City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.8 (A) and 210.8 (D)

Submitted by: Home Builders Association of Central Arizona

210.8(A) Dwelling Units.
All 125-volt, single-phase, 15- and 20-ampere ~~through 250-volt~~ receptacles installed in the locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms
(2) Garages and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(3) Outdoors
(4) Crawl spaces — at or below grade level
(5) Basements
(6) Kitchens
(7) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(8) Boathouses
(9) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(10) Laundry areas
(11) Indoor damp and wet locations

[The exceptions remain unchanged.]

210.8(D) Specific Appliances.
GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase:

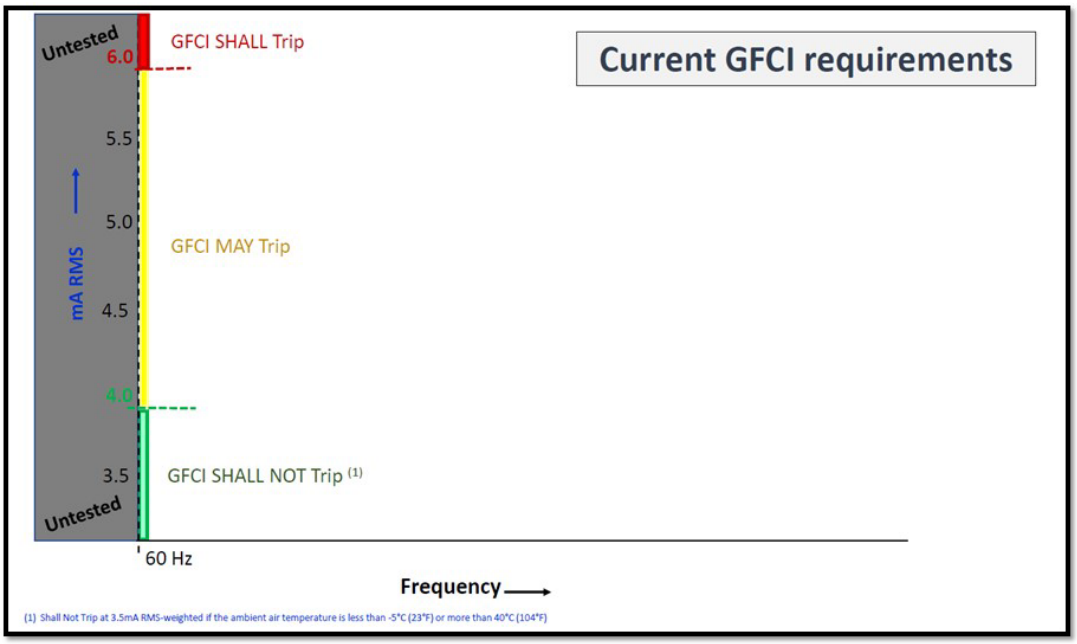
(1) Automotive vacuum machines
(2) Drinking water coolers and bottle fill stations
(3) High-pressure spray washing machines
(4) Tire inflation machines
(5) Vending machines
(6) Sump pumps
(7) Dishwashers
~~(8) Electric ranges~~
~~(9) Wall-mounted ovens~~
~~(10) Counter-mounted cooking units~~
~~(11)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

Justification:

The two main reasons for this amendment are the (1) incompatibility issues caused by requiring 240-volt appliances to be on a GFCI device and (2) the inadequate substantiation given when it was adopted into the model code.

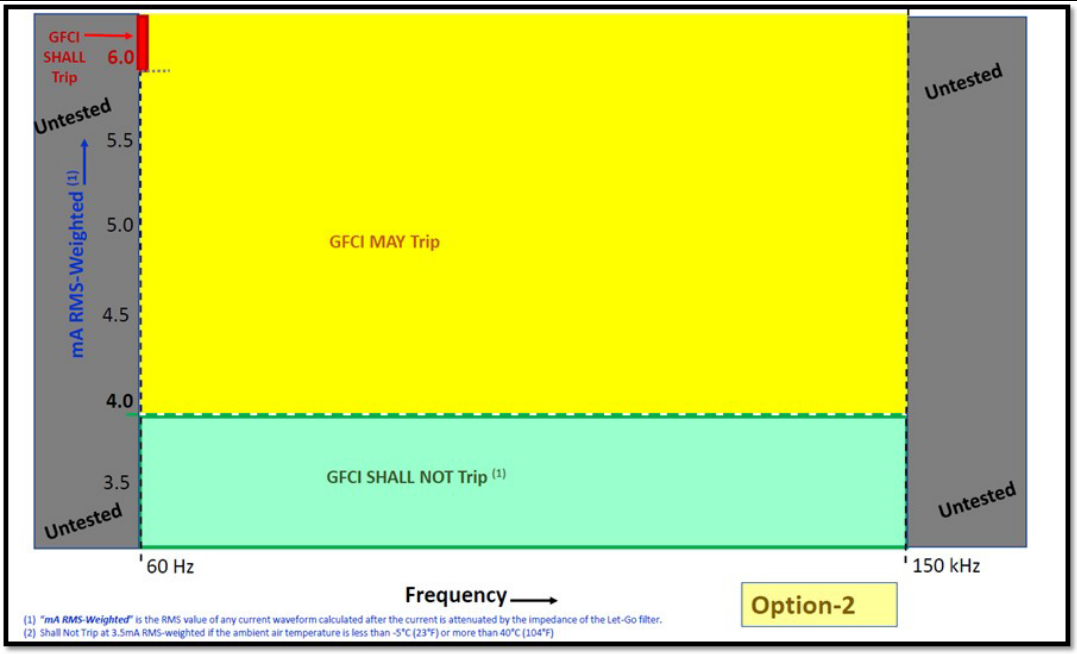
The change to this section now requires receptacles serving household ranges to be covered by a GFCI device. The Association of Home Appliance Manufacturers (AHAM) points out that when this code proposal was submitted to the NEC, it was not submitted to the relevant product safety standards for household appliances that plug into such outlets. As a result, no evaluation was conducted to evaluate issues of compatibility between these household appliances and GFCI devices, leading to nuisance tripping. For more information, see AHAM's white paper Nuisance Tripping of Ground-Fault Circuit Interrupters (GFCIs) for Appliances.

The GFCI was first introduced into the NEC when loads, such as appliances, in the home were operating on 60Hz electricity. Therefore, the GFCIs based their protection requirements on current measurements at 60Hz:



Virtually every modern AC electrical product has parts of the appliance that are operating at frequencies other than 60Hz. This is due to implementation of components like LED drivers, switched-mode power supplies, electrically commutated motors, and variable frequency drives. These components have been implemented to meet consumer demands but also to comply with mandatory energy efficiency regulations set by the U.S. Department of Energy and state regulators.

GFCIs need to be modernized. There are no existing requirements for how a GFCI shall react to frequencies above 60Hz. Even if appliances have minimal, safe levels of high frequency leakage current, GFCIs are tripping and disabling critical appliances. There is a UL 943 Task Group that is working to update the GFCI standard for modern electrical loads.



Until this update is published into UL 943 and made a compliance requirement, GFCI expansion in the NEC is premature.

Regarding the substantiation for this change in the model code, the unfortunate event used as the sole substantiation for the change involved an older stove with both an appliance manufacturing error as well as an installation error. This change goes beyond requiring belt and suspenders safety provisions, which were already in place.

