South Carolina Building Codes Council
2021 Proposed Modifications
For 8/19/21 Study Committee Meeting

*The code sections below are hyperlinked to the corresponding pages. The LLR Logo at the top of each page will take you back to the index.

IRC CODE SECTION	Requesting Association/Jurisdiction	NEW/ CONTINUATION	COMMITTEE RECOMMENDATION
R202 Definitions - Crawl Space	HBA of SC	New	Support Approval
R307.1 Space required and R2705.1 (5) Installation	HBA of SC	New	Support Approval w/ Changes
R312.1.1 Where Required	HBA of SC	Continuation	Support Approval w/ Changes
R314.3 Location	HBA of SC	New	Support Approval w/ Changes
R326.3 Story above grade plane	HBA of SC	New	Support Approval w/ Changes
R403.1.6 Foundation anchorage	HBA of SC	New	Do Not Support Approval
R408.8 Under-floor vapor retarder	HBA of SC	New	Support Approval
P2503.6 Shower Liner Test	HBA of SC	New (Adds to a continuation)	Support Approval
P2603.2.1 Protection against physical damage	HBA of SC	New	Support Approval w/ Changes
P2603.5 Freezing	HBA of SC	New (Adds to a continuation)	Support Approval
P2705.1 (3) General	HBA of SC	New	Support Approval as edited
P2708.4 Shower control valves	HBA of SC	New	Support Approval
P2713.3 Bathtub and whirlpool bathtub valves	HBA of SC	New	Support Approval
Part VIII-Electrical, Chapters 34-43	NEMA	New	Do Not Support Approval
E3601.8 Emergency Disconnects	HBA of SC	New	Do Not Support Approval
E3606.5 Surge Protection	HBA of SC	New	Support Approval
E3901.4.2 (1) - Island and peninsular countertops and work spaces	HBA of SC	New	Support Approval
E3902 Ground Fault & Arc-Fault Circuit-Interrupter Protection	HBA of SC	New	Support Approval

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E3902.5 Basement Receptacles	HBA of SC	New	Tabled for 9/28 meeting
E3902.10 Indoor damp and wet locations.	HBA of SC	New	Tabled for 9/28 meeting
E3902.17 Arc Fault Circuit Interrupted Protection	HBA of SC	Continuation	Tabled for 9/28 meeting
E4002.14 Tamper-resistant receptacles.	HBA of SC	New	Tabled for 9/28 meeting

IBC CODE SECTION	Requesting Association/Jurisdiction	NEW/ CONTINUATION	COMMITTEE RECOMMENDATION
[A] 101.4.7 Existing Buildings	American Concrete Institute	New	Support Approval
1703.1.3 Personnel	American Concrete Institute	New	Do Not Support Approval
1704.2 Special inspections and tests	American Concrete Institute	New	Do Not Support Approval

IFC CODE SECTION	Requesting Association/Jurisdiction	NEW/ CONTINUATION	COMMITTEE RECOMMENDATION
6110.1 Temporarily out of service	SC Fire Marshal's Association	Continuation	Tabled for 9/28 meeting
903.3.1.2 NFPA 13R sprinkler systems	HBA of SC	New	Do Not Support Approval
Appendix D- D102.1 Access and loading	HBA of SC	New	Tabled for 9/28 meeting
Appendix D- D107.1 One- or two-family dwelling residential developments	HBA of SC	New	Tabled for 9/28 meeting

NEC CODE SECTION	Requesting Association/Jurisdiction	NEW/ CONTINUATION	COMMITTEE RECOMMENDATION
210.8(A) Dwelling Units	HBA of SC	New	Tabled for 9/28 meeting
210.8(A)(5) Basements	HBA of SC	New	Tabled for 9/28 meeting
210.8(F) Outdoor Outlets	HBA of SC	New	Tabled for 9/28 meeting
210.12 Arc-Fault Circuit-Interrupter Protection	HBA of SC	New	Tabled for 9/28 meeting
230.67 Surge Protection	HBA of SC	New	Support Approval

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230.85 Emergency Disconnects	HBA of SC	New	Modification Withdrawn
406.4(D)(4) Arc-Fault Circuit-Interrupter Protection	HBA of SC	New	Tabled for 9/28 meeting
406.9(C) Bathtub and Shower Space	HBA of SC	New	Tabled for 9/28 meeting
406.12 Tamper-Resistant Receptacles	HBA of SC	New	Tabled for 9/28 meeting

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2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
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- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: Chapter 2 Definitions - Crawl Space

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

Crawl Space: An underfloor space that is not a basement. *Spaces under decks and porches that do not contain mechanical equipment are not to be considered crawlspaces.*

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Phone No.: [redacted] Email Address: [redacted]

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2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: R307.1 Space required and R2705.1 (5) Installation

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

R307.1 Space required - Fixtures shall be spaced in accordance with Figure R307.1 and in accordance with the requirements of Section P2705.1.

"In Figure 307.1 change the distance from a wall, tub, shower or vanity to 12” from either side of a toilet but with an aggregate of no less than 27”. "

R2705.1 (5) Water closets, lavatories and bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than ~~30 inches (762 mm)~~ 27 inches

center- to-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.

8/19/21 Committee Meeting:
307.1 Denied.
Committee supports modification **R2705.1(5)** as written above.

In 200 characters or less, please briefly describe the justification for this modification request.

Reason: Places language in congruence with an existing modification and allows for greater flexibility.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature:_____ Date: _____

Title: Executive Director

2021 International Residential Code
South Carolina Building Codes Council
Modification Continuations from 2018

2021 Code Section: R312.1.1 Where required

Modification: The existing text was modified to create a downward slope ratio.

The section now states:

Guards shall be located along-open sided walking surfaces of all decks, porches, balconies, stairs, ramps and landings that are located more than 30 inches measured vertically to the floor or grade below and at any point where a downward slope exceeds 3V:12H within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a guard.

Reason: No technical justification to substantiate a 36 inch measurement away from the leading edge of the walking surface or tread to determine when a guard should be required

Proponent: Home Builders Association of South Carolina

Previous Code Cycles	Previous Modification Number	Previous Code Section
IRC 2018	IRC 2018 10	R312.1.1
IRC 2015	IRC 2015 10	R312.1.1
IRC 2012	IRC 2012 08	R312.1.1

Comments: Word “floors” added in the 2021 code to first sentence.

2021 IRC
R312.1.1 Where required. *Guards* shall be provided for those portions of open-sided walking surfaces, including floors, stairs, *ramps* and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

7/27: Tabled to fully review 2021 change.

8/19/21 Committee Meeting: Support continuation of modification with addition of word "floors" added into existing modification text after the word "balconies."

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: R314.3.2 Location

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

R314.3.2 Location- Outside each separate sleeping area ~~in the immediate vicinity of the~~ *no further than 25' from any* bedrooms~~.~~ *or as required by the devices installation instructions.*

8-19-21 Committee Meeting: Support modification as written below:

R314.3(2) Location. Outside each separate sleeping area, within 21 ft (6.4 m) of any door to a sleeping room, with the distance measured along a path of travel.

In 200 characters or less, please briefly describe the justification for this modification request.

Reason: Clarification to reflect as noted in NFPA 72.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:01:22 -04'00' Date: _____

Title: Executive Director

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: R326 Habitable Attics

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

R326 Habitable Attics Delete Exceptions 1, 1.1 & 1.2 & 4

8/19/21 Committee Meeting: Recommend approval of changing "one third" in exception 1.1 to "three fourths" and deleting exception 1.2. No other changes approved.

R326.3 Story above grade plane. A habitable attic shall be considered a story above *grade plane*.
Exceptions: A habitable attic shall not be considered to be a story above *grade plane* provided that the habitable attic meets all the following:
1. The aggregate area of the habitable attic is either of the following:
1.1. Not greater than ~~one-third~~ three-fourths of the floor area of the story below.
~~1.2. Not greater than one-half of the floor area of the story below where the habitable attic is located within a dwelling unit equipped with a fire sprinkler system in accordance with Section P2904.~~
2. The occupiable space is enclosed by the roof assembly above, knee walls, if applicable, on the sides and the floor-ceiling assembly below.
3. The floor of the habitable attic does not extend beyond the exterior walls of the story below.
4. Where a habitable attic is located above a third story, the dwelling unit or townhouse unit shall be equipped with a fire sprinkler system in accordance with Section P2904.

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: the deletion of these exceptions brings the definition of the Habitable Attic in line with the 2018 IRC.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:08:16 -04'00' Date: _____

Title: Executive Director

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Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: R403.1.6 Foundation anchorage

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

R403.1.6 Foundation anchorage. Wood sill plates and wood walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Cold-formed steel framing shall be anchored directly to the foundation or fastened to wood sill plates anchored to the foundation. Anchorage of cold-formed steel framing and sill plates supporting cold- formed steel framing shall be in accordance with this section and Section R505.3.1 or R603.3.1.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of *braced wall panels* at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with minimum 1/2-inch diameter (12.7 mm) anchor bolts spaced a maximum of 6 feet (1829 mm) on center or *approved* anchors or anchor straps spaced as required to provide equivalent anchorage to 1/2-inch- diameter (12.7 mm) anchor bolts. Bolts shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located in the middle third of the width of the plate. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundations that are not part of a *braced wall panel* shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Anchor bolts shall be permitted to be located while concrete is still plastic and before it has set. Where anchor bolts resist placement or the consolidation of concrete around anchor bolts is impeded, the concrete shall be vibrated to ensure full contact between the anchor bolts and concrete.

Exceptions:

1. Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).
2. Connection of walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).
3. Where the basic wind speed in accordance with Figure R301.2(4)A does not exceed 115 miles per hour (51 m/s), the seismic design category is A or B and Method GB in accordance with Section R602.10 is used for a *braced wall line* on the interior of the dwelling, anchor bolts shall not be required for the wood sole plates of the *braced wall panels*. Positive anchorage with approved fasteners shall be provided.

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment provides an exception to the requirement for attaching bottom plates of braced wall panels on the interior of a dwelling to foundations with anchor bolts. The exception applies in low-wind, low-seismic areas where gypsum board is used as the bracing method for the interior wall in question. See attached for additional reasoning.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:09:54 -04'00' Date: _____

Title: Executive Director

Reason:

This amendment revises the language for anchorage of light-frame wood stud walls to the foundations of the house. As currently stated, the provisions require anchor bolts for the portions of a wall on the interior of a dwelling that are designated as braced wall panels for a braced wall line passing through the dwelling. To provide the required 7–inch embedment depth, a thickened slab or other continuous footing would be necessary. Chapters 4 and 6 of the IRC do not explicitlyrequire a continuous foundation in these locations in low-wind, low-seismic areas, and they are not traditionally provided. If interpreted and enforced by plan reviewers and inspectors in these areas, disputes and project delays will result and/or homeowners will incur significant additional construction costs.

The ICC Ad-Hoc Committee on Wall Bracing revised this section during the 2007/2008 code cyclewith the intent of ensuring that sufficient anchorage is provided along braced wall lines inside a dwelling to transfer lateral loads to either monolithic (thickened) slab foundations or continuous footings. While NAHB agrees that providing a continuous load path is important, the new language is overly broad in its application and not technically justified for many common conditions. The typical bracing method used for braced wall lines on the interior of a one- or two- story dwelling in a low-wind, low-seismic area is Method GB, consistent with the use of gypsum board as the typical interior wall finish material. The allowable shear capacity for Method GB whenused on both sides of a braced wall is 200plf (pounds per linear foot). The standard fastener schedule, Table R602.3(1), specifies 3-16d nails at 16" spacing for fastening the bottom plate of abraced wall panel on the interior of a dwelling to floor framing below (such as a raised floor system over a crawlspace or pier-and-beam foundation). This standard nailing provides a 200plf allowable capacity, as would many typical post-installed anchors (e.g. wedge or expansion anchors) that are short enough to be installed in just a slab-on-grade without the need for thickened footings, or even power-actuated fasteners. 1/2" diameter anchor bolts at 6-foot spacing are not necessary for the proper anchorage of these walls.

