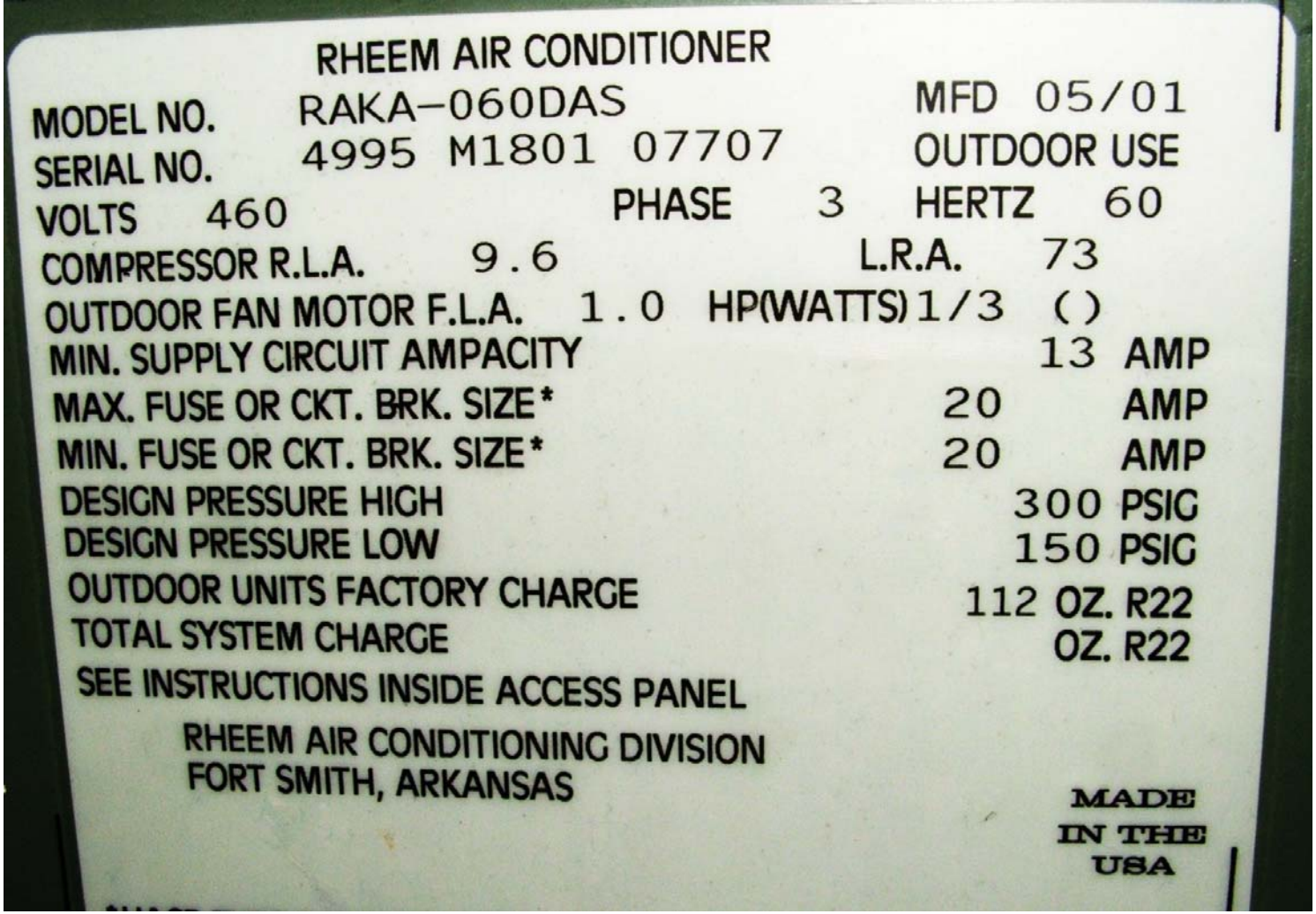
DESIGN / TEST PRESSURE GAGE | HIGH | PSI 450 | kPa 3102 | LOW | PSI 278 | kPa 1917

FAN MOTORS	QTY	VOLTS AC	PH	HZ	FLA	HP	kW OUT
OUTDOOR	6	208/230	3	60	6.6	2.0	1.5
OUTDOOR	4	208/230	3	60	5.5	1.6	1.2
OTHER							
HEATERS					TOTAL	ONLY SUITABLE FOR OUTDOOR USE	

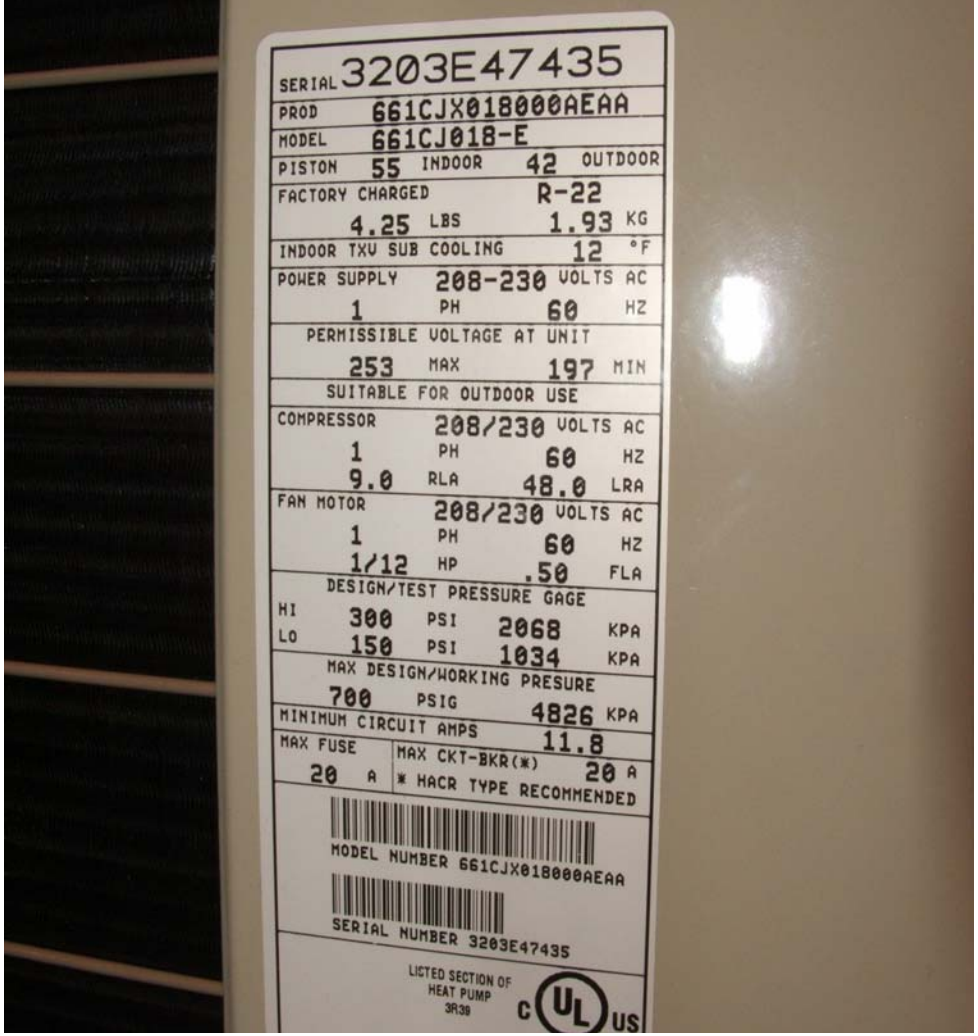
POWER SUPPLY	208/230 VOLTS	3 PH	60 HZ	CKT	MIN CIRCUIT AMPS	MAX OVERCURRENT PROTECTION DEVICE AMPS	
PERMISSIBLE VOLTAGE AT UNIT	253 MAX	187 MIN		1	671.4	800	FUSE OR HACR TYPE CIRUIT BREAKER
CONTROL POWER SUPPLY	115 VOLTS	1 PH	60 HZ	30 AMPS	2		

MADE IN U.S.A. TLF CHARGE SYSTEM PER INSTALLATION INSTRUCTIONS 99NA504514 E

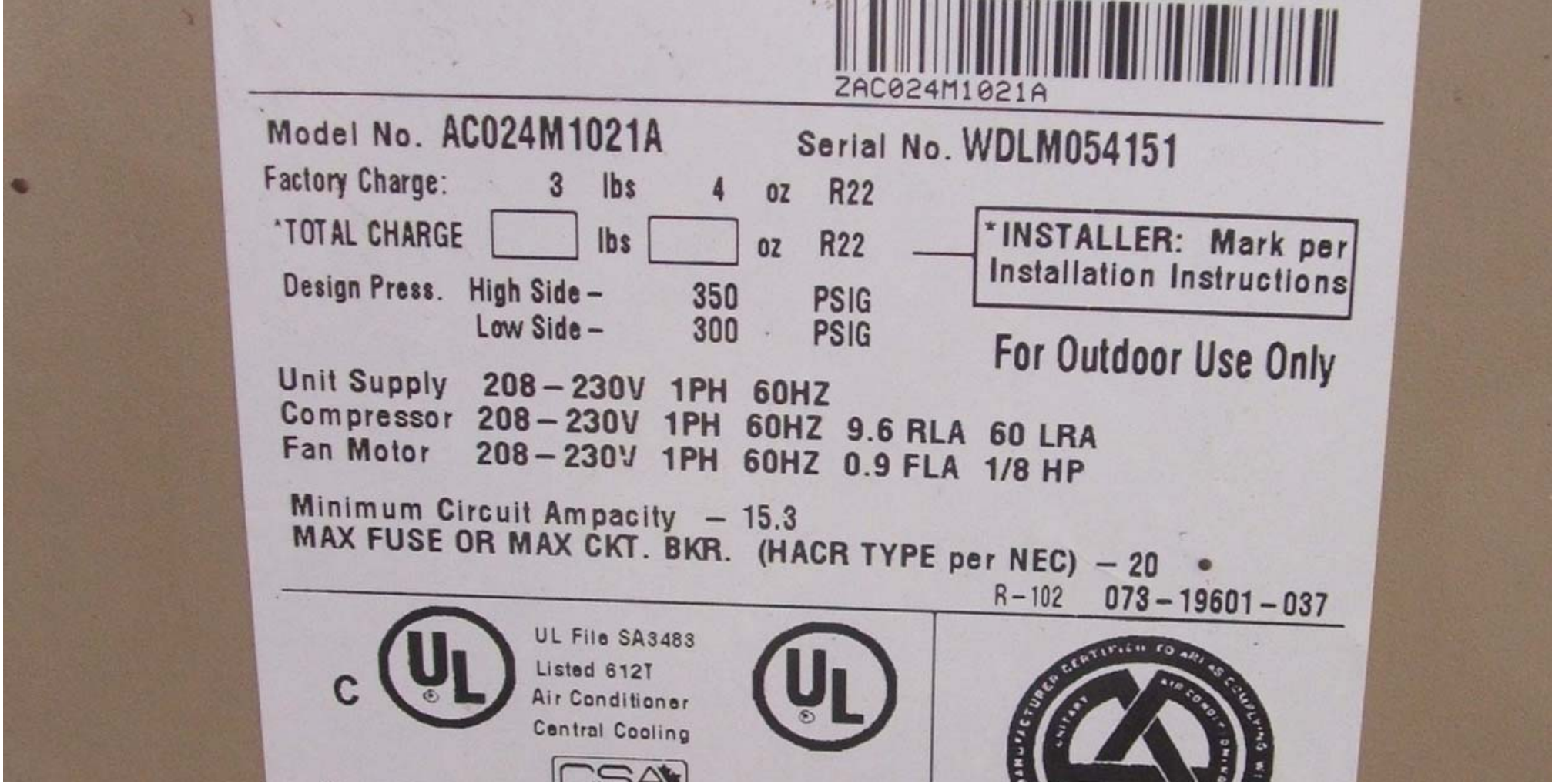
The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!



The equivalent HP rating should be marked by manufacturer!

Public Input No. 526-NFPA 70-2023 [Section No. 440.12(B)(1)]

(1) Horsepower Rating.

The horsepower rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the rated-load condition and also at the locked-rotor condition. The combined rated-load current and the combined locked-rotor current so obtained shall be considered as a single motor for the purpose of this requirement as required by 440.12(B)(1)(a) and (B)(1)(b).

(a) The full-load current equivalent to the horsepower rating of each motor, other than a hermetic refrigerant motor-compressor, and fan or blower motors as covered in 440.6(B) shall be selected from Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the motor-compressor rated-load current(s) or branch-circuit selection current(s), whichever is greater, and to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

(b) The locked-rotor current equivalent to the horsepower rating of each motor, other than a hermetic refrigerant motor-compressor, shall be selected from Table 430.251(A) or Table 430.251(B) , and, for fan and blower motors of the shaded-pole or permanent split-capacitor type marked with the locked-rotor current, the marked value shall be used. The locked-rotor currents shall be added to the motor-compressor locked-rotor current(s) and to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads such as resistance heaters, or both, cannot be started simultaneously, appropriate combinations of locked-rotor and rated-load current or branch-circuit selection current, whichever is greater, shall be an acceptable means of determining the equivalent locked-rotor current for the simultaneous combined load.

In cases where different horsepower ratings are obtained when applying these tables, a horsepower rating at least equal to the larger of the values obtained shall be selected.

Exception: Where part of the concurrent load is a resistance load and the disconnecting means is a switch rated in horsepower and amperes, the switch used shall be permitted to have a horsepower rating not less than the combined load to the motor-compressor(s) and other motor(s) at the locked-rotor condition, if the ampere rating of the switch is not less than this locked-rotor load plus the resistance load.

Statement of Problem and Substantiation for Public Input

This change would clarify the intentions of the sections. In addition this change would create consistency with the language and requirements of 440.11(A)(2) and, upon acceptance of PI 521, create consistency with the requirements of Article 430.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 521-NFPA 70-2023 [Section No. 430.110(C)(1)]	Proposing the same change for Article 430 in regards to different HP ratings

Submitter Information Verification

Submitter Full Name: Steven Gibson
Organization: Electrical Training Alliance of Western Oklahoma

Street Address:
City:
State:
Zip:
Submittal Date: Mon Apr 03 10:22:28 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Further description of the problem this is trying to correct needs to be provided to substantiate the proposed change.

Public Input No. 1444-NFPA 70-2023 [New Section after 440.14]

TITLE OF NEW CONTENT

Exception 3

Residential single phase 250 volt or less and 60 amperes or less shall be accessible.

Statement of Problem and Substantiation for Public Input

The location for the disconnecting means does not need to be readily accessible only accessible . The size of disconnecting means and limited need for operation does not need the space required for larger units. The incident energy on theses residential units is not high and does not pose the dangers of larger equipment.

Submitter Information Verification

Submitter Full Name: George Tidden
Organization: IES Residential
Affiliation: IEC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 17 11:02:04 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The proposed text would be applicable to non-fused pullout type disconnects, however it is not necessarily applicable to fused pullout type disconnects. Also, this would allow the disconnect to not be in sight of the equipment. Even though the incident energy is low that does not mean there is not a shock hazard.

Public Input No. 1486-NFPA 70-2023 [New Section after 440.14]

Exception 3

Air-conditioning equipment disconnects for one-family dwellings shall not be required to meet working space requirements of 110.26(A).

Statement of Problem and Substantiation for Public Input

110.26(A) states “Working space for equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), (A)(3), and (A)(4) or as required or permitted elsewhere in this Code.” AC disconnects for dwelling units do not require examination, adjustment, servicing, or maintenance while energized. The purpose of the disconnect is to provide a means for the AC service technician to energize and de-energize the AC equipment at a convenient location. The disconnect does not contain any parts that would require servicing or maintenance while energized. If voltage or current testing is required at the disconnect, the disconnect must be de-energized at the power source before test leads are connected. After the test leads are connected the disconnect can be energized at the power source. This procedure would be in accordance with NFPA 70E.

