



## Second Revision No. 8517-NFPA 70-2024 [ Global Comment ]

See attached Word file for revisions related to the phrase "to be installed" in Articles 424, 425 and 426.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_Global_SR8517.docx		
70_CMP17_Global_SR8517_for_ballot.docx	For ballot	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 13:26:31 EDT 2024

### Committee Statement

**Committee Statement:** The phrase "to be installed" is redundant to the scope of the NEC in 90.2(C) in most applications and therefore was removed or modified as needed.

**Response Message:** SR-8517-NFPA 70-2024

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**Article 424:**

**424.13 Spacing from Combustible Materials.**

Fixed electric space-heating equipment shall be installed to provide the required spacing between the equipment and adjacent combustible material, unless it is listed ~~to be installed in for~~ direct contact with combustible material.

**424.48 Installation of Cables in Walls.**

Unless prohibited by 424.38(B), heating cables and cable sets shall be permitted ~~to be installed in~~, on, or behind walls provided all of the following are met:

- (1) Heating cables and cable sets shall be identified as suitable for installation in, on, or behind walls.
- (2) Heating cables and cable sets shall be GFCI protected.
- (3) Grounding means, such as copper braid, metal sheath, or other approved means, shall be provided.
- (4) Heating cables and cable sets shall be AFCI protected.
- (5) Heating cables and cable sets shall be permitted ~~to be installed~~ no more than 1.2 m (4 ft) above the floor.

This requirement shall become effective January 1, 2026.

**424.93 Installation.**

**(A) General.**

**(3) Separation from Outlets for Luminaires.**

Edges of panels and panel sets shall be separated by not less than 200 mm (8 in.) from the edges of any outlet boxes and junction boxes that are to be used for mounting surface luminaires. A clearance of not less than 50 mm (2 in.) shall be provided from recessed luminaires and their trims, ventilating openings, and other such openings in room surfaces, unless the heating panels and panel sets are listed and marked for lesser clearances, in which case they shall be permitted ~~to be installed~~ at the marked clearances. Sufficient area shall be provided to ensure that no heating panel or heating panel set is to be covered by any surface-mounted equipment.

**424.93 Installation.**

**(C) Installation of Heating Panels in Walls.**

Unless prohibited by 424.93(A)(2), heating panels shall be permitted ~~to be installed in~~, on, or behind walls provided all of the following are met:

- (1) Heating panels shall be identified as suitable for installation in, on, or behind walls.
- (2) Heating panels shall be installed per the manufacturer's instructions and in accordance with the product listing.
- (3) Heating panels shall be GFCI protected.
- (4) Grounding means, such as copper braid, metal sheath, or other approved means, shall be provided.
- (5) Heating panels shall be AFCI protected.
- (6) Heating panels shall be permitted ~~to be installed~~ no more than 1.2 m (4 ft) above the floor.

*Exception: Low-voltage heating panels shall not be required to be GFCI protected.*

This requirement shall become effective January 1, 2026.

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**Article 425:**

**425.13 Spacing from Combustible Materials.**

Fixed industrial process heating equipment shall be installed to provide the required spacing between the equipment and adjacent combustible material, unless it is listed ~~to be installed in for~~ direct contact with combustible material.

**Article 426:**

**426.20(C) Cover.**

Units, panels, or cables shall be installed as follows:

- (1) On a substantial concrete, masonry, or asphalt base at least 50 mm (2 in.) thick and have at least 38 mm (~~1~~<sup>1</sup>/<sub>2</sub> in.) of concrete, masonry, or asphalt applied over the units, panels, or cables; or
- (2) They shall be permitted ~~to be installed~~ over other identified bases and embedded within 90 mm (~~3~~<sup>1</sup>/<sub>2</sub> in.) of concrete, masonry, or asphalt but not less than 38 mm (~~1~~<sup>1</sup>/<sub>2</sub> in.) from the top surface; or
- (3) Equipment that has been listed for other forms of installation shall be installed only in the manner for which it has been identified.

**426.26 Corrosion Protection.**

Ferrous and nonferrous metal raceways, cable armor, cable sheaths, boxes, fittings, supports, and support hardware shall be permitted ~~to be installed~~ in concrete or in direct contact with the earth, or in areas subject to severe corrosive influences, where made of material suitable for the condition, or where provided with corrosion protection identified as suitable for the condition.

**426.43 Corrosion Protection.**

Ferromagnetic envelopes, ferrous or nonferrous metal raceways, boxes, fittings, supports, and support hardware shall be permitted ~~to be installed~~ in concrete or in direct contact with the earth, or in areas subjected to severe corrosive influences, where made of material suitable for the condition, or where provided with corrosion protection identified as suitable for the condition. Corrosion protection shall maintain the original wall thickness of the ferromagnetic envelope.



## Second Revision No. 8375-NFPA 70-2024 [ Detail ]

**[Relocate as shown and renumber subsequent sections]**

### **680.22(D) 29 Portable Signs.**

Portable electric signs shall not be placed within pools or within 1.5 m (5 ft) measured horizontally from the inside walls of a pool.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_680.22_SR8375.docx	For Staff Use	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 13:22:00 EDT 2024

### Committee Statement

**Committee Statement:** The proposed relocation of 680.29 into first level subdivision D under 680.22 improves clarity and aligns with overall layout of NEC style manual. This relocation does not alter technical content. Additionally, 680.22(D) and (E) were re-lettered to maintain proper sequence.

**Response Message:** SR-8375-NFPA 70-2024

[Public Comment No. 23-NFPA 70-2024 \[Section No. 680.29\]](#)

[Public Comment No. 22-NFPA 70-2024 \[New Section after 680.22\(C\)\]](#)



## Second Revision No. 8441-NFPA 70-2024 [ Detail ]

### 422.5

Detail SR-8441

**(D) Type and Location.**

The GFCI shall be readily accessible, listed, and located in one or more of the following locations:

- (1) Within the branch-circuit ~~overcurrent protective device~~OCPD
- (2) In a device or outlet within the supply circuit
- (3) In an integral part of the attachment plug
- (4) Within the supply cord not more than 300 mm (12 in.) from the attachment plug
- (5) Factory installed within the appliance

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 18:54:23 EDT 2024

### Committee Statement

**Committee Statement:** Article 422 was editorially revised to include the acronym "OCPD" as recommended by PC-1657.

**Response Message:** SR-8441-NFPA 70-2024



## Second Revision No. 8508-NFPA 70-2024 [ Detail ]

### 422.5(B) Appliances.

The following appliances shall be GFCI protected:

- (1) Automotive vacuum machines
- (2) Drinking water coolers and bottle fill stations
- (3) ~~Cord-and-plug-connected~~ High-pressure spray washing machines
- (4) Tire inflation machines
- (5) Vending machines
- (6) Sump pumps
- (7) Dishwashers

Informational Note No. 1: See 210.8 for GFCI protection requirements for branch-circuit outlets where covered locations warrant such protection.

Informational Note No. 2: Electrically cooled drinking water fountains are one type of drinking water cooler.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_422.5_B_SR8508.docx	For Staff Use	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 12:05:36 EDT 2024

### Committee Statement

**Committee Statement:** Item (3) was updated to remove "Cord and plug connect" to correlate with previous requirements that were in 210.8(D) since appliances are under the purview of Article 422.

**Response Message:** SR-8508-NFPA 70-2024

Public Comment No. 1164-NFPA 70-2024 [Section No. 422.5(B)]



## Second Revision No. 8550-NFPA 70-2024 [ Detail ]

[See attached Word file for New Part VI to Article 426 and renumber existing Part VI]

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_NewArticle426.60_SR8550.docx		
70_CMP17_NewArticle426.60_Detail_SR8550.docx	For editorial use only	
NEC_Detail_SR-8550_426.60_for_ballot.docx	For ballot	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 17:16:32 EDT 2024

### Committee Statement

**Committee Statement:** A new Part VI has been added to Article 426 to address conductive pavement heating systems, based on Public Input 4168 and Public Comment 1735.

These requirements establish oversight by licensed professional engineers with documentation to be provided to the Authority Having Jurisdiction.

The unique site-specific nature of these installations need this for the AHJ to make the final approval decision.

Hazardous locations and near swimming pools and similar environments were added as Prohibited Locations to reduce the likelihood of ignition of flammable materials in these environments and to reduce the risk of electric shock.

The operating voltage is limited to 30 Volts RMS or 60 Volts DC and must be from an ungrounded source in line with accepted industry standards for applications where persons may be exposed and to further limit surface contact voltage for any contact by persons.

Wiring methods specific to these kinds of installations were established to ensure that any penetrations into the conductive pavement were with nonmetallic raceways and that metal from wiring methods or any equipment anchors in contact with the conductive pavement were nonmetallic to mitigate potential shock hazards. Language was added to ensure that surface mounted structures are electrically isolated from the pavement to mitigate corrosion and electric shock hazards.

Overtemperature protection requirements were established to mitigate possible burn hazards to any persons contacting the conductive pavement system surface. The overtemperature protection requirements of 426.68 were revised to expand the maximum surface temperature to 109°F, as the submitted 60°F is not hazardous and may not result in a functioning system. The issue of automatic de-energization is better

handled in the product safety standard and was removed.

Section 426.70 was revised to change the “embedment” requirements to “cover” requirements for accuracy. The types of support hardware were removed in favor of a simple requirement that they be nonconductive, making this section less of a design specification.

The language regarding transformers in 426.74 was revised to include all power supplies because the system can be a dc system.

Editorial revisions were made to remove text that was repetitive to other provisions in Part VI, and to comply with the NEC Style Manual.

The testing and documentation requirements of 426.82 were consolidated, as much of the material is already covered in other sections, such as 426.64(B).

Section 426.84 was reduced for simplicity while still addressing the safety concerns therein.

A new requirement for signage was added in 426.88. Although 426.13 applies to these installations, more specific signage was deemed necessary due to the unique nature of these installations.

The former Part VI (Control and Protection) was renumbered to Part VII, and sections 426.50 and 426.51 were renumbered to 426.90 and 426.91, respectively.

The listing requirements for these systems were added to 426.2.

CMP-17 did not accept the public comment (PC-1735) verbatim for the following reasons:

Much of the submitted material was considered redundant to the requirements of Chapters 1-4 and was therefore deleted.

There was much design criteria that was considered outside the purpose of the NEC, as indicated in 90.2(A). That material was removed.

Material that was better addressed in a product safety standard was also removed.

**Response** SR-8550-NFPA 70-2024  
**Message:**

[Public Comment No. 1735-NFPA 70-2024 \[Sections Part VI., 426.50, 426.51\]](#)

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## **Part VI. Conductive Pavement Heating Systems**

### **426.60 General.**

Conductive pavement heating systems shall comply with Article 426 Parts I, II, VI, and VII.