The proposed requirement of GFCI protection for all 240-volt receptacles is too broad and not supported by the committee's substantiation. According to the NFPA article used to support the change, the appliance in question was "an older installation, one predating today's requirement to install an equipment grounding conductor in the branch circuit to the range". The tragedy was only possible with older wiring. This is another example that shows new construction and updated electrical systems do not constitute the same dangers as those in older homes, yet this requirement was not limited to homes with older wiring methods.

The committee contended that 240-volt receptacles presented similar hazards as 125-volt convenience receptacles and this is not true. 240-volt receptacles are installed behind the range or dryer without being readily accessible to the consumer. 240-volt appliances are plugged in and left for the operation of the appliance, but 125-volt receptacles are generally accessible to the consumer. If the consumer chose to, they could use a convenience receptacle for extension cords or other appliance use, whereas a 240-volt receptacle is specific to that appliance.

Similar amendments have been adopted in Iowa, Oregon, South Dakota, and Utah, and the requirement for GFCI coverage on 240-volt receptacles has been postponed in some jurisdictions, as well.

In 2019, the cost of this change was calculated to be $272 for homes with two 240-volt appliances, such as an electric range and an electric dryer. Many homes also have additional appliances that would be affected, such as electric water heaters. Since the cost for 240-volt GFCI breakers was calculated, the cost of electronic devices has increased greatly due to global supply chain challenges.

Cost Impact:

Staff Committee Rationale for Recommendation:

The NEC Committee recommended this proposed amendment to be denied since the UL standards were updated in 2023. Additionally, GFCI protection was required at these voltages in other than dwelling units in the 2017 NEC without notable issues.
Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**
ACTION TAKEN:
2024 Code Committee Date: 2/11/2025 ☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken
Development Advisory Board (DAB) Subcommittee Date: 03/13/2025 ☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken
Development Advisory Board (DAB) Date: 04/22/2025 ☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken
Transportation, Infrastructure and Planning Subcommittee Date: ☐ Approved as submitted ☐ Modified and approved ☐ Denied ☐ No action taken
City Council Action Date: ☐ Approved as submitted ☐ Modified and approved ☐ Denied ☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.8(A)

Submitted by: Home Builders Association of Central Arizona

210.8(A) Dwelling Units.
All 125-volt through 250-volt receptacles installed in the locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms
(2) Garages and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(3) Outdoors
(4) Crawl spaces — at or below grade level
(5) Basements
(6) Kitchens — where the receptacles are installed to serve the countertop surfaces
(7) ~~Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking~~
(8) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(9) Boathouses
(10) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(11) Laundry areas
(12) Indoor damp and wet locations

[The exceptions remain unchanged.]

Justification: GFCIs have been an unmitigated success, contributing significantly to reducing deaths due to electrical shock. In just 25 years after GFCIs were introduced, accidental electrocutions in the United States were cut by more than half, even though electricity use more than doubled[1]. There is a clear relationship between the reduction in electrocutions and the increased use of GFCIs over the last 45 years as indicated in Figure 1 below. However, this success has relied on requiring the devices in locations where dangers exist which they can protect against.

GFCIs are shown to be effective where a corded product is plugged into a standard "convenience" receptacle in a wet or damp location. However, the expanded requirement is for areas of the kitchen where handheld electric devices will never come near the sink. The extent of a "kitchen" is very open to interpretation and may include any dining and living areas connected to it in today's popular open floor plans. Many additional receptacles are covered by this new requirement.

Over 80 percent of the incidents cited as reason for this change in the model code resulted from people attempting to repair, modify or install an appliance while plugged in and contact occurring with the energized elements within the particular appliance. The NEC should not mandate GFCI protection for all kitchen outlets due to the clearly unsafe practices of unqualified individuals.

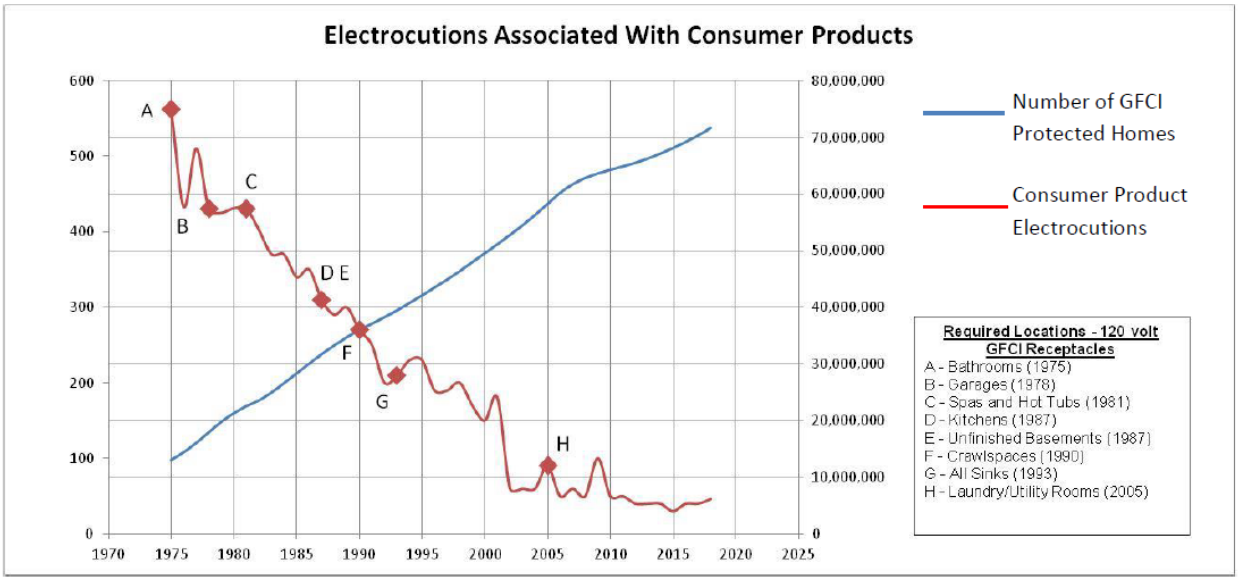


Figure 1: GFCI Protection in Homes Versus Electrocutions 1975 to 2018 (Source: A NEMA Ground Fault Personnel Protection Section Article entitled "GFCI Receptacles: Consumer Protection Personified" June 2020, Revision 2).

Footnotes:

[1] "Know the Dangers in Your Older Home", February 2015 (page 5), Electrical Safety Foundation International.

Cost Impact:

Staff Committee Rationale for Recommendation:
The NEC Committee recommends this proposed amendment be denied. GFCI protection has a long history of success in reducing electrocutions. The proposed verbiage requested to be struck includes areas with the same hazards that exist in the remainder of the areas required to be protected by GFCI protection. Removing these locations would result in an installation that is less safe than the national code.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 2/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
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City Council Action	Date:
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City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.8 (F)

Submitted by: Home Builders Association of Central Arizona

SECTION: 210.8 (F) OUTDOOR OUTLETS
All outdoor outlets, including outlets installed in the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, shall be provided with GFCI protection:

1. Garages that have floors located at or below grade level
2. Accessory buildings
3. Boathouses

Exceptions:

1. GFCI protection shall not be required on lighting outlets other than those covered in Section 210.8(F) of NFPA 70.
2. GFCI protection shall not be required for receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-meting, deicing, or pipeline and vessel heating equipment where such equipment is protected as required by NFPA 70.
3. GFCI protection shall not be required for listed HVAC equipment. ~~This exception shall expire September 1, 2026.~~ [210.8(F)]

Justification:
This amendment removes the requirement for outdoor outlets other than those receptacles covered by 210.8(A) to have GFCI protection. This code section did not take into consideration that variable speed motors used to gain higher efficiency would trip GFCI breakers therefore putting residents at risk of suffering heat related health emergencies. The recommended amendment removes the expiration date.