The proposed amendment provides an exception to the requirement that an interior wall that also used as part of a braced wall line be fastened to a slab-on-grade with anchor bolts, rather than other methods of making a “positive connection” such as wedge or expansion anchors, power fasteners, or concrete nails. The exception is limited to areas of low wind and low seismic hazardsand to walls braced using gypsum board, with its lower allowable shear capacity.

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: R408.8 Under-floor vapor retarder

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

R408.8 Under-floor vapor retarder - Delete section 408

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: recommend replacing the entire Section 408 with IRC 2018 language as the new language is horrible and just a bad idea in Hot-Humid locations and virtually impossible to construct. The new language is so intertwined its hard to modify therefore inserting the existing language is much easier.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Title: Executive Director

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- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: P2503.6 Shower Liner Test

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

P2503.6 Shower Liner Test - Add sentence at end of paragraph *The shower liner test shall be performed at the final plumbing inspection.*

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: we need to set a particular inspection method for consistency.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:07:08 -04'00' Date: _____

Title: Executive Director

2021 International Residential Code
South Carolina Building Codes Council
Modification Continuations from 2018

2021 Code Section: P2503.6 Shower liner test

Modification: The requirement for a dam for the shower liner test was eliminated.

The sentence now states:

Where shower floors and receptors are made watertight by the application of materials required by section P2709.2, the completed liner installation shall be tested. Shower liner shall be tested to the lesser of the depth of threshold or 2" and shall be operated at normal pressure for a test period of not less than 15 minutes, and there shall be no evidence of leakage.

Reason: To allow a simple test performed under typical conditions

Proponent: Home Builders Association of South Carolina

Previous Code Cycles	Previous Modification Number	Previous Code Section
IRC 2018	IRC 2018 38	P2503.6
IRC 2015	IRC 2015 31	P2503.6
IRC 2012	IRC 2012 22	P2503.6

Comments: No changes in 2021 IRC.

7/27 Committee Meeting: Recommendation for Modification Continuation.

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South Carolina Building Codes Council
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2021 BUILDING CODE MODIFICATION REQUEST FORM

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☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: P2603.2.1 -Protection against physical damage

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

P2603.2.1 -Protection against physical damage - Add sentence to end *Steel shield plates shall be secured with nails, screws or per manufacturers requirements.*

8/19/21 Committee Meeting: Recommend approval as written below in red.

P2603.2.1 Protection against physical damage. In concealed locations, where piping, other than cast-iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 11/4 inches (31.8 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 Gage). Such plates shall cover the area of the pipe where the member is notched or bored, and shall extend not less than 2 inches (51 mm) above sole plates and below top plates. Steel shield plates shall not be secured with nails or screws, unless required by the manufacturer.

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: Clarification.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:03:39 -04'00' Date: _____

Title: Executive Director

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: P2603.5 Freezing

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

P2603.5 Freezing Add Exception: Water pipes that are installed on the warm in winter side of the building envelope IE above the insulation line in a floor system or below the insulation line in an attic do not need additional pipe insulation.

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: this should not affect the current modification addressing soil and waste pipe removal from this paragraph.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:03:18 -04'00' Date: _____

Title: Executive Director

2021 International Residential Code
South Carolina Building Codes Council
Modification Continuations from 2018

2021 Code Section: P2603.5 Freezing

Modification: Modify language to allow a soil or waste pipe to be installed outside of a building.

The section now reads:

In localities having a winter design temperature of 32 degrees (0 degrees C) or lower as shown in Table R301.2~~(1)~~ of this code, a water pipe shall not be installed outside of a building, in exterior walls, in attic or crawl spaces, or any other place subjected to freezing temperatures unless adequate provision is made to protect it from freezing by insulation or heat or both. Water service pipe shall be installed not less than 12 inches (305 mm) deep and not less than 6 inches (152 mm) below the frost line.

Reason: Unusually restrictive

Proponent: Home Builders Association of South Carolina

Previous Code Cycles	Previous Modification Number	Previous Code Section
IRC 2018	IRC 2018 39	P2603.5
IRC 2015	IRC 2015 32	P2603.5

Comments: No changes in 2021 IRC. Note correction above.

7/27: Minor correction was approved as part of continuation.

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Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: P2705.1.3 General

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

P2705.1.3 General - Add Exception - Toilets and/or bidets shall not be required to be caulked to flooring surface.

8/19/21 Committee Meeting: recommend approval as written below in red.

SECTION P2705
INSTALLATION

P2705.1 General. The installation of fixtures shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, copper alloy or other corrosion-resistant material.
2. Wall-hung fixtures shall be rigidly supported so that strain is not transmitted to the plumbing system.
3. Where fixtures come in contact with walls and floors, the contact area shall be watertight.
   Exception: Water closets and/or bidets shall not be required To be caulked to flooring surface.
4. Plumbing fixtures shall be usable.
5. Water closets, lavatories and bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) centerto-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.
6. The location of piping, fixtures or equipment shall not interfere with the operation of windows or doors.
7. In flood hazard areas as established by Table R301.2, plumbing fixtures shall be located or installed in accordance with Section R322.1.6.
8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.4.

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: it has been decided that sealing a toilet/bidets to the floor would prevent witness to possible seal leaks that may go undetected.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:02:57 -04'00' Date: _____

Title: Executive Director

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Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: P2708.4 Shower control valves

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

P2708.4 Shower control valves. Individual shower and tub/shower combination valves shall be balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valves that conform to the requirements of ASSE 1016/ASME 112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1. ~~Shower control valves shall be rated for the flow rate of the installed shower head. Such valves shall be installed at the point of use.~~

Shower and tub/shower combination valves required by this section shall be equipped with a means to limit the maximum setting of the valve to 120°F (49°C), which shall be field adjusted in accordance with the manufacturer's instructions to provide water at a temperature not to exceed 120ºF (49°C). In-line thermostatic valves shall not be utilized for compliance with this section.

In 200 characters or less, please briefly describe the justification for this modification request.

Reason: Unenforceable and ambiguous.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:00:56 -04'00' Date: _____

Title: Executive Director

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: P2713.3 Bathtub and whirlpool bathtub valves.

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

P2713.3 Bathtub and whirlpool bathtub valves.

~~Bathtubs and whirlpool bathtub valves shall have or be supplied by a water-temperature-limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70, except where such valves are combination tub/shower valves in accordance with Section P2708.4. The water-temperature-limiting device required by this section shall be equipped with a means to limit the maximum setting of the device to 120ºF (49ºC), and, where adjustable, shall be field adjusted in accordance with the manufacturer's instructions to provide hot water at a temperature not to exceed 120ºF (49ºC). Access shall be provided to water-temperature-limiting devices that conform to ASSE 10705/ASME A112.1070/CSA B125.70.~~
~~**Exception:** Access is not required for nonadjustable water-temperature-limiting devices that conform to ASSE 1070/ASME A112.1070/CSA B125.70 and are integral with a fixture fitting, provided that the fixture fitting itself can be accessed for replacement.~~

Hot water supplied to bathtubs and whirlpool bathtubs shall be limited to a temperature of not greater than 120°F (49°C) by a water-temperature limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3, except where such protection is otherwise provided by a combination tub/shower valve in accordance with Section P2708.4.

In 200 characters or less, please briefly describe the justification for this modification request.

Reason. New language is unenforceable and ambiguous. Reverts language back to 2018 IRC.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:00:22 -04'00' Date: _____

Title: Executive Director

National Electrical Manufacturers Association

The association of electrical equipment
and medical imaging manufacturers
www.nema.org

June 3, 2021

South Carolina Building Codes Council
PO Box 11329
Columbia, SC 29211-1329

CC: Molly Price - Administrator
Teresa Martin - Board Staff, Building Codes

Subject: 2021 Code Modification Association Cover Letter

To Whom It May Concern:

This cover letter is providing verification that Senior Technical Field Representative Bryan Holland has been authorized by the National Electrical Manufacturers Association (NEMA) to submit and provide supporting testimony for the proposed modification to the 2021 International Residential Code, Part VIII, Chapters 34-43. This action has been approved and authorized by the NEMA Codes and Standards Committee and Subcommittee on the NEMA Field Representative Program.

Respectfully Yours,

Bryan P. Holland

Bryan P. Holland, MCP, CStd.
Senior Technical Field Representative, Southern Region
NEMA Codes & Standards

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: National Electrical Manufacturers Association (NEMA)

Address: 1300 17th Street North, Suite 900 (Street) Rosslyn (City) Virginia (State) 22209 (Zip)

Name: Bryan P. Holland, MCP, CStd Title/Position: Senior Technical Field Rep

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: Part VIII-Electrical, Chapters 34-43

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

CHAPTER 34 GENERAL REQUIREMENTS

"Delete all text that follows"

Section E3401

GENERAL

E3401.1 Applicability.

(Electrical devices, equipment, systems, and components for buildings under the scope of this code shall comply with the applicable provisions of NFPA 70, National Electrical Code.) ~~The provisions of Chapters 34 through 43 shall establish the general scope of the electrical system and equipment requirements of this code. Chapters 34 through 43 cover those wiring methods and materials most commonly encountered in the construction of one- and two-family dwellings and structures regulated by this code. Other wiring methods, materials and subject matter covered in NFPA 70 are also allowed by this code~~.

~~E3401.2 Scope~~
~~E3401.3 Not covered~~
~~E3401.4 Additions and alterations~~
~~E3402 Building Structure Protection~~
~~E3403 Inspection and Approval~~
~~E3405 Equipment Location and Clearances~~
~~E3406 Electrical Conductors and Connectors~~
~~E3407 Conductor and Terminal Identification~~
~~Chapter 35 Services~~
~~Chapter 36 Wiring Methods~~
~~Chapter 37 Branch Circuit and Feeder Requirements~~
~~Chapter 38 Wiring Methods~~
~~Chapter 39 Power and Lighting Distribution~~
~~Chapter 40 Devices and Luminaires~~
~~Chapter 41 Appliance Installation~~
~~Chapter 42 Swimming Pools~~
~~Chapter 43 Class 2 Remote-Control, Signaling and Power-Limited Circuits~~

In 200 characters or less, please briefly describe the justification for this modification request.

This proposed modification revises the applicability of the IRC related to electrical installations by providing a pointer to the NEC for compliance and requests the rest of Chapter 34 and all of Chapter 35-43 to be deleted or placed in "reserved" status. Having electrical installation requirements in both the NEC and Chapters 34-43 of the IRC can create confusion and complicates proper enforcement. Since the rules outlined in Chapters 34-43 are direct extracts from the NEC, these rules are not needed in the IRC. It should be noted that Chapters 34-43 are not adopted or enforced in FL, GA, NC, TN, TX, and many other states.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Bryan Holland	Senior Technical Field Rrepresentative	NEMA	[redacted]	

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature:_____ Date: June 3, 2021

Title: Senior Technical Field Rep

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E3601.8 Emergency Disconnect

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

~~E3601.8 Emergency disconnect~~

Reason:

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 and backup generators, will still provide power even after power from the electrical utility is disconnected.

This requirement also provides a serious security risk as it would make it easy for criminals or vandals to easily shut power down to the entire house.

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: see above

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:06:03 -04'00' Date: _____

Title: Executive Director

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr • Columbia • SC • 29210
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llr.sc.gov/bcc

2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
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- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E3606.5 Service Equipment-General

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

~~E3606.5 Service Equipment-General~~

Delete section

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: delete the entire section as the requirement does not cover low voltage systems, cannot provide complete coverage from surges outside of the incoming service line. This language would also foster an unreasonable and unenforceable implied warranty. The additional costs do not justify any potential benefits.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:05:41 -04'00' Date: _____

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Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E3901.4.2.1 - Island and peninsular countertops and work spaces

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

E3901.4.2.1 - Island and peninsular countertops and work spaces -Modify-

At least one receptacle outlet shall be provided for the first 6 ~~9 square~~ feet of length or fraction thereof, of the countertop or work surface. A minimum of two receptacle outlets shall be provided for any island over 6 feet long.