The location of the disconnect is determined during the rough-in stage of construction for a new house. At that time the circuit supplying the air conditioner compressor is stubbed out and the exact location of the outside unit is not known. The outside unit is set in place after the outside wall is completely finished and the AC disconnect has been mounted. Many times, this causes the AC disconnect switch to be mounted above the outside AC unit. As stated above, this should not be a violation of 110.26(A) because the AC disconnect has no components that require examination, adjustment, servicing, or maintenance while energized.

Submitter Information Verification

Submitter Full Name: IEC National
Organization: IEC
Affiliation: George Tidden
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 21 10:15:49 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: As proposed, this would be applicable to all types of disconnects and would permit no clearance. Reduced working space, which is not defined by the proposed text, would be acceptable for non-fused pullout type disconnects, however working space should still be required for fused pullout type disconnects.

Public Input No. 1635-NFPA 70-2023 [Section No. 440.14]

440.14 Location.

Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment in accordance with Section 110 .29. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A).

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Informational Note: See Parts VII and IX of Article 430 for additional requirements.

Statement of Problem and Substantiation for Public Input

The revisions to this section are intended to correlate directly with revised text in Section 110.29. The correlation should enhance clarity relative to the literal meaning of the “in sight from” rule and reinforce the existing “readily accessible from” language of this section and the general rules in Article 110. The revisions in 110.29 are intended to apply to all rules requiring disconnecting means “in sight from” the equipment they supply so that the same rules do not have to be repeated throughout the Code. This revision should also improve electrical safety in the workplace compliance with the general principles of establishing electrically safe work conditions further protecting electrical worker/installers and service and maintenance personnel. See companion PIs.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1597-NFPA 70-2023 [Section No. 110.29]	
Public Input No. 1634-NFPA 70-2023 [Section No. 430.102]	
Public Input No. 1597-NFPA 70-2023 [Section No. 110.29]	
Public Input No. 1634-NFPA 70-2023 [Section No. 430.102]	

Submitter Information Verification

Submitter Full Name: Kyle Krueger
Organization: NECA
Affiliation: NECA
Street Address:
City:
State:

Zip:
Submittal Date: Thu Jul 27 15:25:10 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Because 110.29 is already applicable, further substantiation is needed as to why a reference needs to be included in 440.14.

Public Input No. 2708-NFPA 70-2023 [Section No. 440.14]

440.14 Location.

Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A).

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Informational Note: See Article 430, Parts VII and ~~IX of Article 430 for~~ IX for additional requirements.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:56:25 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8050-NFPA 70-2024

Statement: The reference to Article 430, Parts VII and IX is updated to comply with 4.1.4 of the NEC Style Manual.

Public Input No. 3015-NFPA 70-2023 [Section No. 440.14]

440.14 Location.

Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A).

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable open in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Informational Note: See Parts VII and IX of Article 430 for additional requirements.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document when a disconnecting means is required to be lockable open elsewhere in the code. The text is revised to comply with the NEC Style Manual. The NEC Style Manual Section 3.2.5 Consistent Application of Terms, 3.2.5.3 Lockable Open. Where a requirement specifies that a disconnecting means be capable of being locked in the open position, the phrase lockable open in accordance with 110.25 shall be used.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 28 17:06:03 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8051-NFPA 70-2024
Statement: The term “lockable” is revised for compliance with 3.2.5 of the NEC Style Manual.

Public Input No. 4135-NFPA 70-2023 [Section No. 440.14]

440.14 Location.

(A) Readily Accessible. Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment.

(B) Working Space. Disconnecting means shall meet the working space requirements of 110.26(A).

(C) Mounting. The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Informational Note: See Parts VII and IX of Article 430 for additional requirements.

Statement of Problem and Substantiation for Public Input

Breaking up 440.14 into a list item format to facilitate understanding for Code users. In accordance with NFPA Style Manual section 3.5.1.2 additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 06 18:09:29 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The requirements all pertain to location, it is not necessary to further subdivide them. Also, the proposed revision may mis-align the exceptions to a requirement they are not intended for.

Public Input No. 60-NFPA 70-2023 [Section No. 440.14]

440.14 Location.

Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A).

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25, and where there is no liklihood of operation by ghosts, and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Informational Note: See Parts VII and IX of Article 430 for additional requirements.

Statement of Problem and Substantiation for Public Input

We need to be concerned about ghosts operating equipment.

Submitter Information Verification

Submitter Full Name: John Doe
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jan 06 22:50:23 EST 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation lacks technical proof or historical data that there is a problem with unauthorized operation of disconnects.

Public Input No. 2709-NFPA 70-2023 [Section No. 440.31]

440.31 General.

Part IV and adjustments made in accordance with ~~Part III of~~ Article 310 ~~specify~~ , Part III specify ampacities of conductors required to carry the motor current without overheating under the conditions specified, except as modified in 440.6(A), Exception No. 1.

These articles shall not apply to integral conductors of motors, to motor controllers and the like, or to conductors that form an integral part of approved equipment.

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:57:27 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8056-NFPA 70-2024
Statement: The reference to Part III of Article 310 is revised to comply with Part 4.1.4 of the NEC Style Manual.

Public Input No. 2215-NFPA 70-2023 [Section No. 440.33]

440.33 Motor-Compressor(s) With or Without Additional Motor Loads.

Conductors supplying one or more motor-compressor(s) with or without an additional motor load(s) shall have an ampacity not less than the sum of each of the following:

(1) 125 percent of the highest motor-compressor or motor full load current in the group

(2) The sum of ~~the rated~~ all other rated -load or branch-circuit selection current, whichever is greater, of all motor-compressor(s)

(3) The sum of the full-load current rating of all other motors

(4) ~~25 percent of the highest motor-compressor or motor full load current in the group~~

Exception No. 1: Where the circuitry is interlocked so as to prevent the starting and running of a second motor-compressor or group of motor-compressors, the conductor size shall be determined from the largest motor-compressor or group of motor-compressors that is to be operated at a given time.

Exception No. 2: The branch-circuit conductors for room air conditioners shall be in accordance with Part VII of Article 440.

Statement of Problem and Substantiation for Public Input

Bring the wording of 440.33 in line with 430.24
Wording associated with continuous duty applications throughout the NEC use the phrasing "125 percent of"

Submitter Information Verification

Submitter Full Name: Andrew Rolfe
Organization: Louisville Electrical JATC
Affiliation: IBEW LU 369
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 15 10:09:53 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The proposed change does not provide clarity or usability to the existing requirement. It is possible that the proposed items 2) and 3) could cause confusion as they imply that both a motor compressor current and a motor full load current be excluded (due to the use of “all other”, when it may only be one or the other of items 2) or 3)).

Public Input No. 2710-NFPA 70-2023 [Section No. 440.33]

440.33 Motor-Compressor(s) With or Without Additional Motor Loads.

Conductors supplying one or more motor-compressor(s) with or without an additional motor load(s) shall have an ampacity not less than the sum of each of the following:

(1) The sum of the rated-load or branch-circuit selection current, whichever is greater, of all motor-compressor(s)

(2) The sum of the full-load current rating of all other motors

(3) 25 percent of the highest motor-compressor or motor full load current in the group

Exception No. 1: Where the circuitry is interlocked so as to prevent the starting and running of a second motor-compressor or group of motor-compressors, the conductor size shall be determined from the largest motor-compressor or group of motor-compressors that is to be operated at a given time.

Exception No. 2: The branch-circuit conductors for room air conditioners shall be in accordance with ~~Part VII of~~ Article 440 , Part VII .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:58:09 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8057-NFPA 70-2024
Statement: The reference to Part VII of Article 440 is revised to comply with Part 4.1.4 of the NEC Style Manual.

Public Input No. 1310-NFPA 70-2023 [Section No. 440.41(A)]

(A) Motor-Compressor Controller.

A motor-compressor controller shall have both a continuous-duty full-load current rating and a locked-rotor current rating not less than the nameplate rated-load current or branch-circuit selection current, whichever is greater, and locked-rotor current, respectively, of the compressor. In case the motor controller is rated in horsepower but is without one or both of the foregoing current ratings, equivalent currents shall be determined from the ratings as follows. Table 430.248, Table 430.249, and Table 430.250 shall be used to determine the equivalent full-load current rating. Table 430.251(A) ~~and~~ , Table 430.251(B), or 430.251(C) shall be used to determine the equivalent locked-rotor current ratings.

Statement of Problem and Substantiation for Public Input

This Public Input is a companion to the NEMA Public Input proposing to add new Table 430.251(C).

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Fri Jul 07 17:16:48 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8058-NFPA 70-2024
Statement: A reference to Table 430.251(C) is being added to be consistent with revision in Article 430 which adds a new Table 430.251(C).

Public Input No. 2711-NFPA 70-2023 [Section No. 440.51]

440.51 General.

Part VI specifies devices intended to protect the motor-compressor, the motor-control apparatus, and the branch-circuit conductors against excessive heating due to motor overload and failure to start.

Informational Note: See 240.4(G) for application of Article 440, Parts III and VI ~~of Article 440~~ .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to to comply with the NEC Style Manual Section 4.1.4, regarding the use of Parts.
4.1.4 References to an Entire Article. References shall not be made to an entire article, except for the Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 18:59:59 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8059-NFPA 70-2024
Statement: The reference to Parts III and VI of Article 440 is revised to comply with Part 4.1.4 of the NEC Style Manual.

Public Input No. 809-NFPA 70-2023 [Section No. 440.54 [Excluding any Sub-Sections]]

Overload protection for motor-compressors and equipment used on 15- or 20-ampere 120-volt, or 15-ampere 208-, 240-, or ~~240~~ 277 -volt, single-phase branch circuits shall be permitted in accordance with 440.54(A) and (B).

Statement of Problem and Substantiation for Public Input

Just like how 208 volts is standard in multi-family residential and light commercial properties, 277 volts is standard as the lower voltage and not over 300 volts as derived from a 277/480 service/feeder transformer in heavy commercial and all industrial properties, so it should also be included.

Submitter Information Verification

Submitter Full Name: Conrad Ko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 19:51:02 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8062-NFPA 70-2024
Statement: Single phase 277 volt (derived from 480/277 transformers) can be found in commercial and industrial properties.

Public Input No. 810-NFPA 70-2023 [Section No. 440.55]

440.55 Cord- and Attachment-Plug-Connected Motor-Compressors and Equipment on 15- or 20-Ampere Branch Circuits.

Overload protection for motor-compressors and equipment that are cord- and attachment-plug-connected and used on 15- or 20-ampere 120-volt, or 15-ampere 208-, 240-, or ~~240~~ 277 -volt, single-phase branch circuits shall be permitted in accordance with 440.55(A), (B), and (C).

(A) Overload Protection.

The motor-compressor shall be provided with overload protection as specified in 440.52(A). Both the controller and the motor overload protective device shall be identified for installation with the short-circuit and ground-fault protective device for the branch circuit to which the equipment is connected.

(B) Attachment Plug and Receptacle or Cord Connector Rating.

The rating of the attachment plug and receptacle or cord connector shall not exceed 20 amperes at 125 volts or 15 amperes at ~~250 volts~~ 277 volts .

(C) Time Delay.

The short-circuit and ground-fault protective device protecting the branch circuit shall have sufficient time delay to permit the motor-compressor and other motors to start and accelerate their loads.

Statement of Problem and Substantiation for Public Input

Added support for NEMA 7-15, 7-20, 7-30, 7-50, 11-15, 11-20, 11-30, 11-50, 15-15, 15-20, 15-30, 15-50, 15-60, 18-15, 18-20, 18-30, 18-50, and 18-60, as well as NEMA L7-15, L7-20, and L7-30.

Just like how 208 volts is standard in multi-family residential and light commercial properties, 277 volts is standard as the lower voltage and not over 300 volts as derived from a 277/480 service/feeder transformer in heavy commercial and all industrial properties, so it should also be included.

Submitter Information Verification

Submitter Full Name: Conrad Ko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 19:54:26 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation has not been given for the need for adding 277 V for cord and attachment plug equipment.

Public Input No. 808-NFPA 70-2023 [Section No. 440.60]

440.60 General.

Part VII shall apply to electrically energized room air conditioners that control temperature and humidity. For the purpose of Part VII, a room air conditioner (with or without provisions for heating) shall be considered as an ac appliance of the air-cooled window, console, or in-wall type that is installed in the conditioned room and that incorporates a hermetic refrigerant motor-compressor(s). Part VII covers equipment rated not over ~~250 volts~~ 277 volts , single phase, or 250 volts, three phase, and the equipment shall be permitted to be cord- and attachment-plug-connected.

A room air conditioner that is rated ~~3-phase or rated over 250 volts~~ over 277 volts, single phase, or 250 volts, three phase, shall be directly connected to a wiring method recognized in Chapter 3, and Part VII shall not apply.

Statement of Problem and Substantiation for Public Input

Added support for NEMA 7-15, 7-20, 7-30, 7-50, 11-15, 11-20, 11-30, 11-50, 15-15, 15-20, 15-30, 15-50, 15-60, 18-15, 18-20, 18-30, 18-50, and 18-60, as well as NEMA L7-15, L7-20, and L7-30.

Just like how 208 volts is standard in multi-family residential and light commercial properties, 277 volts is standard as the lower voltage and not over 300 volts as derived from a 277/480 service/feeder transformer in heavy commercial and all industrial properties, so it should also be included. Furthermore, 240 volts three phase is also common as a lower voltage.

Submitter Information Verification

Submitter Full Name: Conrad Ko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 19:34:03 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The Code already addresses single-phase equipment rated over 250 V.

Public Input No. 2840-NFPA 70-2023 [Section No. 440.61]

440.~~61~~ 61 Equipment Grounding Conductor .

The enclosures of room air conditioners shall be connected to the equipment grounding conductor in accordance with 250.110, 250.112, and 250.114.

Statement of Problem and Substantiation for Public Input

The section title must be revised to match the technical requirement. In accordance with NEC style manual section 2.1.3.2 the title must be descriptive and concise with the intent of the requirement. See 215.6 Feeder Equipment Grounding Conductor, 320.108 Equipment Grounding Conductor, 330.108 Equipment Grounding Conductor, 334.108 Equipment Grounding Conductor, 410.182 Equipment Grounding Conductor, 547.27 Separate Equipment Grounding Conductor, 555.37 Equipment Grounding Conductor, and 690.45 Size of Equipment Grounding Conductors.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 25 14:31:01 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: NEC Style Manual section 2.1.3.2 applies only to Chapters. Also, the requirements pertain to grounding of equipment, not the equipment grounding conductor itself.

Public Input No. 811-NFPA 70-2023 [Section No. 440.62(A)]

(A) Room Air Conditioner as a Single Motor Unit.

A room air conditioner shall be considered as a single motor unit in determining its branch-circuit requirements where all the following conditions are met:

(1) It is cord- and attachment-plug-connected.

(2) Its rating is not more than 40 amperes and ~~250 volts~~ 277 volts , single phase or 30 amperes and 250 volts, three phase .

(3) Total rated-load current is shown on the room air-conditioner nameplate rather than individual motor currents.

(4) The rating of the branch-circuit short-circuit and ground-fault protective device does not exceed the ampacity of the branch-circuit conductors or the rating of the receptacle, whichever is less.

Statement of Problem and Substantiation for Public Input

Added support for NEMA 7-15, 7-20, 7-30, 7-50, 11-15, 11-20, 11-30, 11-50, 15-15, 15-20, 15-30, 15-50, 15-60, 18-15, 18-20, 18-30, 18-50, and 18-60, as well as NEMA L7-15, L7-20, and L7-30.