From NAHB and HBACA - The requirements of this section have been very contentious since it was introduced in the 2020 NEC. When it was first implemented, multiple states experienced large numbers of GFCIs tripping which shut down air conditioning as well as heat pump units. Due to the problems experienced by the first states to adopt the 2020 NEC with the new section, almost every other state that adopted that edition modified or deleted Section 210.8(F).
The 2023 edition would have required this section to be enforced in full except for the intervention of the NFPA Standards Council following an appeal. In their decision from August 2022, the Council, which acts like a court of last resort in the NFPA code development process, commented that the section has been at the heart of multiple processed Tentative Interim Amendments (TIAs), as well as extensive Task Group work since it was introduced. According to the Council, the appeal does present a clear and substantial basis upon which to overturn the results yielded by the NPFA standards development process. It cannot be overemphasized how significant this statement is, and it shows that not all model code changes should be accepted at face value.
The Council's final decision #22-12 adds an exemption for "listed HVAC equipment" which

expires September 1, 2026. Jurisdictions should be aware of this date because it is highly unlikely the compatibility issues explained below will be resolved by then. To fully address the issue, the standards that govern GFCI protection as well as HVAC equipment need to be updated in a coordinated manner, and that process is not close to completion.
If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm. The issue of GFCI protection not being compatible with listed HVAC equipment was known at the time it was approved for the model code. In fact, three of the four negative ballots during the code development cycle specifically mentioned the concern with incompatibility associated with requiring GFCI protection for listed HVAC equipment.

Technical Substantiation
UL 943 (Standard for Ground-Fault Circuit-Interrupters) requires that Class A ground-fault circuit-interrupters are capable of tripping at a minimum of 6 mA and could be as low as 4 mA. UL 60335-2 (Standard for Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers) allows a maximum leakage current value of 10 mA for appliances accessible to the general public.
Data shows that HVAC equipment can have a leakage current higher than what would trip a Class A GFCI, but the touch current remains at safe levels. What is concerning are the number of fatalities (no cooling during a heat wave period) due to nuisance trips associated with GFCI protection of HVAC equipment.
Five conditions were identified that affect interoperability which have yet to be fully examined. This highlights the fact that a solution to the issue is unlikely to be found prior to the 2026 expiration date for the current exception as approved by the Standards Council.

Conclusion:
Almost every state that has adopted the 2020 Edition of the NEC has modified or deleted Section 210.8(F). The equipment incompatibility issues identified above will not be resolved by September 1, 2026. If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm.
Similar amendments have been adopted in Georgia, Massachusetts, New Mexico, Oregon, South Dakota, Texas, Utah, and additional jurisdictions in Arizona. Many other states have dealt with Section 210.8(F) in ways other than code amendments. Additionally, five states added exemptions allowing certain pumps (sump pumps, sewage lift pumps or condensate pumps) to not be covered by a GFCI.

Cost Impact: No cost impact.

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied since the UL standard was updated in 2023. UL 60335-2-40, Ed. 4 – The fourth edition of UL Standard for Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers reduced the touch current limit to not exceed 3.5 mA. The expiration date of the exception should ensure that all equipment installed after that date already should meet the new standard.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**	
ACTION TAKEN:	
2024 Code Committee	Date: 01/07/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
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City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.8(F)

Submitted by: Home Builders Association of Central Arizona

~~**210.8(F) Outdoor Outlets.**~~
[Delete the entire section.]

Justification:
The requirements of this section have been very contentious since it was introduced in the 2020 NEC. When it was first implemented, multiple states experienced large numbers of GFCIs tripping which shut down air conditioning as well as heat pump units. Due to the problems experienced by the first states to adopt the 2020 NEC with the new section, almost every other state that adopted that edition modified or deleted Section 210.8(F).
The 2023 edition would have required this section to be enforced in full except for the intervention of the NFPA Standards Council following an appeal. In their decision from August 2022, the Council, which acts like a court of last resort in the NFPA code development process, commented that the section has been at the heart of multiple processed Tentative Interim Amendments (TIAs), as well as extensive Task Group work since it was introduced. According to the Council, the appeal does present a clear and substantial basis upon which to overturn the results yielded by the NPFA standards development process. It cannot be overemphasized how significant this statement is, and it shows that not all model code changes should be accepted at face value.
The Council's final decision #22-12 adds an exemption for "listed HVAC equipment" which expires September 1, 2026. Jurisdictions should be aware of this date because it is highly unlikely the compatibility issues explained below will be resolved by then. To fully address the issue, the standards that govern GFCI protection as well as HVAC equipment need to be updated in a coordinated manner, and that process is not close to completion.
If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm. The issue of GFCI protection not being compatible with listed HVAC equipment was known at the time it was approved for the model code. In fact, three of the four negative ballots during the code development cycle specifically mentioned the concern with incompatibility associated with requiring GFCI protection for listed HVAC equipment.
Technical Substantiation
UL 943 (*Standard for Ground-Fault Circuit-Interrupters*) requires that Class A ground-fault circuit-interrupters are capable of tripping at a minimum of 6 mA and could be as low as 4 mA. UL 60335-2 (*Standard for Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers*) allows a maximum leakage current value of 10 mA for appliances accessible to the general public.
Data shows that HVAC equipment can have a leakage current higher than what would trip a Class A GFCI, but the touch current remains at safe levels. What is concerning are the number of fatalities (no cooling during a heat wave period) due to nuisance trips associated with GFCI protection of HVAC equipment.

Facts to Consider		**Sources**

No. of Homes with HVAC Units in US (Estimated)	100 million	https://www.eia.gov/consumption/residential/reports/2009/air-conditioning.php
US Population Age 65 and over	17%	https://censusreporter.org/profiles/01000US-united-states/
Temperature Where Heat Exhaustion or Stroke Can Occur	104° F	https://www.mayoclinic.org/diseases-conditions/heat-stroke/symptoms-causes/syc-20353581

Five conditions were identified that affect interoperability which have yet to be fully examined. This highlights the fact that a solution to the issue is unlikely to be found prior to the 2026 expiration date for the current exception as approved by the Standards Council.

Conclusion

Almost every state that has adopted the 2020 Edition of the NEC has modified or deleted Section 210.8(F). The equipment incompatibility issues identified above will not be resolved by September 1, 2026. If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm.

Similar amendments have been adopted in Georgia, Massachusetts, New Mexico, Oregon, South Dakota, Texas, and Utah. Many other states have dealt with Section 210.8(F) in ways other than code amendments. Additionally, five states added exemptions allowing certain pumps (sump pumps, sewage lift pumps or condensate pumps) to not be covered by a GFCI.