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: simplifies the language and makes it more efficient to determine the number of outlets required. The language closely matched E3901.4.2.2.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:04:57 -04'00' Date: _____

Title: Executive Director

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Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E3902 Ground Fault & Arc-Fault Circuit-Interrupter Protection

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

E3902. Ground-Fault and Arc-Fault Circuit Interrupter Protection

(remove all references to; through 250 volt. See attached

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment removes the requirement for AFCI devices for residential dwelling units, including one- and two-family homes. See attached for additional reasoning.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:04:25 -04'00' Date: _____

Title: Executive Director

SECTION E3902 GROUND-FAULT AND ARC-FAULT

CIRCUIT-INTERRUPTER PROTECTION

E3902.1 Bathroom receptacles. 125-volt ~~through 250-volt~~ receptacles installed in bathrooms and supplied by single- phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for person- nel. [210.8(A)(1)]

E3902.2 Garage and accessory building receptacles. 125- volt ~~through 250-volt~~ receptacles installed in garages and grade-level portions of unfinished accessory buildings used for storage or work areas and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(2)]

E3902.3 Outdoor receptacles. 125-volt through ~~250-volt~~ receptacles installed outdoors and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(3)]

Exception: Receptacles as covered in Section E4101.7. [210.8(A)(3) Exception]

E3902.4 Crawl space receptacles and lighting outlets. Where a crawl space is at or below grade level, 125-volt ~~through 250-volt~~ receptacles installed in such spaces and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. Lighting outlets not exceeding 120 volts shall have ground-fault circuit-interrupter protection. [210.8(A)(4), 2108(E)]

E3902.5 Basement receptacles. 125-volt ~~through 250-volt~~ receptacles installed in basements and supplied by single- phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for person- nel. [210.8(A)(5)]

Exception: A receptacle supplying only a permanently installed fire alarm or burglar alarm system. A receptacle installed in accordance with this exception shall not be considered as meeting the requirement of Section E3901.9. Receptacles installed in accordance with this exception shall not be considered as meeting the require- ment of Section E3901.9. [210.8(A)(5) Exception]

E3902.6 Kitchen receptacles. 125-volt ~~through 250-volt~~ receptacles that serve countertop surfaces and are supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(6)]

E3902.7 Sink receptacles. 125-volt ~~through 250-volt~~ receptacles that are located within 6 feet (1829 mm) of the top inside edge of the bowl of the sink and supplied by single- phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for person- nel. [210.8(A)(7)]

E3902.8 Bathtub or shower stall receptacles. 125-volt ~~through 250-volt~~ receptacles that are located within 6 feet (1829 mm) of the outside edge of a bathtub or shower stall and supplied by single-phase branch circuits rated 150 volts

or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(9)]

E3902.9 Laundry areas. 125-volt ~~through 250-volt~~ receptacles installed in laundry areas and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(10)]

E3902.10 Indoor damp and wet locations. 125-volt ~~through 250-volt~~ receptacles installed in indoor damp and wet locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(11)]

E3902.11 Kitchen dishwasher branch circuit. Ground- fault circuit-interrupter protection shall be provided for outlets supplied by branch circuits rated 150 volts or less to ground that supply dishwashers in dwelling unit locations. [422.5 (A)]

E3902.12 Boathouse receptacles. 125-volt ~~through 250- volt~~ receptacles installed in boathouses and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(8)]

E3902.13 Boat hoists. Ground-fault circuit-interrupter protection for personnel shall be provided for 240-volt and less outlets that supply boat hoists. [555.9]

E3902.14 Electrically heated floors. Ground-fault circuit- interrupter protection for personnel shall be provided for electric heating cables embedded in concrete or poured masonry floors in bathrooms, kitchens and in hydromassage bathtub, spa and hot tub locations. Heating cables installed under floor coverings shall be provided with ground-fault circuit-interrupter protection for personnel. [424.44(E), 424.45(E)]

E3902.15 Location of ground-fault circuit interrupters. Ground-fault circuit interrupters shall be installed in a read- ily accessible location. When determining distance from receptacles, the distance shall be measured as the shortest path the supply cord of an appliance connected to the recep- tacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or the shortest path without passing through a window. [210.8(A)]

E3902.16 Location of arc-fault circuit interrupters. Arc- fault circuit interrupters shall be installed in readily accessi- ble locations.

E3902.17 Arc-fault circuit interrupter protection. Branch circuits that supply 120-volt, single-phase, 15- and 20- ampere outlets installed in kitchens, family rooms, dining rooms, living rooms, parlors, libraries,

dens, bedrooms, sunrooms, recreations rooms, closets, hallways, laundry areas and similar rooms or areas shall be protected by any of the following: [210.12(A)]

1. A listed combination-type arc-fault circuit inter- rupter, installed to provide protection of the entire branch circuit. [210.12(A)(1)]

2. A listed branch/feeder-type AFCI installed at the origin of the branch-circuit in combination with a

listed outlet branch-circuit-type arc-fault circuit interrupter installed at the first outlet box on the branch circuit. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit. [210.12(A)(2)]

3. A listed supplemental arc-protection circuit breaker installed at the origin of the branch circuit in combi- nation with a listed outlet branch-circuit-type arc- fault circuit-interrupter installed at the first outlet box on the branch circuit where all of the following conditions are met:

3.1. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

3.2. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet (15.2 m) for 14 AWG conductors and 70 feet (21.3 m) for 12 AWG conductors.

3.3. The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit. [210.12(A)(3)]

4. A listed outlet branch-circuit-type arc-fault circuit interrupter installed at the first outlet on the branch circuit in combination with a listed branch-circuit overcurrent protective device where all of the follow- ing conditions are met:

4.1. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

4.2. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet (15.2 m) for 14 AWG conductors and 70 feet (21.3 m) for 12 AWG conductors.

4.3. The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit.

4.4. The combination of the branch-circuit over- current device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and shall be listed as such. [210.12(A)(4)]

5. Where metal raceways, metal wireways, metal auxil- iary gutters or Type MC or Type AC cable meeting the applicable requirements of Section E3908.9 with metal boxes, metal conduit bodies and metal enclo- sures are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, a listed outlet branch-circuit type AFCI installed at the first outlet shall be considered as providing protection for the remaining portion of the branch circuit. [210.12(A)(5)]

6. Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 2 inches (50.8 mm) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet shall be considered as providing protection for the remaining portion of the branch circuit. [210.12(A)(6)]

Exception: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system where the branch circuit is installed in a metal raceway, metal auxiliary gutter, steel-armored cable, Type MC or Type AC, meeting the requirements of Section E3908.9, with metal boxes, conduit bodies and enclosures.

E3902.18 Arc-fault circuit-interrupter protection for branch circuit extensions or modifications. Where branch- circuit wiring is modified, replaced, or extended in any of the areas specified in Section E3902.17, the branch circuit shall be protected by one of the following:

1. A combination-type AFCI located at the origin of the branch circuit.

2. An outlet branch-circuit type AFCI located at the first receptacle outlet of the existing branch circuit. [210.12(B)]

Exception: AFCI protection shall not be required where the extension of the existing branch circuit conductors is not more than 6 feet (1.8 m) in length and does not include any additional outlets or devices other than splic- ing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box. [210.12(B) Exception]

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 150,000 households are priced out of the market for a median-priced new home. 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 $838 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.

T**he total cost to home buyers to install AFCIs is over $430,000,000—per year. This is 24 times the cost of damage per year, and 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.

From 1980 to 2015 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.

Reason:

This amendment retains the provisions of the 2017 NEC. AFCIs were first introduced in the 1999 edition of the National Electrical Code (NEC) with an effective date of Jan. 1, 2002. Code Making Panel 2, which had responsibility over branch circuits where AFCIs are addressed, largely based its approval of the code change on several U.S. Consumer Product Safety Commission (CPSC) reports. **However, the number of incidents cited at the time were several times higher than in later reports, and 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 were overblown.

The problems with the rationale were so evident that even electrical manufacturers spoke against the proposal. 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.

When the Home Was Built Is Important

A CPSC epidemiological study, "Residential Electrical Distribution System Fires," showed that 85% of fires of electrical origin occur in homes that are more than 20 years old. 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, 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.

The June 2015 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]." 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 39%, 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.

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. **Even as homes built to today's residential code get older, they will continue to provide protection for families through their improved safety.**

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E3902.5 Basement Receptacles

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

E3902.5 Basement Receptacles

Add Exception *Receptacles in walk-out basements are excluded from this requirement.*

In 200 characters or less, please briefly describe the justification for this modification request.

Explanation: A finished basement is not noted as a wet area and their addition is not needed or required.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

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Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:03:59 -04'00' Date: _____

Title: Executive Director

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E3902.10 Indoor damp and wet locations.

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

Delete section

~~**E3902.10 Indoor damp and wet locations.** 125-volt through 250-volt receptacles installed in indoor damp and wet locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(11)]~~

Reason:

GFCIs are shown to be effective where a corded product is plugged into a standard "convenience" receptacle in a wet or damp location. However, this requirement is for condenser units, which are hardwired.

Data was not provided to supports expanding the use of GFCI protection on these circuits. The event used as substantiation was a result of an unqualified individual performing an electrical installation they never should have attempted. The NEC should not mandate GFCI protection for all outdoor outlets based on very specific unfortunate circumstances.

This requirement is extremely broad and will result in many unintended consequences. For example, it has not been determined if all A/C condenser units will operate on a GFCI protected circuit as sufficient testing has not been conducted. If the condenser unit is affected by high humidity and trips the GFCI, it could result in unhealthy conditions and property damage inside the home due to heat, humidity and mold growth, especially where the home is unoccupied for an extended period. There is also the potential for unwanted tripping and compatibility issues with heat pumps.

Branch circuit extensions or modifications would require the addition of GFCI protection for old condenser units, and it is not known whether the existing equipment is compatible with GFCI This requirement also applies to hardwired connections for effluent pumps and other types of lift station pumps with outdoor connections.

In 200 characters or less, please briefly describe the justification for this modification request.

Reason: see above

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 15:59:59 -04'00' Date: _____

Title: Executive Director

2021 International Residential Code
South Carolina Building Codes Council
Modification Continuations from 2018

2021 Code Section: ~~E3902.16~~ E3902.17 Arc Fault Circuit Interrupted Protection

Modification: Deleted "kitchen & laundry rooms" and Add Language.

In areas other than kitchen and laundry areas, branch circuits that supply 120-volt single-phase, 15- and 20-ampere outlets installed in family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreations rooms, closets, hallways, and similar rooms or areas shall be protected by any of the following: [210.12(A)]

1. A listed combination-type arc-fault circuit-interrupter, installed to provide protection of the entire branch circuit. [210.12(A)(1)]

2. A listed branch/feeder-type AFCI installed at the origin of the branch-circuit in combination with a listed outlet branch-circuit-type arc-fault circuit-interrupter installed at the first outlet box on the branch circuit. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit. [210.12(A)(2)]

3. A listed supplemental arc-protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type arc-fault circuit interrupter installed at the first outlet box on the branch circuit where all of the following conditions are met:

3.1 The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit-interrupter.

3.2 The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet (15.2 m) for 14 AWG conductors and 70 feet (21.3 m) for 12 AWG conductors.

3.3 The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit. [210.12(A)(3)].

4. A listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet on the branch circuit in combination with a listed branch-circuit overcurrent protective device where all of the following conditions are met:

4.1 The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit-interrupter.

4.2 The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet (15.2 m) for 14 AWG conductors and 70 feet (21.3m) for 12 AWG conductors.

4.3 The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit.

4.4 The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and shall be listed as such. [210.12(A)(4)]

Reason: N/A

Proponent: Home Builders Association of South Carolina

Previous Code Cycles	Previous Modification Number	Previous Code Section
IRC 2018	IRC 2018 44	3902.16

Comments: 2021 IRC Section changed to 3902.17, no language change.