Just like how 208 volts is standard in multi-family residential and light commercial properties, 277 volts is standard as the lower voltage and not over 300 volts as derived from a 277/480 service/feeder transformer in heavy commercial and all industrial properties, so it should also be included. Furthermore, 240 volts three phase is also common as a lower voltage.

Submitter Information Verification

Submitter Full Name: Conrad Ko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 19:57:17 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation has not been provided for adding 277 V single phase or 30 amp, 250 V three phase.

Public Input No. 812-NFPA 70-2023 [Section No. 440.63]

440.63 Disconnecting Means.

An attachment plug and receptacle or cord connector shall be permitted to serve as the disconnecting means for a single-phase room air conditioner rated ~~250 volts~~ 277 volts or less ~~if~~ , and for a three-phase room air conditioner rated 250 volts or less, if (1) the manual controls on the room air conditioner are readily accessible and located within 1.8 m (6 ft) of the floor, or (2) an approved manually operable disconnecting means is installed in a readily accessible location within sight from the room air conditioner.

Statement of Problem and Substantiation for Public Input

Added support for NEMA 7-15, 7-20, 7-30, 7-50, 11-15, 11-20, 11-30, 11-50, 15-15, 15-20, 15-30, 15-50, 15-60, 18-15, 18-20, 18-30, 18-50, and 18-60, as well as NEMA L7-15, L7-20, and L7-30.

Just like how 208 volts is standard in multi-family residential and light commercial properties, 277 volts is standard as the lower voltage and not over 300 volts as derived from a 277/480 service/feeder transformer in heavy commercial and all industrial properties, so it should also be included. Furthermore, 240 volts three phase is also common as a lower voltage.

Submitter Information Verification

Submitter Full Name: Conrad Ko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 20:03:12 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation has not been provided for adding 277 V single phase, 250 V three phase.

Public Input No. 813-NFPA 70-2023 [Section No. 440.64]

440.64 Supply Cords.

Where a flexible cord is used to supply a room air conditioner, the length of such cord shall not exceed 3.0 m (10 ft) for a nominal, 120-volt rating or 1.8 m (6 ft) for a nominal, 208-~~ or~~ , 240-, or 277- volt rating.

Statement of Problem and Substantiation for Public Input

Just like how 208 volts is standard in multi-family residential and light commercial properties, 277 volts is standard as the lower voltage and not over 300 volts as derived from a 277/480 service/feeder transformer in heavy commercial and all industrial properties, so it should also be included.

Submitter Information Verification

Submitter Full Name: Conrad Ko
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 12 20:04:52 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Substantiation has not been provided for adding 277 V.

Public Input No. 1263-NFPA 70-2023 [New Section after 460.1]

TITLE OF NEW CONTENT

460.2 Reconditioning of Equipment.

Reconditioning of capacitors shall be determined by the manufacturer.

Statement of Problem and Substantiation for Public Input

This language would make it clear that capacitors can only be rebuilt or remanufactured if permitted by the capacitor manufacturer. This added language will provide guidance for users of the code by requiring documentation from the manufacturer on how, or if, the capacitor can be rebuilt.

Submitter Information Verification

Submitter Full Name: Charles Littlefield
Organization: Goochland County
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 03 13:55:05 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: Reconditioning of capacitors should not be allowed, in line with the NEMA Technical Position on Reconditioned Equipment (NEMA CS 100-2020, Appendix B.1).

Public Input No. 630-NFPA 70-2023 [New Section after 460.1]

460.2 Reconditioned Equipment

Capacitors shall not be reconditioned.

Statement of Problem and Substantiation for Public Input

These items are not permitted to be reconditioned per the NEMA Technical Position on Reconditioned Equipment (NEMA CS 100-2020, Appendix B.1)

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 634-NFPA 70-2023 [New Section after 692.1]	

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: Leblanc Consulting Services
Street Address:
City:
State:
Zip:
Submittal Date: Sun Apr 16 09:38:20 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8136-NFPA 70-2024

Statement: Capacitors should not be reconditioned, in-line with NEMA Technical Position on Reconditioned Equipment (NEMA CS 100-2020, Appendix B.1). The numbering and wording is as required per 2.2.1 of the NEC Style Manual.

Public Input No. 3755-NFPA 70-2023 [Section No. 460.3]

460.~~3~~ 4 Enclosing and Guarding.

(A) Containing More Than 11 L (3 gal) of Flammable Liquid.

Capacitors containing more than 11 L (3 gal) of flammable liquid shall be enclosed in vaults or outdoor fenced enclosures complying with Article 110, Part III. This limit shall apply to any single unit in an installation of capacitors.

(B) Accidental Contact.

Where capacitors are accessible to unauthorized and unqualified persons, they shall be enclosed, located, or guarded so that persons cannot come into accidental contact or bring conducting materials into accidental contact with exposed energized parts, terminals, or buses associated with them. However, no additional guarding is required for enclosures accessible only to authorized and qualified persons.

Statement of Problem and Substantiation for Public Input

The requirement should be relocated for compliance with the NEC Style Manual Section 2.2.1.

Submitter Information Verification

Submitter Full Name: Derrick Atkins
Organization: Minneapolis Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 05 15:30:02 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8137-NFPA 70-2024
Statement: This section is being re-numbered for compliance with 2.2.1 of the NEC Style Manual.

Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]

460.8 Conductors ~~.~~

~~(A)~~

~~-~~ Ampacity.

~~—.~~ ~~The ampacity of capacitor circuit conductors shall not be less than 135 percent of the rated current of the capacitor. The ampacity of conductors that connect a capacitor to the terminals of a motor or to motor circuit conductors shall not be less than one-third the ampacity of the motor circuit conductors and in no case less than 135 percent of the rated current of the capacitor.~~

~~(B)~~

460.9 Overcurrent Protection.

An overcurrent device shall be provided in each ungrounded conductor for each capacitor bank. The rating or setting of the overcurrent device shall be as low as practicable.

Exception: A separate overcurrent device shall not be required for a capacitor connected on the load side of a motor overload protective device.

~~(C)~~

460.10 Disconnecting Means.

A disconnecting means shall be provided in each ungrounded conductor for each capacitor bank and shall meet the following requirements:

(1) The disconnecting means shall open all ungrounded conductors simultaneously.

(2) The disconnecting means shall be permitted to disconnect the capacitor from the line as a regular operating procedure.

(3) The rating of the disconnecting means shall not be less than 135 percent of the rated current of the capacitor.

Exception: A separate disconnecting means shall not be required where a capacitor is connected on the load side of a motor controller.

Statement of Problem and Substantiation for Public Input

Currently 460.8 is titled Conductors. And then followed by three first level subdivisions (A), (B), and (C). Technically subdivision (A) is the only one directly about conductors or the ampacity of. First level (B) is about the overcurrent protection of the capacitor or capacitor bank and therefore should not be under the heading of "Conductors". And first level (C) is about the disconnecting means of a capacitor bank and sizing of the disconnect based on the capacitor, again this shouldn't be under the title of "Conductors". I propose that (A) Ampacity and the following language be placed with 460.8, removing (A), with no change in that requirement language. Then (B) becomes its own section 460.9 and (C) becomes its own section 460.10, also with no change in current requirement language or text.
If this moves forward than the following Sections will have to be renumbered. See related PI's

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]	Renumber
Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]	Renumber

Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]	Renumber
Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]	
Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]	
Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]	

Submitter Information Verification

Submitter Full Name: Darryl Hill
Organization: Wichita Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 14 11:51:26 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8144-NFPA 70-2024
Statement: The requirements of 460.8 are being split into three sections to increase usability of the code.

Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]

460.9 ~~–~~ **11** Rating or Setting of Motor Overload Device.

Where a motor installation includes a capacitor connected on the load side of the motor overload device, the rating or setting of the motor overload device shall be based on the improved power factor of the motor circuit.

The effect of the capacitor shall be disregarded in determining the motor circuit conductor rating in accordance with 430.22.

Statement of Problem and Substantiation for Public Input

If PI 2172 is acted upon favorably into an FR, then this code section number will need to be updated from 460.9 to 460.11 or other appropriate number.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]	Renumber
Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]	Renumber
Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]	Renumber
Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]	
Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]	
Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]	

Submitter Information Verification

Submitter Full Name: Darryl Hill
Organization: Wichita Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 14 14:00:01 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8144-NFPA 70-2024
Statement: The requirements of 460.8 are being split into three sections to increase usability of the code.

Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]

460.~~10~~ 12 Grounding.

Capacitor cases shall be connected to the equipment grounding conductor.

Exception: Capacitor cases shall not be connected to the equipment grounding conductor where the capacitor units are supported on a structure designed to operate at other than ground potential.

Statement of Problem and Substantiation for Public Input

If PI 2172 is acted upon favorably into an FR, then this code section number will need to be updated from 460.10 to 460.12 or other appropriate number.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]	Renumber
Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]	Renumber
Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]	Renumber
Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]	
Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]	
Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]	

Submitter Information Verification

Submitter Full Name: Darryl Hill
Organization: Wichita Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 14 14:12:00 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8144-NFPA 70-2024
Statement: The requirements of 460.8 are being split into three sections to increase usability of the code.

Public Input No. 2841-NFPA 70-2023 [Section No. 460.10]

460.~~10~~ 10 Equipment Grounding Conductor .

Capacitor cases shall be connected to the equipment grounding conductor.

Exception: Capacitor cases shall not be connected to the equipment grounding conductor where the capacitor units are supported on a structure designed to operate at other than ground potential.

Statement of Problem and Substantiation for Public Input

The section title must be revised to match the technical requirement. In accordance with NEC style manual section 2.1.3.2 the title must be descriptive and concise with the intent of the requirement. See 215.6 Feeder Equipment Grounding Conductor, 320.108 Equipment Grounding Conductor, 330.108 Equipment Grounding Conductor, 334.108 Equipment Grounding Conductor, 410.182 Equipment Grounding Conductor, 547.27 Separate Equipment Grounding Conductor, 555.37 Equipment Grounding Conductor, and 690.45 Size of Equipment Grounding Conductors.

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 25 14:32:21 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: NEC Style Manual section 2.1.3.2 applies only to Chapters. Also, the requirements pertain to grounding of capacitor cases, not the equipment grounding conductor itself.

Public Input No. 2200-NFPA 70-2023 [Section No. 460.12]

460.~~12~~ 13 Marking.

Each capacitor shall be provided with a nameplate giving the name of the manufacturer, rated voltage, frequency, kilovar or amperes, number of phases, and, if filled with a combustible liquid, the volume of liquid. Where filled with a nonflammable liquid, the nameplate shall so state. The nameplate shall also indicate whether a capacitor has a discharge device inside the case.

Statement of Problem and Substantiation for Public Input

If PI 2172 is acted upon favorably into an FR, then this code section number will need to be updated from 460.12 to 460.13 or other appropriate number.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]	Renumber
Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]	Renumber
Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]	Renumber
Public Input No. 2172-NFPA 70-2023 [Section No. 460.8]	
Public Input No. 2197-NFPA 70-2023 [Section No. 460.9]	
Public Input No. 2198-NFPA 70-2023 [Section No. 460.10]	

Submitter Information Verification

Submitter Full Name: Darryl Hill
Organization: Wichita Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 14 14:14:37 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8144-NFPA 70-2024
Statement: The requirements of 460.8 are being split into three sections to increase usability of the code.

Public Input No. 2611-NFPA 70-2023 [Section No. 470.2]

470. ~~2~~ **3** Reconditioned Equipment.

(A) ~~Resistors~~ **Permitted to be Installed .**

Reconditioned ~~resistors~~ reactors shall ~~not~~ be permitted to be installed .

(B) ~~Reactors~~ **Not Permitted to be Installed .**

Reconditioned ~~reactors~~ resistors shall ~~be permitted~~ not be installed .

Statement of Problem and Substantiation for Public Input

This Public Input is being submitted on behalf of the NEC Correlating Committee Usability Task Group in order to provide correlation throughout the document. The text is revised to comply with the NEC Style Manual Section 2.2.1 regarding reconditioned equipment.
2.2.1 Parallel Numbering Required. Technical committees shall use the following section numbers for the same purposes within articles. This requirement shall not apply to Articles 90, 100, and 110. If the article does not contain listing or reconditioning requirements, the subdivisions shall not be included in the article.
Required Parallel Numbering Format
XXX.1 Scope.
XXX.2 Listing Requirements.
XXX.3 Reconditioned Equipment.
XXX.3(A) Permitted to be Installed.
XXX.3(B) Not Permitted to be Installed.
The Usability Task Group members are: Derrick Atkins, David Hittinger, Richard Holub, Dean Hunter, Chad Kennedy and David Williams.

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 23 20:04:47 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8148-NFPA 70-2024
Statement: Change is for compliance with the parallel numbering provisions in section 2.2.1 of the NEC Style Manual.

Public Input No. 3777-NFPA 70-2023 [Section No. 470.2]

470.~~2~~ 3 Reconditioned Equipment.

(A) Resistors.

Reconditioned resistors shall not be permitted.

(B) Reactors.

Reconditioned reactors shall be permitted.

Statement of Problem and Substantiation for Public Input

The requirement should be relocated for compliance with the NEC Style Manual Section 2.2.1.

Submitter Information Verification

Submitter Full Name: Derrick Atkins
Organization: Minneapolis Electrical JATC
Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 05 16:00:13 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8148-NFPA 70-2024
Statement: Change is for compliance with the parallel numbering provisions in section 2.2.1 of the NEC Style Manual.