Cost Impact:

Staff Committee Rationale for Recommendation:

The NEC Committee recommended this proposed amendment to be denied since the UL standard was updated in 2023. UL 60335-2-40, Ed. 4 – The fourth edition of UL Standard for Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers reduced the touch current limit to not exceed 3.5 mA. The expiration date of the exception should ensure that all equipment installed after that date already should meet the new standard.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 2/11/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:	
☐ Approved as submitted	☐ Modified and approved	☐ Denied ☐ No action taken
City Council Action	Date:	
☐ Approved as submitted	☐ Modified and approved	☐ Denied ☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.12(B)

Submitted by: Home Builders Association of Central Arizona

210.12(B) Dwelling Units.
All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):

~~(1) Kitchens~~
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
~~(13) Laundry areas~~
(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit until January 1, 2025.
Informational Note No. 1: See NFPA 72-2022, National Fire Alarm and Signaling Code, 29.9.4(5), for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Justification:
Kitchens and laundry areas were added to the list of locations within a dwelling requiring AFCIs in the 2014 NEC. It was the last time the list was changed, and it was substantiated by pointing to the decision to add them to the code in the 1990s. Since then, that original decision has not been revisited despite mounting evidence that these devices do not offer the benefits they were designed for.
There is an incompatibility problem between AFCI devices and home appliances, and the added areas include many home appliances. Despite this, no formal evaluation was conducted

on issues of compatibility between household appliances and AFCI devices, some of which are overly sensitive. There are no industry-wide rules for the specific protection that an AFCI must provide, making it impossible for home appliance manufacturers to consistently design products that will not nuisance trip an AFCI. Nuisance tripping is especially concerning when it puts consumers at risk and without access to appliances essential for health and safety, like room air conditioners, dehumidifiers, refrigerators, freezers or room air cleaners. The Association of Home Appliance Manufacturers have created the white paper "Nuisance Tripping of Arc-Fault Circuit Interrupters (AFCIs) for Appliances" which explains the issue in greater detail.

AFCIs were first introduced in the 1999 edition of the National Electrical Code (NEC) with an effective date of Jan. 1, 2002. The approval of the code change was based on the U.S. Consumer Product Safety Commission (CPSC) report *Revised Residential Fire Loss Estimates: 1980 –1998*. **However, the number of incidents cited at the time was nearly five times higher than in the later CPSC report *2010–2012 Residential Fire Loss Estimates* (see Table 1).** This significant change is not due to any effect from the slow rollout of AFCIs after 2002 which was limited to bedroom circuits until the 2008 NEC and only where the latest edition was adopted.

Table 1: Change in Electrical Distribution Fire Estimates

	CPSC Report 1980-1998	2015 CPSC Report 2010-2012	**Percentage of Original Estimate**
Total Estimated Fires Attended by the Fire Service (Annual Average)	47,000	9,600†	**20%**

† The properties that were included in the analysis were single/multifamily dwellings, any type of boarding houses, dormitories, sorority/fraternity houses, hotels/motels, and mobile and motor homes not in transit.

It is important to note that the lower number from the later report includes mobile (manufactured) homes and motor homes (RVs) that are not in transit. It is unclear to what extent these particular property types contribute to the overall number of fires, and the proposed exception does not exempt them.

Where the data showed that AFCIs would have a minimal benefit, the results were ignored. The resulting expected benefits led to AFCI requirements being included in the NEC, but they were overblown. Today, the data bears this out. AFCIs have now been protecting electrical systems in homes for two decades and that protection has grown to cover an extensive area of the home. If they were effective, one should reasonably expect to see fire data showing a steady decline in fires involving electrical wiring and related equipment. However, that is not the case.

The Fire Protection Research Foundation (FPRF), an affiliate of NFPA, concluded there is no practical method to collect relevant data in their report *Residential Electrical Fire Problem: The Data Landscape*. The FPRF investigated the available data in 2018 and concluded the following: "Unfortunately, there are inherent challenges and barriers to the effective collection of the applicable data. Traditional data collection approaches have shortcomings that make their ultimate value questionable (e.g., lack of detail and quality on fire department collected residential fire events). Further, not all existing datasets are openly accessible, is lacking specific important details, or is insufficient in quality." There is no known data indicating that the expansion of AFCI requirements in the NEC has resulted in a quantifiable reduction of residential fires due to electrical malfunctions.

The problems with the original rationale were so evident that even electrical manufacturers spoke against the proposal at the time. During the 1998 code development cycle comment period, manufacturers' representatives stated that a large body of information was available to support **rejecting** an AFCI mandate. The main issue: the electrical problems AFCIs are designed to prevent occur overwhelmingly in older dwellings.

The July 2021 issue of the U.S. Fire Administration's Topical Fire Report Series reported "A strong relationship between housing age and the rate of electrical fires has been observed, **with housing over 40 years old having the strongest association with electrical distribution**

fires [emphasis added]." This finding is from the 1988 CPSC study, "Residential Electrical Distribution System Fires," so it is comparing homes that are now 80 years old with those that were new at that time of the time of the study. No similar study has been made to compare the previous findings with homes built in the last four decades.

When the home was built is important: The median age of one- and two-family housing in the U.S. is 40 years. The share of housing units built before 1970 is 38%, and those built before 1950 is 18%. According to a study conducted by the U.S. Consumer Product Safety Commission, dwellings built before 1965 may still have fuses instead of circuit breakers, and those built before 1945 may still have knob and tube wiring.

No data is collected on the age of homes where fire occurs, and the vast majority of residential fires may occur in these older homes. **The CPSC study showed that 85% of fires of electrical origin occur in homes that are more than 20 years old at the time of the study.** This means that the bulk of these homes were wired in accordance with the 1965 or earlier editions of the NEC. Further, they were wired with products manufactured to product safety standards of a similar vintage. In the years since this study was produced, numerous changes have been made in both the NEC and product safety standards which mitigate against similar fires in newer homes—even as they age.

These older homes were also wired with a very limited number of receptacle outlets, resulting in extensive use of extension cords or improper alterations and additions to the original electrical system, both recognized fire hazards. In addition, they are more likely to have outdated appliances, space heaters or other characteristics that might lead to a greater risk of a fire starting. Newer homes have fire blocking, hardwired smoke alarms and egress windows installed to today's codes, all of which increase the chances of surviving a fire if one does start. **Even as homes built to today's residential code get older, they will continue to provide protection for families through their improved safety.**

It is clear that requiring AFCIs in new construction will not prevent all damage. This is due to the fact that AFCIs cannot prevent all fires and, more importantly, that electrical fires occur overwhelmingly in older houses. While questions regarding construction code requirements intended to increase the safety of homes cannot, and should not, be decided solely on the issue of cost, it is reasonable to ask if there is a demonstrated need for the requirement or if an acceptable level of safety can be achieved through other, less expensive means. The cost of an incremental increase in the margin of safety can be quite high.

Higher regulatory costs have real consequences for working American families. These regulations end up pushing the price of housing beyond the means of many teachers, police officers, firefighters and other middle-class workers. Nationally, for every $1,000 increase in the price of a home, about 140,500 households are priced out of the market for a median-priced new home. (These households would qualify for the mortgage before the price increase, but not afterward.) The added cost of $300-$400 for AFCIs may not sound like much when compared to the overall cost of a home, but this is only one of many regulations which adds cost for new homebuyers. Every $859 increase in construction costs adds an additional $1,000 to the final price of the home.