7/27: Tabled for 8/19 meeting.

In 200 characters or less, please briefly describe the justification for this modification request.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature:_____ Date: _____

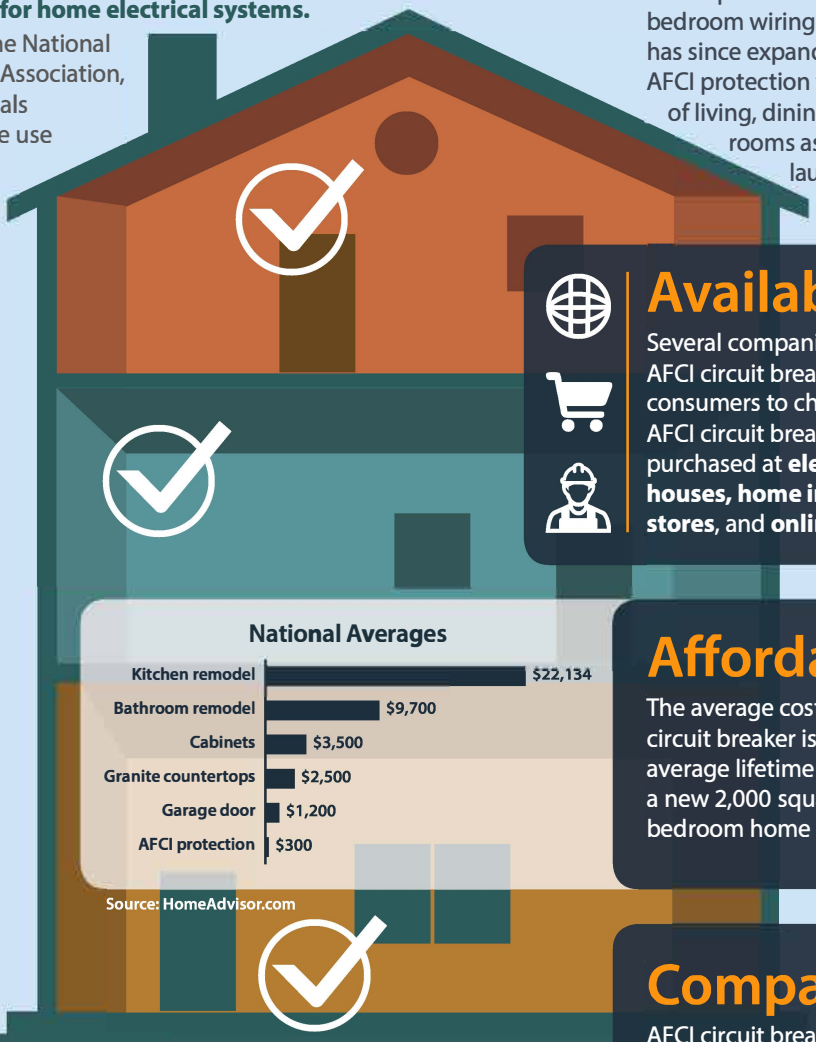
Title: Executive Director

Circuit Breaker AFCIs | Advanced Technology for the Modern Home

Applying technology to improve the electrical safety of the modern home is a wise investment for both the homeowner and the community at large. Circuit breaker arc-fault circuit interrupters, or AFCIs, can provide enhanced protection from fires resulting from damaged or unsafe home wiring conditions. Typical household fuses and standard circuit breakers do not respond to early arcing and sparking conditions in home wiring. By the time a fuse or standard circuit breaker opens a circuit to defuse these conditions, a fire may already have begun.

AFCI circuit breakers represent the latest technological advancement for home electrical systems.

According to the National Fire Protection Association, fire safety officials recommend the use of AFCIs in all dwellings.



AFCI circuit breakers should be installed by a person trained and qualified in electrical wiring methods.

Effective

AFCI circuit breakers are **intelligent devices** containing advanced technology that will detect an arc fault in home wiring and automatically shut down the electricity when it senses a hazard.

The National Fire Prevention Association publishes the National Electrical Code® (NEC) to protect people and property from electrical hazards. The NEC has required AFCI protection for bedroom wiring since 2002 and has since expanded to require AFCI protection for the wiring of living, dining, and family rooms as well as kitchens, laundry, hallways, and closets.

Available

Several companies manufacture AFCI circuit breakers for consumers to choose from. AFCI circuit breakers can be purchased at **electrical supply houses, home improvement stores**, and **online**.

Affordable

The average cost for an AFCI circuit breaker is **$38***, and the average lifetime cost to protect a new 2,000 square-foot, four-bedroom home is **$300**.

Compatible

AFCI circuit breakers work extremely well with **new appliances** that meet U.S. product safety standards.

AFCI vs GFCI

AFCIs and GFCIs provide different but **critically important protection**. AFCI circuit breakers address fire hazards whereas GFCIs address **electric shock hazards**. A common way to provide both types of protection is to use a dual function breaker that combines Class A 5mA GFCI and combinations type AFCI protection against both arc faults and ground fault in one device.

According to the Consumer Product Safety Commission, both AFCI and GFCI circuit breakers are important safety devices.

For more information go to **www.afcisafety.org**

**NEMA blind survey for 2017 HUD Manufactured Housing Construction Standards.*

National Electrical Manufacturers Association

National Electrical Manufacturers Association
The association of electrical equipment and medical imaging manufacturers
www.nema.org

Circuit Breaker Arc-Fault Circuit Interrupters (AFCIs) – Myth vs. Fact

Cost

Myth: AFCI circuit breakers required in new home construction can cost $3,000+ per home, making them unaffordable.

Fact: The average cost for an AFCI circuit breaker is $38 (according to a NEMA blind survey for 2017 HUD Manufactured Housing Construction Safety Standards), or approx. $300 to protect a new 2,000-square-foot, four-bedroom home from electrical fires caused by electrical arcing. That's about 83 cents per month to protect a family from electrical fires over a 30-year mortgage. In contrast, material and hefty labor costs associated with installing a home builder upgrade like granite countertops averages around $4,500, or $12.50 per month over the same period. The National League of Cities recently indicated home builder "labor and land costs are by far the biggest construction expenses nationwide," resulting in rapidly rising home prices.

Appliance Compatibility

Myth: AFCI circuit breakers are not compatible with common household appliances.

Fact: AFCI circuit breakers work extremely well with new appliances that meet U.S. product safety standards. Some older appliances may incorporate components that predate current product safety standards or have operational characteristics that are not compatible with AFCI protection. Counterfeit appliances or those not certified by a Nationally Recognized Testing Laboratory (NRTL) may also be incompatible with AFCI circuit breakers.

AFCI/GFCI Compatibility

Myth: AFCI circuit breaker and Ground Fault Circuit Interrupters (GFCIs) won't work together.

Fact: AFCI circuit breakers and GFCIs complement and function well together in providing electrical safety and fire protection throughout a home. Both devices are required by the 2017 National Electrical Code® because they provide different, but critically important, protection. AFCI circuit breakers detect dangerous arcing in a home's wiring and stop electrical fires before they can start. GFCIs are required in rooms like kitchens, bathrooms and laundry rooms where water is present and help prevent possible shock and electrocution. There are dual function AFCI/GFCI circuit breakers on the market today that provide both types of protection in one device.

Product Availability

Myth: AFCI circuit breakers are hard to find.

Fact: Several companies manufacture AFCI circuit breakers for consumers to choose from. AFCI circuit breakers can be purchased at electrical supply houses, home improvement stores, and online.

AFCI Lifespan

Myth: AFCI circuit breakers only last one year or need frequent replacement.

Fact: AFCI circuit breakers are tested and certified to extremely rigorous U.S. product safety standards. When installed correctly, AFCI circuit breakers are expected to last the life of a standard circuit breaker under normal operating conditions. AFCI circuit breakers also carry a manufacturer's warranty.

Circuit Breaker Arc-Fault Circuit Interrupters (AFCI)

Smoke alarms, fire extinguishers and escape ladders are all examples of emergency equipment used in homes to take action when a fire occurs. A circuit breaker arc-fault circuit interrupter (AFCI) is a product designed to detect a wide range of arcing electrical faults to help reduce the electrical system from being an ignition source of a fire. Unlike a standard circuit breaker detecting overloads and short circuits, an AFCI utilizes advanced electronic technology to "sense" the different arcing conditions that may be occur on a circuit. While there are different techniques employed to detect arcs by the various AFCI circuit breaker manufacturers, the end result is the same: detection of arcing conditions on the branch-circuit wiring, plugged-in electrical cords, and within appliances and other utilization equipment.

Importance

AFCI circuit breakers were created as a direct response to a U.S. Consumer Product Safety Commission report conducted by Underwriters Laboratories (UL) that identified an electrical problem in residential wiring systems causing numerous residential fires. In 1999, AFCI protection became a requirement in the National Electrical Code®. According to a 2017 National Fire Protection Association report, between 2010 and 2014, U.S. municipal fire departments responded to an estimated annual average of 45,210 home structure fires involving electrical failure or malfunction. These fires caused annual averages of 420 civilian deaths, 1,370 civilian injuries, and $1.4 billion in direct property damage.

Affordability

The average cost for an AFCI circuit breaker is $38, according to a NEMA blind survey for 2017 HUD Manufactured Housing Construction Safety Standards, or $300 to protect a new 2,000-square-foot, four-bedroom home from electrical fires caused by electrical arcing. That equates to 83 cents per month to protect a family from electrical fires over a 30-year mortgage. When installed correctly, AFCI circuit breakers are expected to last the life of a standard circuit breaker under normal operating conditions. AFCI circuit breakers can be purchased at electrical supply houses, home improvement stores, and online. Several companies manufacture AFCI circuit breakers for consumers to choose from.

