City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

PHOENIX BUILDING CONSTRUCTION CODE

Amendment to 2017 National Electrical Code (NEC)
Section 210.52(G)(1)

Submitted by: 2018 National Electrical Code Committee

ARTICLE 210 Branch Circuits

210.52(G)(1) Garages. In each attached garage and in each detached garage with electric power, at least one receptacle outlet shall be installed in each vehicle bay ~~and~~ at not less than (18) inches and not more than 1.7 m (5 ½ ft.) above the floor.

Reasons:
2018 IRC section G2408.2 (305.3) Elevation of ignition source. This section states that equipment and appliances having an ignition source shall be elevated such that the source of the ignition is not less than 18 inches (457 mm) above the floor in hazardous locations and public garages, private garages, repair garages, motor fuel dispensing facilities and parking garages.

Many private/dwelling garages are utilized to work on vehicles or other equipment that contain volatile fuels or other liquids and gases. Other jurisdictions around the United States have amended this section of NEC article 210.52 to address this situation. The receptacles outlets, if installed below the 18 inches, could possibly become an ignition source which could cause fire, property damage, injury, or death if these volatile liquids or gases are present.

Cost Impact: No cost impact.
Receptacle outlets are required in the dwelling garages as per the NEC. All wiring and associated electrical equipment do not change from the NEC standard requirement.

Approved in previous 2012 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2018 Code Committee	Date: December 14, 2017
☒ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
Development Advisory Board (DAB) Technical Subcommittee	Date: January 11, 2018
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City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

PHOENIX BUILDING CONSTRUCTION CODE

Amendment to 2017 National Electrical Code (NEC)
Section 210.8(A)(11)

Submitted by: 2018 National Electrical Code Committee

ARTICLE 210 Branch Circuits

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in 210.8(A)(1) through (~~10~~11) shall have ground-fault circuit interrupter protection for personnel.

(11) Other indoor damp and wet locations

Reasons:
Added safety in damp locations indoors.

NEC Article 100 defines Damp Location as follows: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

Additionally, NEC Section 406.9(A) requires that a receptacle located in any damp location is installed in a weatherproof enclosure.

Since receptacles located in an outdoor damp location require GFCI protection, logically, receptacles located in an indoor damp location should also be provided with the same GFCI protection.

Cost Impact: Minimal cost impact.

Approved in previous 2012 Code Adoption process: ☒ **YES** ☐ **NO**

This amendment was approved in previous code adoptions. It has subsequently been evaluated by the committee for applicability to the 2017 NEC and carried forward as presented.

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City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

PHOENIX BUILDING CONSTRUCTION CODE

Amendment to 2017 National Electrical Code (NEC)
Section 210.8(B)(6)

Submitted by: 2018 National Electrical Code Committee

ARTICLE 210 Branch Circuits

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

(B) Other Than Dwelling Units. All single-phase receptacles rated 150 volts to ground or less, 50 amperes or less and three-phase receptacles rated 150 volts to ground or less, 100 amperes or less installed in the following locations shall have ground-fault circuit-interrupter protection for personnel.

(6) Indoor damp and wet locations

Reasons:
Added safety in damp locations indoors.

NEC Article 100 defines Damp Location as follows: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

Additionally, NEC Section 406.9(A) requires that a receptacle located in any damp location is installed in a weatherproof enclosure.

Since receptacles located in an outdoor damp location require GFCI protection, logically, receptacles located in an indoor damp location should also be provided with the same GFCI protection.

Cost Impact: Minimal cost impact.

Approved in previous 2012 Code Adoption process: ☒ **YES** ☐ **NO**

This amendment was approved in previous code adoptions. It has subsequently been evaluated by the committee for applicability to the 2017 NEC and carried forward as presented.

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PLANNING & DEVELOPMENT DEPARTMENT

PHOENIX BUILDING CONSTRUCTION CODE

Amendment to 2017 National Electrical Code (NEC)
Section 250.118(4)

Submitted by: 2018 National Electrical Code Committee

ARTICLE 250 Grounding and Bonding

250.118 Types of Equipment Grounding Conductors. The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:

(4) Electrical metallic tubing with an additional equipment grounding conductor.