Mandating costly incremental increases in safety will only protect those who can afford them and will often decrease safety for those who cannot. Families who cannot qualify to purchase homes due to the increased costs from mandatory code requirements such as AFCIs will have to live in housing that is less safe, because that housing was built to less stringent code requirements.

Similar amendments have been adopted in Arkansas, North Carolina, Oregon and Wisconsin. Three additional states have exempted kitchens or kitchen countertops from requiring AFCIs. Three more have completely removed the requirement for AFCIs for single-family homes. In all, nineteen states have amended the code to remove or reduce AFCI requirements.

Cost Impact:

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied since substantiation has not been shown that the installation of AFCI protection presents a safety concern. It is important to note that the same hazards that exist due to damage to nonmetallic wiring methods and/or appliance cords in other rooms also exist in kitchens and laundry areas. These areas are already required to have AFCI protection under the 2017 NEC without any notable issues since its adoption.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 02/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.12 (B)

Submitted by: Home Builders Association of Central Arizona

210.12(B) Dwelling Units.
All 120-volt, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1) through (A)(6):

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.
Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit until January 1, 2025.
Exception No. 3: AFCI protection shall not be required for one- and two-family dwellings and townhouses.

Informational Note No. 1: See *NFPA 72*-2022, *National Fire Alarm and Signaling Code*, 29.9.4(5), for information on secondary power source requirements for smoke alarms installed in dwelling units.
Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Justification:
The list of locations within a dwelling requiring AFCIs was last expanded in the 2014 NEC. That change was substantiated by pointing to the decision to add them to the code in the 1990s. Since then, that original decision has not been revisited despite mounting evidence that these devices do not offer the benefits they were designed for.

AFCIs were first introduced in the 1999 edition of the National Electrical Code (NEC) with an effective date of Jan. 1, 2002. The approval of the code change was based on the U.S. Consumer Product Safety Commission (CPSC) report *Revised Residential Fire Loss Estimates: 1980 –1998.* **However, the number of incidents cited at the time was nearly five times higher than in the later CPSC report *2010–2012 Residential Fire Loss Estimates* (see Table 1).** This significant change is not due to any effect from the slow rollout of AFCIs after 2002 which was limited to bedroom circuits until the 2008 NEC and only where the latest edition was adopted.

Table 1: Change in Electrical Distribution Fire Estimates

	CPSC Report 1980-1998	2015 CPSC Report 2010-2012	**Percentage of Original Estimate**
Total Estimated Fires Attended by the Fire Service (Annual Average)	47,000	9,600†	**20%**

† The properties that were included in the analysis were single/multifamily dwellings, any type of boarding houses, dormitories, sorority/fraternity houses, hotels/motels, and mobile and motor homes not in transit.

It is important to note that the lower number from the later report includes mobile (manufactured) homes and motor homes (RVs) that are not in transit. It is unclear to what extent these particular property types contribute to the overall number of fires, and the proposed exception does not exempt them.

Where the data showed that AFCIs would have a minimal benefit, the results were ignored. The resulting expected benefits led to AFCI requirements being included in the NEC, but they were overblown. Today, the data bears this out. AFCIs have now been protecting electrical systems in homes for two decades and that protection has grown to cover an extensive area of the home. If they were effective, one should reasonably expect to see fire data showing a steady decline in fires involving electrical wiring and related equipment. However, that is not the case.

The Fire Protection Research Foundation (FPRF), an affiliate of NFPA, concluded there is no practical method to collect relevant data in their report *Residential Electrical Fire Problem: The Data Landscape*. The FPRF investigated the available data in 2018 and concluded the following: “Unfortunately, there are inherent challenges and barriers to the effective collection of the applicable data. Traditional data collection approaches have shortcomings that make their ultimate value questionable (e.g., lack of detail and quality on fire department collected residential fire events). Further, not all existing datasets are openly accessible, is lacking specific important details, or is insufficient in quality.” There is no known data indicating that the expansion of AFCI requirements in the NEC has resulted in a quantifiable reduction of residential fires due to electrical malfunctions.

The problems with the original rationale were so evident that even electrical manufacturers spoke against the proposal at the time. During the 1998 code development cycle comment period, manufacturers’ representatives stated that a large body of information was available to support **rejecting** an AFCI mandate. The main issue: the electrical problems AFCIs are designed to prevent occur overwhelmingly in older dwellings.

The July 2021 issue of the U.S. Fire Administration’s Topical Fire Report Series reported “A strong relationship between housing age and the rate of electrical fires has been observed, **with housing over 40 years old having the strongest association with electrical distribution fires** [emphasis added].” This finding is from the 1988 CPSC study, “Residential Electrical Distribution System Fires,” so it is comparing homes that are now 80 years old with those that were new at the time of the study. No similar study has been made to compare the previous findings with homes built in the last four decades.

When the home was built is important: The median age of one- and two-family housing in the U.S. is 40 years. The share of housing units built before 1970 is 38%, and those built before 1950 is 18%. According to a study conducted by the U.S. Consumer Product Safety

Commission, dwellings built before 1965 may still have fuses instead of circuit breakers, and those built before 1945 may still have knob and tube wiring.

No data is collected on the age of homes where fire occurs, and the vast majority of residential fires may occur in these older homes. **The CPSC study showed that 85% of fires of electrical origin occur in homes that are more than 20 years old at the time of the study.** This means that the bulk of these homes were wired in accordance with the 1965 or earlier editions of the NEC. Further, they were wired with products manufactured to product safety standards of a similar vintage. In the years since this study was produced, numerous changes have been made in both the NEC and product safety standards which mitigate against similar fires in newer homes—even as they age.

These older homes were also wired with a very limited number of receptacle outlets, resulting in extensive use of extension cords or improper alterations and additions to the original electrical system, both recognized fire hazards. In addition, they are more likely to have outdated appliances, space heaters or other characteristics that might lead to a greater risk of a fire starting. Newer homes have fire blocking, hardwired smoke alarms and egress windows installed to today's codes, all of which increase the chances of surviving a fire if one does start. **Even as homes built to today's residential code get older, they will continue to provide protection for families through their improved safety.**

It is clear that requiring AFCIs in new construction will not prevent all damage. This is due to the fact that AFCIs cannot prevent all fires and, more importantly, that electrical fires occur overwhelmingly in older houses. While questions regarding construction code requirements intended to increase the safety of homes cannot, and should not, be decided solely on the issue of cost, it is reasonable to ask if there is a demonstrated need for the requirement or if an acceptable level of safety can be achieved through other, less expensive means. The cost of an incremental increase in the margin of safety can be quite high.

Higher regulatory costs have real consequences for working American families. These regulations end up pushing the price of housing beyond the means of many teachers, police officers, firefighters and other middle-class workers. Nationally, for every $1,000 increase in the price of a home, about 140,500 households are priced out of the market for a median-priced new home. (These households would qualify for the mortgage before the price increase, but not afterward.) The added cost of $300-$400 for AFCIs may not sound like much when compared to the overall cost of a home, but this is only one of many regulations which adds cost for new homebuyers. Every $859 increase in construction costs adds an additional $1,000 to the final price of the home.