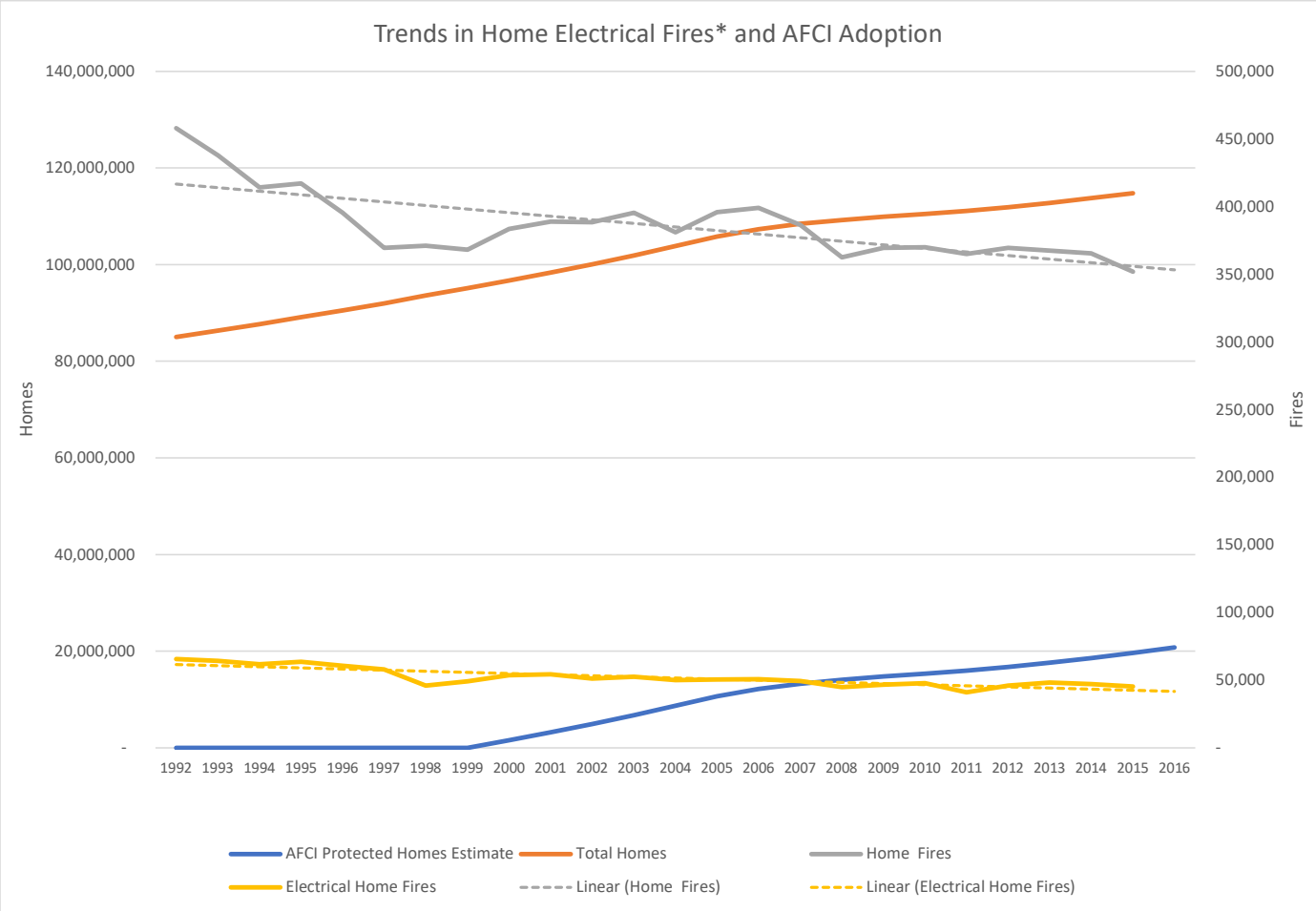
Compatibility

AFCI circuit breakers work extremely well with appliances and devices that meet U.S. product safety standards. AFCI circuit breakers also compliment ground-fault circuit interrupters (GFCIs) and function well together to provide electrical safety and fire protection throughout a home. Both devices are required by the National Electrical Code® because they provide different but critically important protection. AFCIs detect dangerous arcing in a home's wiring and stop electrical fires before they can start whereas GFCIs help to prevent possible shock and electrocution where these hazards to a person are present.

NEMA Position

The National Electrical Manufacturers Association actively supports and promotes the installation and use of AFCI technology in residential and commercial buildings as an important electrical safety device to protect persons and property.

The National Electrical Manufacturers Association (NEMA) represents nearly 350 electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems. Our combined industries account for 360,000 American jobs in more than 7,000 facilities covering every state. Our industry produces $106 billion shipments of electrical equipment and medical imaging technologies per year with $36 billion exports.



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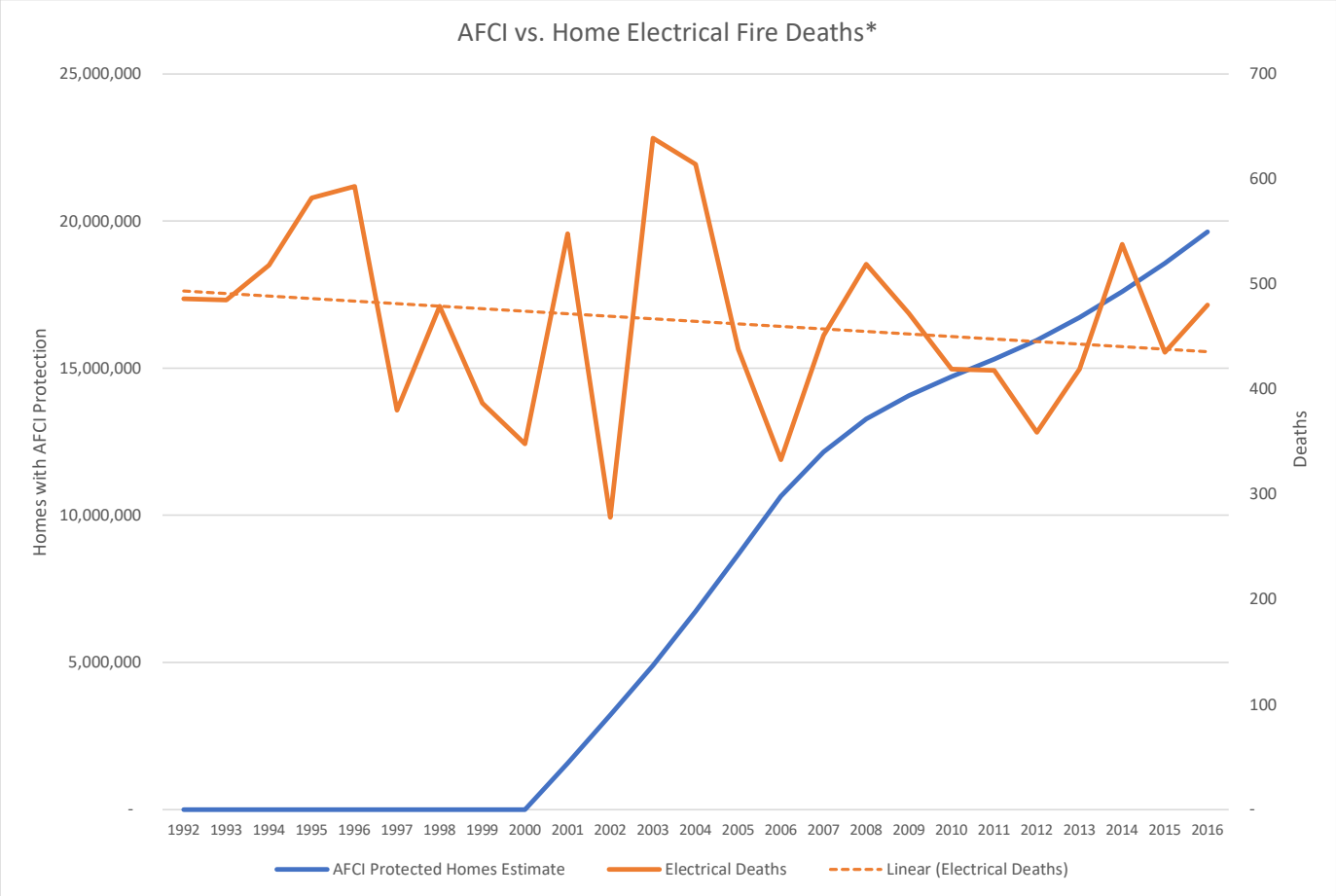

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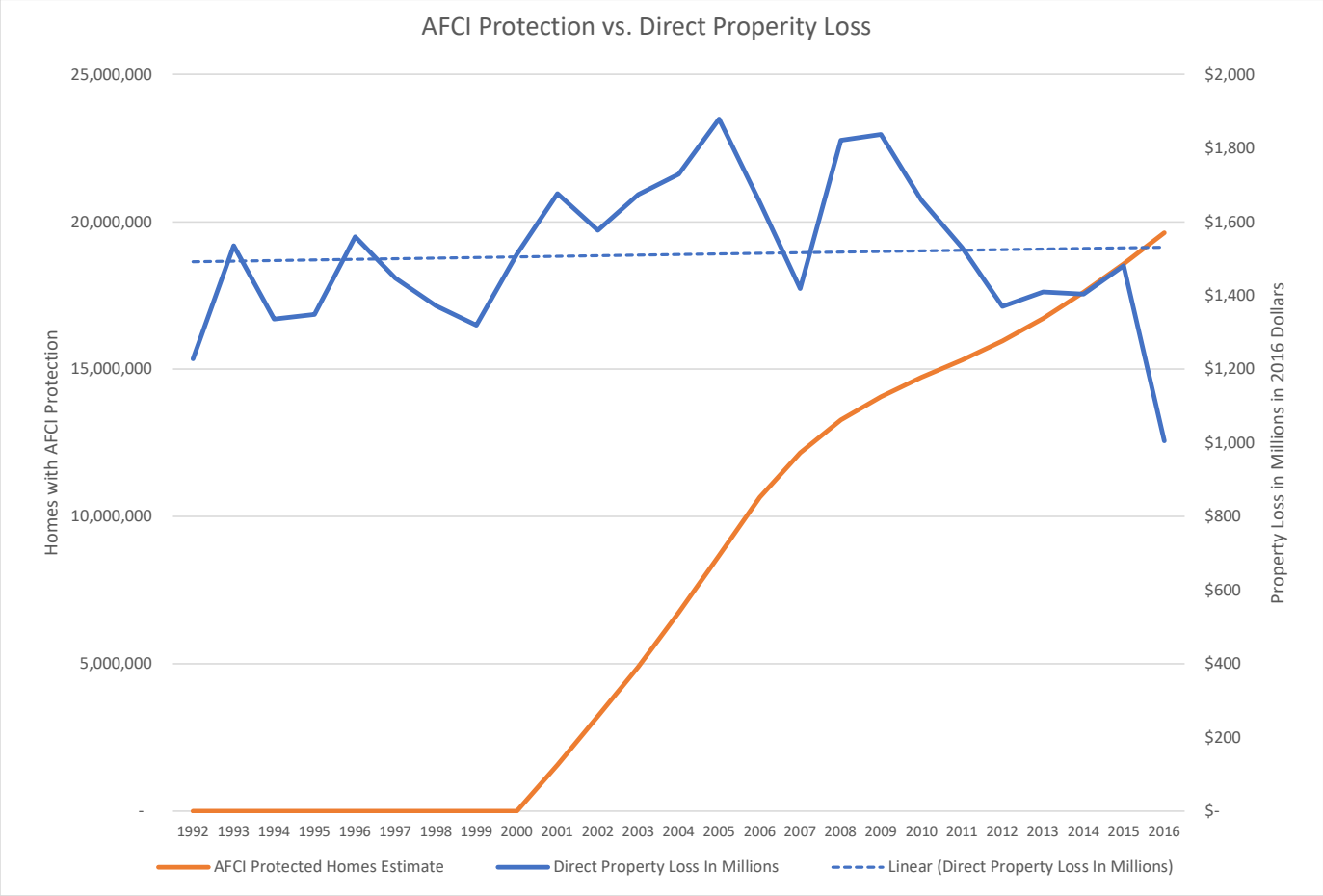

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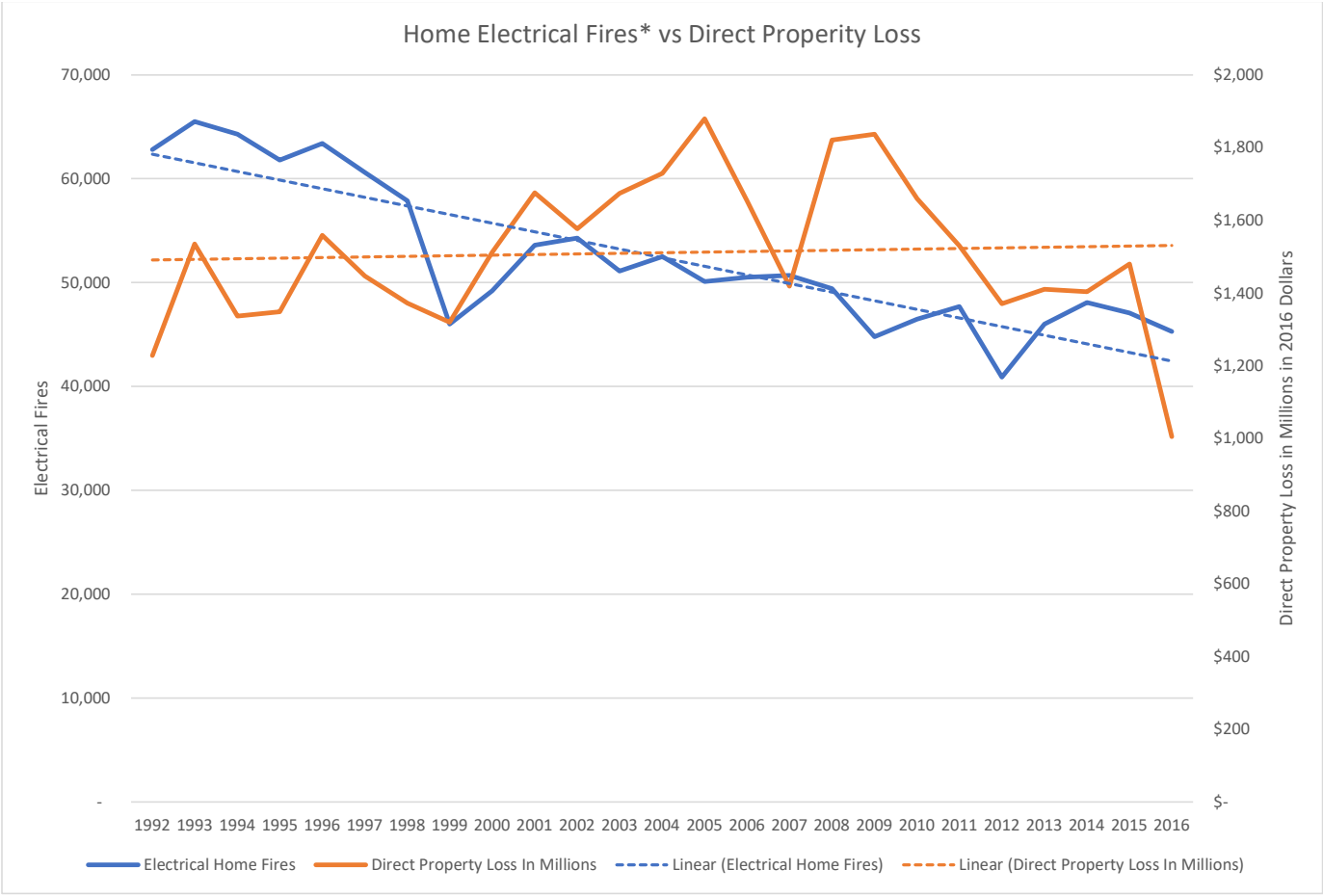