Reasons:
This amendment requires that specific wiring methods include an individual equipment-grounding conductor. This amendment is more restrictive than the NEC, but provides for a higher degree of equipment grounding safety. The intent of the amendment is to supplement the low impedance path to ground and to attain reasonable compliance with requirements for the performance of the fault current path.

Cost Impact: Minimal cost impact.
Cost due to additional grounding conductor.

Approved in previous 2012 Code Adoption process: ☒ **YES** ☐ **NO**

This amendment was approved in previous code adoptions. It has subsequently been evaluated by the committee for applicability to the 2017 NEC and carried forward as presented.

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PHOENIX BUILDING CONSTRUCTION CODE

Amendment to 2017 National Electrical Code (NEC)
Section 334.10

Submitted by: 2018 National Electrical Code Committee

ARTICLE 334 Nonmetallic-Sheathed Cable; Types NM, NMC and NMS

Part II. Installation

334.10 Uses Permitted.
Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following, except as prohibited in 334.12:

(1) One- and two-family dwellings and their attached or detached garages, and their storage buildings.

(2) Multi-family dwellings permitted to be of Types III, IV, and V construction.

(3) Other dwelling unit accessory buildings and structures ~~permitted to be of Types III, IV, and V construction. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.~~ in accordance with 334.10(1) and (2).

(4) Cable trays in dwelling structures, in accordance with 334.10(1) and (2), ~~permitted to be Types III, IV, or V~~ where the cables are identified for the use.

(5) Types I and II construction, in accordance with 334.10(1) and (2), where installed within raceways permitted to be installed in Types I and II construction.

Reasons:
The use of Nonmetallic-Sheathed cable in commercial buildings has not typically been permitted in the Phoenix metropolitan area as well as many surrounding cities. Nonmetallic-Sheathed cable (NM) is traditionally used in dwelling units, whereas a stouter wiring method enclosed within raceways is traditionally used in commercial buildings.

The code restrictions of the NEC, with respect to allowing type NM cable in a commercial building, would tend to make the installation impractical in most cases, (i.e. NM cable would not be allowed underground or in drop ceilings), and at best the resulting installation would likely be a mixture of several different wiring methods, (each with their own requirements). This type of mixture would actually tend to make the installation more complex, creating a larger hurdle to providing a code compliant installation.

Concerns also exist that Nonmetallic-Sheathed Cable would be more subject to damage, such as nicks in the insulation, etc. The integrity of the insulation is critical to the safety of the electrical installation. In dwelling units, the NEC requires AFCI (Arc-Fault Circuit Interrupter) protection for most circuits since a nick in the insulation, such as from a nail for hanging a

picture, can cause an arcing fault which may not be cleared by a normal circuit breaker before a fire starts.

The AFCI breaker was developed specifically to detect and clear arcing faults; however, the NEC does not require AFCI protection in most non-dwelling occupancies.

It is therefore the general consensus of the electrical section, and supported in general by the Electrical Focus Group, (made up of members of the local electrical engineering community and others members of the industry), that the use of Nonmetallic-Sheathed Cable should be restricted to dwellings, as described within this document, to provide a higher degree of electrical safety in other occupancies.

Cost Impact:
Additional cost due to the cost difference between an installation consisting of Nonmetallic-Sheathed Cable and an installation consisting of another wiring method, depending on the wiring method chosen.

Approved in previous 2012 Code Adoption process: ☒ **YES** ☐ **NO**

This amendment was approved in previous code adoptions. It has subsequently been evaluated by the committee for applicability to the 2017 NEC and carried forward as presented.

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PHOENIX BUILDING CONSTRUCTION CODE

Amendment to 2017 National Electrical Code (NEC)
Section 310.15(B)(7)

Submitted by: 2018 National Electrical Code Committee

ARTICLE 310 Conductors for General Wiring

310.15(B)(7) 120/240-Volt, Single-Phase Dwelling Services and Feeders. For one-family dwellings and the individual dwelling units of two-family and multifamily dwellings, service and feeder conductors supplied by a single-phase, 120/240-volt system shall be permitted to be sized in accordance with 310.15(B)(7)(1) through (4).