Mandating costly incremental increases in safety will only protect those who can afford them and will often decrease safety for those who cannot. Families who cannot qualify to purchase homes due to the increased costs from mandatory code requirements such as AFCIs will have to live in housing that is less safe, because that housing was built to less stringent code requirements.

From 1980 to 2015, data shows there has been a significant drop in the number of reported fires, injuries and fatalities in the United States. During that time period the number of fires has dropped by 50 percent and fatalities have dropped by about the same margin, even as the population increased. The decline was sharpest during the 1980s before AFCIs were introduced. This further supports the importance of encouraging homeowners to move up to newer homes without the added burden of increased regulation.

Similar amendments have been adopted in Indiana, Michigan, and Utah. In all, nineteen states have amended the code to reduce AFCI requirements.

Cost Impact: (Type one of the following: No cost impact. Or Minimal cost impact.)
(Add explanation here.)

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied since substantiation has not been shown that the installation of AFCI protection presents a safety concern. It is important to note that one- and two-family dwellings and townhomes are commonly wired with nonmetallic wiring methods. AFCI protection was designed to detect arcing faults due to damage to nonmetallic wiring methods and/or appliance cords. These areas are already required to have AFCI protection under the 2017 NEC without any notable issues since its adoption.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 02/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 210.52(C)(2)

Submitted by: National Electrical Code Committee

ARTICLE 210 Branch Circuits

210.52(C)(2) Island and Peninsular Countertops and Work Surfaces.
At least one r~~R~~eceptacle outlet~~s, if~~ shall be installed to serve ~~an~~ each island and/or peninsular countertop or work surface~~,~~ and shall be installed in accordance with 210.52(C)(3). ~~If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.~~
If a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the depth of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.); the range, counter-mounted cooking unit, or sink shall be considered to divide the countertop space into two separate countertop spaces.

Justification: The intent of NEC 210.52 (and much of the electrical code) is to provide receptacle outlets located to preclude the need for extension cords. The code has long required at least one receptacle outlet, (located below the respective countertop), to serve island or peninsular countertops. However, due to numerous instances of burn injuries as a result of spilling hot contents of countertop cooking appliances on children that pulled the appliance cord; the 2023 NEC was revised to no longer allow receptacle outlets to be located below the countertop.

The revision to the code also made providing a receptacle outlet to serve the island or peninsula optional so long as provisions were provided to add it later. However, due to the high cost (multiple trades) of adding a receptacle outlet above the countertop later; it is likely that the result would be the use of an extension cord stretched to an island countertop, creating the same hazard that the change was intending to prevent.

This amendment to 2023 NEC 210.52(C)(2) requires that at least one receptacle outlet be installed to serve each island and/or peninsular countertop or work surface and also requires that island or peninsular countertops that have a range, counter-mounted cooking unit, or sink installed with less than 12 in. of countertop behind it, shall be considered to divide the countertop space into two separate countertop spaces, each requiring at least one receptacle outlet. This will prevent the need to stretch an appliance cord across a sink or cooking surface.

Cost Impact: Minor cost increase. Receptacle outlets are required to serve island and peninsular countertops in the 2017 NEC and this amendment is consistent with what is currently required with the increased safety of the receptacle outlet now being required to be in or above countertop per the 2023 NEC.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:
2024 Code Committee Date: 12/16/2024 ☒ Approved as submitted ☐ Modified and approved ☐ Denied ☐ No action taken
Development Advisory Board (DAB) Subcommittee Date: 03/13/2025 ☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken
Development Advisory Board (DAB) Date: 04/22/2025 ☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken
Transportation, Infrastructure and Planning Subcommittee Date: ☐ Approved as submitted ☐ Modified and approved ☐ Denied ☐ No action taken
City Council Action Date: ☐ Approved as submitted ☐ Modified and approved ☐ Denied ☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 220.5(C)

Submitted by: Home Builders Association of Central Arizona

220.5(C) Floor Area.
The floor area for each floor shall be calculated from the outside dimensions of the building, dwelling unit, or other area involved. For dwelling units, the calculated floor area shall not include open porches, garages, or unfinished areas not adaptable for future use as a habitable room or occupiable space.

Justification:
In the 2023 NEC development cycle, garages were removed from the list of exempted areas solely because "there are general lighting load requirements throughout the entire dwelling," including the garage. As written, this section requires the floor area of garages to be included in the branch-circuit load calculations. It does not add any additional electrical loading through receptacle outlets, lighting, etc. It simply requires more capacity in the electrical panel despite discussions happening that electrical loads are declining due to more efficient lighting and appliances.
This amendment restores the application of this section to the 2020 code by replacing the word "garages."
Consider that the code requires the following electrical loads which would fall under the calculation of Section 220.5(C).

- One 20-amp receptacle outlet in each vehicle bay
- One lighting outlet

Section 220.41 allows motors rated less than 1/8 hp to be considered part of the minimum lighting load when connected to a lighting circuit. However, garage door openers available today are typically ½ hp or larger. They would need to be calculated separately and would not be included in the floor area calculation.

Cost Impact: (Type one of the following: No cost impact. Or Minimal cost impact.)
(Add explanation here.)

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied. Garage space is often converted to habitable space. The addition of the watts per square foot of the garage area will have minimum impact on the load calculation for the service due to the demand factors allowed by code.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 2/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 220.110 (1)

Submitted by: Darrel R. Miller, PE, LEED-AP, ICC Certified Electrical Plans Examiner

Table 220.110(1) Demand Factors for Receptacles Supplied by General-Purpose Branch Circuits in Category 1 and Category 2 Patient Care Spaces

Portion of Receptacle Load to Which Demand Factors Applies (Volt-Amperes)	Demand Factor (%)
~~First 5000 or less~~ First 50,000 or less at	~~100~~ 40
~~From 5001 to 10,000~~	~~50~~
~~Remainder over 10,000~~ Remainder over 50,000 at	~~25~~ 20

Justification:

This NEC Change has been through a couple of iterations. Previous to and including NEC 2017 220.44 allowed the use of either Table 220.42 or Table 220.44 to apply to receptacles loads as defined by 220.14(H) and (1). Table 220.42 was a Lighting demand factor table by title. Nevertheless, it had always been applied to receptacles loads as described in NEC 220.44.
In NEC 2020 edition, Table 220.42 was removed by a committee coordinating the energy code lighting power densities with NEC 220 lighting load calculations. They found from empirical evidence that this table could be removed and replaced with text allowing the use of the energy code values. This code change made it all the way through to publication before it became evident the Table had other applications within the NEC, as with the reference made in NEC 220.44.
The lighting uses in Hospital applications were effectively negated by a foot note qualifying the demand factor not apply to cases where continuous use of the lighting was likely (such as might occur in a hospital setting). However, the applicability to the receptacles as referenced in NEC 220.44 was always applied in hospital applications.
In NEC 2023 edition a new section within 220 has been added, 220.110 that is attempting to replace the missing table. NEC 220.44 has moved to become 220.110. The wording has been updated to include appropriate references to the new tables added. Table 220.110(1) is attempting to replace the old Table 220.42 that was removed entirely but only for the Hospital application. The Table description has clarified the table applicability based on the medical Space Category designation which is appropriate. However, the demand factors have been tinkered with and do not match up to the original table demand factors. This has resulted in a conflict in design loads for existing Hospital buildings compared to new required calculations. A comparison of the two demand factor tables found the following:
NEC 2017 (and previous) Table 220.42
• Loads between 0 and 33kVA result in a larger applied demand factor (reduction)
• Loads of 67kVA and larger result in a larger applied demand factor (reduction)
NEC 2023 Table 220.110(1)
• Loads between 34kVA and 66kVA result in a larger applied demand factor (reduction)
Application of the new load demand factor is only favorable in a small band of the load profile,

existing facilities will conceivably have new overload conditions. I have actually experienced this with one local jurisdiction already.
The demand factors allowed in the 2017 NEC have been in place since the 1970's. So the historical evidence is they work. It is not clear why there was a need to deviate from the original demand factors. I have read NFPA ROP discussions making this same argument to restore the old demand factors.