Public Input No. 2410-NFPA 70-2023 [Definition:]

Table A.1(a) Product Safety Standards for Conductors and Equipment That Have an Associated Listing Requirement

Article	Standard Number	Standard Title
110	UL 10C	Positive Pressure Fire Tests of Door Assemblies
	UL 305	Panic Hardware
	UL 486D	Sealed Wire Connector Systems
	UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 62275	Cable Management Systems — Cable Ties for Electrical Installation
210	UL 498	Attachment Plugs and Receptacles
	UL 935	Fluorescent-Lamp Ballasts
	UL 943	Ground Fault Circuit Interrupters
	UL 1029	High-Intensity-Discharge Lamp Ballast
	UL 1699	Arc-Fault Circuit-Interrupters
	UL 1699A	Outlet Branch Circuit AFCIs
225	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1242	Electrical Intermediate Metal Conduit — Steel

UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
230 UL 6	Electrical Rigid Metal Conduit — Steel
UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
UL 67	Panelboards
UL 98	Enclosed and Dead-Front Switches
UL 218	Fire Pump Controllers
UL 231	Power Outlets
UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
UL 360	Liquid-Tight Flexible Metal Conduit
UL 414	Meter Sockets
UL 486A-486B	Wire Connectors
UL 486C	Splicing Wire Connectors
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 508	Industrial Control Equipment
UL 508A	Industrial Control Panels
UL 514B	Conduit, Tubing and Cable Fittings

UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 845	Motor Control Centers
UL 857	Busways
UL 869A	Reference Standard for Service Equipment
UL 891	Switchboards
UL 977	Fused Power-Circuit Devices
UL 1008	Transfer Switch Equipment
UL 1008A	Transfer Switch Equipment, Over 1000 Volts
UL 1008M	Meter-Mounted Transfer Switches
UL 1008S	Solid-State Transfer Switches
UL 1053	Ground-Fault Sensing and Relaying Equipment
UL 1062	Unit Substations
UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
UL 1242	Electrical Intermediate Metal Conduit — Steel
UL 1429	Pullout Switches
UL 1449	Surge Protective Devices

UL 1558	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
UL 1740	Robots and Robotic Equipment
UL 1953	Power Distribution Blocks
UL 2011	Machinery
UL 2200	Stationary Engine Generator Assemblies
UL 2416	Audio/Video, Information and Communication Technology Equipment Cabinet, Enclosure and Rack Systems
UL 2446	Unitary Boiler Room Systems
UL 2565	Industrial Metalworking and Woodworking Machine Tools
UL 2735	Electric Utility Meters
UL 2745	Meter Socket Adapters for Communications Equipment
UL 2876	Remote Racking Devices for Switchgear and Controlgear
UL 4248-1	Fuseholders — Part 1: General Requirements
UL 60947-1	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
240 UL 248-1	Low-Voltage Fuses — Part 1: General Requirements

UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses
UL 248-3	Low-Voltage Fuses — Part 2: Class CA and CB Fuses
UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
UL 248-6	Low-Voltage Fuses — Part 6: Class H Non-Renewable Fuses
UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
UL 248-11	Low-Voltage Fuses — Part 11: Plug Fuses
UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
UL 248-17	Low-Voltage Fuses — Part 17: Class CF Fuses
UL 248-18	Low-Voltage Fuses — Part 18: Class CD Fuses
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 489I	Solid State Molded-Case Circuit Breakers
UL 943	Ground-Fault Circuit-Interrupters

	UL 1053	Ground-Fault Sensing and Relaying Equipment
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 4248-1	Fuseholders — Part 1: General Requirements
242	UL 1449	Surge Protective Devices
250	UL 1	Flexible Metal Conduit
	UL 4	Armored Cable
	UL 5	Surface Metal Raceways and Fittings
	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 467	Grounding and Bonding Equipment
	UL 486A-486B	Wire Connectors
	UL 486C	Splicing Wire Connectors
	UL 486D	Sealed Wire Connector Systems
	UL 498	Attachment Plugs and Receptacles
	UL 504	Mineral-Insulated, Metal-Sheathed Cable
	UL 514A	Metallic Outlet Boxes
	UL 514B	Conduit, Tubing, and Cable Fittings

UL 797	Electrical Metallic Tubing — Steel
UL 797A	Electrical Metallic Tubing — Aluminum
UL 1242	Electrical Intermediate Metal Conduit — Steel
UL 1569	Metal-Clad Cables
UL 1652	Flexible Metallic Tubing
300 UL 4	Armored Cable
UL 44	Thermoset-Insulated Wires and Cables
UL 83	Thermoplastic-Insulated Wires and Cables
UL 83A	Fluoropolymer Insulated Wire
UL 263	Fire Tests of Building Construction and Materials
UL 504	Mineral-Insulated, Metal-Sheathed Cable
UL 746C	Polymeric Materials — Use in Electrical Equipment Evaluations
UL 1569	Metal-Clad Cable
UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
UL 2239	Hardware for Support of Conduit, Tubing and Cable
UL 2556	Wire and Cable Test Methods

	UL 62275	Cable Management Systems — Cable Ties for Electrical Installation
310	UL 44	Thermoset-Insulated Wires and Cables

UL 83	Thermoplastic-Insulated Wires and Cables

UL 83A	Fluoropolymer Insulated Wire

UL 224	Extruded Insulating Tubing

UL 1063	Machine-Tool Wires and Cables

	UL 1441	Coated Electrical Sleeving
315	ANSI C119.4	Electric Connectors — Connectors for Use between Aluminum-to-Aluminum and Aluminum-to-Copper Conductors Designed for Normal Operation at or Below 93ºC and Copper-to-Copper Conductors Designed for Normal Operation at or Below 100ºC

IEEE 48	IEEE Standard for Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV

IEEE 386	IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV

IEEE 404	IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV

UL 4	Armored Cable

UL 504	Mineral-Insulated, Metal-Sheathed Cable

UL 1072	Medium Voltage Power Cables

	UL 1569	Metal-Clad Cable
312	UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 916	Energy Management Equipment

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UL 61010-1 and UL 61010-2-030	Electrical Equipment for Measurement, Control, and Laboratory Use — Part 2-030: Particular Requirements for Testing and Measuring Circuits
314 UL 50	Enclosures for Electrical Equipment

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations

UL 486D	Sealed Wire Connector Systems

UL 498	Attachment Plugs and Receptacles

UL 498B	Receptacles with Integral Switching Means

UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts

UL 498E	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection

UL 514A	Metallic Outlet Boxes

UL 514B	Conduit, Tubing, and Cable Fittings

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 514D	Cover Plates for Flush-Mounted Wiring Devices

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	UL 44	Thermoset-Insulated Wires and Cables
	UL 83	Thermoplastic-Insulated Wires and Cables
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	UL 514B	Conduit, Tubing, and Cable Fittings
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	UL 1063	Machine-Tool Wires and Cables
	UL 1565	Positioning Devices
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324	UL 486A-486B	Wire Connectors
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	UL 83	Thermoplastic-Insulated Wires and Cables
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	UL 2239	Hardware for the Support of Conduit, Tubing, and Cable
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334	UL 719	Nonmetallic-Sheathed Cables
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335	UL 2250	Instrumentation Tray Cable
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337	UL 1309A	Cable for Use in Mobile Installations
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342	UL 514B	Conduit, Tubing, and Cable Fittings
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	UL 514B	Conduit, Tubing, and Cable Fittings
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350	UL 360	Liquid-Tight Flexible Steel Conduit
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353	UL 651A	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990	Nonmetallic Underground Conduit with Conductors
355	UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
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500	FM 121303	Guide for Use of Detectors for Flammable Gases
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	IEEE 1349	Guide for the Application of Electric Machines in Zone 2 and Class I, Division 2 Hazardous (Classified) Locations
	NFPA 33	Standard for Spray Application Using Flammable or Combustible Materials
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UL 122001	General Requirements for Electrical Ignition Systems for Internal Combustion Engines in Class I, Division 2 or Zone 2, Hazardous (Classified) Locations

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501	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements

IEEE 1349	Guide for the Application of Electric Machines in Zone 2 and Class I, Division 2 Hazardous (Classified) Locations

NFPA 496	Standard for Purged and Pressurized Enclosures for Electrical Equipment

UL 674	Electric Motors and Generators for Use in Hazardous (Classified) Locations

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UL 1836	Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations

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UL 498E	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
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UL 1022	Line Isolation Monitors
UL 1047	Isolated Power Systems Equipment
UL 1286	Office Furnishing Systems
UL 2930	Cord-and-Plug-connected Health Care Facility Outlet Assemblies
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518 UL 498 Attachment Plugs and Receptacles

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UL 943	Ground-Fault Circuit-Interrupters

UL 943C	Special Purpose Ground-Fault Circuit-Interrupters

UL 2305	Exhibition Display Units, Fabrication and Installation

	UL 2305A	Convention Center Cord Sets
520	UL 62	Flexible Cords and Cables

UL 334	Theater Lighting Distribution and Control Equipment

UL 1573	Stage and Studio Luminaires and Connector Strips

UL 1640	Portable Power-Distribution Equipment

	UL 1691	Single Pole Locking-Type Separable Connectors
522	UL 13	Power Limited Circuit Cables

UL 1063	Machine-Tool Wires and Cables

	UL 2250	Instrumentation Tray Cable
525	UL 62	Flexible Cords and Cables

UL 817	Cord Sets and Power-Supply Cords

UL 943	Ground-Fault Circuit-Interrupters

UL 943C	Special Purpose Ground-Fault Circuit-Interrupters

	UL 1691	Single Pole Locking-Type Separable Connectors
530	UL 62	Flexible Cords and Cables

UL 1479	Fire Tests of Penetration Firestops

UL 1573	Stage and Studio Luminaires and Connector Strips

UL 1680	Stage and Lighting Cables
UL 1691	Single Pole Locking-Type Separable Connectors
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545 UL 5	Surface Metal Raceways and Fittings
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UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
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UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
UL 514A	Metallic Outlet Boxes

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 2024	Cable Routing Assemblies and Communications Raceways

547 UL 50 Enclosures for Electrical Equipment, Non-Environmental Considerations

UL 50E	Enclosures for Electrical Equipment, Environmental Considerations

UL 62	Flexible Cords and Cables

UL 514A	Metallic Outlet Boxes

UL 514B	Conduit, Tubing, and Cable Fittings

UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 1598	Luminaires

UL 2225	Cable and Cable Fittings for Use in Hazardous (Classified) Locations

550 UL 6 Electrical Rigid Metal Conduit — Steel

UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel

UL 83	Thermoplastic-Insulated Wires and Cables

UL 307A	Liquid Fuel-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles

UL 307B	Gas-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles

UL 360	Liquid-Tight Flexible Metal Conduit

UL 467	Grounding and Bonding Equipment

UL 498	Attachment Plugs and Receptacles
UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
UL 498E	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 817	Cord Sets and Power-Supply Cords
UL 1242	Electrical Intermediate Metal Conduit — Steel
UL 1462	Mobile Home Pipe Heating Cable
UL 1598	Luminaires
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UL 2108	Low-Voltage Lighting Systems
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551 UL 6	Electrical Rigid Metal Conduit — Steel
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UL 62	Flexible Cords and Cables
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UL 234	Low Voltage Lighting Fixtures for use in Recreational Vehicles
UL 360	Liquid-Tight Flexible Metal Conduit
UL 467	Grounding and Bonding Equipment
UL 486C	Splicing Wire Connectors
UL 498	Attachment Plugs and Receptacles
UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
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UL 2200	Stationary Engine Generator Assemblies
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
UL 60730-1	Automatic Electrical Controls; Part 1: General Requirements
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552 SAE J1128-2015	Low Voltage Primary Cable, for Types GXL, HDT, and SXL
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UL 6	Electrical Rigid Metal Conduit — Steel
UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations
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UL 62	Flexible Cords and Cables
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UL 817	Cord Sets and Power-Supply Cords
UL 916	Energy Management Equipment
UL 943	Ground-Fault Circuit-Interrupters
UL 1004-4	Electric Generators
UL 1242	Electrical Intermediate Metal Conduit — Steel

UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
UL 1598	Luminaires
UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
UL 2108	Low Voltage Lighting Systems
UL 2200	Stationary Engine Generator Assemblies
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

555 UL 6 Electrical Rigid Metal Conduit — Steel

UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
UL 231	Power Outlets
UL 486D	Sealed Wire Connector Systems
UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 676	Underwater Luminaires and Submersible Junction Boxes
UL 943	Ground-Fault Circuit-Interrupters
UL 1053	Ground-Fault Sensing and Relaying Equipment
UL 1650	Portable Power Cable
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

590 UL 496 Lampholders

UL 514B	Conduit, Tubing, and Cable Fittings

UL 588	Seasonal and Holiday Decorative Products
UL 817	Cord Sets
UL 943	Ground-Fault Circuit-Interrupters
UL 1088	Temporary Lighting Strings
UL 1377	Wire used in Low Voltage Seasonal Lighting Products In Circuits With a Maximum Available Power of 15W

600	UL 1	Flexible Metal Conduit
UL 5	Surface Metal Raceways and Fittings	
UL 5A	Nonmetallic Surface Raceways and Fittings	
UL 13	Power-Limited Circuit Cables	
UL 48	Electric Signs	
UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations	
UL 50E	Enclosures for Electrical Equipment, Environmental Considerations	
UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems	
UL 248-19	Low-Voltage Fuses — Part 19: Photovoltaic Fuses	
UL 360	Liquid-Tight Flexible Metal Conduit	

UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures For Use With Photovoltaic (PV) Systems
UL 508I	Disconnect Switches Intended for Use in Photovoltaic Systems
UL 814	Gas-Tube-Sign Cable
UL 879	Electric Sign Components
UL 879A	LED Sign and Sign Retrofit Kits
UL 879B	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
UL 943	Ground-Fault Circuit-Interrupters
UL 1310	Class 2 Power Units
UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
UL 1699B	Photovoltaic (PV) DC Arc-Fault Circuit Protection
UI 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
UL 2161	Neon Transformers and Power Supplies
UL 2703	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
UL 3001	Distributed Energy Generation and Storage Systems
UL 3003	Distributed Generation Cables

UL 3703	Solar Trackers
UL 4703	Photovoltaic Wire
UL 6703	Connectors for Use in Photovoltaic Systems
UL 7103	Investigation for Building-Integrated Photovoltaic Roof Coverings
UL 8703	Concentrator Photovoltaic Modules and Assemblies
UL 9703	Distributed Generation Wiring Harnesses
UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements For Construction
UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements For Testing
UL 62109	Power Converters for Use in Photovoltaic Power Systems — Part 1: General Requirements
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

604 UL 1 Flexible Metal Conduit

UL 4	Armored Cable
UL 5	Surface Metal Raceways and Fittings
UL 5A	Nonmetallic Surface Raceways and Fittings
UL 5B	Strut-Type Channel Raceways and Fittings
UL 5C	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits

	UL 62	Flexible Cords and Cables
	UL 183	Manufactured Wiring Systems
	UL 209	Cellular Metal Floor Raceways and Fittings
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 797	Electrical Metallic Tubing — Steel
	UL 797A	Electrical Metallic Tubing — Aluminum and Stainless Steel
	UL 857	Busways
	UL 1569	Metal-Clad Cables
	UL 2024	Cable Routing Assemblies and Communications Raceways
605	UL 962	Household and Commercial Furnishings
	UL 1286	Office Furnishings Systems
	UL 1310	Class 2 Power Units
	UL 2999	Individual Commercial Office Furnishings
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
610	UL 62	Flexible Cords and Cables
	UL 2273	Festoon Cable
620	UL 62	Flexible Cords and Cables

UL 83	Thermoplastic-Insulated Wires and Cables
UL 98	Enclosed and Dead-Front Switches
UL 104	Elevator Door Locking Devices and Contacts
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 508	Industrial Control Equipment
UL 508A	Industrial Control Panels
UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
UL 1310	Class 2 Power Units
UL 1449	Surge Protective Devices
UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
UL 2556	Wire and Cable Test Methods
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
625 UL 62	Flexible Cords And Cables
UL 1650	Portable Power Cable
UL 2202	Electric Vehicle (EV) Charging System Equipment
UL 2231-1	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits — Part 1: General Requirements

UL 2231-2	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits — Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
UL 2251	Plugs, Receptacles and Couplers for Electrical Vehicles
UL 2580	Batteries for Use in Electric Vehicles
UL 2594	Electric Vehicle Supply Equipment
UL 9741	Electric Vehicle Power Export Equipment (EVPE)
626 UL 62	Flexible Cords and Cables
UL 231	Power Outlets
UL 498	Attachment Plugs and Receptacles
UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
UL 498E	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
UL 498F	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
UL 817	Cord Sets and Power-Supply Cords
UL 1651	Optical Fiber Cable
UL 1686	Pin and Sleeve Configurations
630 UL 551	Transformer-Type Arc-Welding Machines
640 UL 13	Power Limited Circuit Cables
UL 62	Flexible Cords and Cables

UL 813	Commercial Audio Equipment
UL 1310	Class 2 Power Units
UL 1419	Professional Video and Audio Equipment
UL 1492	Audio-Video Products and Accessories
UL 1711	Amplifiers for Fire Protective Signaling Systems
UL 2269	Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes
UL 6500	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
UL 60065	Audio, Video and Similar Electronic Apparatus — Safety Requirements
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

645 UL 38 Manual Signaling Boxes for Fire Alarm Systems

UL 268	Smoke Detectors for Fire Alarm Systems
UL 444	Communications Cables
UL 464	Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
UL 497B	Protectors for Data Communications and Fire Alarm Circuits
UL 833	Control Units and Accessories for Fire Alarm Systems
UL 864	Control Units and Accessories for Fire Alarm Systems