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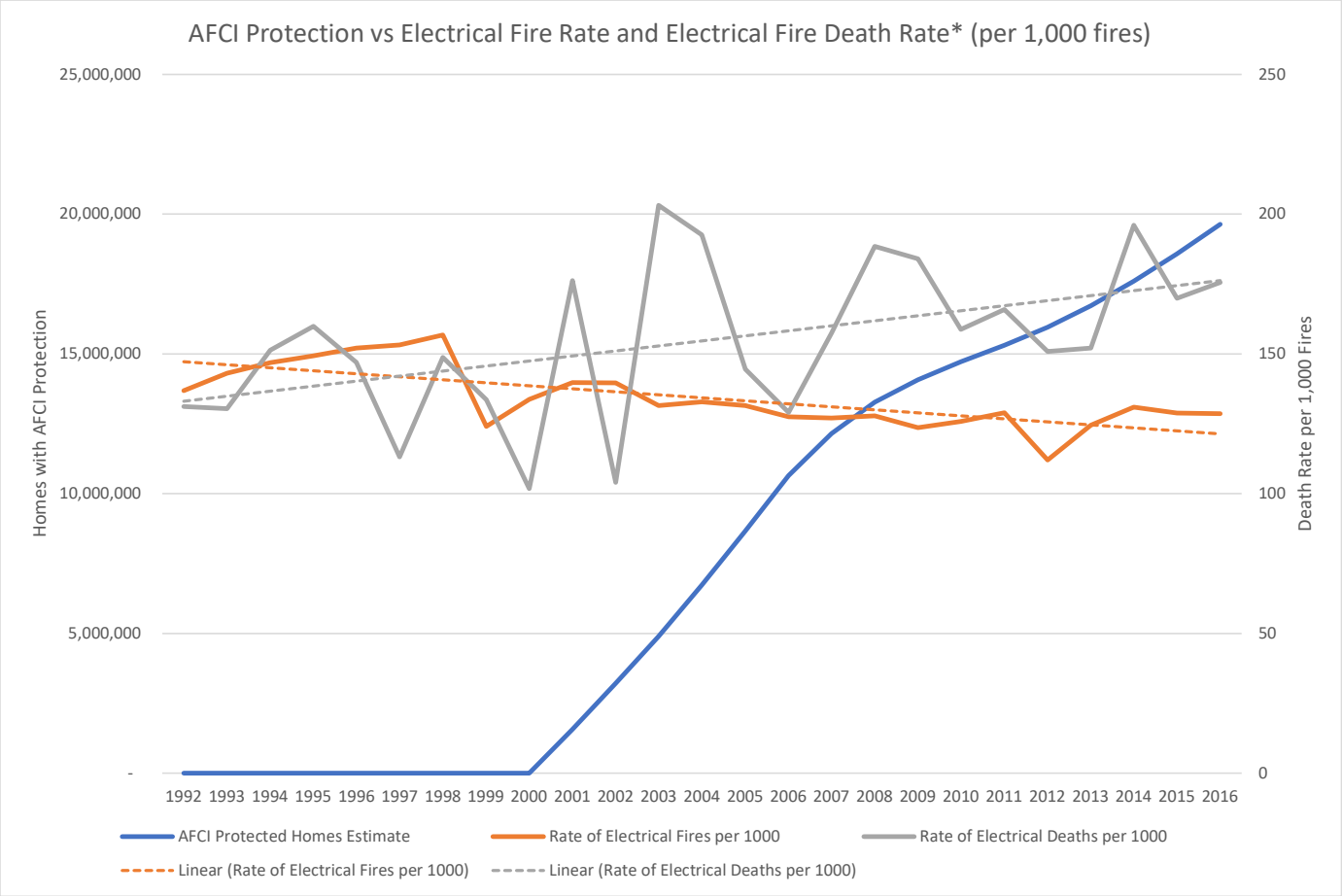

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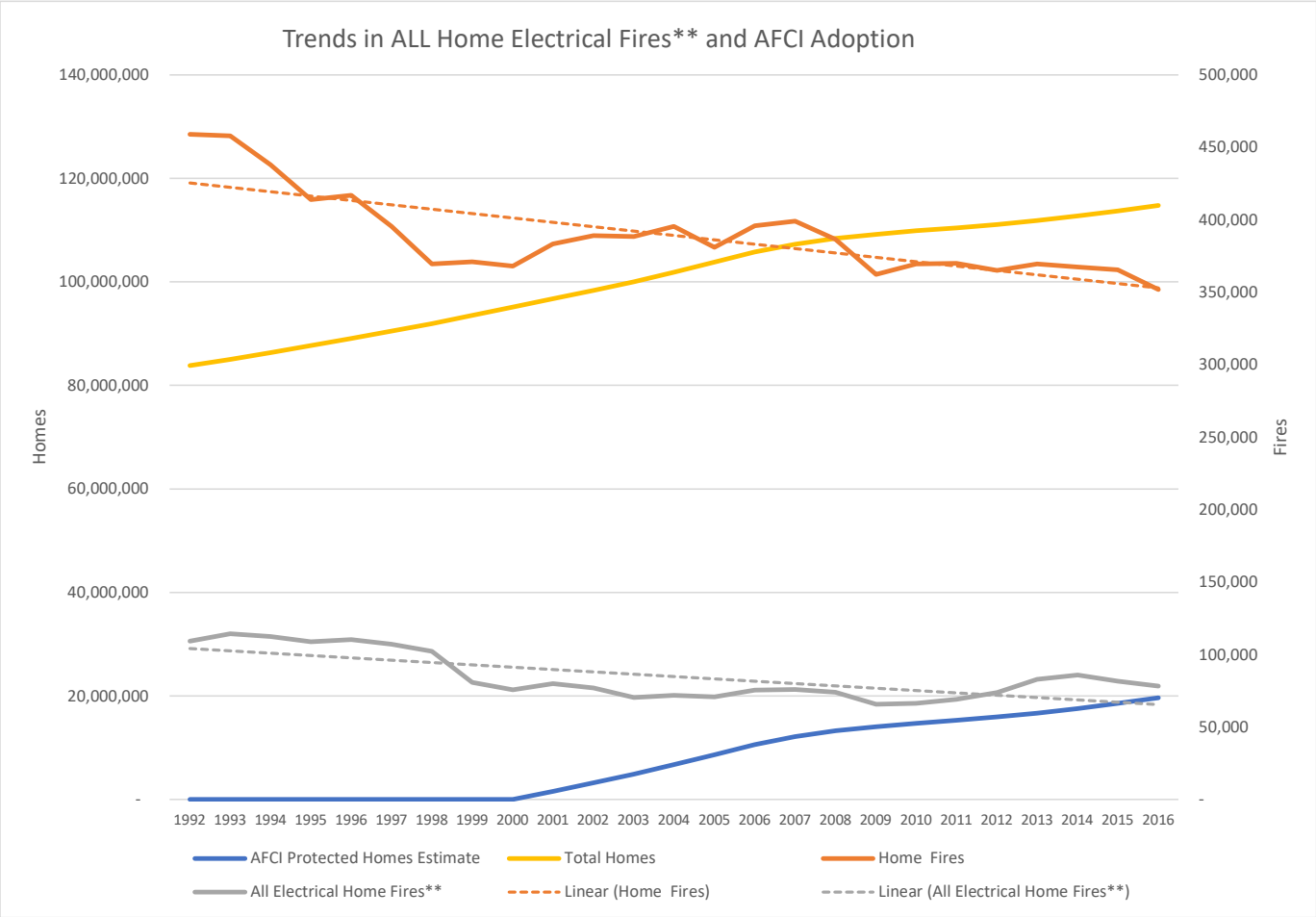

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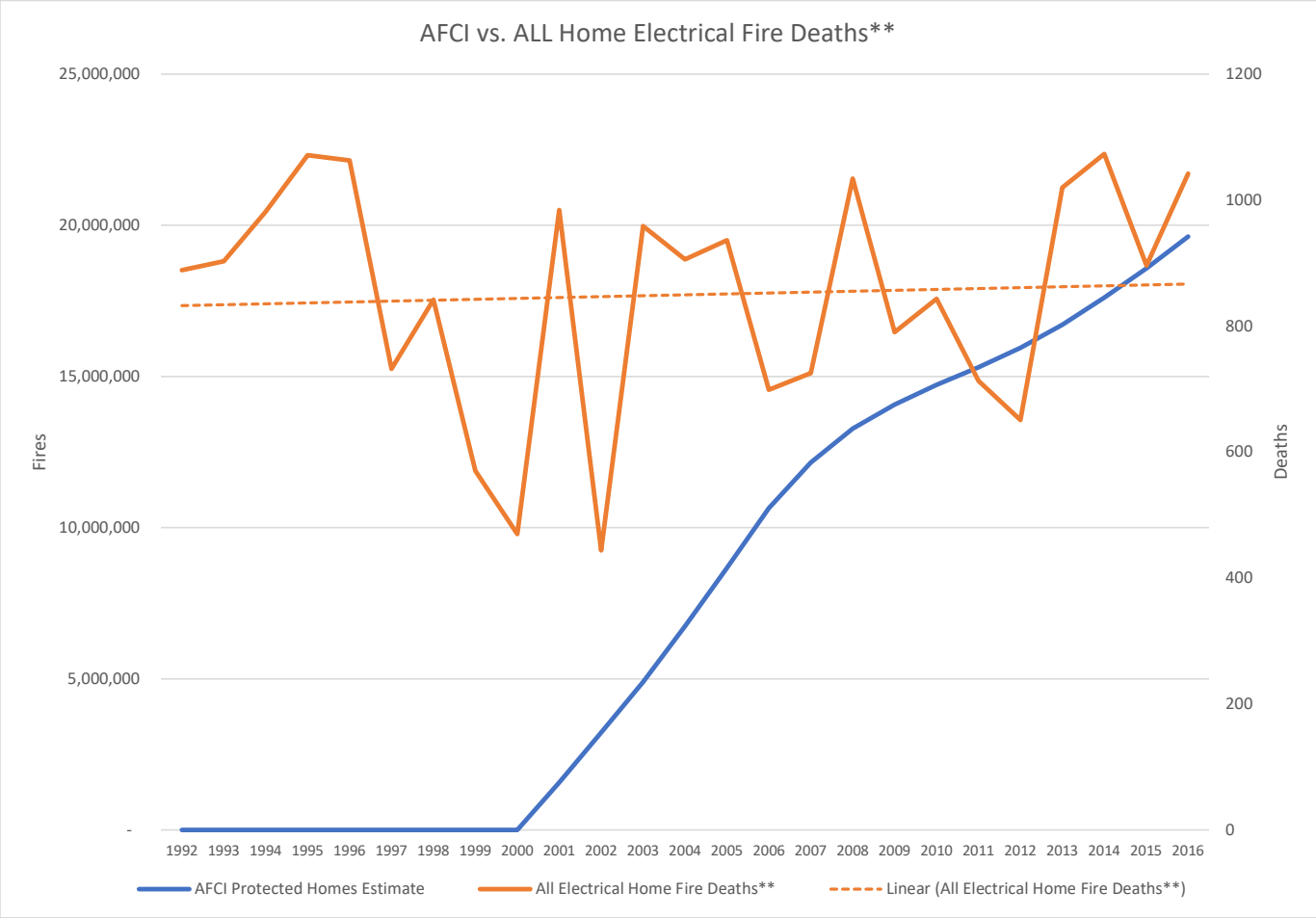