Recommendation
Replace the demand factors with the historic demand factors which were last seen in the 2017 NEC Table 220.42 into the new 2023 Table 220.110(1) as marked up in this submittal.
This will retain the historical calculation method the existing local hospitals were built around. We believe the Code committees will be working to resolve this discrepancy in the next code cycle.
If this recommendation is not acceptable, please consider inserting the amended table presented as a third table, Table 220.110(3) covering calculation of receptacle loads in existing facilities built under the previous edition of the adopted City of Phoenix Electrical code (2017 and older).

Cost Impact: No cost impact.

Staff Committee Rationale for Recommendation:
This amendment is recommended to be denied. The main concern expressed in the justification by the submitter was related to load calculations for the 'existing to remain' receptacles in a hospital. Since these loads already would be acceptable using the 2017 demands to establish an existing load, there would not be a need to amend this table. Note: any new receptacle loads added would need to comply with the new demand factors of 2023 NEC.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 01/21/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 230.85

Submitted by: Home Builders Association of Central Arizona

~~**230.85 Emergency Disconnects.**~~
[Delete the entire section.]

Justification:
The intent of this change is to allow firefighters to quickly shut off power from the electrical service before entering a house to fight a fire. In some states, especially in the southwest, this is already common practice. A likely means of complying with the requirement in other parts of the country would be installing a meter main housing, which includes the main circuit breaker along with the meter socket, on the exterior of the home where the service drop is located. A second main breaker would not be necessary in the electrical panel located inside the home.
This requirement is not necessary in jurisdictions where the fire service has made other arrangements for dealing with the electrical service in the case of fire. It is also important to note that activating the disconnect will not shut off all power in every case. Some systems, such as photovoltaic, backup generators and energy storage systems, will still provide power even after power from the electrical utility is disconnected.
The ongoing global supply chain challenges have limited the inventory of the meter mains used to comply with this section, greatly increasing their delivery wait times and cost.

A similar amendment has been adopted in Oregon.

Cost Impact:

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied. As the above justification notes, the service disconnects are already required to be installed on the exterior of one- and two-family dwellings due to local utility requirements.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 02/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken

Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 314.27(A)(2) and 314.27(C)

Submitted by: Home Builders Association of Central Arizona

314.27(A)(2) Ceiling Outlets.
At every outlet used exclusively for lighting, the box shall be designed or installed so that a luminaire or lampholder can be attached. Boxes shall be required to support a luminaire weighing a minimum of 23 kg (50 lb). A luminaire that weighs more than 23 kg (50 lb) shall be supported independently of the outlet box, unless the outlet box is listed for not less than the weight to be supported. The interior of the box shall be marked by the manufacturer to indicate the maximum weight the box shall be permitted to support.
Outlet boxes mounted in the ceilings of family rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms and similar areas of dwelling occupancies and located in an area of the ceiling typical for the installation of a ceiling-suspended (paddle) fan shall be installed to accommodate a ceiling-suspended (paddle) fan in accordance with 314.27(C).

314.27(C) Boxes at Ceiling-Suspended (Paddle) Fan Outlets.
Outlet boxes or outlet box systems used as the sole support of a ceiling-suspended (paddle) fan shall be listed, shall be marked by their manufacturer on the interior of the box as suitable for this purpose, and shall not support ceiling-suspended (paddle) fans that weigh more than 32 kg (70 lb). For outlet boxes or outlet box systems designed to support ceiling-suspended (paddle) fans that weigh more than 16 kg (35 lb), the required marking shall include the maximum weight to be supported.
~~Outlet boxes mounted in the ceilings of habitable rooms of dwelling occupancies in a location acceptable for the installation of a ceiling-suspended (paddle) fan shall comply with one of the following:~~
Where a ceiling-suspended (paddle) fan is not installed, the outlet box shall comply with one of the following:

(1) Listed for the sole support of ceiling-suspended (paddle) fans
(2) Installed so as to allow direct access through the box to structural framing capable of supporting a ceiling-suspended (paddle) fan without removing the box

Justification:
It has been reported that Section 314.27(C) has been cited to require multiple fan-rated boxes in one room, even in rooms which do not typically have a single ceiling fan installed, such as a kitchen or dining room. In some cases the lights were arranged in a rectangle around the ceiling with none near the middle of the ceiling. One problem with the language is using the vague phrasing “in a location acceptable for the installation of a ceiling-suspended (paddle) fan.” There are many locations where a ceiling fan could conceivably be installed, but no one would ever put one there. Unfortunately, as written, this language allows such a broad interpretation that even those locations are being required to comply.
Electricians who do work in PA, NJ and DE have brought this to our attention. They are installing fan-rated boxes around the kitchen and in off-center lighting locations around various rooms based as a result of the electrical inspector’s interpretation at a cost of $15-$20 per

location. A home being built with 20 or so “acceptable” locations is now paying an additional $400 which is being passed along to the homeowner with no added benefit.
Generally, the light in the center of a bedroom, family room, living room and rooms with similar uses is a location where a fan could be installed, and fan-rated boxes are often provided. The list of areas added to Section 314.27(A)(2) by this amendment includes a large list of rooms where a fan may typically be installed and is taken from existing code language.
A second issue with the model code language is its location. The requirement for installing outlet boxes rated for ceiling fans applies to ceiling light locations, so there should be a pointer to the requirement provided under 314.27(A)(2) which provides the more general requirement for ceiling outlets. The heading of 314.27(C) implies that the section only applies to ceiling outlets where a fan is intended to be installed so it can be easily overlooked if there is no intent to install a ceiling fan. The result can be a surprise added cost to the homeowner through no fault of their own.

Cost Impact:

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied. The concern noted for enforcement in other states is not an issue in this jurisdiction.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 02/11/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/13/2025	
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Development Advisory Board (DAB)	Date: 04/22/2025	
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Transportation, Infrastructure and Planning Subcommittee	Date:	
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City Council Action	Date:	
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City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2023 National Electrical Code (NEC)
Section 406.4(D)(4)

Submitted by: Home Builders Association of Central Arizona

~~**406.4(D)(4) Arc-Fault Circuit-Interrupter Protection.**~~
[Delete the entire section.]