UL 1424	Cables for Power-Limited Fire-Alarm Circuits
UL 1425	Cables for Non-Power-Limited Fire-Alarm Circuits
UL 1449	Surge Protective Devices
UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
UL 1638	Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
UL 1651	Optical Fiber Cable
UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
UL 1690	Data-Processing Cable
UL 1778	Uninterruptible Power Systems
UL 2024	Cable Routing Assemblies and Communications Raceways
UL 60950-1	Information Technology Equipment Safety — Part 1: General Requirements
UL 60950-21	Information Technology Equipment Safety — Part 21: Remote Power Feeding
UL 60950-22	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
UL 60950-23	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
646 UL 10C	Positive Pressure Fire Tests of Door Assemblies

UL 62	Flexible Cords and Cables
UL 67	Panelboards
UL 98	Enclosed and Dead-Front Switches
UL 305	Panic Hardware
UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 508	Industrial Control Equipment
UL 508A	Industrial Control Panels
UL 845	Motor Control Centers
UL 869A	Reference Standard for Service Equipment
UL 891	Switchboards
UL 924	Emergency Lighting and Power Equipment
UL 977	Fused Power-Circuit Devices
UL 1008	Transfer Switch Equipment
UL 1008A	Transfer Switch Equipment, Over 1000 Volts
UL 1008M	Meter-Mounted Transfer Switches

	UL 1008S	Solid-State Transfer Switches
	UL 1062	Unit Substations
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1429	Pullout Switches
	UL 1449	Surge Protective Devices
	UL 1655	Community-Antenna Television Cables
	UL 1989	Standby Batteries
	UL 2755	Modular Data Centers
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
647	UL 1598	Luminaires
650	UL 1310	Class 2 Power Units
	UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
670	ANSI/CSA-C22.2 No. 19085-1	Woodworking machines — Safety — Part 1: Common requirements
	UL 508	Industrial Control Equipment
	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
675	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables

UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
680 UL 6	Electrical Rigid Metal Conduit — Steel
UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
UL 20	General Use Snap-Switches
UL 62	Flexible Cords and Cables
UL 360	Liquid-Tight Flexible Metal Conduit
UL 379	Power Units for Fountain, Swimming Pool, and Spa Luminaires
UL 467	Grounding and Bonding Equipment
UL 486D	Sealed Wire Connector Systems
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 676	Underwater Luminaires and Submersible Junction Boxes
UL 676A	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
UL 943	Ground-Fault Circuit-Interrupters
UL 943C	Special Purpose Ground-Fault Circuit-Interrupters
UL 1004-10	Pool Pump Motors

UL 1081	Swimming Pool Pumps, Filters, and Chlorinators
UL 1241	Junction Boxes for Swimming Pool Luminaires
UL 1242	Electrical Intermediate Metal Conduit — Steel
UL 1261	Electric Water Heaters for Pools and Tubs
UL 1563	Electric Spas, Equipment Assemblies, and Associated Equipment
UL 1569	Metal-Clad Cables
UL 1660	Liquid-Tight Flexible Nonmetallic Conduit
UL 1795	Hydromassage Bathtubs
UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
UL 2452	Electric Swimming Pool and Spa Cover Operators
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
UL 2515A	Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
UL 2995	Lifts for Swimming Pools and Spas
UL 60335-2-1000	Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts
682 UL 486D	Sealed Wire Connector Systems
UL 1650	Portable Power Cable

	UL 1838	Low Voltage Landscape Lighting Systems
690	UL 98B	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 248-19	Low-Voltage Fuses — Part 19: Photovoltaic Fuses
	UL 467	Grounding and Bonding Equipment
	UL 489B	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures For Use With Photovoltaic (PV) Systems
	UL 508I	Disconnect Switches Intended for Use in Photovoltaic Systems
	UL 1569	Metal-Clad Cables
	UL 1699B	Photovoltaic (PV) DC Arc-Fault Circuit Protection
	UL 1703	Flat-Plate Photovoltaic Modules and Panels
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	UL 2703	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
	UL 3001	Distributed Energy Generation and Storage Systems
	UL 3003	Distributed Generation Cables
	UL 3005	Distributed Energy Resource Management Systems
	UL 3703	Solar Trackers
	UL 3730	Photovoltaic Junction Boxes

	UL 3741	Photovoltaic Hazard Control
	UL 4703	Photovoltaic Wire
	UL 6703	Connectors for Use in Photovoltaic Systems
	UL 7103	Investigation for Building-Integrated Photovoltaic Roof Coverings
	UL 8703	Concentrator Photovoltaic Modules and Assemblies
	UL 8801	Photovoltaic Luminaire Systems
	UL 9703	Distributed Generation Wiring Harnesses
	UL 61730-1	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 62109-1	Power Converters for Use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 62275	Cable Management Systems — Cable Ties for Electrical Installation
692	UL 2262	Fuel Cell Modules for Use in Portable and Stationary Equipment
	UL 2262A	Borohydride Fuel Cartridges with Integral Fuel Processing for Use with Portable Fuel Cell Power Systems or Similar Equipment
	UL 2265	Fuel Cell Power Units and Fuel Storage Containers for Portable Devices
	UL 2265A	Hand-held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for use in Original Equipment Manufacturer's Information Technology Equipment

	UL 2265C	Hand-Held or Hand-Transportable Alkaline (Direct Borohydride) Fuel Cell Power Units and Borohydride Fuel Cartridges For Use With Consumer Electronics or Information Technology Equipment
	UL 2266	Electromagnetic Compatibility, Electrical Safety, and Physical Protection of Stationary and Portable Fuel Cell Power Systems for Use with Commercial Network Telecommunications Equipment
	UL 2267	Fuel Cell Power Systems for Installation in Industrial Electric Trucks
694	UL 467	Grounding and Bonding Equipment
	UL 489C	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2227	Flexible Motor Supply Cable and Wind Turbine Tray Cable
	UL 2736	Single Pole Separable Interconnecting Cable Connectors for Use with Wind Turbine Generating Systems
	UL 4143	Wind Turbine Generator — Life Time Extension (LTE)
	UL 6141	Wind Turbines Permitting Entry of Personnel
	UL 6142	Wind Turbine Generating Systems — Small
695	UL 6	Electrical Rigid Metal Conduit — Steel
	UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 218	Fire Pump Controllers

UL 448	Centrifugal Stationary Pumps for Fire-Protection Service
UL 448B	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
UL 448C	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
UL 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 1004-5	Fire Pump Motors
UL 1242	Electrical Intermediate Metal Conduit — Steel
UL 1569	Metal-Clad Cables
UL 1724	Fire Tests for Electrical Circuit Protective Systems
UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

700	UL 924	Emergency Lighting and Power Equipment
UL 1008		Transfer Switch Equipment
UL 1008A		Transfer Switch Equipment, Over 1000 Volts
UL 1449		Surge Protective Devices
UL 1724		Fire Tests for Electrical Circuit Protective Systems

UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables

UL 2200	Stationary Engine Generator Assemblies

701	UL 924	Emergency Lighting and Power Equipment

UL 1008	Transfer Switch Equipment

UL 1008A	Transfer Switch Equipment, Over 1000 Volts

702	UL 98	Enclosed and Dead-Front Switches

UL 1008	Transfer Switch Equipment

UL 1008A	Transfer Switch Equipment, Over 1000 Volts

UL 1008M	Meter-Mounted Transfer Switches

UL 1008S	Solid-State Transfer Switches

705	UL 62	Flexible Cords and Cables

UL 98	Enclosed and Dead-Front Switches

UL 486D	Sealed Wire Connector Systems

UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures

UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures

UL 1429	Pullout Switches

UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources

UL 2200	Stationary Engine Generator Assemblies
UL 3003	Distributed Generation Cables
UL 6141	Wind Turbines Permitting Entry of Personnel
UL 6142	Small Wind Turbine Systems
UL 9540	Energy Storage Systems and Equipment
UL 62109-2	Power Converters for Use in Photovoltaic Power Systems — Part 2: Particular Requirements for Inverters
706 UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses
UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
UL 248-6	Low-Voltage Fuses — Part 6: Class H Non-Renewable Fuses
UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses
UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
UL 248-10	Low-Voltage Fuses — Part 10: Class L Fuses
UL 248-12	Low-Voltage Fuses — Part 12: Class R Fuses
UL 248-15	Low-Voltage Fuses — Part 15: Class T Fuses
UL 248-17	Low-Voltage Fuses — Part 17: Class CF Fuses

UL 248-18	Low-Voltage Fuses — Part 18: Class CD Fuses
UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 489H	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, for Use with Direct Current (DC) Microgrids
UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
UL 9540	Energy Storage Systems and Equipment
708 UL 1	Flexible Metal Conduit
UL 4	Armored Cable
UL 83	Thermoplastic-Insulated Wires and Cables
UL 360	Liquid-Tight Flexible Metal Conduit
UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
UL 497A	Secondary Protectors for Communications Circuits
UL 1008	Transfer Switch Equipment
UL 1008A	Transfer Switch Equipment, Over 1000 Volts
UL 1008M	Meter-Mounted Transfer Switches
UL 1008S	Solid-State Transfer Switches

	UL 1569	Metal-Clad Cables
	UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
710	UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2200	Stationary Engine Generator Assemblies
	UL 8801	Photovoltaic Luminaire Systems
	UL 9540	Energy Storage Systems and Equipment
	UL 62109-1	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 62109-2	Power Converters for Use in Photovoltaic Power Systems — Part 2: Particular Requirements for Inverters

722	UL 13	Standard for Power-Limited Circuit Cables
	UL 444	Standard for Safety for Communications Cables
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1651	Optical Fiber Cable
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts

	UL 1685	Standard for Safety for Vertical-Tray Fire-Propagation and Smoke- Release Test for Electrical and Optical-Fiber Cables
	UL 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2024	Standard for Safety for Communications Cables
	UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 2556	Standard for Wire and Cable Test Methods
725	UL 1310	Class 2 Power Units
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 9990	Information and Communication Technology (ICT) Power Cables
	UL 61010-2-201	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 2-201: Particular Requirements for Control Equipment
	UL 61800-5-1	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
726	UL 1400-1	Fault-Managed Power Systems — Part 1 General Requirements
	UL 1400-2	Fault-Managed Power Systems — Part 2 Requirements for Cables
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables

	UL 2556	Wire and Cable Test Methods
728	UL 5	Surface Metal Raceways and Fittings
	UL 5A	Nonmetallic Surface Raceways and Fittings
	UL 5B	Strut-Type Channel Raceways and Fittings
	UL 5C	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits
	UL 209	Cellular Metal Floor Raceways and Fittings
	UL 467	Grounding and Bonding Equipment
	UL 514A	Metallic Outlet Boxes
	UL 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 568	Nonmetallic Cable Tray Systems
	UL 884	Underfloor Raceways and Fittings
	UL 1724	Fire Tests for Electrical Circuit Protective Systems
	UL 2024	Cable Routing Assemblies and Communications Raceways
	UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
760	UL 268	Smoke Detectors for Fire Alarm Signaling Systems
	UL 268A	Smoke Detectors for Duct Application

	UL 486C	Splicing Wire Connectors
	UL 497B	Protectors for Data Communication and Fire Alarm Circuits
	UL 1424	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480	Speakers for Fire Alarm and Signaling Systems, Including Accessories
	UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 60730-2-14	Automatic Electrical Controls; Part 2: Particular Requirements for Electric Actuators
770	UL 467	Grounding and Bonding Equipment
	UL 568	Nonmetallic Cable Tray Systems
	UL 1651	Optical Fiber Cable
	UL 2024	Optical Fiber and Communication Cable Raceway
	UL 2196	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 62275	Cable Management Systems — Cable Ties for Electrical Installation
800	UL 444	Communications Cables

UL 467	Grounding and Bonding Equipment
UL 489A	Circuit Breakers for Use in Communication Equipment
UL 497	Protectors for Paired-Conductor Communications Circuits
UL 497A	Secondary Protectors for Communications Circuits
UL 497C	Protectors for Coaxial Communications Circuits
UL 497E	Protectors for Antenna Lead-In Conductors
UL 523	Telephone Service Drop Wire
UL 568	Nonmetallic Cable Tray Systems
UL 723	Test for Surface Burning Characteristics of Building Materials
UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
UL 1666	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
UL 1863	Communication Circuit Accessories
UL 2024	Cable Routing Assemblies and Communications Raceways
UL 62275	Cable Management Systems — Cable Ties for Electrical Installation

805 UL 444 Communications Cables

UL 497	Protectors for Paired-Conductor Communications Circuits
UL 497A	Secondary Protectors for Communications Circuits
UL 497C	Protectors for Coaxial Communications Circuits
UL 497E	Protectors for Antenna Lead-In Conductors
UL 523	Telephone Service Drop Wire
UL 719	Nonmetallic-Sheathed Cables
UL 1310	Class 2 Power Units
UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
UL 1685	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
UL 1863	Communication Circuit Accessories
UL 2043	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
UL 62275	Cable Management Systems — Cable Ties for Electrical Installation
UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

810 UL 150 Antenna Rotators

UL 452	Antenna-Discharge Units
UL 467	Grounding and Bonding Equipment

	UL 497E	Protectors for Antenna Lead-In Conductors
820	UL 444	Communications Cables

UL 497E	Protectors for Antenna Lead-In Conductors

	UL 1655	Community-Antenna Television Cables
830	UL 444	Communications Cables

UL 497A	Secondary Protectors for Communications Circuits

UL 497C	Protectors for Coaxial Communications Circuits

UL 497E	Protectors for Antenna Lead-In Conductors

	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
840	UL 444	Communications Cables

UL 467	Grounding and Bonding Equipment

UL 498A	Current Taps and Adapters

UL 1310	Class 2 Power Units

UL 1651	Optical Fiber Cable

UL 1863	Communication Circuit Accessories

UL 2024	Cable Routing Assemblies and Communications Raceways

	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
Tables 11(A) and 11(B)	UL 1310	Class 2 Power Units
	UL 1434	Thermistor-Type Devices
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
Tables 12(A) and 12(B)	UL 1310	Class 2 Power Units
	UL 1434	Thermistor-Type Devices
	UL 5085-3	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

Table A.1(b) Product Safety Standards for Conductors and Equipment That Do Not Have an Associated Listing Requirement

Article	Standard Number	Standard Title
110	UL 969	Marking and Labeling Systems
	UL 9691	Recommended Practice for Nameplates for Use in Electrical Installations
300	UL 635	Insulating Bushings
314	UL 514C	Conduit, Tubing, and Cable Fittings
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
320	UL 514A	Metallic Outlet Boxes
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
322	UL 5	Surface Metal Raceways and Fittings
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
324	UL 5	Surface Metal Raceways and Fittings
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
330	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
332	UL 1565	Positioning Devices
	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
334	UL 6	Electrical Rigid Metal Conduit — Steel
UL 6A	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel	

UL 514B	Conduit, Tubing, and Cable Fittings
UL 651	Schedule 40 and 80 Rigid PVC Conduit
UL 797	Electrical Metallic Tubing — Steel
UL 797A	Electrical Metallic Tubing — Aluminum and Stainless Steel
UL 1242	Electrical Intermediate Metal Conduit — Steel
UL 1565	Positioning Devices
UL 2239	Hardware for the Support of Conduit, Tubing and Cable
UL 2420	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
UL 2515	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
UL 2515A	Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

335	UL 2250	Instrumentation Tray Cable
337	UL 1565	Positioning Devices

	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
340	UL 493	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 635	Insulating Bushings

	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
344	UL 635	Insulating Bushings

	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
348	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
350	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
352	UL 635	Insulating Bushings

	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
353	UL 635	Insulating Bushings
355	UL 635	Insulating Bushings

	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
356	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
358	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
362	UL 2239	Hardware for the Support of Conduit, Tubing and Cable
368	UL 857	Busways
392	UL 568	Nonmetallic Cable Tray Systems
400	UL 62	Flexible Cords and Cables