### **426.62 Prohibited Locations.**

#### **(A) Hazardous (Classified) Locations.**

Conductive pavement heating systems shall not be installed in any hazardous (classified) location.

#### **(B) Swimming Pools, Spas, Fountains, and Similar Locations.**

Conductive pavement heating systems shall not be installed in any location covered in 680.1.

### **426.64 Engineering.**

#### **(A) Site Specific Design.**

Engineering design shall be in accordance with 426.64(A)(1) and 426.64(A)(2).

#### **(1) Pavement Material Design.**

The pavement material design shall be in accordance with the following:

- (1) Designed by a licensed professional civil engineer
- (2) Designed for the specific installation site within the limits of the listing

#### **(2) Electrical Design.**

Conductive pavement heating systems shall be in accordance with the following:

- (1) Designed by a licensed professional electrical engineer
- (2) Designed for the specific installation site within the limits of the listing

#### **(B) Documentation.**

Documentation shall comply with 426.64(B)(1) and 426.64(B)(2).

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### **(1) General.**

Design, testing, and compliance documentation of the system shall be provided to the owner and the authority having jurisdiction (AHJ).

### **(2) Electrodes.**

The electrode material type, size, and placement of the electrodes shall be specified in the documentation.

Informational Note: Examples of the documentation include but are not limited to pavement mixture specifications, pavement wet conductivity test report, as-built drawings, and commissioning test reports.

## **426.66 Installation.**

### **(A) Engineering Supervision.**

Conductive pavement heating systems shall be installed under the supervision of the design engineers in accordance with 426.64.

### **(B) Commissioning.**

The electrical design engineer shall conduct or witness the commissioning of the system.

## **426.68 Overtemperature Protection.**

### **(A) Surface Temperature Limits.**

Conductive pavement systems shall have surface overtemperature protection to limit surface temperatures to not greater than 43°C (109°F).

### **(B) Overtemperature Protection.**

The overtemperature protection shall be part of the listed system.

## **426.70 Conductive Pavement Heating System.**

### **(A) Electrode Cover.**

Embedded electrodes shall be covered by not less than 50 mm (2 in.) of conductive pavement on top of the electrode.

### **(B) Support and Securement.**

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Electrodes and supply conductors within the conductive pavement shall be supported and secured in place by nonmetallic means while the conductive pavement is placed.

**(C) Expansion and Contraction.**

Electrodes and supply conductors shall not be installed where they bridge expansion joints unless provisions are made for expansion, contraction or other movement.

**(D) Flexural Capability.**

Electrodes and associated equipment shall have a flexural capability that is compatible with the movement of the pavement.

**426.72 Operating Voltage.**

The operating voltage of the conductive pavement system electrodes shall not exceed 30 volts ac or 60 volts dc.

**426.74 Power Supply.**

The power supply to the electrodes shall be an ungrounded system.

**426.76 Wiring Methods**

**(A) Electrode Supply Conductors.**

The power supply conductors shall be directly buried or installed in nonmetallic raceways.

**(B) Sensor and Control Conductors.**

Sensor and control conductors shall be installed in accordance with the following:

- (1) Nonmetallic raceways shall be required for all sensor and control conductors installed in the conductive pavement.
- (2) Sensor and control conductors installed above the conductive pavement shall be installed in nonmetallic raceways for any penetration through the conductive pavement.
- (3) Metal wiring methods installed above the conductive pavement shall not have any contact with the conductive pavement.

**(C) Other Electrical Equipment.**

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Electrical equipment, other than electrode supply conductors and sensor and control conductors, installed above the conductive pavement shall comply with all of following:

- (1) All penetrations through the conductive pavement shall be made with nonmetallic raceways.
- (2) Metal raceways installed above the conductive pavement shall not have any contact with the conductive pavement.

#### **426.78 Electrical Connections.**

##### **(A) Electrode Connections.**

Electrical connections to the electrodes within the conductive pavement shall be one of the following:

- (1) Exothermic welding
- (2) Irreversible crimp-type terminal complying with all of the following:
  - a. Connectors shall be listed for direct burial or concrete encasement.
  - b. Connectors shall be installed with stainless steel bolts, washers, and nuts.

##### **(B) Accessibility.**

After inspection, the connection to the electrode shall not be required to be accessible.

#### **426.82 Conductive Pavement Material Testing.**

The conductive pavement material mixture shall be tested for its electrical resistance, in accordance with the design, as it is placed.

#### **426.84 Mounting of Equipment or Other Structures.**

Only nonmetallic anchors, fasteners, support hardware, structures, or penetrations shall be permitted in or on the conductive pavement, unless electrically isolated from the pavement.

#### **426.88 Signage.**

The complete system shall have signs stating the following or equivalent:

**WARNING**  
**RISK OF FIRE AND/OR ELECTRIC SHOCK**

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Conductive pavement installed.

Do not penetrate pavement with any metallic components.

## **Part VII. Control and Protection**

### **426.90 Disconnecting Means.**

#### **(A) Disconnection.**

All fixed outdoor deicing and snow-melting equipment shall be provided with a means for simultaneous disconnection from all ungrounded conductors. Where readily accessible to the user of the equipment, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means. The disconnecting means shall be the indicating type and be lockable open in accordance with 110.25.

#### **(B) Cord- and- Plug-Connected Equipment.**

The factory-installed attachment plug of cord- and- plug-connected equipment rated 20 amperes or less and 150 volts or less to ground shall be permitted to be the disconnecting means.

### **426.91 Controllers.**

#### **(A) Temperature Controller with "Off" Position.**

Temperature-controlled switching devices that indicate an "off" position and that interrupt line current shall open all ungrounded conductors when the control device is in the "off" position. These devices shall not be permitted to serve as disconnecting means unless they are lockable open in accordance with 110.25.

#### **(B) Temperature Controller Without "Off" Position.**

Temperature-controlled switching devices that do not have an "off" position shall not be required to open all ungrounded conductors. These devices shall not be permitted to serve as disconnecting means.

#### **(C) Remote Temperature Controller.**

Remote-controlled temperature-actuated devices shall not be required to meet the requirements of 426.91(A). These devices shall not be permitted to serve as disconnecting means.

#### **(D) Combined Switching Devices.**

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Switching devices consisting of combined temperature-actuated devices and manually controlled switches that serve both as the controller and disconnecting means shall comply with all of the following conditions:

- (1) Open all ungrounded conductors when manually placed in the "off" position
- (2) Be so designed that the circuit cannot be energized automatically if the device has been manually placed in the "off" position
- (3) Be lockable open in accordance with 110.25



## Second Revision No. 8418-NFPA 70-2024 [ Definition: Appliance. ]

### Appliance.

Utilization equipment, generally other than industrial, that is normally built in a standardized size or type and is installed or connected as a unit to perform one or more functions ~~such as clothes washing, air conditioning, food mixing, and deep frying~~. (CMP-17)

Informational Note: Examples of appliances are clothes washers, air conditioners, food mixers, and deep fryers.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NEC_CMP-17_SR-8418_Appliance.docx		

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 17:48:30 EDT 2024

### Committee Statement

**Committee Statement:** The examples of appliances were moved to a new informational note to comply with the NEC Style Manual 2.1.2.5. The appliance functions were changed to refer to the appliances (“washing” to “washers”, “frying” to “fryers”, etc)

**Response Message:** SR-8418-NFPA 70-2024

[Public Comment No. 479-NFPA 70-2024 \[Definition: Appliance.\]](#)

[Public Comment No. 5-NFPA 70-2024 \[Definition: Appliance.\]](#)



## Second Revision No. 8400-NFPA 70-2024 [ Definition: Pool, Permanently Installed Swimming, Wading, I... ]

**Pool, Permanently Installed ~~Swimming, Wading, Immersion, and Therapeutic~~ .  
(Permanently Installed ~~Swimming, Wading, Immersion, and Therapeutic~~ Pools)**

These ~~A pool~~ that ~~are~~ is permanently constructed or installed in the ground, partially in the ground, above ground, inside of a building, or on a building, whether or not served by electrical circuits. (680) (CMP-17)

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:40:52 EDT 2024

### Committee Statement

**Committee Statement:** The descriptors “Swimming, Wading.....” were removed from the definition title, as these are already used in the definition of Pool. Additionally, “Those” was changed to “A pool” for clarity.

**Response Message:** SR-8400-NFPA 70-2024

[Public Comment No. 496-NFPA 70-2024 \[Definition: Pool, Permanently Installed Swimming, Wading, I...\]](#)



## Second Revision No. 8401-NFPA 70-2024 [ Definition: Pool, Storable (Storable Immersion Pool). (Stor... ]

### Pool, Storable\_ (Storable Immersion Pool): (Storable Pool)

Pools of any water depth, used for swimming, wading, or immersion, installed entirely on or above the ground that are intended to be stored when not in use or are designed for ease of relocation. (680) (CMP-17)

~~Informational Note: A storable pool that is installed with a permanent deck around all or a portion of its perimeter is considered a permanently installed pool.~~

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:44:37 EDT 2024

### Committee Statement

**Committee Statement:** Informational note that was included was an interpretation of the definition. This would not comply with the NEC Style Manual (2.1.10.2). Therefore, this was relocated to 680.30 as a requirement.

**Response Message:** SR-8401-NFPA 70-2024

[Public Comment No. 495-NFPA 70-2024 \[Definition: Pool, Storable \(Storable Immersion Pool\). \(Stor...\]](#)

[Public Comment No. 7-NFPA 70-2024 \[Definition: Pool, Storable \(Storable Immersion Pool\). \(Stor...\]](#)



## Second Revision No. 8406-NFPA 70-2024 [ Definition: Pool. ]

### Pool.

Manufactured or field-constructed equipment designed to contain water and intended for use by persons for swimming, wading, immersion, recreational, or therapeutic purposes, ~~but not including bodies of water incorporated as part of an industrial process, lakes, lagoons, surf parks, or other natural and artificially made bodies of water that could incorporate swimming and swimming areas .~~ (680) (CMP-17)

Informational Note No. 1: A leisure river attraction is a type of pool.

Informational Note No. 2: Bodies of water incorporated as part of an industrial process, lakes, lagoons, surf parks, or other natural and artificially made bodies of water that could incorporate swimming and swimming areas are not pools. Natural and man-made artificially made bodies of water, which includes lakes, lagoons, surf parks, or other similar bodies of water, are addressed in Article 682.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_Article100_SR8406.docx	Staff Use Only	
70_CMP17_Article100_SR8406_Pool.docx	For prod use	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 16:38:44 EDT 2024

### Committee Statement

**Committee Statement:** “Leisure river attraction” was added as a new informational note to clarify that this type of attraction is a pool and subject to the applicable provisions of Art 680. The term “Leisure River” is used instead of “Lazy River” to correlate with other codes such as ISPSC (International Swimming Pool and Spa Code).

Informational Note 2 was added to clarify what is not a pool, and this was removed from the body of the Definition, in accordance with Correlating Committee PC 494.