Justification:
(The last time the list of locations within a dwelling requiring AFCIs was changed was in the 2014 NEC, and it was substantiated by pointing to the decision to add them to the code in the 1990s. Since then, that original decision has not been revisited despite mounting evidence that these devices do not offer the benefits they were intended for.
AFCIs were first introduced in the 1999 edition of the National Electrical Code (NEC) with an effective date of Jan. 1, 2002. The approval of the code change was based on the U.S. Consumer Product Safety Commission (CPSC) report *Revised Residential Fire Loss Estimates: 1980 –1998*. **However, the number of incidents cited at the time was nearly five times higher than in the later CPSC report *2010–2012 Residential Fire Loss Estimates* (see Table 1).** This significant change is not due to any effect from the slow rollout of AFCIs after 2002 which was limited to bedroom circuits until the 2008 NEC and only where the latest edition was adopted.
Table 1: Change in Electrical Distribution Fire Estimates

	CPSC Report 1980-1998	2015 CPSC Report 2010-2012	**Percentage of Original Estimate**
Total Estimated Fires Attended by the Fire Service (Annual Average)	47,000	9,600†	**20%**

† The properties that were included in the analysis were single/multifamily dwellings, any type of boarding houses, dormitories, sorority/fraternity houses, hotels/motels, and mobile and motor homes not in transit.

It is important to note that the lower number from the later report includes mobile (manufactured) homes and motor homes (RVs) that are not in transit. It is unclear to what extent these particular property types contribute to the overall number of fires, and the proposed exception does not exempt them.
Where the data showed that AFCIs would have a minimal benefit, the results were ignored. The resulting expected benefits led to AFCI requirements being included in the NEC, but they were overblown. Today, the data bears this out. AFCIs have now been protecting electrical systems in homes for two decades and that protection has grown to cover an extensive area of the home. If they were effective, one should reasonably expect to see fire data showing a steady decline in fires involving electrical wiring and related equipment. However, that is not the case.
The Fire Protection Research Foundation (FPRF), an affiliate of NFPA, concluded there is no practical method to collect relevant data in their report *Residential Electrical Fire Problem: The Data Landscape*. The FPRF investigated the available data in 2018 and concluded the following: “Unfortunately, there are inherent challenges and barriers to the effective collection of the applicable data. Traditional data collection approaches have

shortcomings that make their ultimate value questionable (e.g., lack of detail and quality on fire department collected residential fire events). Further, not all existing datasets are openly accessible, is lacking specific important details, or is insufficient in quality." There is no known data indicating that the expansion of AFCI requirements in the NEC has resulted in a quantifiable reduction of residential fires due to electrical malfunctions.

The problems with the original rationale were so evident that even electrical manufacturers spoke against the proposal at the time. During the 1998 code development cycle comment period, manufacturers' representatives stated that a large body of information was available to support **rejecting** an AFCI mandate. The main issue: the electrical problems AFCIs are designed to prevent occur overwhelmingly in older dwellings.

The July 2021 issue of the U.S. Fire Administration's Topical Fire Report Series reported "A strong relationship between housing age and the rate of electrical fires has been observed, **with housing over 40 years old having the strongest association with electrical distribution fires** [emphasis added]." This finding is from the 1988 CPSC study, "Residential Electrical Distribution System Fires," so it is comparing homes that are now 80 years old with those that were new at that time of the time of the study. No similar study has been made to compare the previous findings with homes built in the last four decades.

When the home was built is important: The median age of one- and two-family housing in the U.S. is 40 years. The share of housing units built before 1970 is 38%, and those built before 1950 is 18%. According to a study conducted by the U.S. Consumer Product Safety Commission, dwellings built before 1965 may still have fuses instead of circuit breakers, and those built before 1945 may still have knob and tube wiring.

No data is collected on the age of a home when a fire occurs, and the vast majority of residential fires may occur in these older homes. **The CPSC study showed that 85% of fires of electrical origin occur in homes that are more than 20 years old at the time of the study.** This means that the bulk of these homes were wired in accordance with the 1965 or earlier editions of the NEC. Further, they were wired with products manufactured to product safety standards of a similar vintage. In the years since this study was produced, numerous changes have been made in both the NEC and product safety standards which mitigate against similar fires in newer homes—even as they age.

These older homes were also wired with a very limited number of receptacle outlets, resulting in extensive use of extension cords or improper alterations and additions to the original electrical system, both recognized fire hazards. In addition, they are more likely to have outdated appliances, space heaters or other characteristics that might lead to a greater risk of a fire starting. Newer homes have fire blocking, hardwired smoke alarms and egress windows installed to today's codes, all of which increase the chances of surviving a fire if one does start. **Even as homes built to today's residential code get older, they will continue to provide protection for families through their improved safety.**

From 1980 to 2015, data shows there has been a significant drop in the number of reported fires, injuries and fatalities in the United States. During that time period the number of fires has dropped by 50 percent and fatalities have dropped by about the same margin, even as the population increased. The decline was sharpest during the 1980s before AFCIs were introduced. This further supports the importance of encouraging homeowners to move up to newer homes without the added burden of increased regulation.

It is clear that requiring AFCIs in new construction will not prevent all damage. This is due to the fact that AFCIs cannot prevent all fires and, more importantly, that electrical fires occur overwhelmingly in older houses. While questions regarding construction code requirements intended to increase the safety of homes cannot, and should not, be decided solely on the issue of cost, it is reasonable to ask if there is a demonstrated need for the requirement or if an acceptable level of safety can be achieved through other, less expensive means. The cost of an incremental increase in the margin of safety can be quite high.

The lack of data to support AFCI expansion caused the leadership of the governing code-making panel to ask the NFPA Research Foundation (an affiliate of NFPA who publishes the NEC) to analyze existing fire data and make recommendations on next steps. Its report

"Residential Electrical Fire Problem: The Data Landscape" acknowledged that "data and data analytics is lacking to guide the optimum approaches to minimize residential electrical fires and related hazards." The report also observes that "while proving the effectiveness of preventative measures (e.g., AFCIs) is a challenging task, the significant limitations associated with the existing traditional data sources presents serious concerns." It is clearly not the time to expand AFCI coverage in the home when the benefits cannot be verified.
Higher regulatory costs have real consequences for working American families. These regulations end up pushing the price of housing beyond the means of many teachers, police officers, firefighters and other middle-class workers. Nationally, for every $1,000 increase in the price of a home, about 140,500 households are priced out of the market for a median-priced new home. (These households would qualify for the mortgage before the price increase, but not afterward.) The added cost of $300-$400 for AFCIs may not sound like much when compared to the overall cost of a home, but this is only one of many regulations which adds cost for new homebuyers. Every $859 increase in construction costs adds an additional $1,000 to the final price of the home.
Mandating costly incremental increases in safety will only protect those who can afford them and will often decrease safety for those who cannot. Families who cannot qualify to purchase homes due to the increased costs from mandatory code requirements such as AFCIs will have to live in housing that is less safe, because that housing was built to less stringent code requirements.

Similar amendments have been adopted in New Jersey and North Carolina. Three additional states have completely removed the requirement for AFCIs for single-family homes. In all, nineteen states have amended the code to reduce AFCI requirements.

Cost Impact: (Type one of the following: No cost impact. Or Minimal cost impact.)
(Add explanation here.)

Staff Committee Rationale for Recommendation:
The NEC Committee recommended this proposed amendment to be denied since substantiation has not been shown that the installation of AFCI protection presents a safety concern. Replacement receptacles are already required to have AFCI protection under the 2017 NEC without any notable issues since its adoption.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 02/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
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