UL 498	Attachment Plugs and Receptacles

UL 498B	Receptacles with Integral Switching Means

UL 498D	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts

UL 498E	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection

UL 514B	Conduit, Tubing, and Cable Fittings

UL 817	Cord Sets and Power-Supply Cords

UL 1650	Portable Power Cable

	UL 1680	Stage and Lighting Cables
402	UL 66	Fixture Wire
408	UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations

	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
424	UL 834	Heating, Water Supply, and Power Boilers — Electric

UL 1693	Electric Radiant Heating Panels and Heating Panel Sets

	UL 1995	Heating and Cooling Equipment
	UL 1996	Electric Duct Heaters
	UL 60335-1	Safety of Household and Similar Electrical Appliances, Part 1: General Requirements
	UL 60335-2-40	Household and Similar Electrical Appliances, Part 2–40
425	UL 834	Heating, Water Supply, and Power Boilers — Electric
426	UL 1588	Roof and Gutter De-Icing Cable Units
427	UL 515	Electrical Resistance Trace Heating for Commercial Applications
	UL 1462	Mobile Home Pipe Heating Cable
	UL 2049	Residential Pipe Heating Cable
430	UL 248-13	Low Voltage Fuses — Part 13: Semiconductor Fuses
445	UL 3001	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
450	UL 50	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E	Enclosures for Electrical Equipment, Environmental Considerations
	UL 248-1	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-8	Low-Voltage Fuses — Part 8: Class J Fuses

	UL 248-9	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 1561	Dry-Type General Purpose and Power Transformers
	UL 5085-2	Low Voltage Transformers — Part 2: General Purpose Transformers
460	UL 810	Capacitors
	UL 1283	Electromagnetic Interference Filters
	UL 60384-14	Fixed Capacitors for Use in Electronic Equipment — Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains
470	UL 508	Industrial Control Equipment
	UL 1283	Electromagnetic Interference Filters
500	ANSI/IEEE C2	National Electrical Safety Code, Section 127A, Coal Handling Areas
	API RP 14F	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1 and Division 2 Locations
	API RP 500	Recommended Practice for Classification of Locations of Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
	API RP 2003	Protection Against Ignitions Arising Out of Static Lightning and Stray Currents.
	ASHRAE 15	Safety Standard for Refrigeration Systems.
	ASME B1.20.1	Pipe Threads, General Purpose (Inch)
	IEEE 844.2	Standard for Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — Application Guide for Design, Installation, Testing, Commissioning, and Maintenance

IEEE 60079-30-2	IEEE/IEC International Standard for Explosive atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation, and maintenance
IIAR 2	Standard for Safe Design of Closed-Circuit Ammonia Refrigeration Systems
ISA-12.10	Area Classification in Hazardous (Classified) Dust Locations
ISO 965-1	ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data
ISO 965-3	ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads
NFPA 30	Flammable and Combustible Liquids Code
NFPA 32	Standard for Drycleaning Facilities
NFPA 33	Standard for Spray Application Using Flammable or Combustible Materials
NFPA 34	Standard for Dipping, Coating and Printing Processes Using Flammable or Combustible Liquids
NFPA 35	Standard for the Manufacture of Organic Coatings
NFPA 36	Standard for Solvent Extraction Plants
NFPA 45	Standard on Fire Protection for Laboratories Using Chemicals
NFPA 55	Compressed Gases and Cryogenic Fluids Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 59	Utility LP-Gas Plant Code

	NFPA 77	Recommended Practice on Static Electricity
	NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
	NFPA 499	Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installation in Chemical Process Areas
	NFPA 780	Standard for the Installation of Lightning Protection Systems
	NFPA 820	Standard for Fire Protection in Wastewater Treatment and Collection Facilities
	UL 60079-29-2	Explosive Atmospheres — Part 29-2: Gas detectors — Selection, installation, use and maintenance of detectors for flammable gases and oxygen
	UL 120002	Certificate Standard for AEx Equipment for Hazardous (Classified) Locations
	UL 120101	Definitions and Information Pertaining to Electrical Equipment in Hazardous (Classified) Locations
	UL 121303	Guide for Combustible Gas Detection as a Method of Protection
	UL RP 121203	Recommended Practice for Portable/Personal Electronic Products Suitable for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2, Class III, Division 1, Class III, Division 2, Zone 21 and 22 Hazardous (Classified) Locations
501	UL 62	Flexible Cord and Cable
	UL 504	Mineral-Insulated, Metal-Sheathed Cable
502	UL RP 121203	Recommended Practice for Portable/Personal Electronic Products Suitable for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2, Class III, Division 1, Class III, Division 2, Zone 21 and Zone 22 Hazardous (Classified) Locations
503	NFPA 505	Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations

	UL RP 121203	Recommended Practice for Portable/Personal Electronic Products Suitable for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2, Class III, Division 1, Class III, Division 2, Zone 21 and Zone 22 Hazardous (Classified) Locations
504	ISA-RP 12.06.01	Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety
505	ANSI/API RP 14FZ	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1, and Zone 2 Locations

API RP 505	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2

API RP 2003	Protection Against Ignitions Arising Out of Static Lightning and Stray Currents.

ASME B1.20.1	Pipe Threads, General Purpose (Inch)

EI 15	Model Code of Safe Practice, Part 15: Area Classification Code for Installations Handling Flammable Fluids

IEEE 844.2	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — Application Guide for Design, Installation, Testing, Commissioning, and Maintenance

IEEE 60079-30-2	Explosive Atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation and maintenance

IIAR 2	Standard for Safe Design of Closed-Circuit Ammonia Refrigeration Systems

ISA-60079-10-1 (12.24.01)	Explosive Atmospheres — Part 10-1: Classification of Areas — Explosive gas atmospheres

ISA-60079-29-2	Explosive Atmospheres — Part 29-2: Gas detectors — Selection, installation, use and maintenance of detectors for flammable gases and oxygen

ISO 965-1	ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data

ISO 965-3	ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads

NFPA 30	Flammable and Combustible Liquids Code

NFPA 77	Recommended Practice on Static Electricity

NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas

NFPA 780	Standard for the Installation of Lightning Protection Systems

UL 80079-20-1	Explosive Atmospheres — Part 20-1: Material Characteristics for Gas and Vapour Classification — Test Methods and Data

UL 120101	Definitions and Information Pertaining to Electrical Equipment in Hazardous (Classified) Locations

UL 121303	Guide for Use of Detectors for Flammable Gases

	UL RP 121203	Recommended Practice for Portable/Personal Electronic Products Suitable for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2, Class III, Division 1, Class III, Division 2, Zone 21 and Zone 22 Hazardous (Classified) Locations
506	ASME B1.20.1	Pipe Threads, General Purpose (Inch)

IEEE 844.2	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — Application Guide for Design, Installation, Testing, Commissioning, and Maintenance

IEEE 60079-30-2	Explosive Atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation and maintenance

ISA-60079-10-2 (12.10.05)	Explosive Atmospheres — Part 10-2: Classification of Areas — Combustible Dust Atmospheres

NFPA 499	Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installation in Chemical Process Areas

	UL RP 121203	Recommended Practice for Portable/Personal Electronic Products Suitable for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2, Class III, Division 1, Class III, Division 2, Zone 21 and Zone 22 Hazardous (Classified) Locations
511	NFPA 30A	Code for Motor Fuel Dispensing Facilities and Repair Garages

	NFPA 88A	Standard for Parking Structures
512	ICC IFC	International Fire Code

NFPA 1	Fire Code

NFPA 30	Flammable and Combustible Liquids Code

NFPA 33	Standard for Spray Application Using Flammable or Combustible Materials

NFPA 36	Standard for Solvent Extraction Plants

NFPA 58	Liquefied Petroleum Gas Code

NFPA 70B	Recommended Practice for Electrical Equipment Maintenance

	NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
513	NFPA 30	Flammable and Combustible Liquids Code

NFPA 33	Standard for Spray Application Using Flammable or Combustible Materials

	NFPA 409	Standard on Aircraft Hangars
514	NFPA 2	Hydrogen Technologies Code

NFPA 30A	Code for Motor Fuel Dispensing Facilities and Repair Garages

NFPA 52	Vehicular Natural Gas Fuel Systems Code

NFPA 58	Liquefied Petroleum Gas Code

	NFPA 59	Utility LP-Gas Plant Code
	NFPA 303	Fire Protection Standard for Marinas and Boatyards
515	NFPA 30	Flammable and Combustible Liquids Code
516	NFPA 13	Standard for the Installation of Sprinkler Systems
	NFPA 33	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 34	Standard for Dipping, Coating and Printing Processes Using Flammable or Combustible Liquids
	NFPA 77	Recommended Practice on Static Electricity
	NFPA 91	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids
	NFPA 701	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
620	UL 4	Armored Cable
	UL 44	Thermoset-Insulated Wires and Cables
	UL 66	Fixture Wire
	UL 504	Mineral Insulated Wire
	UL 1063	Machine-Tool Wires and Cables
	UL 1569	Metal Clad Cable
625	UL 3001	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
630	UL 1276	Welding Cable
650	UL 1651	Optical Fiber Cable
660	UL 62	Flexible Cords and Cables

	UL 817	Cord Sets and Power Supply Cords
668	UL 4	Armored Cable

	UL 62	Flexible Cords and Cables
670	UL 2011	Machinery
675	UL 44	Thermoset-Insulated Wires and Cables

UL 83	Thermoplastic-Insulated Wires and Cables

UL 83A	Fluoropolymer Insulated Wire

UL 1063	Machine-Tool Wires and Cables

	UL 1263	Irrigation Cable
690	UL 3001	Distributed Energy Generation and Storage Systems

	UL 3010	Single Site Energy Systems
691	UL 3001	Distributed Energy Generation and Storage Systems

	UL 3010	Single Site Energy Systems
692	UL 44	Thermoset-Insulated Wires and Cables

UL 83	Thermoplastic-Insulated Wires and Cables

UL 83A	Fluoropolymer Insulated Wire

UL 1063	Machine-Tool Wires and Cables

UL 3001	Distributed Energy Generation and Storage Systems

	UL 3010	Single Site Energy Systems
694	UL 44	Thermoset-Insulated Wires and Cables

UL 62	Flexible Cords and Cables

UL 83	Thermoplastic-Insulated Wires and Cables

UL 83A	Fluoropolymer Insulated Wire

UL 1063	Machine-Tool Wires and Cables

UL 3001	Distributed Energy Generation and Storage Systems

	UL 3010	Single Site Energy Systems
700	UL 3001	Distributed Energy Generation and Storage Systems
701	UL 3001	Distributed Energy Generation and Storage Systems
702	UL 3001	Distributed Energy Generation and Storage Systems
705	UL 3001	Distributed Energy Generation and Storage Systems

	UL 3010	Single Site Energy Systems
710	UL 3001	Distributed Energy Generation and Storage Systems

UL 3010	Single Site Energy Systems

Additional Proposed Changes

File Name	Description	Approved
NEC_Annex_A_Article_409_Absence_of_Voltage_Detection_Devices_submitted.docx	Annex A - Standards for voltage detection devices	

Statement of Problem and Substantiation for Public Input

This is a companion proposal to the proposal for Section 409.xx (NEW) which proposes a listing requirement for absence of voltage detection devices and absence of voltage testers. UL 1436 is a standard which covers absence of voltage testers, and UL 61010-1 and UL 61010-2-030 are standards for absence of voltage detection devices.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2409-NFPA 70-2023 [New Section after 409.30]	The related PI adds a listing requirement that necessitates the related standards to be added to Annex A
Public Input No. 2409-NFPA 70-2023 [New Section after 409.30]	

Submitter Information Verification

Submitter Full Name: John Kovacik
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Submittal Date: Wed Aug 16 21:37:30 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8154-NFPA 70-2024

Statement: Absence of voltage testers and detection devices do not have an associated listing requirement in this Code. Therefore, it is outside the scope of Table A.1(a).

While these aren't currently required to be Listed, the guidance for relevant products safety standards is useful in case installers, AHJ's, other authorities or relevant parties aren't aware of the appropriate standards and are within the scope of Table A.1(b).

PROPOSAL:

Table A.1(a) Product Safety Standards for Conductors and Equipment That Have an Associated Listing Requirement

Article	Standard Number	Standard Title
409	UL 1436	Outlet Circuit Testers and Other Similar Indicating Devices
	UL 61010-1	Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
	UL 61010-2-030	Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Testing and Measuring Circuits

RATONALE:

This is a companion proposal to the proposal for Section 409.xx (NEW) which proposes a listing requirement for absence of voltage detection devices and absence of voltage testers. UL 1436 is a standard which covers absence of voltage testers, and UL 61010-1 and UL 61010-2-030 are standards for absence of voltage detection devices.

Public Input No. 1809-NFPA 70-2023 [New Part after I.]

Add new Informational Note No. 6 under Section 430.1 to read:

430.1 Scope

Informational Note No. 6: See IEEE Std 3004.8, *IEEE Recommended Practice for Motor Protection for Industrial and Commercial Power Systems* , for additional information on ac and dc motor overload protection as well as motor branch-circuit short-circuit and ground-fault protection for fixed speed and adjustable speed drive applications for all voltages.

Statement of Problem and Substantiation for Public Input

IEEE Std 3004.8-2016 (formerly Chapter 10 of IEEE Std 242-2001, the Buff Book) provides industry-established recommended practices for the protection of all motors of all voltages. Adding new Informational Note No. 6 to Section 430.1 would aid the user with additional information that is not currently found in the National Electrical Code; and, some users may not know it exists.
Examples of information included in IEEE Std 3004.8 that apply to the NEC Sections are as follows:

- Motor circuit conductors in 430.21 General.
  -IEEE Std 3004.8 includes the conductor short-circuit temperature ratings in Table 5 which are used to show the conductor damage curve on time-current coordination plots (Figure 16) showing the motor branch-circuit conductors are protected by the overload and short-circuit devices.
- Motor and branch-circuit overload protection in 430.31 General.
  -IEEE Std 3004.8 includes Figure 11 showing thermal overload curves (time-current coordination plots) for cold and warm curves for Class 10, Class 20, and Class 30 overloads.
- Adjustable speed drive systems in 430.120 General.
  -IEEE Std 3004.8 includes Figure 47 showing typical adjustable speed drive internal overload protection (time-current coordination plots) for self-cooled motors with overload curves at 50 Hz, 20 Hz, 10 Hz, 5 Hz, 3 Hz, and 1 Hz.
- Motors over 1000 Volts, nominal in 430.201 General.
  -IEEE Std 3004.8 includes Table 6 listing the typical motor protection functions (typically in a multifunction motor protection relay) that would be used for Fused E2 contactor controlled induction motors, critical service breaker controlled induction motors, and critical service breaker controlled synchronous motors.
  -IEEE Std 3004.8 includes single-line and three-line schematic drawings for the protection which reduces application errors.
  -IEEE Std 3004.8 includes Figure 30 showing the ground fault overcurrent protection using a zero sequence CT to illustrate the proper termination of medium-voltage shielded conductors for proper operation of the ground fault protection.

Submitter Information Verification

Submitter Full Name: Lorraine Padden
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Submittal Date: Fri Aug 04 15:33:55 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-7922-NFPA 70-2024

Statement: Recommends acceptance of this informational note to the scope of article 430 while recognizing that the correlating committee has responsibility for scopes. Information provided in IEEE 3004.8 would provide additional data for motor & motor control application installations.

Public Input No. 777-NFPA 70-2023 [New Part after XIV.]

Table 430.250

This should be broken up into (2) separate tables for "induction type squirrel cage and wound rotor" and "synchronous type unity power factor" motor ampacities.

It's confusing the way it is layed out.

Statement of Problem and Substantiation for Public Input

Table 430.250 has (2) different tables of information combined into 1 table. It is confusing to use the synchronous table and the note for that table when it's combined with the main table. I think they should be separated, as they are different types of motors.