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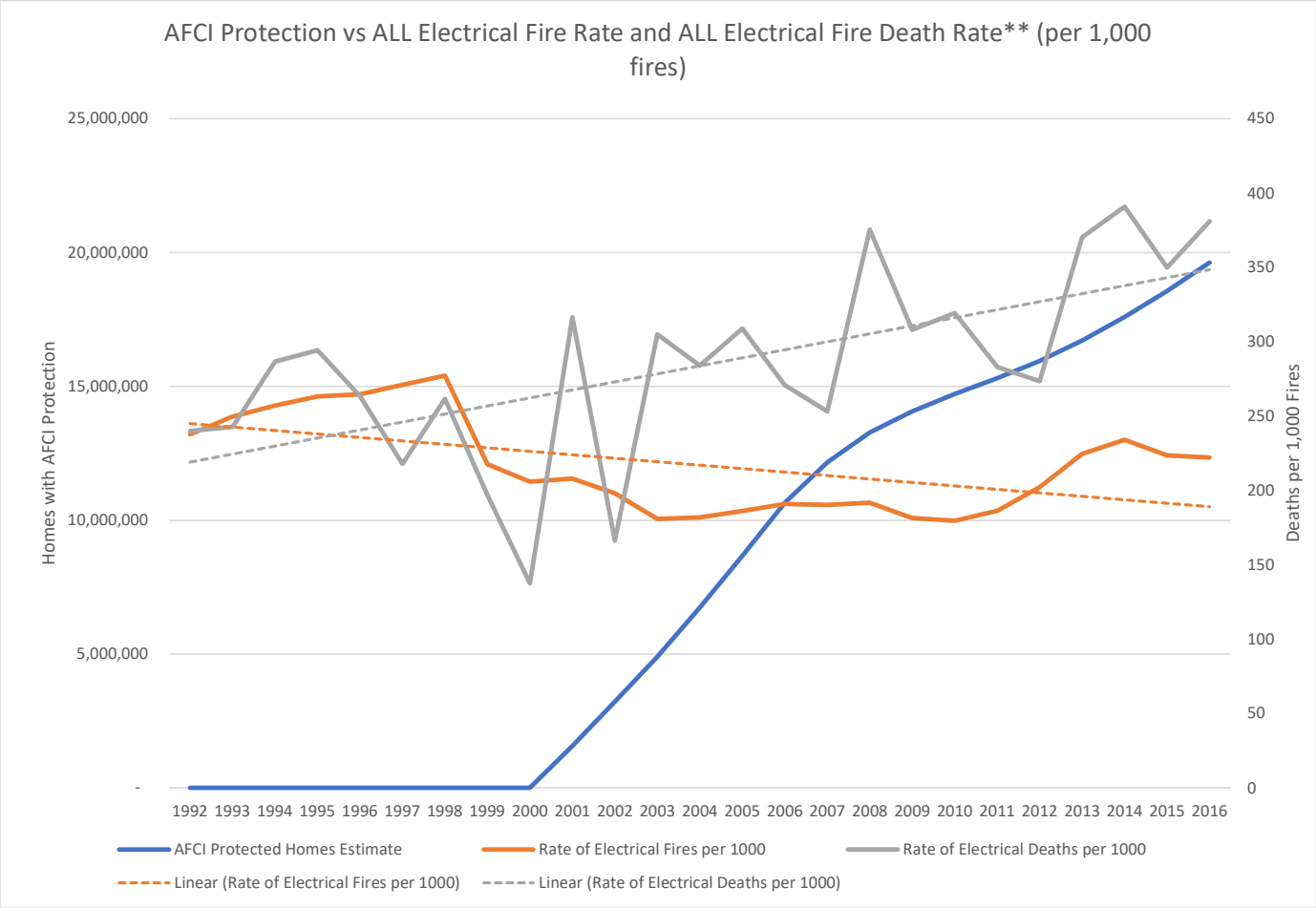

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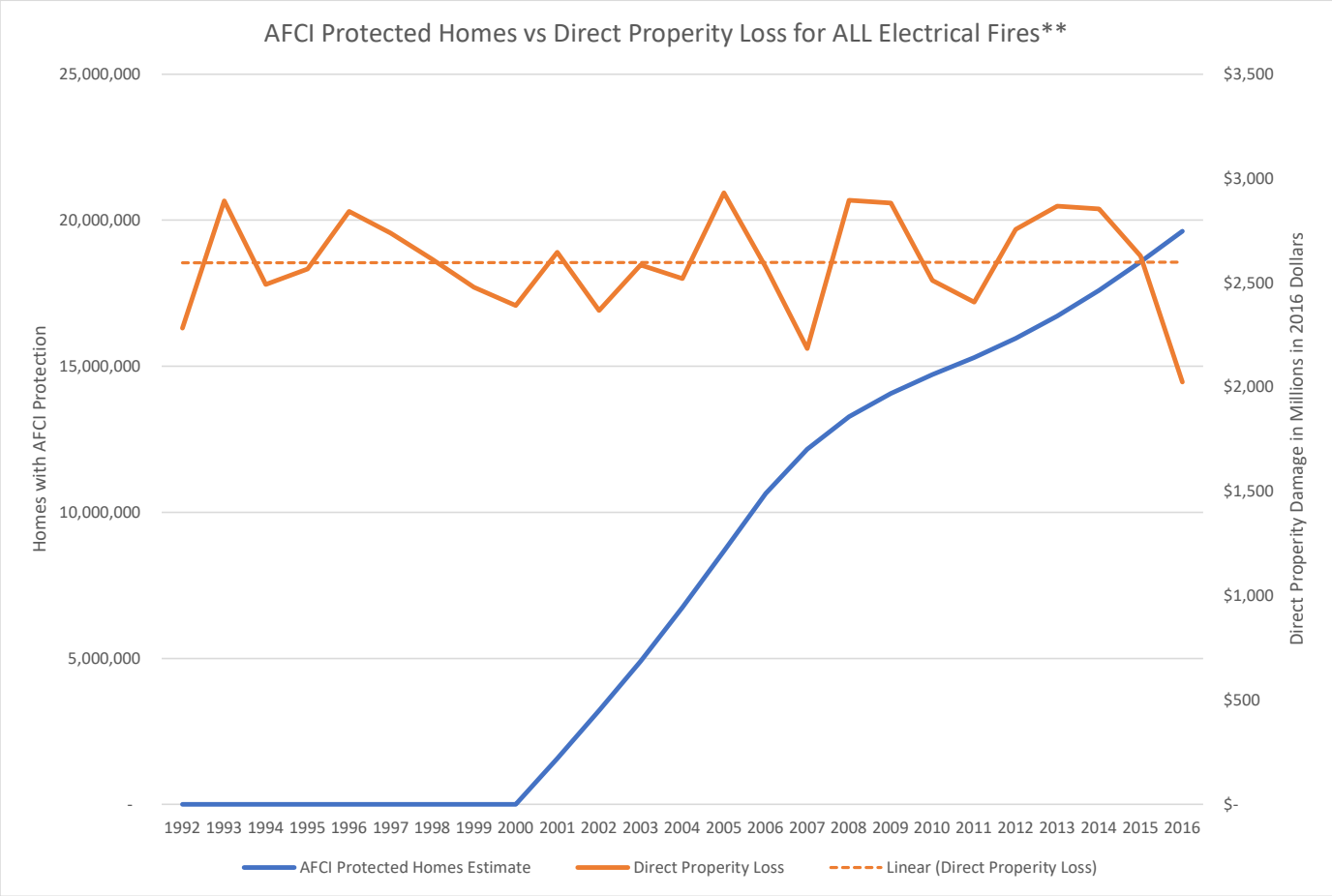

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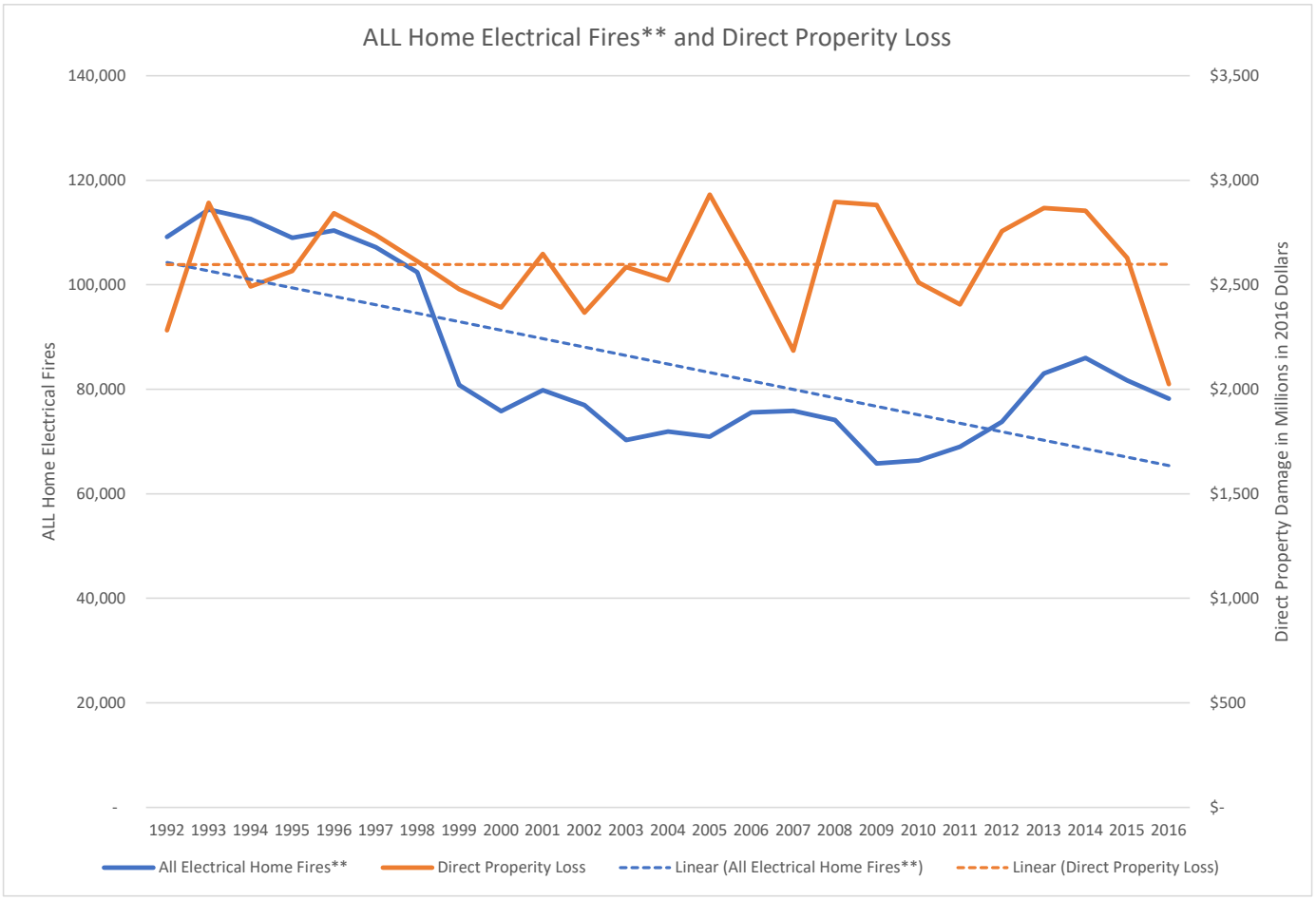


**Caused by Electrical Failure, Malfunction, Distribution, and Lighting

arc fault circuit interrupters

using advanced technology to reduce electrical fires

NEMA

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

INTRODUCTION

Arc fault circuit interrupters (AFCIs) are required by the National Electrical Code® (NEC) for certain electrical circuits in the home. Questions have been raised regarding their application and even the need for them. Various technical "opinions," organizational "marketing pitches," and misinformation are being distributed about AFCIs that further mislead the public about the purpose of the device as a part of overall electrical safety for the public.