**Response Message:** SR-8406-NFPA 70-2024

[Public Comment No. 494-NFPA 70-2024 \[Definition: Pool.\]](#)

[Public Comment No. 8-NFPA 70-2024 \[Definition: Pool.\]](#)



## Second Revision No. 8553-NFPA 70-2024 [ New Definition after Definition:

### Concealed Knob-and-Tube Wi... ]

#### Conductive Pavement Heating System.

A system in which heat is generated by passing current through the pavement material and between electrodes embedded within the pavement material. (426)(CMP-17).

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 17:29:30 EDT 2024

### Committee Statement

**Committee Statement:** This definition is necessary for the proper application of the new Part VI of Article 426 and to recognize this new technology.

**Response Message:** SR-8553-NFPA 70-2024

[Public Comment No. 1733-NFPA 70-2024 \[New Definition after Definition: Concealed Knob-and-Tube Wi...\]](#)



## Second Revision No. 8447-NFPA 70-2024 [ New Section after 422.5(B) ]

(C) High Frequency (HF) GFCI Protection.

If GFCI protection is provided for the following appliances, the GFCI shall be identified as high frequency (HF):

- (1) Refrigerators
- (2) HVAC appliances

This requirement shall become effective January 1, 2029.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 19:19:35 EDT 2024

### Committee Statement

**Committee Statement:** UL 943 is anticipated to be updated to include new specifications for a High Frequency (HF) GFCI. This GFCI will be required due to efficiency regulations which will require incorporation of High Frequency components in these appliances. Use of an updated GFCI on an appliance will help to reduce instances of unwanted tripping. An effective date was included since currently there are no listed products meeting this requirement.

**Response Message:** SR-8447-NFPA 70-2024

Public Comment No. 1900-NFPA 70-2024 [Section No. 422.5]



## Second Revision No. 8505-NFPA 70-2024 [ Section No. 422.5(B) ]

[Detail SR-8508](#)

### (B) Appliances.

The following appliances shall be GFCI protected:

- (1) Automotive vacuum machines
- (2) Drinking water coolers and bottle fill stations
- (3) ~~Cord- and plug-connected high~~ High-pressure spray washing machines
- (4) Tire inflation machines
- (5) Vending machines
- (6) Sump pumps
- (7) Dishwashers
- (8) Electric ranges
- (9) Wall-mounted ovens
- (10) Counter-mounted cooking units
- (11) Clothes dryers
- (12) Microwave ovens

Informational Note No. 1: See 210.8 for GFCI protection requirements for branch-circuit outlets where covered locations warrant such protection.

Informational Note No. 2: Electrically cooled drinking water fountains are one type of drinking water cooler.

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 11:53:35 EDT 2024

## Committee Statement

**Committee Statement:** The list of appliances was modified to incorporate existing GFCI requirements in 210.8(D) and relocated here since appliances are under the purview of Article 422.

**Response Message:** SR-8505-NFPA 70-2024

[Public Comment No. 1014-NFPA 70-2024 \[Section No. 422.5\(B\)\]](#)

[Public Comment No. 1082-NFPA 70-2024 \[Section No. 422.5\(B\)\]](#)

[Public Comment No. 1275-NFPA 70-2024 \[Section No. 422.5\(B\)\]](#)

[Public Comment No. 1853-NFPA 70-2024 \[Section No. 422.5\(B\)\]](#)

[Public Comment No. 686-NFPA 70-2024 \[Section No. 422.5\]](#)



## Second Revision No. 8432-NFPA 70-2024 [ Section No. 422.11 ]

### 422.11 Overcurrent Protection.

Appliances shall be protected against overcurrent in accordance with 422.11(A) through 422.11(G) and 422.10.

#### (A) Branch-Circuit Overcurrent Protection.

Branch circuits shall be protected in accordance with 240.4.

If a ~~protective device rating~~ an appliance is marked ~~on~~ with an ~~appliance~~ OCPD rating, the branch-circuit ~~overcurrent protective device~~ OCPD rating shall not exceed that marked rating.

#### (B) Household-Type Appliances with Surface Heating Elements.

Household-type appliances with surface heating elements having a maximum demand of more than 60 amperes calculated in accordance with Table 120.55 shall have their power supply subdivided into two or more circuits, each of which shall be provided with ~~overcurrent protection~~ OCPDs rated at not over 50 amperes.

#### (C) Infrared Lamp Commercial and Industrial Heating Appliances.

Infrared lamp commercial and industrial heating appliances shall have ~~overcurrent protection~~ OCPDs not exceeding 50 amperes.

#### (D) Open-Coil or Exposed Sheathed-Coil Types of Surface Heating Elements in Commercial-Type Heating Appliances.

Open-coil or exposed sheathed-coil types of surface heating elements in commercial-type heating appliances shall be protected by ~~overcurrent protective devices~~ OCPDs rated at not over 50 amperes.

#### (E) Single Non-Motor-Operated Appliance.

If the branch circuit supplies a single non-motor-operated appliance, the rating of overcurrent protection shall comply with the following:

- (1) Not exceed the overcurrent protection rating marked on the appliance.
- (2) Not exceed 20 amperes if the overcurrent protection rating is not marked and the appliance is rated 13.3 amperes or less.
- (3) Not exceed 150 percent of the appliance rated current if the ~~overcurrent protection~~ OCPD rating is not marked and the appliance is rated over 13.3 amperes. Where 150 percent of the appliance rating does not correspond to a standard ~~overcurrent device~~ OCPD ampere rating, the next higher standard rating shall be permitted.

#### (F) Electric Heating Appliances Employing Resistance-Type Heating Elements Rated More Than 48 Amperes.

##### (1) Electric Heating Appliances.

Electric heating appliances employing resistance-type heating elements rated more than 48 amperes, other than household appliances with surface heating elements covered by 422.11(B); and commercial-type heating appliances covered by 422.11(D), shall have the heating elements subdivided. Each subdivided load shall not exceed 48 amperes, and each subdivided load shall be protected at not more than 60 amperes.

These supplementary ~~overcurrent protective devices~~ OCPDs shall be (1) factory-installed within or on the heater enclosure or provided as a separate assembly by the heater manufacturer; , (2) accessible; , and (3) suitable for branch-circuit protection.

The main conductors supplying these ~~overcurrent protective devices~~ OCPDs shall be considered branch-circuit conductors.

**(2) Commercial Kitchen and Cooking Appliances.**

Commercial kitchen and cooking appliances using sheathed-type heating elements not covered in 422.11(D) shall be permitted to be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes where one of the following is met:

- (1) Elements are integral with and enclosed within a cooking surface.
- (2) Elements are completely contained within an enclosure identified as suitable for this use.
- (3) Elements are contained within an ASME-rated and stamped vessel.

**(3) Water Heaters and Steam Boilers.**

Resistance-type immersion electric heating elements shall be permitted to be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes as follows:

- (1) Where contained in ASME-rated and stamped vessels
- (2) Where included in listed instantaneous water heaters
- (3) Where installed in low-pressure water heater tanks or open-outlet water heater vessels

Informational Note: See IEC 60335-2-21, *Household and similar electrical appliances — Safety — Particular requirements for storage water heaters*, for information on low-pressure and open-outlet heaters are atmospheric pressure water heaters.

**(G) Motor-Operated Appliances.**

Motors of motor-operated appliances shall be provided with overload protection in accordance with Article 430; Part III. Hermetic refrigerant motor-compressors in air-conditioning or refrigerating equipment shall be provided with overload protection in accordance with Article 440; Part VI. Where appliance overcurrent protective devices that are separate from the appliance are required, data for selection of these devices shall be marked on the appliance. The minimum marking shall be that specified in 430.7 and 440.4.

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 18:29:22 EDT 2024

## Committee Statement

**Committee Statement:** Article 422 was editorially revised to include the acronym “OCPD” as recommended by PC-1657.

Section 422.11 (charging statement) was not changed because it was determined that “provided with overcurrent protection” alludes to the appliance containing the overcurrent protection device instead of simply being protected against overcurrent by an external device.

Section 422.11(A) was editorially revised for clarity.

**Response Message:** SR-8432-NFPA 70-2024



## Second Revision No. 8434-NFPA 70-2024 [ Section No. 422.31(A) ]

**(A)** Appliances of any Volt-Ampere Rating or Not Over  $\frac{1}{8}$  Horsepower.

For permanently connected appliances of any volt-ampere rating or not over  $\frac{1}{8}$  hp, the branch-circuit ~~overcurrent protective device~~ OCPD shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance or be lockable open in accordance with 110.25.

Informational Note: See 422.34 for appliances employing unit switches.

### Submitter Information Verification

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### Committee Statement

**Committee Statement:** Article 422 was editorially revised to include the acronym "OCPD" as recommended by PC-1657.

**Response Message:** SR-8434-NFPA 70-2024



## Second Revision No. 8457-NFPA 70-2024 [ Section No. 422.41 ]

### **422.41** Cord- and- Plug-Connected Appliances Subject to Immersion.

Cord- and- plug-connected ~~portable~~ , freestanding hydromassage units and hand-held hair dryers shall be constructed to provide protection for personnel against electrocution when immersed.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 20:00:40 EDT 2024

### Committee Statement

**Committee Statement:** The word "portable" does not add any extra clarification to the requirement and is therefore removed.

**Response Message:** SR-8457-NFPA 70-2024



## Second Revision No. 8436-NFPA 70-2024 [ Section No. 422.62(B)(1) ]

### (1) Marking.

In addition to the marking required in 422.60, the marking on an appliance consisting of a motor with other load(s) or motors with or without other load(s) shall specify the minimum supply circuit conductor ampacity and the maximum rating of the circuit ~~overcurrent protective device~~ OCPD. This requirement shall not apply to an appliance with a nameplate in compliance with 422.60 where both the minimum supply circuit conductor ampacity and maximum rating of the circuit ~~overcurrent protective device~~ OCPD are not more than 15 amperes.

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**Response Message:** SR-8436-NFPA 70-2024



## Second Revision No. 8509-NFPA 70-2024 [ Section No. 424.4 ]

### 424.4 Branch Circuits.

#### (A) Individual Branch-Circuit-Requirements .

An individual branch circuit shall be permitted to supply any volt-ampere or wattage rating of fixed electric space-heating equipment for which the branch circuit is rated.

~~Branch circuits supplying two or more outlets for fixed electric space-heating equipment shall be rated not over 30 amperes. In other than a dwelling unit, fixed infrared heating equipment shall be permitted to be supplied from branch circuits rated not over 50 amperes.~~

#### (B) Multioutlet Branch Circuits.

Branch circuits supplying two or more outlets for fixed electric space-heating equipment shall be rated not over 30 amperes.

#### (C) Other than Dwelling Units.

In other than a dwelling unit, fixed infrared heating equipment shall be permitted to be supplied from branch circuits rated not over 50 amperes.