~~For one-family dwellings and the individual dwelling units of two-family and multifamily dwellings, single-phase feeder conductors consisting of 2 ungrounded conductors and the neutral conductor from a 208Y/120-volt system shall be permitted to be sized in accordance with 310.15(B)(7)(1) through (3).~~

(1) For a service rated 100 through 400 amperes, the service conductors supplying the entire load associated with a one-family dwelling, or the service conductors supplying the entire load associated with an individual dwelling unit in a two-family or multifamily dwelling, shall be permitted to have an ampacity not less than 83 percent of the service rating.
(2) For a feeder rated 100 through 400 amperes, the feeder conductors supplying the entire load associated with a one-family dwelling, or the feeder conductors supplying the entire load associated with an individual dwelling unit in a two-family or multifamily dwelling, shall be permitted to have an ampacity not less than 83 percent of the feeder rating.
(3) In no case shall a feeder for an individual dwelling unit be required to have an ampacity greater than that specified in 310.15(B)(7)(1) or (2).
(4) Grounded conductors shall be permitted to be sized smaller than the ungrounded conductors, if the requirements of 220.61 and 230.42 for service conductors or the requirements of 215.2 and 220.61 for feeder conductors are met.

Where correction or adjustment factors are required by 310.15(B)(2) or (3), they shall be permitted to be applied to the ampacity associated with the temperature rating of the conductor.

Informational Note No. 1: The service or feeder ratings addressed by this section are based on the standard ampacity ratings from 240.6(A).

Informational Note No. 2: See Example D7 in Annex D.

Reasons:
Conductor ampacity is required by the code to be selected per the ampacity tables and adjusted for conditions that cause heating of the conductor. The ampacity of a conductor is affected by heat, including both the heat generated by current flowing in the conductor, and other adjacent conductors, and from the ambient temperature surrounding the conductors.

The ampacities in Table 310.15(B)(16) are based on three current-carrying conductors in a raceway or cable and an ambient temperature of 86°F.

The code requires that if there are more than three current-carrying conductors, that the allowable ampacity be adjusted by the factors listed in Table 310.15(B)(3)(a). This is due to the

additional heating effects of having more current-carrying conductors in the same raceway or cable. Similarly, the code requires the ampacity to be adjusted if the ambient temperature is greater than the 86° F that Table 310.15(B)(16) is based upon. The ampacity must be adjusted by the factors listed in Table 310.15(B)(2)(a). This is because the higher ambient temperature reduces the ampacity of the conductor as well as hinders the dissipation of heat from the conductor.

The 2017 NEC added 208Y/120-volt single-phase 3-wire systems to Section 310.15(B)(7). This presents an unsafe installation.

Consider the electrical characteristics of a single-phase 120/240V system, which has two ungrounded conductors and a neutral conductor. The ungrounded conductors are 180 degrees out of phase with each other. Therefore, for a balanced load, the neutral current would be zero and for an unbalanced load the neutral current will be a small value based on the unbalance. This system essentially represents two current-carrying conductors since the neutral current is negligible.

However, in a 208Y/120-volt single-phase system, with two ungrounded conductors and a neutral conductor, the ungrounded conductors are 120 degrees out of phase with each other. This results in neutral current that is the same as the phase current for a balanced load and almost as large as the phase current for an unbalanced load. Therefore, this system represents three current-carrying conductors.

Prior to the 2017 edition, NEC 310.15(B)(7) has historically only been applicable to 120/240-volt single phase dwelling services and feeders. This is due to considering only two current-carrying conductors and allowing an increase in ampacity in those conductors due to less heat being generated by the conductors. However, since 208V single-phase systems must be considered three current-carrying conductors, the ampacities in Table 310.15(B)(16) must be used and 310.15(B)(7) should not apply. Allowing the use of this ampacity adjustment on 208Y/120-volt systems will result in conductors being undersized based on the load and the overcurrent device intended to protect them. This will be an unsafe installation that could result in fire.

This amendment removes 208Y/120-volt systems from the code section. NEC 310.15(B)(7) is only applicable to 120/240V single-phase dwellings.

Cost Impact: No cost impact**.**
Neutral. Previous code cycles did not permit 310.15(B)(7) to apply to 208Y/120-volt systems.

Approved in previous 2012 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

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