Submitter Information Verification

Submitter Full Name: Chad Privratsky
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Submittal Date: Mon May 08 20:36:49 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The public input is in violation of Regulations Governing the Development of NFPA Standards 4.3.4.1(c). There is no proposed text or table change provided. It is not clear how breaking this table into two tables would increase the usability of the Code.

Public Input No. 1400-NFPA 70-2023 [Part XIV.]

Part XIV. Tables

Table 430.247 Full-Load Current in Amperes, Direct-Current Motors

The following values of full-load currents* are for motors running at base speed.

Horsepower	Armature Voltage Rating*					
	90 Volts	120 Volts	180 Volts	240 Volts	500 Volts	550 Volts
¼	4.0	3.1	2.0	1.6	—	—
⅓	5.2	4.1	2.6	2.0	—	—
½	6.8	5.4	3.4	2.7	—	—
¾	9.6	7.6	4.8	3.8	—	—
1	12.2	9.5	6.1	4.7	—	—
1½	—	13.2	8.3	6.6	—	—
2	—	17	10.8	8.5	—	—
3	—	25	16	12.2	—	—
5	—	40	27	20	—	—
7½	—	58	—	29	13.6	12.2
10	—	76	—	38	18	16
15	—	—	—	55	27	24
20	—	—	—	72	34	31
25	—	—	—	89	43	38
30	—	—	—	106	51	46
40	—	—	—	140	67	61
50	—	—	—	173	83	75
60	—	—	—	206	99	90
75	—	—	—	255	123	111
100	—	—	—	341	164	148
125	—	—	—	425	205	185
150	—	—	—	506	246	222
200	—	—	—	675	330	294

*These are average dc quantities.

Table 430.248 Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and ~~220~~ 200 to 240 volts.

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
⅙	4.4	2.5	2.4	2.2
¼	5.8	3.3	3.2	2.9
⅓	7.2	4.1	4.0	3.6
½	9.8	5.6	5.4	4.9
¾	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1½	20	11.5	11.0	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
5	56	32.2	30.8	28
7½	80	46.0	44.0	40
10	100	57.5	55.0	50

Table 430.249 Full-Load Current, Two-Phase Alternating-Current Motors (4-Wire)

The following values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Current in the common conductor of a 2-phase, 3-wire system will be 1.41 times the value given. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)				
	115 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
½	4.0	2.0	1.0	0.8	—
¾	4.8	2.4	1.2	1.0	—
1	6.4	3.2	1.6	1.3	—
1½	9.0	4.5	2.3	1.8	—
2	11.8	5.9	3.0	2.4	—
3	—	8.3	4.2	3.3	—
5	—	13.2	6.6	5.3	—
7½	—	19	9.0	8.0	—
10	—	24	12	10	—
15	—	36	18	14	—
20	—	47	23	19	—
25	—	59	29	24	—
30	—	69	35	28	—
40	—	90	45	36	—
50	—	113	56	45	—
60	—	133	67	53	14
75	—	166	83	66	18
100	—	218	109	87	23
125	—	270	135	108	28
150	—	312	156	125	32
200	—	416	208	167	43

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)								
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts	-	2
½	4.4	2.5	2.4	2.2	1.1	0.9	—	-	
¾	6.4	3.7	3.5	3.2	1.6	1.3	—	-	
1	8.4	4.8	4.6	4.2	2.1	1.7	—	-	
1½	12.0	6.9	6.6	6.0	3.0	2.4	—	-	
2	13.6	7.8	7.5	6.8	3.4	2.7	—	-	
3	—	11.0	10.6	9.6	4.8	3.9	—	-	
5	—	17.5	16.7	15.2	7.6	6.1	—	-	
7½	—	25.3	24.2	22	11	9	—	-	
10	—	32.2	30.8	28	14	11	—	-	
15	—	48.3	46.2	42	21	17	—	-	
20	—	62.1	59.4	54	27	22	—	-	
25	—	78.2	74.8	68	34	27	—	-	53
30	—	92	88	80	40	32	—	-	63
40	—	120	114	104	52	41	—	-	83
50	—	150	143	130	65	52	—	-	10
60	—	177	169	154	77	62	16	-	12
75	—	221	211	192	96	77	20	-	15
100	—	285	273	248	124	99	26	-	20
125	—	359	343	312	156	125	31	-	25
150	—	414	396	360	180	144	37	-	30
200	-		552	528	480	240	192	49	-
250	—	—	—	—	302	242	60	-	
300	—	—	—	—	361	289	72	-	
350	—	—	—	—	414	336	83	-	
400	—	—	—	—	477	382	95	-	
450	—	—	—	—	515	412	103	-	
500	—	—	—	—	590	472	118	-	

*For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.

Table 430.251(A) Conversion Table of Single-Phase Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
½	58.8	32.5	29.4
¾	82.8	45.8	41.4
1	96	53	48
1½	120	66	60
2	144	80	72

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
3	204	113	102
5	336	186	168
7½	480	265	240
10	1000	332	300

Table 430.251(B) Conversion Table of Polyphase Design B, C, and D Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design B, C, and D*					
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts
	B, C, D	B, C, D	B, C, D	B, C, D	B, C, D	B, C, D
½	40	23	22.1	20	10	8
¾	50	28.8	27.6	25	12.5	10
1	60	34.5	33	30	15	12
1½	80	46	44	40	20	16
2	100	57.5	55	50	25	20
3	—	73.6	71	64	32	25.6
5	—	105.8	102	92	46	36.8
7½	—	146	140	127	63.5	50.8
10	—	186.3	179	162	81	64.8
15	—	267	257	232	116	93
20	—	334	321	290	145	116
25	—	420	404	365	183	146
30	—	500	481	435	218	174
40	—	667	641	580	290	232
50	—	834	802	725	363	290
60	—	1001	962	870	435	348
75	—	1248	1200	1085	543	434
100	—	1668	1603	1450	725	580
125	—	2087	2007	1815	908	726
150	—	2496	2400	2170	1085	868
200	—	3335	3207	2900	1450	1160
250	—	—	—	—	1825	1460
300	—	—	—	—	2200	1760
350	—	—	—	—	2550	2040
400	—	—	—	—	2900	2320
450	—	—	—	—	3250	2600
500	—	—	—	—	3625	2900

*Design A motors are not limited to a maximum starting current or locked rotor current.

Statement of Problem and Substantiation for Public Input

As Table 430.248 includes columns for 200V and 208V, the allowable system voltage ranges should cover 200-220V as well.

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 13 13:26:54 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The problem being addressed is unclear and how the change would improve clarity or safety needs better explanation. The values in this table are nominal voltages and cover the majority of systems addressed by the Code.

Public Input No. 1472-NFPA 70-2023 [Part XIV.]

Part XIV. Tables

Table 430.247 Full-Load Current in Amperes, Direct-Current Motors

The following values of full-load currents* are for motors running at base speed.

Horsepower	Armature Voltage Rating*					
	90 Volts	120 Volts	180 Volts	240 Volts	500 Volts	550 Volts
¼	4.0	3.1	2.0	1.6	—	—
⅓	5.2	4.1	2.6	2.0	—	—
½	6.8	5.4	3.4	2.7	—	—
¾	9.6	7.6	4.8	3.8	—	—
1	12.2	9.5	6.1	4.7	—	—
1½	—	13.2	8.3	6.6	—	—
2	—	17	10.8	8.5	—	—
3	—	25	16	12.2	—	—
5	—	40	27	20	—	—
7½	—	58	—	29	13.6	12.2
10	—	76	—	38	18	16
15	—	—	—	55	27	24
20	—	—	—	72	34	31
25	—	—	—	89	43	38
30	—	—	—	106	51	46
40	—	—	—	140	67	61
50	—	—	—	173	83	75
60	—	—	—	206	99	90
75	—	—	—	255	123	111
100	—	—	—	341	164	148
125	—	—	—	425	205	185
150	—	—	—	506	246	222
200	—	—	—	675	330	294

*These are average dc quantities.

Table 430.248 Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240 volts.

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
⅙	4.4	2.5	2.4	2.2
¼	5.8	3.3	3.2	2.9
⅓	7.2	4.1	4.0	3.6
½	9.8	5.6	5.4	4.9
¾	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1½	20	11.5	11.0	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
5	56	32.2	30.8	28
7½	80	46.0	44.0	40
10	100	57.5	55.0	50

Table 430.249 Full-Load Current, Two-Phase Alternating-Current Motors (4-Wire)

The following values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Current in the common conductor of a 2-phase, 3-wire system will be 1.41 times the value given. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)				
	115 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
½	4.0	2.0	1.0	0.8	—
¾	4.8	2.4	1.2	1.0	—
1	6.4	3.2	1.6	1.3	—
1½	9.0	4.5	2.3	1.8	—
2	11.8	5.9	3.0	2.4	—
3	—	8.3	4.2	3.3	—
5	—	13.2	6.6	5.3	—
7½	—	19	9.0	8.0	—
10	—	24	12	10	—
15	—	36	18	14	—
20	—	47	23	19	—
25	—	59	29	24	—
30	—	69	35	28	—
40	—	90	45	36	—
50	—	113	56	45	—
60	—	133	67	53	14
75	—	166	83	66	18
100	—	218	109	87	23
125	—	270	135	108	28
150	—	312	156	125	32
200	—	416	208	167	43

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)								
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts	-	2
½	4.4	2.5	2.4	2.2	1.1	0.9	—	-	
¾	6.4	3.7	3.5	3.2	1.6	1.3	—	-	
1	8.4	4.8	4.6	4.2	2.1	1.7	—	-	
1½	12.0	6.9	6.6	6.0	3.0	2.4	—	-	
2	13.6	7.8	7.5	6.8	3.4	2.7	—	-	
3	—	11.0	10.6	9.6	4.8	3.9	—	-	
5	—	17.5	16.7	15.2	7.6	6.1	—	-	
7½	—	25.3	24.2	22	11	9	—	-	
10	—	32.2	30.8	28	14	11	—	-	
15	—	48.3	46.2	42	21	17	—	-	
20	—	62.1	59.4	54	27	22	—	-	
25	—	78.2	74.8	68	34	27	—	-	53
30	—	92	88	80	40	32	—	-	63
40	—	120	114	104	52	41	—	-	83
50	—	150	143	130	65	52	—	-	10
60	—	177	169	154	77	62	16	-	12
75	—	221	211	192	96	77	20	-	15
100	—	285	273	248	124	99	26	-	20
125	—	359	343	312	156	125	31	-	25
150	—	414	396	360	180	144	37	-	30
200	-		552	528	480	240	192	49	-
250	—	—	—	—	302	242	60	-	
300	—	—	—	—	361	289	72	-	
350	—	—	—	—	414	336	83	-	
400	—	—	—	—	477	382	95	-	
450	—	—	—	—	515	412	103	-	
500	—	—	—	—	590	472	118	-	

*For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.

Table 430.251(A) Conversion Table of Single-Phase Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
½	58.8	32.5	29.4
¾	82.8	45.8	41.4
1	96	53	48
1½	120	66	60
2	144	80	72

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
3	204	113	102
5	336	186	168
7½	480	265	240
10	1000	332	300

Table 430.251(B) Conversion Table of Polyphase Design B, C, and D Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design B, C, and D*					
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts
	B, C, D	B, C, D	B, C, D	B, C, D	B, C, D	B, C, D
½	40	23	22.1	20	10	8
¾	50	28.8	27.6	25	12.5	10
1	60	34.5	33	30	15	12
1½	80	46	44	40	20	16
2	100	57.5	55	50	25	20
3	—	73.6	71	64	32	25.6
5	—	105.8	102	92	46	36.8
7½	—	146	140	127	63.5	50.8
10	—	186.3	179	162	81	64.8
15	—	267	257	232	116	93
20	—	334	321	290	145	116
25	—	420	404	365	183	146
30	—	500	481	435	218	174
40	—	667	641	580	290	232
50	—	834	802	725	363	290
60	—	1001	962	870	435	348
75	—	1248	1200	1085	543	434
100	—	1668	1603	1450	725	580
125	—	2087	2007	1815	908	726
150	—	2496	2400	2170	1085	868
200	—	3335	3207	2900	1450	1160
250	—	—	—	—	1825	1460
300	—	—	—	—	2200	1760
350	—	—	—	—	2550	2040
400	—	—	—	—	2900	2320
450	—	—	—	—	3250	2600
500	—	—	—	—	3625	2900

*Design A motors are not limited to a maximum starting current or locked rotor current.

Table 430.251(C) Conversion Table of Polyphase Design BE and CE Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Informational Note: Values in Table 430.251(C) should be carefully considered when replacing Design B, C, or D motors with Design BE or CE motors, which are capable of higher efficiency levels. Motor control devices tested for Design B, C, or D motors, such as those covered in UL 508 and UL 60947-4-1, may not have been evaluated to these higher locked rotor current values.

Additional Proposed Changes

File Name	Description	Approved
Table_430.251C_New.xlsx	Proposing addition of a new Table 430.251(C)	

Statement of Problem and Substantiation for Public Input

In Europe, manufacturers have been mandated to provide motors with Super Premium (IEC IE4) efficiency. To meet these higher efficiency levels, manufacturers have had to increase locked-rotor current levels. European manufacturers have established new Design letters NE and HE to accommodate these higher locked-rotor currents. NEMA and energy advocates have agreed upon Super Premium efficiency levels, which align closely with the IEC IE4 levels already in force in Europe, in a proposal that has been presented to the US Department of Energy. It is expected that during this NEC Code cycle, the US DoE will mandate these proposed efficiency values. To achieve this, locked-rotor current levels higher than Design B and C will be needed in the NEC in this cycle. These new Design letters are BE and CE and their locked-rotor current values are equivalent to IEC Designs NE and HE. These new Design letters are preferred to the existing Design A because they define an upper limit for locked-rotor current as opposed to being non-constrained, which promotes safety by aiding in the proper sizing of equipment in the motor branch circuit. New Design letters BE and CE and their maximum locked-rotor currents will be proposed in a revision to ANSI/NEMA MG 1-2021 during this Code cycle.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 1470-NFPA 70-2023 [Section No. 430.52(C)(3)]	
Public Input No. 3564-NFPA 70-2023 [Section No. 430.52(C)(6)]	
Public Input No. 3574-NFPA 70-2023 [Section No. 430.52(C)(7)]	
Public Input No. 3583-NFPA 70-2023 [Section No. 430.52(C)(1)]	

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 20 03:49:38 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: FR-8006-NFPA 70-2024

Statement: The addition of the new design BE and CE energy efficiency motors is the basis for the sizing of related components. The data in this table is based on the draft NEMA MG1 document slated to be published after the conclusion of this meeting. These motor designs have been developed to meet DOE requirements for energy efficiency.

Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design BE and CE						
Rated Horsepower	115 Volts BE, CE	200 Volts BE, CE	208 Volts BE, CE	230 Volts BE, CE	460 Volts BE, CE	575 Volts BE, CE
½	41.2	23.7	22.8	20.6	10.3	8.2
¾	53.3	30.7	29.5	26.7	13.3	10.7
1	63.6	36.6	35.2	31.8	15.9	12.7
1 ½	84.2	48.4	46.6	42.1	21.1	16.8
2	112	64.6	62.1	56.2	28.1	22.5
3		96.9	93.1	84.2	42.1	33.7
5		161	155	140	70.2	56.2
7 ½		242	233	211	105	84.2
10		301	290	262	131	105
15		452	435	393	197	157
20		603	580	524	262	210
25		753	724	655	328	262
30		904	869	786	393	314
40		1119	1076	973	487	389
50		1399	1345	1217	608	487
60		1679	1614	1460	730	584
75		2099	2018	1825	913	730
100		2583	2484	2246	1123	898
125		3229	3105	2808	1404	1123
150		3875	3726	3369	1685	1348
200		5166	4968	4492	2246	1797
250					2808	2246
300					3369	2695
350					3931	3145
400					4492	3594
450					5054	4043
500					5616	4492

Public Input No. 2793-NFPA 70-2023 [Part XIV.]