#### ~~(B) Branch-Circuit Conductor Sizing.~~

~~The branch-circuit conductor(s) ampacity shall not be less than 125 percent of the load of the fixed electric space-heating equipment and any associated motor(s).~~

### 424.5 Continuous Load.

~~The branch-circuit conductor(s) ampacity shall not be less than 125 percent of the load of the fixed~~ Fixed ~~electric space-heating equipment and any associated motor(s) shall be considered a continuous load .~~

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_424.4_SR8509.docx	Staff Use Only	
70_CMP17_424.4_SR8509.docx	For prod use	

## Submitter Information Verification

**Committee:** NEC-P17

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## Committee Statement

**Committee Statement:** The requirement for rating of continuous load was moved to new section 424.5. The existing section 424.4 was updated to meet the NEC Style Manual (3.5.1.1). These changes clarify that fixed electric space-heating equipment is a continuous load for conductor sizing and overcurrent protective device ratings for branch circuits, feeders, and services.

**Response Message:** SR-8509-NFPA 70-2024

Public Comment No. 96-NFPA 70-2024 [Section No. 424.4(B)]



## Second Revision No. 8522-NFPA 70-2024 [ Section No. 424.19(A) [Excluding any Sub-Sections] ]

The disconnecting means for fixed electric space-heating equipment with supplementary overcurrent protection shall be within sight from the supplementary ~~overcurrent protective device(s)~~ OCPDs, on the supply side of these devices, if fuses, and, in addition, shall comply with either 424.19(A)(1) or 424.19(A)(2).

### Submitter Information Verification

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### Committee Statement

**Committee Statement:** Revisions were made to utilize acronyms as required by NEC Style Manual (2.1.2.9) to improve usability as recommended by PC-1657.

**Response Message:** SR-8522-NFPA 70-2024



## Second Revision No. 8521-NFPA 70-2024 [ Section No. 424.19 [Excluding any Sub-Sections] ]

Means shall be provided to simultaneously disconnect the heater, motor controller(s), and supplementary ~~overcurrent protective device(s)~~ OCPDs of all fixed electric space-heating equipment from all ungrounded conductors. Where heating equipment is supplied by more than one source, feeder, or branch circuit, the disconnecting means shall be grouped and identified as having multiple disconnecting means. Each disconnecting means shall simultaneously disconnect all ungrounded conductors that it controls. The disconnecting means specified in 424.19(A) and 424.19(B) shall have an ampere rating not less than 125 percent of the total load of the motors and the heaters and shall be capable of being locked in the open position in compliance with 110.25.

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**Response Message:** SR-8521-NFPA 70-2024



## Second Revision No. 8524-NFPA 70-2024 [ Section No. 424.22 ]

### 424.22 Overcurrent Protection.

#### (A) Branch-Circuit Devices.

Electric space-heating equipment, other than motor-operated equipment required to have additional overcurrent protection by Article 430, Parts III and IV, or Article 440, Parts III and VI, shall be permitted to ~~be protected against overcurrent~~ have overcurrent protection where supplied by one of the branch circuits specified in Article 210, Part II.

#### (B) Resistance Elements.

Resistance-type heating elements in electric space-heating equipment shall be protected at not more than 60 amperes. Equipment rated more than 48 amperes and employing such elements shall have the heating elements subdivided, and each subdivided load shall not exceed 48 amperes. Where a subdivided load is less than 48 amperes, the rating of the supplementary ~~overcurrent protective device~~ OCPD shall comply with ~~424.5~~ 424.4(B). A boiler employing resistance-type immersion heating elements contained in an ASME-rated and stamped vessel shall be permitted to comply with 424.72(A).

#### (C) Overcurrent Protective Devices.

Supplementary ~~overcurrent protective devices~~ OCPDs for the subdivided loads specified in 424.22(B) shall meet all of the following conditions:

- (1) Be factory-installed within or on the heater enclosure or supplied for use with the heater as a separate assembly by the heater manufacturer
- (2) Be accessible
- (3) Be suitable for branch-circuit protection

Where cartridge fuses are used to provide overcurrent protection for subdivided loads, a single disconnecting means shall be permitted to be used as the disconnecting means for all of the subdivided loads.

Informational Note No. 1: See 240.10 for supplementary overcurrent protection.

Informational Note No. 2: See 240.40 for disconnecting means for cartridge fuses in circuits of any voltage.

#### (D) Branch-Circuit Conductors.

The conductors supplying the supplementary ~~overcurrent protective devices~~ OCPDs shall be considered branch-circuit conductors.

Where the heaters are rated 50 kW or more, the conductors supplying the supplementary ~~overcurrent protective devices~~ OCPDs specified in 424.22(C) shall be permitted to be sized at not less than 100 percent of the nameplate rating of the heater, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature-actuated device controls the cyclic operation of the equipment.

**(E) Conductors for Subdivided Loads.**

Field-wired conductors between the heater and the supplementary ~~overcurrent protective devices~~ OCPDs shall be sized at not less than 125 percent of the load served. The supplementary ~~overcurrent protective devices~~ OCPDs specified in 424.22(C) shall protect these conductors in accordance with 240.4.

Where the heaters are rated 50 kW or more, the ampacity of field-wired conductors between the heater and the supplementary overcurrent protective devices shall be permitted to be not less than 100 percent of the load of their respective subdivided circuits, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature-activated device controls the cyclic operation of the equipment.

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**Response Message:** SR-8524-NFPA 70-2024



## Second Revision No. 8525-NFPA 70-2024 [ Section No. 424.72 ]

### **424.72** Overcurrent Protection.

**(A)** Boiler Employing Resistance-Type Immersion Heating Elements in an ASME-Rated and Stamped Vessel.

A boiler employing resistance-type immersion heating elements contained in an ASME-rated and stamped vessel shall have the heating elements protected at not more than 150 amperes. Such a boiler rated more than 120 amperes shall have the heating elements subdivided into loads not exceeding 120 amperes.

Where a subdivided load is less than 120 amperes, the rating of the ~~overcurrent protective device~~ OCPD shall comply with ~~424.5~~ 424.4(B).

**(B)** Boiler Employing Resistance-Type Heating Elements Rated More Than 48 Amperes and Not Contained in an ASME-Rated and Stamped Vessel.

A boiler employing resistance-type heating elements not contained in an ASME-rated and stamped vessel shall have the heating elements protected at not more than 60 amperes. Such a boiler rated more than 48 amperes shall have the heating elements subdivided into loads not exceeding 48 amperes.

Where a subdivided load is less than 48 amperes, the rating of the ~~overcurrent protective device~~ OCPD shall comply with ~~424.5~~ 424.4(B).

**(C)** Supplementary Overcurrent Protective Devices.

The supplementary ~~overcurrent protective devices~~ OCPDs for the subdivided loads as required by 424.72(A) and 424.72(B) shall be as follows:

- (1) Factory-installed within or on the boiler enclosure or provided as a separate assembly by the boiler manufacturer
- (2) Accessible, but need not be readily accessible
- (3) Suitable for branch-circuit protection

Where cartridge fuses are used to provide this overcurrent protection, a single disconnecting means shall be permitted for the several subdivided circuits. See 240.40.

**(D)** Conductors Supplying Supplementary Overcurrent Protective Devices.

The conductors supplying these supplementary ~~overcurrent protective devices~~ OCPDs shall be considered branch-circuit conductors.

Where the heaters are rated 50 kW or more, the conductors supplying the ~~overcurrent protective device~~ OCPD specified in 424.72(C) shall be permitted to be sized at not less than 100 percent of the nameplate rating of the heater, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size and conductor insulation temperature rating.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature- or pressure-actuated device controls the cyclic operation of the equipment.

**(E) Conductors for Subdivided Loads.**

Field-wired conductors between the heater and the supplementary ~~overcurrent protective devices~~ OCPD s shall be sized at not less than 125 percent of the load served. The supplementary overcurrent protective devices specified in 424.72(C) shall protect these conductors in accordance with 240.4.

Where the heaters are rated 50 kW or more, the ampacity of field-wired conductors between the heater and the supplementary overcurrent protective devices shall be permitted to be not less than 100 percent of the load of their respective subdivided circuits, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature-activated device controls the cyclic operation of the equipment.

## Submitter Information Verification

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**Response Message:** SR-8525-NFPA 70-2024



## Second Revision No. 8537-NFPA 70-2024 [ Section No. 424.82 ]

### **424.82** Branch-Circuit Requirements.

The size of branch-circuit conductors and ~~overcurrent protective devices~~ OCPDs shall be calculated on the basis of 125 percent of the total load (motors not included). A contactor, relay, or other device, approved for continuous operation at 100 percent of its rating, shall be permitted to supply its full-rated load. See 210.19(A) Exception to (1). The provisions of this section shall not apply to conductors that form an integral part of an approved boiler.

Where an electrode boiler is rated 50 kW or more, the conductors supplying the boiler electrode(s) shall be permitted to be sized at not less than 100 percent of the nameplate rating of the electrode boiler, provided all the following conditions are met:

- (1) The electrode boiler is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature- or pressure-actuated device controls the cyclic operation of the equipment.

### **Submitter Information Verification**

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**Response Message:** SR-8537-NFPA 70-2024



## Second Revision No. 8512-NFPA 70-2024 [ Section No. 425.2 ]

**425.2** ~~Listed~~ Listing Requirements.

Fixed industrial process heating equipment shall be listed.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 13:01:48 EDT 2024

### Committee Statement

**Committee Statement:** This change corrects a typographical error in the First Draft text.

**Response Message:** SR-8512-NFPA 70-2024

Public Comment No. 11-NFPA 70-2024 [Section No. 425.2]

Public Comment No. 752-NFPA 70-2024 [Section No. 425.2]



## Second Revision No. 8527-NFPA 70-2024 [ Section No. 425.19(A) [Excluding any Sub-Sections] ]

The disconnecting means for fixed industrial process heating equipment with supplementary overcurrent protection shall be within sight from the supplementary ~~overcurrent protective device(s)~~ OCPDs, on the supply side of these devices, if fuses, and, in addition, shall comply with either 425.19(A)(1) or 425.19(A)(2).

### Submitter Information Verification

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## Second Revision No. 8526-NFPA 70-2024 [ Section No. 425.19 [Excluding any Sub-Sections] ]

Means shall be provided to simultaneously disconnect the heater, motor controller(s), and supplementary ~~overcurrent protective device(s)~~ OCPDs of all fixed industrial process heating equipment from all ungrounded conductors. Where heating equipment is supplied by more than one source, feeder, or branch circuit, the disconnecting means shall be grouped and identified as having multiple disconnecting means. Each disconnecting means shall simultaneously disconnect all ungrounded conductors that it controls. The disconnecting means specified in 425.19(A) and 425.19(B) shall have an ampere rating not less than 125 percent of the total load of the motors and heaters and be lockable open in accordance with 110.25.