Part XIV. Tables

Table 430.247 Full-Load Current in Amperes, Direct-Current Motors

The following values of full-load currents* are for motors running at base speed.

Horsepower	Armature Voltage Rating*					
	90 Volts	120 Volts	180 Volts	240 Volts	500 Volts	550 Volts
¼	4.0	3.1	2.0	1.6	—	—
⅓	5.2	4.1	2.6	2.0	—	—
½	6.8	5.4	3.4	2.7	—	—
¾	9.6	7.6	4.8	3.8	—	—
1	12.2	9.5	6.1	4.7	—	—
1½	—	13.2	8.3	6.6	—	—
2	—	17	10.8	8.5	—	—
3	—	25	16	12.2	—	—
5	—	40	27	20	—	—
7½	—	58	—	29	13.6	12.2
10	—	76	—	38	18	16
15	—	—	—	55	27	24
20	—	—	—	72	34	31
25	—	—	—	89	43	38
30	—	—	—	106	51	46
40	—	—	—	140	67	61
50	—	—	—	173	83	75
60	—	—	—	206	99	90
75	—	—	—	255	123	111
100	—	—	—	341	164	148
125	—	—	—	425	205	185
150	—	—	—	506	246	222
200	—	—	—	675	330	294

*These are average dc quantities.

Table 430.248 Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240 volts - need columns for 277V & 480V Single phase motors

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
⅙	4.4	2.5	2.4	2.2
¼	5.8	3.3	3.2	2.9
⅓	7.2	4.1	4.0	3.6
½	9.8	5.6	5.4	4.9
¾	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1½	20	11.5	11.0	10
2	24	13.8	13.2	12

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7½	80	46.0	44.0	40
10	100	57.5	55.0	50

~~Table 430~~ Table Tennis 430 .249 Full-Load Current, Two-Phase Alternating-Current Motors (4-Wire)

The following values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Current in the common conductor of a 2-phase, 3-wire system will be 1.41 times the value given. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)				
	115 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
½	4.0	2.0	1.0	0.8	—
¾	4.8	2.4	1.2	1.0	—
1	6.4	3.2	1.6	1.3	—
1½	9.0	4.5	2.3	1.8	—
2	11.8	5.9	3.0	2.4	—
3	—	8.3	4.2	3.3	—
5	—	13.2	6.6	5.3	—
7½	—	19	9.0	8.0	—
10	—	24	12	10	—
15	—	36	18	14	—
20	—	47	23	19	—
25	—	59	29	24	—
30	—	69	35	28	—
40	—	90	45	36	—
50	—	113	56	45	—
60	—	133	67	53	14
75	—	166	83	66	18
100	—	218	109	87	23
125	—	270	135	108	28
150	—	312	156	125	32
200	—	416	208	167	43

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)								
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts	-	2
½	4.4	2.5	2.4	2.2	1.1	0.9	—	-	
¾	6.4	3.7	3.5	3.2	1.6	1.3	—	-	
1	8.4	4.8	4.6	4.2	2.1	1.7	—	-	
1½	12.0	6.9	6.6	6.0	3.0	2.4	—	-	
2	13.6	7.8	7.5	6.8	3.4	2.7	—	-	
3	—	11.0	10.6	9.6	4.8	3.9	—	-	
5	—	17.5	16.7	15.2	7.6	6.1	—	-	
7½	—	25.3	24.2	22	11	9	—	-	
10	—	32.2	30.8	28	14	11	—	-	
15	—	48.3	46.2	42	21	17	—	-	
20	—	62.1	59.4	54	27	22	—	-	
25	—	78.2	74.8	68	34	27	—	-	53
30	—	92	88	80	40	32	—	-	63
40	—	120	114	104	52	41	—	-	83
50	—	150	143	130	65	52	—	-	10
60	—	177	169	154	77	62	16	-	12
75	—	221	211	192	96	77	20	-	15
100	—	285	273	248	124	99	26	-	20
125	—	359	343	312	156	125	31	-	25
150	—	414	396	360	180	144	37	-	30
200	-		552	528	480	240	192	49	-
250	—	—	—	—	302	242	60	-	
300	—	—	—	—	361	289	72	-	
350	—	—	—	—	414	336	83	-	
400	—	—	—	—	477	382	95	-	
450	—	—	—	—	515	412	103	-	
500	—	—	—	—	590	472	118	-	

*For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.

Table 430.251(A) Conversion Table of Single-Phase Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
½	58.8	32.5	29.4
¾	82.8	45.8	41.4
1	96	53	48
1½	120	66	60
2	144	80	72

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
3	204	113	102
5	336	186	168
7½	480	265	240
10	1000	332	300

Table 430.251(B) Conversion Table of Polyphase Design B, C, and D Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design B, C, and D*					
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts
	B, C, D	B, C, D	B, C, D	B, C, D	B, C, D	B, C, D
½	40	23	22.1	20	10	8
¾	50	28.8	27.6	25	12.5	10
1	60	34.5	33	30	15	12
1½	80	46	44	40	20	16
2	100	57.5	55	50	25	20
3	—	73.6	71	64	32	25.6
5	—	105.8	102	92	46	36.8
7½	—	146	140	127	63.5	50.8
10	—	186.3	179	162	81	64.8
15	—	267	257	232	116	93
20	—	334	321	290	145	116
25	—	420	404	365	183	146
30	—	500	481	435	218	174
40	—	667	641	580	290	232
50	—	834	802	725	363	290
60	—	1001	962	870	435	348
75	—	1248	1200	1085	543	434
100	—	1668	1603	1450	725	580
125	—	2087	2007	1815	908	726
150	—	2496	2400	2170	1085	868
200	—	3335	3207	2900	1450	1160
250	—	—	—	—	1825	1460
300	—	—	—	—	2200	1760
350	—	—	—	—	2550	2040
400	—	—	—	—	2900	2320
450	—	—	—	—	3250	2600
500	—	—	—	—	3625	2900

*Design A motors are not limited to a maximum starting current or locked rotor current.

Additional Proposed Changes

File Name	Description	Approved
IMG_7925.jpeg	Table 430.248 i feel there should be columns for 277v & 480v single phase motors, i understand these are not common, but as an industrial electricain i often run into 277v motors and occasionally 480v single phase motors	

Statement of Problem and Substantiation for Public Input

Table 430.248 needs to have columns for 277 V and 480 V single phase motors
I know they’re not very common voltages, but as an industrial electrician, I run into 277 V motors a lot, and occasionally single phase 480 V motors

Submitter Information Verification

Submitter Full Name: Steven Walters
Organization: Midnightsun Electric Inc
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 24 22:28:07 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The public input is in violation of Regulations Governing the Development of NFPA Standards 4.3.4.1(c). There is no proposed text or table change provided. Adequate data was not provided to generate the requested information in this table.

Table 430.248 Single phase motors
I feel there should be columns for 277 V and 480 V Single phase motors
I understand these are not common single phase voltages, but as an industrial electrician, I often run into 277 V motors, and occasionally 480 V single phase motors

Public Input No. 3427-NFPA 70-2023 [Part XIV.]

Part XIV. Tables

Table 430.247 Full-Load Current in Amperes, Direct-Current Motors

The following values of full-load currents* are for motors running at base speed.

Horsepower	Armature Voltage Rating*					
	90 Volts	120 Volts	180 Volts	240 Volts	500 Volts	550 Volts
¼	4.0	3.1	2.0	1.6	—	—
⅓	5.2	4.1	2.6	2.0	—	—
½	6.8	5.4	3.4	2.7	—	—
¾	9.6	7.6	4.8	3.8	—	—
1	12.2	9.5	6.1	4.7	—	—
1½	—	13.2	8.3	6.6	—	—
2	—	17	10.8	8.5	—	—
3	—	25	16	12.2	—	—
5	—	40	27	20	—	—
7½	—	58	—	29	13.6	12.2
10	—	76	—	38	18	16
15	—	—	—	55	27	24
20	—	—	—	72	34	31
25	—	—	—	89	43	38
30	—	—	—	106	51	46
40	—	—	—	140	67	61
50	—	—	—	173	83	75
60	—	—	—	206	99	90
75	—	—	—	255	123	111
100	—	—	—	341	164	148
125	—	—	—	425	205	185
150	—	—	—	506	246	222
200	—	—	—	675	330	294

*These are average dc quantities.

Table 430.248 Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240 volts.

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
⅙	4.4	2.5	2.4	2.2
¼	5.8	3.3	3.2	2.9
⅓	7.2	4.1	4.0	3.6
½	9.8	5.6	5.4	4.9
¾	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1½	20	11.5	11.0	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
5	56	32.2	30.8	28
7½	80	46.0	44.0	40
10	100	57.5	55.0	50

Table 430.249 Full-Load Current, Two-Phase Alternating-Current Motors (4-Wire)

The following values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Current in the common conductor of a 2-phase, 3-wire system will be 1.41 times the value given. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)				
	115 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
½	4.0	2.0	1.0	0.8	—
¾	4.8	2.4	1.2	1.0	—
1	6.4	3.2	1.6	1.3	—
1½	9.0	4.5	2.3	1.8	—
2	11.8	5.9	3.0	2.4	—
3	—	8.3	4.2	3.3	—
5	—	13.2	6.6	5.3	—
7½	—	19	9.0	8.0	—
10	—	24	12	10	—
15	—	36	18	14	—
20	—	47	23	19	—
25	—	59	29	24	—
30	—	69	35	28	—
40	—	90	45	36	—
50	—	113	56	45	—
60	—	133	67	53	14
75	—	166	83	66	18
100	—	218	109	87	23
125	—	270	135	108	28
150	—	312	156	125	32
200	—	416	208	167	43

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, 550 to 600, and 2300 to 2400 volts.

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)								
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts	-	2
½	4.4	2.5	2.4	2.2	1.1	0.9	—	-	
¾	6.4	3.7	3.5	3.2	1.6	1.3	—	-	
1	8.4	4.8	4.6	4.2	2.1	1.7	—	-	
1½	12.0	6.9	6.6	6.0	3.0	2.4	—	-	
2	13.6	7.8	7.5	6.8	3.4	2.7	—	-	
3	—	11.0	10.6	9.6	4.8	3.9	—	-	
5	—	17.5	16.7	15.2	7.6	6.1	—	-	
7½	—	25.3	24.2	22	11	9	—	-	
10	—	32.2	30.8	28	14	11	—	-	
15	—	48.3	46.2	42	21	17	—	-	
20	—	62.1	59.4	54	27	22	—	-	
25	—	78.2	74.8	68	34	27	—	-	53
30	—	92	88	80	40	32	—	-	63
40	—	120	114	104	52	41	—	-	83
50	—	150	143	130	65	52	—	-	10
60	—	177	169	154	77	62	16	-	12
75	—	221	211	192	96	77	20	-	15
100	—	285	273	248	124	99	26	-	20
125	—	359	343	312	156	125	31	-	25
150	—	414	396	360	180	144	37	-	30
200	-		552	528	480	240	192	49	-
250	—	—	—	—	302	242	60	-	
300	—	—	—	—	361	289	72	-	
350	—	—	—	—	414	336	83	-	
400	—	—	—	—	477	382	95	-	
450	—	—	—	—	515	412	103	-	
500	—	—	—	—	590	472	118	-	

For full load currents of 416 and 400 volt motors, increase the corresponding 460 volt motor full-load current by 15 and 44 percent respectively.

*For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.

Table 430.251(A) Conversion Table of Single-Phase Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
½	58.8	32.5	29.4
¾	82.8	45.8	41.4
1	96	53	48

Rated Horsepower	Maximum Locked-Rotor Current in Amperes, Single-Phase		
	115 Volts	208 Volts	230 Volts
1½	120	66	60
2	144	80	72
3	204	113	102
5	336	186	168
7½	480	265	240
10	1000	332	300

Table 430.251(B) Conversion Table of Polyphase Design B, C, and D Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

For use only with 430.110, 440.12, 440.41, and 455.8(C).

Rated Horsepower	Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design B, C, and D*											
	115 Volts		200 Volts		208 Volts		230 Volts		460 Volts		575 Volts	
	B, C, D		B, C, D		B, C, D		B, C, D		B, C, D		B, C, D	
½	40	-	23	-	22.1	-	20	-	10	-	8	
¾	50	-	28.8	-	27.6	-	25	-	12.5	-	10	
1	60	-	34.5	-	33	-	30	-	15	-	12	
1½	80	-	46	-	44	-	40	-	20	-	16	
2	100	-	57.5	-	55	-	50	-	25	-	20	
3	—	-	73.6	-	71	-	64	-	32	-	25.6	
5	—	-	105.8	-	102	-	92	-	46	-	36.8	
7½	—	-	146	-	140	-	127	-	63.5	-	50.8	
10	—	-	186.3	-	179	-	162	-	81	-	64.8	
15	—	-	267	-	257	-	232	-	116	-	93	
20	—	-	334	-	321	-	290	-	145	-	116	
25	—	-	420	-	404	-	365	-	183	-	146	
30	—	-	500	-	481	-	435	-	218	-	174	
40	—	-	667	-	641	-	580	-	290	-	232	
50	—	-	834	-	802	-	725	-	363	-	290	
60	—	-	1001	-	962	-	870	-	435	-	348	
75	—	-	1248	-	1200	-	1085	-	543	-	434	
100	—	-	1668	-	1603	-	1450	-	725	-	580	
125	—	-	2087	-	2007	-	1815	-	908	-	726	
150	—	-	2496	-	2400	-	2170	-	1085	-	868	
200	—	-	3335	-	3207	-	2900	-	1450	-	1160	
250	—	-	—	-	—	-	—	-	1825	-	1460	
300	—	-	—	-	—	-	—	-	2200	-	1760	
350	—	-	—	-	—	-	—	-	2550	-	2040	
400	—	-	—	-	—	-	—	-	2900	-	2320	
450	—	-	—	-	—	-	—	-	3250	-	2600	

Rated Horsepower	Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design B, C, and D*					
	115 Volts - B, C, D	200 Volts - B, C, D	208 Volts - B, C, D	230 Volts - B, C, D	460 Volts - B, C, D	575 Volts - B, C, D
500	—	—	—	—	3625	2900

*Design A motors are not limited to a maximum starting current or locked rotor current.

Additional Proposed Changes

File Name	Description	Approved
416V_Nameplate.jpg	Example of 416V 60Hz motor.	

Statement of Problem and Substantiation for Public Input

416 Volt three phase systems are now being used widely enough that manufacturers such a Baldor have many motor offerings in that voltage class. 430.6 (A) (1) Directs the code user to these tables for determining the ampacity of conductors, current ratings of switches, and current ratings of branch circuit short circuit and ground-fault protection, however there is no column for 400 or 416 volt motors. Adding this note will assist code users with performing calculations in this voltage class. A similar note existed for many years for 200 and 208 volt motors. A 44% increase for 400V motors roughly corresponds to 1/2 the 200 Volt rating. Cross checking with motor manufacturers is encouraged.

Related Public Inputs for This Document

Related Input	Relationship
Public Input No. 2916-NFPA 70-2023 [Section No. 220.5(A)]	

Submitter Information Verification

Submitter Full Name: Stephen Schmiechen
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Sat Sep 02 19:36:51 EDT 2023
Committee: NEC-P11

Committee Statement

Resolution: The change to the FLA table should have a corresponding change to the LRC table. The proposed changes to the FLA table did not provide substantiation on where the required current was developed. Existing requirements in 430.6 provide guidance on sizing of the conductor.