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**Response Message:** SR-8526-NFPA 70-2024



## Second Revision No. 8528-NFPA 70-2024 [ Section No. 425.22 ]

### 425.22 Overcurrent Protection.

#### (A) Branch-Circuit Devices.

Fixed industrial process heating equipment, other than motor-operated equipment required to have additional overcurrent protection by Article 430, Parts III and IV, or Article 440, Part III, shall be permitted to ~~be protected against overcurrent~~ have overcurrent protection where supplied by one of the branch circuits in Article 210, Part II.

#### (B) Resistance Elements.

Resistance-type heating elements in fixed industrial process heating equipment shall be protected at not more than 60 amperes. Equipment rated more than 48 amperes and employing such elements shall have the heating elements subdivided, and each subdivided load shall not exceed 48 amperes.

Resistance-type heating elements in fixed industrial process heating equipment shall be permitted to be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes where one of the following is met:

- (1) Elements are integral with and enclosed within a process heating surface.
- (2) Elements are completely contained within an enclosure identified as suitable for this use.
- (3) Elements are contained within an ASME-rated and stamped vessel.

Where a subdivided load is less than 48 amperes, the rating of the supplementary ~~overcurrent protective device~~ OCPD shall comply with 425.4(B). A boiler employing resistance-type immersion heating elements contained in an ASME-rated and stamped vessel shall be permitted to comply with 425.72(A).

#### (C) Overcurrent Protective Devices.

Supplementary ~~overcurrent protective devices~~ OCPD s for the subdivided loads specified in 425.22(B) shall comply with the following:

- (1) Be factory installed within or on the heater enclosure or supplied for use with the heater as a separate assembly by the heater manufacturer
- (2) Be accessible but not be required to be readily accessible
- (3) Be suitable for branch-circuit protection

Where cartridge fuses are used to provide supplementary overcurrent protection, a single disconnecting means shall be permitted to be used for the several subdivided loads.

Informational Note No. 1: See 240.10 for supplementary overcurrent protection.

Informational Note No. 2: See 240.40 for disconnecting means for cartridge fuses in circuits of any voltage.

**(D) Supplying Supplementary Overcurrent Protective Devices.**

The conductors supplying the supplementary ~~overcurrent protective devices~~ OCPDs shall be considered branch-circuit conductors.

Where the heaters are rated 50 kW or more, the conductors supplying the supplementary ~~overcurrent protective devices~~ OCPDs specified in 425.22(C) shall be permitted to be sized at not less than 100 percent of the nameplate rating of the heater, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature-actuated device controls the cyclic operation of the equipment.

**(E) Conductors for Subdivided Loads.**

Field-wired conductors between the heater and the supplementary ~~overcurrent protective devices~~ OCPDs for fixed industrial process heating equipment shall be sized at not less than 125 percent of the load served. The supplementary ~~overcurrent protective devices~~ OCPDs specified in 425.22(C) shall protect these conductors in accordance with 240.4. Where the heaters are rated 50 kW or more, the ampacity of field-wired conductors between the heater and the supplementary ~~overcurrent protective devices~~ OCPDs shall be permitted to be not less than 100 percent of the load of their respective subdivided circuits, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature-activated device controls the cyclic operation of the equipment.

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## Second Revision No. 8529-NFPA 70-2024 [ Section No. 425.72 ]

### 425.72 Overcurrent Protection.

#### (A) Boiler Employing Resistance-Type Immersion Heating Elements in an ASME-Rated and Stamped Vessel.

A boiler employing resistance-type immersion heating elements contained in an ASME-rated and stamped vessel shall have the heating elements protected at not more than 150 amperes. Such a boiler rated more than 120 amperes shall have the heating elements subdivided into loads not exceeding 120 amperes. Where a subdivided load is less than 120 amperes, the rating of the ~~overcurrent protective device~~ OCPD shall comply with 425.4(B).

#### (B) Boiler Employing Resistance-Type Heating Elements Rated More Than 48 Amperes and Not Contained in an ASME-Rated and Stamped Vessel.

A boiler employing resistance-type heating elements not contained in an ASME-rated and stamped vessel shall have the heating elements protected at not more than 60 amperes. Such a boiler rated more than 48 amperes shall have the heating elements subdivided into loads not exceeding 48 amperes. Where a subdivided load is less than 48 amperes, the rating of the ~~overcurrent protective device~~ OCPD shall comply with 425.4(B).

#### (C) Supplementary Overcurrent Protective Devices.

The supplementary ~~overcurrent protective devices~~ OCPDs for the subdivided loads as required by 425.72(A) and 425.72(B) ~~(B)~~ shall be as follows:

- (1) Factory-installed within or on the boiler enclosure or provided as a separate assembly by the boiler manufacturer.
- (2) Accessible, but need not be readily accessible.

#### (D) Suitable for Branch-Circuit Protection.

Where cartridge fuses are used to provide this overcurrent protection, a single disconnecting means shall be permitted for the several subdivided circuits. See 240.40.

#### (E) Conductors Supplying Supplementary Overcurrent Protective Devices.

The conductors supplying these supplementary ~~overcurrent protective devices~~ OCPD shall be considered branch-circuit conductors. Where the heaters are rated 50 kW or more, the conductors supplying the ~~overcurrent protective device~~ OCPD specified in 424.72(C) shall be permitted to be sized at not less than 100 percent of the nameplate rating of the heater, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature- or pressure-actuated device controls the cyclic operation of the equipment.

**(F) Conductors for Subdivided Loads.**

Field-wired conductors between the heater and the supplementary ~~overcurrent protective devices~~ OCPDs shall be sized at not less than 125 percent of the load served. The supplementary ~~overcurrent protective devices~~ OCPDs specified in 425.72(C) shall protect these conductors in accordance with 240.4. Where the heaters are rated 50 kW or more, the ampacity of field-wired conductors between the heater and the supplementary ~~overcurrent protective devices~~ OCPDs shall be permitted to be not less than 100 percent of the load of their respective subdivided circuits, provided all of the following conditions are met:

- (1) The heater is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature-activated device controls the cyclic operation of the equipment.

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## Second Revision No. 8531-NFPA 70-2024 [ Section No. 425.82 ]

### **425.82** Branch-Circuit Requirements.

The size of branch-circuit conductors and ~~overcurrent protective devices~~ OCPDs shall be calculated on the basis of 125 percent of the total load (motors not included). A contactor, relay, or other device, listed for continuous operation at 100 percent of its rating, shall be permitted to supply its full-rated load. See 210.19(A)(1) Exception No. 1. This section shall not apply to conductors that form an integral part of an approved boiler.

Where an electrode boiler is rated 50 kW or more, the conductors supplying the boiler electrode(s) shall be permitted to be sized at not less than 100 percent of the nameplate rating of the electrode boiler, provided all the following conditions are met:

- (1) The electrode boiler is marked with a minimum conductor size.
- (2) The conductors are not smaller than the marked minimum size.
- (3) A temperature- or pressure-actuated switch controls the cyclic operation of the equipment.

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**Response Message:** SR-8531-NFPA 70-2024



## Second Revision No. 8533-NFPA 70-2024 [ Section No. 426.1 ]

### 426.1 Scope.

This article covers fixed outdoor electric deicing and snow-melting equipment and the installation of these systems.

~~(A) Embedded:~~

~~Embedded in driveways, walks, steps, and other areas.~~

~~(B) Exposed:~~

~~Exposed on drainage systems, bridge structures, roofs, and other structures.~~

*Informational Note: See ANSI/IEEE 515.1-2012, Standard for the Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Commercial Applications, for further information. See IEEE 844/CSA 293 series of standards for fixed outdoor electric deicing and snow-melting equipment.*

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 14:27:32 EDT 2024

## Committee Statement

**Committee Statement:** The scope of the article was reduced to remove unnecessary material. The redundant classification of “embedded” and “exposed” was removed since these systems can be either of these areas and would therefore cover all the systems. The current text specifies “other areas” for embedded systems or “other structures” for exposed systems which is a generalization of the areas in scope.

The informational note associated with IEEE 844 is a series and not a specific standard. It is therefore deleted since it does not provide an appropriate guidance. IEEE 515.1 addresses a specific application (heat tracing for commercial applications) and cannot be generally applied to electric deicing and snow-melting equipment.

**Response Message:** SR-8533-NFPA 70-2024

[Public Comment No. 1734-NFPA 70-2024 \[Section No. 426.1\]](#)



## Second Revision No. 8552-NFPA 70-2024 [ Section No. 426.2 ]

### 426.2 Listing Requirements.

~~Fixed outdoor deicing and snow-melting equipment shall be listed.~~

#### (A) General.

Fixed outdoor deicing and snow-melting equipment shall be listed.

#### (B) Conductive Pavement Heating Systems.

A conductive pavement heating system shall be listed as a conductive pavement heating system.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NEC_CMP-17_SR-8552_426.2.docx		

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 17:24:39 EDT 2024

### Committee Statement

**Committee Statement:** Listing requirements for conductive pavement heating system were added to ensure the safety of the system.

**Response Message:** SR-8552-NFPA 70-2024



## Second Revision No. 8513-NFPA 70-2024 [ Section No. 427.1 ]

### 427.1 Scope.

This article covers electrically energized heating systems and the installation of these systems used with pipelines, vessels, and other applications for trace heating.

Informational Note: See IEEE 515-2017 , *Standard for the Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Industrial Applications*, for further information. Also see ~~applicable sections of the IEEE 844/CSA 293 series of standards~~ IEEE 844, *Recommended Practice for Electrical Impedance, Induction, and Skin Effect Heating of Pipelines and Vessels* , for alternate technologies for fixed electric heating equipment for pipelines and vessels.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 13:05:30 EDT 2024

### Committee Statement

**Committee Statement:** Revisions have been made to satisfy the NEC Style Manual (2.1.10.3).

**Response Message:** SR-8513-NFPA 70-2024

[Public Comment No. 689-NFPA 70-2024 \[Section No. 427.1\]](#)



## Second Revision No. 8532-NFPA 70-2024 [ Section No. 427.57 ]

### **427.57** Overcurrent Protection.

Heating equipment shall be considered ~~protected against overcurrent~~ to have overcurrent protection where supplied by a branch circuit as specified in 210.20 and 210.24.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Fri Oct 25 14:22:50 EDT 2024

### Committee Statement

**Committee Statement:** Revisions were made to utilize acronyms as required by NEC Style Manual (2.1.2.9) to improve usability as recommended by PC-1657.

**Response Message:** SR-8532-NFPA 70-2024



## Second Revision No. 8397-NFPA 70-2024 [ Section No. 680.8(B) ]

### (B) Equipment Construction.

~~Equipment grounding conductors~~ EGCs shall be connected to a fixed metal part of the assembly. Any removable metal part of the assembly shall be mounted on or bonded to the fixed metal part.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:35:48 EDT 2024

### Committee Statement

**Committee Statement:** The term "Equipment grounding conductor" is replaced with EGC, in accordance with NEC style manual paragraphs 2.1.2.9 and 3.2.3 which permits the use of acronyms. Additionally, EGC is already used in 680.7(B).

PC-155: For grammatical correctness, the apostrophe after EGC was not included.

**Response Message:** SR-8397-NFPA 70-2024

[Public Comment No. 155-NFPA 70-2024 \[Section No. 680.8\(B\)\]](#)



## Second Revision No. 8410-NFPA 70-2024 [ Sections 680.10(A), 680.10(B) ]

### (A) Electric Pool Water Heaters.

#### (1) Resistance Elements.

All electric pool water heaters incorporating resistive heating elements shall have the heating elements subdivided into loads not exceeding 48 amperes and protected at not over 60 amperes.

#### (2) Branch Circuit Conductors and Overcurrent Protective Devices .

The ampacity of the branch-circuit conductors and the ampere rating or setting of ~~overcurrent protective devices~~ OCPDs shall be 125 percent of the total nameplate-rated load or greater.

### (B) Electrically Powered Swimming Pool Heat Pumps and Chillers.

#### (1) Rating.

Electrically powered swimming pool heat pumps and chillers using the circulating water system and providing heating, cooling, or both shall be rated for their intended use.

#### (2) Branch Circuit Conductors and Overcurrent Protective Devices .

The ampacity of the branch-circuit conductors and the ampere rating or setting of ~~overcurrent protective devices~~ OCPDs shall be sized to comply with the nameplate.

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 16:49:14 EDT 2024

## Committee Statement

**Committee Statement:** Revisions were made to 680.10(A)(2) and (B)(2) titles to better align with what is covered in the requirements. Also, the acronym OCPD(s) was added instead of "overcurrent protective devices". The NEC style manual (2.1.2.9) permits the use of acronyms and defined terms.

**Response Message:** SR-8410-NFPA 70-2024

Public Comment No. 1657-NFPA 70-2024 [Global Input]



## Second Revision No. 8354-NFPA 70-2024 [ Section No. 680.12(B) ]

### (B) Receptacles.

Receptacles shall meet the following requirements:

- (1) At least one GFCI-protected 125-volt, 15- or 20-ampere receptacle shall be located within an equipment room.
- (2) All other receptacles within an equipment room, vault, or pit shall be GFCI protected or SPGFCI protected, as applicable, ~~under the following conditions:~~ in accordance with 680.5.
  0. ~~If supplied by branch circuits rated 150 volts or less to ground, 60 amperes or less, single-phase, or 100 amperes or less, 3-phase~~
  0. ~~If supplied by branch circuits exceeding 150 volts to ground but not exceeding 480 volts phase-to-phase~~

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_Article680.12_B_SR8354.docx	For Staff Use	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 11:39:15 EDT 2024

### Committee Statement

**Committee Statement:** It is unnecessary to repeat the details found in 680.5(B) and (C). Other sections of Article 680, such as 680.21(C) and (D)

680.22(A)(4), and 680.22(B)(4) simply reference the requirements of 680.5.

**Response Message:** SR-8354-NFPA 70-2024

[Public Comment No. 688-NFPA 70-2024 \[Section No. 680.12\(B\)\]](#)

[Public Comment No. 814-NFPA 70-2024 \[Section No. 680.12\(B\)\]](#)

[Public Comment No. 1128-NFPA 70-2024 \[Section No. 680.12\(B\)\]](#)



## Second Revision No. 8355-NFPA 70-2024 [ Section No. 680.14(A) ]

### (A) Wiring Methods.

Wiring methods shall be suitable for use in corrosive environments. Rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, reinforced thermosetting resin conduit, liquidtight flexible nonmetallic conduit, and liquidtight flexible metal conduit shall be considered suitable for use. Aluminum ~~conduit and tubing~~ wiring methods shall not be permitted.

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 11:51:21 EDT 2024

### Committee Statement

**Committee Statement:** In NEC 2023 requirements, aluminum cables are permitted while aluminum raceways are not. None of these options provide sufficient corrosion protection, so the requirement has been clarified to address all aluminum wiring methods.

**Response Message:** SR-8355-NFPA 70-2024

Public Comment No. 815-NFPA 70-2024 [Section No. 680.14(A)]



## Second Revision No. 8367-NFPA 70-2024 [ Section No. 680.21(D) ]

**(D) Pool Pump Motor Replacement, Reconditioning, or Repair .**

Where a pool pump motor in 680.21(C) is replaced, reconditioned , or repaired, the ~~replacement or repaired pump motor outlet serving it shall be provided with ground-fault protection complying with 680.5(B) or 680.5(C) , as applicable~~ comply with 680.21(C) .

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_Article680.21_D_SR8367.docx	Staff Use Only	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 12:22:36 EDT 2024

### Committee Statement

**Committee Statement:** The revised wording provides the clarification intended in the FR revision language and incorporates the intended GFCI/SPGFCI requirements. The term “reconditioned” was added to clarify the type of equipment that this applies to. The title was changed to reflect the changes made in the text.

**Response Message:** SR-8367-NFPA 70-2024

[Public Comment No. 816-NFPA 70-2024 \[Section No. 680.21\(D\)\]](#)

[Public Comment No. 13-NFPA 70-2024 \[Section No. 680.21\(D\)\]](#)



## Second Revision No. 8371-NFPA 70-2024 [ Section No. 680.22(A)(4) ]

(4) Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection.

All receptacles located within 6.0 m (20 ft) of the inside walls of a pool shall have GFCI protection complying with 680.5(B) or SPGFCI protection complying in accordance with 680.5(C), as applicable, ~~under the following conditions:~~ \_

- ~~(0) If supplied by branch circuits rated 150 volts or less to ground, 60 amperes or less, single-phase, or 100 amperes or less, 3-phase~~
- ~~(0) If supplied by branch circuits exceeding 150 volts to ground but not exceeding 480 volts phase-to-phase~~

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_Article680.22_A_4_SR8371.docx	Staff Use Only	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 12:52:04 EDT 2024

### Committee Statement

**Committee Statement:** Redundant language was removed from 680.22(A)(4) as there already is a reference to 680.5(B) and (C).

**Response Message:** SR-8371-NFPA 70-2024

[Public Comment No. 817-NFPA 70-2024 \[Section No. 680.22\(A\)\(4\)\]](#)

[Public Comment No. 693-NFPA 70-2024 \[Section No. 680.22\(A\)\(4\)\]](#)



## Second Revision No. 8413-NFPA 70-2024 [ Section No. 680.23(B)(2) ]

### (2) Wiring Extending Directly to the Forming Shell.

Conduit shall be installed from the forming shell to a junction box or other enclosure conforming to the requirements in 680.24. Conduit shall be rigid metal, intermediate metal, liquidtight flexible nonmetallic, or rigid polyvinyl chloride conduit.

- (a) *Metal Conduit.* Metal conduit shall be listed and be red brass or stainless steel.

Informational Note: See UL 6A, *Electrical Rigid Metal Conduit—Aluminum, Red Brass, and Stainless Steel*, for information on the listing criteria for red brass and stainless steel conduit.

(b) *Nonmetallic Conduit.* ~~Where~~ If a nonmetallic conduit is used, ~~an 8 AWG insulated solid or stranded copper bonding jumper shall be installed in this conduit unless a listed low-voltage lighting system not requiring grounding is used. The bonding jumper shall be terminated in the forming shell, junction box or transformer enclosure, or GFCI enclosure. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a listed potting compound to protect the connection from the possible deteriorating effect of pool water.~~ a bonding jumper complying with all of the following shall be installed in the conduit:

- (1) Not smaller than 8 AWG
- (2) Copper
- (3) Insulated
- (4) Solid or stranded
- (5) Terminated in the forming shell ~~shall be~~ and covered with, or encapsulated in, a listed potting compound to protect the connection from the possible deteriorating effect of pool water
- (6) Terminated in the junction box, or the enclosure of a transformer, power supply, or GFCI supplying the forming shell

Exception: If a listed low-voltage lighting system not requiring grounding is used, the bonding conductor shall not be required.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_680.23_B_2_SR8413.docx	For Staff Use	
NEC_CMP-17_SR-8413_680.23_B_2_.docx	For prod use	

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 17:15:24 EDT 2024

### Committee Statement

**Committee Statement:** This revision provides clarification, as the previous language created ambiguity, potentially implying bonding termination being required only at one end. Power supply was added for consistency with other sections of Article 680. This change ensures that all necessary components are properly bonded, reducing confusion and improving clarity. The section was revised to a list format to comply with the NEC Style Manual (3.5.2).

**Response Message:** SR-8413-NFPA 70-2024

[Public Comment No. 17-NFPA 70-2024 \[Section No. 680.23\(B\)\(2\)\]](#)



## Second Revision No. 8374-NFPA 70-2024 [ Section No. 680.24(D) ]

### (D) Grounding Terminals.

Grounding terminals shall comply with ~~the requirements in~~ 680.24(D)(1) and 680.24(D)(2), as applicable.

#### (1) Number of Grounding Terminals.

Junction boxes, transformer and power-supply enclosures, and GFCI enclosures connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be provided with a number of grounding terminals that ~~are~~ is no fewer than one more than the number of conduit entries.

#### (2) Connected to Panelboard Enclosure.

The grounding terminals of a junction box, transformer enclosure, or other enclosure in the supply circuit to a wet-niche or no-niche luminaire and the field-wiring chamber of a dry-niche luminaire shall be connected to an equipment grounding conductor, which is directly connected to the panelboard enclosure.

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 13:16:12 EDT 2024

## Committee Statement

**Committee Statement:** This revision deletes redundant language ("the requirements in") to comply with 4.1.3 of the NEC Style Manual, and changes "are" to "is" where the subject of the sentence is singular ("number", not "numbers").

**Response Message:** SR-8374-NFPA 70-2024

[Public Comment No. 818-NFPA 70-2024 \[Section No. 680.24\(D\)\]](#)

[Public Comment No. 10-NFPA 70-2024 \[Section No. 680.24\(D\)\(1\)\]](#)



## Second Revision No. 8381-NFPA 70-2024 [ Section No. 680.26(B) ]

### (B) Bonded Parts.

The parts specified in 680.26(B)(1) through 680.26(B)(7) shall be bonded together using one or more of the following:

- (1) Solid copper or 40 percent copper-clad steel conductors, as follows:
  - a. Are insulated, covered, or bare, not smaller than 8 AWG
  - b. Are not required to be extended or attached to remote panelboard enclosures, service equipment, or electrodes
  - c. Are permitted to encircle the pool to facilitate bonding connections to portions of the perimeter covered in 680.26(B)(2)(a) and 680.26(B)(2)(b) that are not contiguous
- (2) Rigid metal conduit of brass or other identified corrosion-resistant metal
- (3) Structural reinforcing steel
- (4) Steel structural welded wire reinforcement (e.g., welded wire mesh, welded wire fabric)

Connections to bonded parts shall be made in accordance with 250.8 and 680.7(C).

### (1) Conductive Pool Shells.

Bonding to conductive pool shells shall be provided as specified in 680.26(B)(1)(a) or 680.26(B)(1)(b). Cast-in-place concrete, pneumatically applied or sprayed concrete, and concrete block with painted or plastered coatings shall all be considered conductive materials due to water permeability and porosity. Reconstructed pool shells shall also meet the requirements of this section. Vinyl liners and fiberglass composite shells shall be considered nonconductive materials and not subject to these requirements.

(a) *Structural Reinforcing Steel.* Unencapsulated structural reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where structural reinforcing steel is encapsulated in a nonconductive compound, a ~~copper conductor~~ conductive grid shall be installed in accordance with 680.26(B)(1)(b).

(b) ~~Copper Conductor~~ Conductive Grid. A copper or 40 percent copper-clad steel conductor grid shall be provided in accordance with the following:

- (1) Be constructed of minimum 8 AWG bare solid copper or 40 percent copper-clad steel conductors bonded to each other at all points of crossing in accordance with 250.8 or other approved means
- (2) Conform to the contour of the pool
- (3) Be arranged in a 300 mm (12 in.) by 300 mm (12 in.) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 100 mm (4 in.)
- (4) Be secured within or under the pool no more than 150 mm (6 in.) from the outer contour of the pool shell

**(2) Perimeter Surfaces.**

Bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a), 680.26(B)(2)(b), and 680.26(B)(2)(c). The perimeter surface shall include unpaved surfaces, concrete, masonry pavers, and other types of paving. The perimeter surface to be bonded shall extend 900 mm (3 ft) horizontally beyond the inside walls of the pool at a height between 900 mm (3 ft) above and 900 mm (3 ft) below the maximum water level. Perimeter surfaces separated from the pool by a permanent wall or building 1.5 m (5 ft) in height or more shall require equipotential bonding only on the pool side of the permanent wall or building.

For conductive pool shells where bonding to perimeter surfaces is required, bonding shall be attached to the pool structural reinforcing steel or copper conductor grid at a minimum of four points uniformly spaced around the perimeter of the pool. If the bonded perimeter surface does not surround the entire pool, bonding shall be attached to the pool reinforcing structural steel or copper or 40 percent copper-clad steel conductor grid at a minimum of four uniformly spaced points along the bonded perimeter surface.

For nonconductive pool shells, where bonding to the perimeter surfaces is required, bonding at four points shall not be required. The perimeter bonding shall be attached to the 8 AWG copper or 40 percent copper-clad steel equipotential bonding conductor and, if present, to any conductive support structure for the pool.

Informational Note: Because the perimeter surface can incorporate various types of materials at various locations and elevations above and below maximum water level, the perimeter surface required to be bonded might not surround the entire pool. The 8 AWG copper or 40 percent copper-clad steel equipotential bonding conductor can encircle the entire pool to facilitate connection of bonded parts.

(a) *Conductive Paved Portions of Perimeter Surfaces.* Conductive paved portions of perimeter surfaces shall be bonded to one or more of the following:

- (1) Unencapsulated structural reinforcing steel in accordance with 680.26(B)(1)(a)
- (2) ~~Copper-conductor~~ Conductor grid made of copper or 40 percent copper-clad steel
- (3) Unencapsulated steel structural welded wire reinforcement bonded together by steel tie wires or the equivalent, fully embedded within the pavement unless pavement will not allow for embedding

If structural reinforcing steel is absent or encapsulated in a nonconductive compound, or if embedding is not possible, unencapsulated welded wire steel reinforcement or a ~~copper~~ conductor grid made of copper or 40 percent copper-clad steel shall be provided and secured directly under the paving not more than 150 mm (6 in.) below finished grade.

Where not fully embedded in concrete, ~~copper~~ the conductor grid and unencapsulated steel structural welded wire used for equipotential bonding shall be listed for corrosion resistance and mechanical performance. This listing requirement shall become effective January 1, 2029. The ~~copper~~ conductor grid or unencapsulated steel structural welded wire reinforcement shall also meet the following:

- (1) ~~Copper~~ The conductor grid is constructed of 8 AWG solid bare copper or 40 percent copper-clad steel and arranged in accordance with 680.26(B)(1)(b)(3).
- (2) Structural steel welded wire reinforcement is minimum ASTM 6 × 6-W2.0 × W2.0 or minimum No. 3 rebar constructed in a 300 mm (12 in.) grid.
- (3) ~~Copper~~ The conductor grid and steel structural welded wire reinforcement follows the contour of the perimeter surface extending not less than 900 mm (3 ft) horizontally beyond the inside walls of the pool.

Informational Note No. 1: Performance of the equipotential bonding system at the perimeter surface is improved as the distance between the bonding means and finished grade is minimized, either by embedding within, or by direct contact with the underside of, the finished pavement.

Informational Note No. 2: See ASTM A615/A615M, *Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement*; A1064/A1064M, *Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*; A1022/A1022M, *Standard Specification for Deformed and Plain Stainless Steel Wire and Welded Wire for Concrete Reinforcement*; A1060A/A1060M, *Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete*; and ACI Standard ACI 318, *Building Code Requirements for Structural Concrete*, for examples of standards currently used in the listing of reinforcing steel bars and steel welded wire reinforcement.

(b) *Unpaved Portions of Perimeter Surfaces.* Unpaved portions of perimeter surfaces shall be bonded with any of the following methods:

(1) ~~A copper conductor(s)~~ Conductor(s), shall meet the following:

- a. At least one minimum 8 AWG bare solid copper or 40 percent copper-clad steel conductor is provided, including the 8 AWG copper equipotential bonding conductor, if available.
- b. The conductor(s) follows the contour of the perimeter surface.
- c. The conductor(s) is 450 mm to 600 mm (18 in. to 24 in.) from the inside walls of the pool.
- d. The conductor(s) is under the unpaved portion of the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below finished grade.
- e. The conductor(s) is installed only in perimeter surfaces not intended to have direct access to swimmers in the pool.

(2) A copper or 40 percent copper-clad steel conductor grid or unencapsulated steel structural welded wire reinforcement used for equipotential bonding of unpaved portions of perimeter surfaces shall meet the following:

- a. It is installed in accordance with 680.26(B)(2)(a).
- b. It is located within an unpaved surface(s) between 100 mm to 150 mm (4 in. to 6 in.) below finished grade.

(c) *Nonconductive Perimeter Surfaces.* Equipotential bonding shall not be required for nonconductive portions of perimeter surfaces that are separated from earth or raised on nonconducting supports. Equipotential bonding shall not be required for any perimeter surface that is electrically separated from the pool structure and raised on nonconductive supports above an equipotentially bonded surface.

Informational Note: Nonconductive materials include, but are not limited to, wood, plastic, wood-plastic composites, fiberglass, and fiberglass composites.

### **(3) Metallic Components.**

All metallic parts of the pool structure, including reinforcing metal not addressed in 680.26(B)(1)(a), shall be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, the reinforcing steel shall not be required to be bonded.

### **(4) Underwater Lighting.**

All metal forming shells and mounting brackets of no-niche luminaires shall be bonded.

*Exception: Listed low-voltage lighting systems with nonmetallic forming shells shall not require bonding.*

### **(5) Metal Fittings and Metal Structures.**

All metal fittings and metal structures within or attached to the pool or perimeter surface indicated in 680.26(B)(2) shall be bonded.

*Exception: The following shall not be required to be bonded:*

- (1) *Isolated parts that are not over 100 mm (4 in.) in any dimension and do not penetrate into the pool structure more than 25 mm (1 in.)*
- (2) *Metallic pool cover anchors intended for insertion in a concrete or masonry deck surface, 25 mm (1 in.) or less in any dimension and 51 mm (2 in.) or less in length*
- (3) *Metallic pool cover anchors intended for insertion in a wood or composite deck surface, 51 mm (2 in.) or less in any flange dimension and 51 mm (2 in.) or less in length*
- (4) *Metal fittings and metal parts fixed to bulkheads constructed of nonconductive material within the pool, with no conductive connection to the pool or perimeter surface indicated in 680.26(B)(2) by the bulkhead and/or metal parts fixed to the bulkhead*

**(6) Electrical Equipment.**

Metal parts of the following electrical equipment shall be bonded:

- (1) Electrically powered pool cover(s)
- (2) Pool water circulation, treatment, heating, cooling, or dehumidification equipment
- (3) Unless separated from the pool by a permanent barrier that prevents contact by a person, any other electrical equipment within 1.5 m (5 ft) measured horizontally from the inside wall of the pool, or 3.7 m (12 ft) measured vertically above the maximum water level of the pool, or as measured vertically above any observation stands, towers, platforms, or any diving structures

*Exception: Metal parts of listed equipment incorporating an approved system of double insulation shall not be bonded.*

(a) *Double-Insulated Water Pump Motors.* Where a double-insulated water pump motor is installed under the provisions of this rule, a solid 8 AWG copper conductor of sufficient length to make a bonding connection to a replacement motor shall be extended from the swimming pool equipotential bonding means to an accessible point in the vicinity of the pool pump motor. Where there is no connection between the swimming pool equipotential bonding means and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit.

(b) *Pool Water Heaters.* For pool water heaters rated at more than 50 amperes and having specific instructions regarding bonding and grounding, only those parts designated to be bonded shall be bonded and only those parts designated to be grounded shall be grounded.

**(7) Fixed Metal Parts.**

All fixed metal parts, including, but not limited to, metal-sheathed cables and raceways, metal piping, metal awnings, metal fences, and metal door and window frames, shall be bonded where located no greater than either of the following:

- (1) 1.5 m (5 ft) horizontally from the inside walls of the pool
- (2) 3.7 m (12 ft) vertically above the maximum water level of the pool, observation stands, towers, platforms, or any diving structures

*Exception: Those separated from the pool by a permanent barrier that prevents contact by a person shall not be required to be bonded.*

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP17_680.26_B_SR8381.docx		
70_CMP17_680.26_B_SR8381.docx	For prod use	

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 13:46:07 EDT 2024

## Committee Statement

**Committee Statement:** Data and substantiation provided indicate that copper-clad steel will perform satisfactorily to provide equipotential bonding for pools. Revisions were made to 680.26(B) to add 40% copper clad steel as an option where copper wire or copper conductor grid is required.

**Response** SR-8381-NFPA 70-2024

**Message:**

[Public Comment No. 291-NFPA 70-2024 \[Section No. 680.26\(B\) \[Excluding any Sub-Sections\]\]](#)

[Public Comment No. 293-NFPA 70-2024 \[Section No. 680.26\(B\)\(2\)\]](#)

[Public Comment No. 292-NFPA 70-2024 \[Section No. 680.26\(B\)\(1\)\]](#)



## Second Revision No. 8402-NFPA 70-2024 [ Section No. 680.30 ]

### 680.30 General.

~~Electrical installations at storable pools, storable spas, storable hot tubs, or storable immersion pools shall comply with the provisions of Article 680, Parts I and III.~~

#### (A) General.

Electrical installations at storable pools, storable spas, storable hot tubs, or storable immersion pools shall comply with the provisions of 680; Parts I and III.

#### (B) Additional Requirements.

A storable pool assembled on site that abuts a permanent deck that encloses all or a portion of the pool's perimeter and that is intended to provide access to the pool shall also comply with 680.26 .

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NEC_CMP-17_SR-8402_680.30.docx		

### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:50:02 EDT 2024

### Committee Statement

**Committee Statement:** The informational note provided in the definition for Portable Pool included an interpretation of the definition. The informational note was removed from the definition. The requirements were added to this section and the section was revised to comply with the NEC Style Manual (2.1.6.3).

**Response Message:** SR-8402-NFPA 70-2024



## Second Revision No. 8384-NFPA 70-2024 [ Section No. 680.32 ]

**680.32** Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection.

All electrical equipment, including power-supply cords, used with storable pools shall have GFCI protection ~~complying with 680.5(B)~~ or SPGFCI protection complying with ~~680.5(C)~~ 680.5, as applicable.

All receptacles located within 6.0 m (20 ft) of the inside walls of a storable pool, storable spa, or storable hot tub shall have GFCI protection ~~complying with 680.5(B)~~ or SPGFCI protection complying with ~~680.5(C)~~ 680.5, as applicable, ~~if any of the following conditions exist:~~

- ~~(0) If supplied by branch circuits rated 150 volts or less to ground and 60 amperes or less, single-phase~~
- ~~(0) If supplied by branch circuits rated 150 volts or less to ground and 100 amperes or less, 3-phase~~
- ~~(0) If supplied by branch circuits exceeding 150 volts to ground but not exceeding 480 volts phase-to-phase and 100 amperes or less~~

In determining these dimensions, the distance to be measured shall be the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
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### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 13:55:51 EDT 2024

### Committee Statement

**Committee Statement:** The revision to 680.32 removes redundant language already covered by 680.5, which comprehensively outlines the GFCI and SPGFCI requirements.

**Response Message:** SR-8384-NFPA 70-2024

[Public Comment No. 694-NFPA 70-2024 \[Section No. 680.32\]](#)

[Public Comment No. 820-NFPA 70-2024 \[Section No. 680.32\]](#)



## Second Revision No. 8389-NFPA 70-2024 [ Section No. 680.43(A)(2) ]

(2) Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection for Receptacles, General.

All receptacles located within 3.0 m (10 ft) of the inside walls of a spa or hot tub shall have GFCI protection complying with ~~680.5(B)~~ or SPGFCI protection complying with ~~680.5(C)~~ 680.5, as applicable, if any of the following conditions exist: .

- (0) ~~If supplied by branch circuits rated 150 volts or less to ground and 60 amperes or less, single-phase~~
- (0) ~~If supplied by branch circuits rated 150 volts or less to ground and 100 amperes or less, 3-phase~~
- (0) ~~If supplied by branch circuits exceeding 150 volts to ground but not exceeding 480 volts phase-to-phase and 100 amperes or less~~

### Submitter Information Verification

**Committee:** NEC-P17

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### Committee Statement

**Committee Statement:** The revision to 680.43(A)(2) removes redundant language already covered by 680.5, which comprehensively outlines the GFCI and SPGFCI requirements.

**Response Message:** SR-8389-NFPA 70-2024

[Public Comment No. 821-NFPA 70-2024 \[Section No. 680.43\(A\)\(2\)\]](#)

[Public Comment No. 695-NFPA 70-2024 \[Section No. 680.43\(A\)\(2\)\]](#)



## Second Revision No. 8391-NFPA 70-2024 [ Section No. 680.45(C) ]

### (C) Heaters.

Heaters used with permanently installed immersion pools shall comply with ~~either 680.45(C)(1) or 680.45(C)(2)~~, or 680.45(C)(3), as applicable.

#### (1) Permanently Installed Heaters — ~~Hard-Wired~~ Permanently Connected.

Permanently installed heaters rated 120 volts through 250 volts, nominal, that are built-in or permanently attached as an integral part of permanently installed immersion pools shall ~~meet~~ comply with the following:

- (1) ~~Heaters shall be~~ Be identified for swimming pool and spa use
- (2) ~~Heaters shall be grounded and~~ Be connected to an EGC and bonded
- (3) ~~Heaters shall have~~ Be provided with GFCI or SPGFCI protection ~~complying with 680.5(B) or SPGFCI protection complying with 680.5(C), as applicable, as applicable, in accordance with 680.5~~

#### (2) Permanently Installed Heaters — Cord- and Plug-Connected.

Permanently installed immersion heaters rated nominal 120 volts, 20 amperes or less, or nominal 250 volts, 30 amperes or less, single-phase, shall comply with the following:

- (1) ~~Heaters shall be~~ Be permitted to be cord- and plug-connected.
- (2) ~~Heaters shall meet~~ Meet the following:
  - a. The cord ~~shall is not be~~ shorter than 1.83 m (6 ft) and not longer than 4.6 m (15 ft).
  - b. If GFCI is provided as an integral part of the cord assembly, it ~~shall be is~~ located at the attachment plug or in the power-supply cord within 300 mm (12 in) of the attachment plug.
  - c. ~~Heaters shall have~~ Be provided with GFCI or SPGFCI protection, as applicable, complying with ~~680.5(B) or SPGFCI protection complying with 680.5(C), as applicable 680.5~~.
  - d. ~~Heaters shall be~~ Be provided with means for grounding all non-current-carrying metal parts.

#### (3) Storable and Portable Heaters.

~~Cord and plug-~~ connected storable or portable heaters rated 120 volts, nominal, and 20 amperes or less, or 250 volts, nominal, and 30 amperes or less, single-phase, used with but not permanently installed or attached as an integral part of permanently installed immersion pools, shall ~~meet~~ comply with the following:

- (1) ~~Heaters shall be~~ Be identified for swimming pool and spa use.
- (2) ~~Heaters shall be~~ Be cord- and plug-connected with a cord not shorter than 1.83 m (6 ft) and not longer than 4.6 m (15 ft).
- (3) ~~Heaters shall have~~ Be provided with GFCI or SPGFCI protection, as applicable, complying with ~~680.5(B) or SPGFCI protection complying with 680.5(C), as applicable 680.5~~.
- (4) If GFCI is provided as an integral part of the cord assembly, it ~~shall be is~~ located at the attachment plug or in the power-supply cord within 300 mm (12 in.) of the attachment plug.

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
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## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:12:36 EDT 2024

## Committee Statement

**Committee Statement:** These changes ensure consistency with NEC language to align with preferred terminology in the NEC style manual and to improve clarity in technical contexts, maintaining uniformity across the code.

The requirement for bonding in 680.45(C)(1)(2) was retained as this is not addressed by equipment grounding conductor.

**Response Message:** SR-8391-NFPA 70-2024

[Public Comment No. 145-NFPA 70-2024 \[Section No. 680.45\(C\)\]](#)

[Public Comment No. 691-NFPA 70-2024 \[Section No. 680.45\(C\)\]](#)

[Public Comment No. 833-NFPA 70-2024 \[Section No. 680.45\(C\)\]](#)



## Second Revision No. 8393-NFPA 70-2024 [ Section No. 680.58 ]

**680.58** Ground-Fault Circuit-Interrupter (GFCI) and Special Purpose Ground-Fault Circuit-Interrupter (SPGFCI) Protection for Adjacent Receptacle Outlets.

All receptacles located within 6.0 m (20 ft) of a fountain edge shall have GFCI protection ~~complying with 680.5(B) or SPGFCI protection complying with 680.5(C), as applicable, if any of the following conditions exist: , as applicable, in accordance with 680.5 .~~

- ~~(0) If supplied by branch circuits rated 150 volts or less to ground, and 60 amperes or less, single-phase~~
- ~~(0) If supplied by branch circuits rated 150 volts or less to ground and 100 amperes or less, 3-phase~~
- ~~(0) If supplied by branch circuits exceeding 150 volts to ground but not exceeding 480 volts phase-to-phase and 100 amperes or less~~

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
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### Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:23:41 EDT 2024

### Committee Statement

**Committee Statement:** The revision to 680.58 removes redundant language already covered by 680.5, which comprehensively outlines the GFCI and SPGFCI requirements.

**Response Message:** SR-8393-NFPA 70-2024

[Public Comment No. 834-NFPA 70-2024 \[Section No. 680.58\]](#)

[Public Comment No. 690-NFPA 70-2024 \[Section No. 680.58\]](#)



## Second Revision No. 8394-NFPA 70-2024 [ Section No. 680.71 ]

### 680.71 Branch Circuit.

~~Hydromassage Branch circuits supplying hydromassage bathtubs and their associated electrical components shall be on an individual branch circuit(s)~~ serve no other loads .

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:30:48 EDT 2024

## Committee Statement

**Committee Statement:** The revision removes the phrase "be on an individual branch circuit" because it is contradictory. An individual branch circuit cannot serve multiple loads, so specifying that it serves the hydromassage bathtub and associated electrical components inherently means no other loads are served. This change aligns with similar requirements found throughout the code, improving clarity without altering the technical intent.

**Response Message:** SR-8394-NFPA 70-2024

[Public Comment No. 835-NFPA 70-2024 \[Section No. 680.71\]](#)

[Public Comment No. 143-NFPA 70-2024 \[Section No. 680.71\]](#)



## Second Revision No. 8395-NFPA 70-2024 [ Section No. 680.75 ]

### 680.75 GFCI Protection.

Hydromassage bathtubs and their associated electrical components shall be protected by a readily accessible GFCI.

#### ~~(A)~~ General:

~~Hydromassage bathtubs and their associated electrical components shall be protected by a readily accessible GFCI.~~

#### ~~(B)~~ Receptacles:

~~All 125-volt, single-phase receptacles not exceeding 30 amperes and located within 1.83 m (6 ft) measured horizontally of the inside walls of a hydromassage tub shall be GFCI protected.~~

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NEC_CMP-17_SR-8395_680.75.docx		

## Submitter Information Verification

**Committee:** NEC-P17

**Submittal Date:** Thu Oct 24 14:33:05 EDT 2024

## Committee Statement

**Committee Statement:** 680.75 item (B) is removed as this requirement is already addressed in 210.8.

**Response Message:** SR-8395-NFPA 70-2024

[Public Comment No. 687-NFPA 70-2024 \[Section No. 680.75\]](#)