This brochure is intended to address the various aspects of AFCIs and dispell the misinformation circulating in the industry.

WHY DO WE REALLY NEED AFCIs?

Smoke alarms, fire extinguishers and escape ladders are all examples of emergency equipment used in homes to take action when a fire occurs. An AFCI is a product that is designed to detect a wide range of arcing electrical faults to help prevent the electrical system from being an ignition source of a fire. Conventional overcurrent protective devices do not detect low level hazardous arcing currents that have the potential to initiate electrical fires. It is well known that electrical fires do exist and take many lives and damage or destroy significant amounts of property. Electrical fires can be a silent killer occurring in areas of the home that are hidden from view and early detection. The objective is to protect the circuit in a manner that will reduce its chances of being a source of an electrical fire.

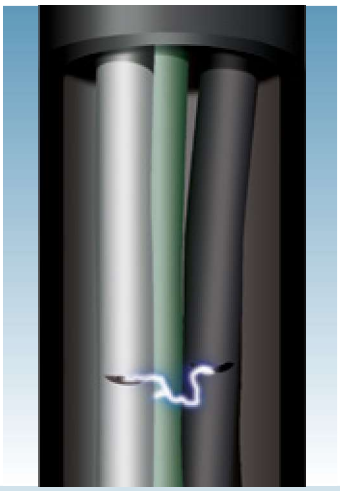
THE JOURNEY TO DEVELOP DETECTION TECHNOLOGY

Research in the arc fault area began in the late 1980s and early 1990s when the U.S. Consumer Product Safety Commission (CPSC) identified a concern with the residential fires of electrical origin. A large number of these fires were estimated to be in branch circuit wiring systems.

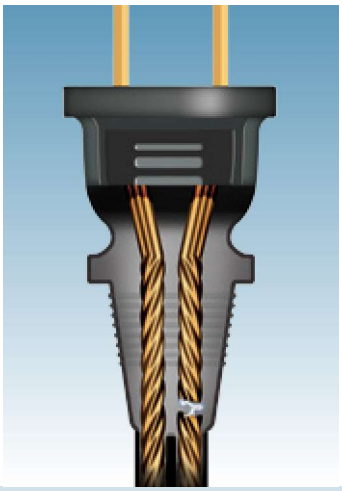
The concept of AFCIs gained more momentum when code proposals were made to the 1993 NEC to change the instantaneous trip levels of 15A and 20A circuit breakers. The Electronic Industries Association (EIA) had studied the issue of electrical fires and determined that additional protection against arcing faults were an area that needed to be addressed by electrical protection. This proposal first attempted to do this by requiring that instantaneous trip levels of a circuit breaker be reduced from a range of 120 to 150 amperes down to 85 amperes. However, it became clear that the lowering of those levels below some of the minimums already available on the market would result in significant unwanted tripping due to normal inrush currents.

It was these early studies and code efforts that led to the first proposals requiring AFCIs, which were made during the development of the 1999 NEC. NEC Code-Making Panel 2 (CMP2) reviewed many proposals ranging from protecting the entire residence to the protection of living and sleeping areas. In addition, the panel heard numerous presentations on both sides of the issue. After much data analysis and discussion, the CMP2 concluded that AFCI protection should be required for branch circuits that supply receptacle outlets in bedrooms.

Subsequent editions of the NEC further upgraded the requirements to include all 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in dwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, and similar rooms or areas, along with other enhancements.



Parallel Arc



Series Arc

WHAT ARE ARC FAULTS?

The UL Standard for AFCIs (UL 1699) defines an arc fault as an unintentional arcing condition in a circuit. Arcing creates high intensity heating at the point of the arc, resulting in burning particles that may over time ignite surrounding material, such as wood framing or insulation.

The temperatures of these arcs can exceed 10,000 degrees Fahrenheit. Repeated arcing can create carbon paths that are the foundation for continued arcing, generating even higher temperatures.

typical causes of arc faults

Example conditions where arc faults may start include:

- Damaged wires
- Worn electrical insulation
- Wires or cords in contact with vibrating metal
- Overheated or stressed electrical cords and wires
- Misapplied or damaged electrical appliances

Furniture pushed against or resting on electrical cords can damage the wire insulation. Damaged cords can become a potential condition for arcing.

Extension or appliance cords that are damaged or have worn or cracked insulation can contribute to electrical arcing.

Cord insulation can be deteriorated by heat generated by hot air ducts or sunlight.

Cables that are improperly nailed or stapled too tightly against a wall stud can sever insulation and cause arcing.

Wires located behind walls can be accidentally punctured by a screw or drill bit damaging the insulation of the wiring.

Nails carelessly driven into walls can break wire insulation and cause arcing.

Nonmetallic sheathed cable damaged by gusset plate while being pulled through attic.

FIRE DATA ANALYSIS

The Federal Government, the National Fire Protection Association, and US fire departments track the incidence of electrical fires across the United States and categorize those fires based on their causes. In reviewing statistics from 2003 to 2014, fires in home electrical systems averaged 25,366 annually and resulted in 378 civilian deaths, 1,290 civilian injuries and $1.4 billion in direct property damage.* The NFPA Home Electrical Fires Fact Sheet indicates that wiring and related equipment were involved in 63% of these fires and half of the associated deaths in 2007-2011.

The U.S. Department of Housing and Urban Development (HUD) recommendation is to promote AFCIs as one of the many devices that can be used to prevent burns and fire related injuries. In addition, it cites a 1999 CPSC Report recommending the use of AFCIs to "prohibit or reduce potential electrical fires from happening."**

As you can see from the data above, fires of electrical origin are a significant issue that must be addressed. Frequently, it is argued that fires only occur in older homes. However, it should be recognized that new homes become older homes. It is critical to install the AFCIs in the beginning so that they can perform their protection function from the start. Seldom are devices such as AFCIs added to homes after they are constructed and occupied.

*Home Electrical Fires Fact Sheet, National Fire Protection Association

**Healthy Homes Issues: Injury Hazards, U.S. Department of Housing and Urban Development, Version 3, March 2006

HOW IS AN ARC FAULT DETECTED?

An AFCI device uses advanced electronic technology to "sense" the different arcing conditions. While there are different technologies employed to measure arcs by the various AFCI manufacturers, the end result is the same, detecting parallel arcs (line to line, line to neutral and line to ground) and/or series arcs (arcing in series with one of the conductors).

How does arc fault detection work? In essence, the detection is accomplished by the use of advanced electronic technology to monitor the circuit for the presence of "normal" and "dangerous" arcing conditions. Some equipment in the home, such as a motor driven vacuum cleaner or furnace motor, naturally create arcs. This is considered to be a normal arcing condition. Another normal arcing condition that can sometimes be seen is when a light switch is turned off and the opening of the contacts creates an arc.

A dangerous arc, as mentioned earlier, occurs for many reasons, including damage of the electrical conductor insulation. When arcing occurs, the AFCI analyzes the characteristics of the event and determines if it is a hazardous event. AFCI manufacturers test for the hundreds of possible operating conditions and then program their devices to monitor constantly for the normal and dangerous arcing conditions.

THE NEC AND UL STANDARD

National Electrical Code

The National Electrical Code specifically defines and mandates the installation of AFCIs. The areas in homes where AFCI protection is required have gradually expanded, and as of the 2014 edition include kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, and similar rooms or areas.

UL Standard

Product standards to cover AFCIs began to be developed in the mid-1990s. Underwriters Laboratories published UL 1699 Standard for Safety for AFCIs in 1999 to cover a wide variety of conditions to evaluate an AFCI. The standard includes requirements for the following conditions:

- Humidity conditioning
- Leakage current
- Voltage surge
- Environmental evaluation
- Dielectric voltage
- Arc-fault detection
- Unwanted tripping
- Operation inhibition
- Resistance to environmental noise
- Abnormal operation

One of the most frequent questions about AFCIs is related to resistance to unwanted tripping. There are four varieties of tests related to its ability to resist unwanted tripping:

- Inrush current: High-current-draw devices such as tungsten filament lamps and capacitor start motors.
- Normal arcing: Brush motors, thermostatic contacts, wall switch and appliance plugs.
- Non-sinusoidal waveforms: Examples of devices creating these electrical waveforms include electronic lamp dimmers, computer switching-mode power supplies and fluorescent lamps.
- Cross talk: This test measures trip avoidance for an AFCI when an arc is detected in an adjacent circuit. Only the circuit with the arc should cause the breaker to trip, not another circuit.

Through the use of the NEC requirement and extensive UL testing, manufacturers' AFCI products provide superior protection against arcing faults.

CONTRASTING AFCIs AND GFCIs

There is a major difference between the functioning of an AFCI as compared to a GFCI (ground fault circuit interrupter). The function of the GFCI is to protect people from the deadly effects of electric shock that could occur if parts of an electrical appliance or tool become energized due to a ground fault. The function of the AFCI is to protect the branch circuit wiring and electrical cords connected to it from dangerous arcing faults that could initiate an electrical fire.

AFCI and GFCI technologies can co-exist with each other and are a great complement for the most complete protection that can be provided on a circuit.

WHAT ARE THE VARIOUS SAFETY AND GOVERNMENTAL AGENCIES SAYING ABOUT AFCI?

"The National Association of State Fire Marshals (NASFM) strongly supports the broad adoption of AFCI technology through national, state, and local building codes. AFCIs are the most welcome addition to fire prevention in decades. AFCIs promise to save hundreds of lives every year."

— John C. Bean, President, NASFM

"The National Association of Home Inspectors (NAHI) strongly encourages its members to educate all of their clients about the life and property saving benefits of AFCI technology, especially those clients considering the purchase of a home more than 20 years old."

— Mallory Anderson, Executive Director

"The National Electrical Contractors Association (NECA) submitted comments to legislative committees in Michigan and South Carolina, urging them to retain requirements for AFCI protection of bedroom receptacles in their state electrical codes. Cost-cutting pressure from homebuilders' associations in both states led to code proposals to delete AFCI protection required by the National Electrical Code, when constructing new homes."

— NECA Contractor Code Letter

"CPSC has identified arc fault circuit interrupter (AFCI) technology as an effective means of preventing fires caused by electrical wiring faults in homes."

— U.S. Fire Administration

"The Electrical Safety Foundation International (ESFI) urges that arc fault circuit interrupter (AFCI) technology be installed in all new and existing housing to protect homes and families from fires caused by electrical arcing."

— Brett Brenner, President, ESFI

TYPES OF ARC FAULT CIRCUIT INTERRUPTERS

AFCI and GFCI Protection

An AFCI can be used in conjunction with GFCI protection to provide both arcing fault protection as well as 5mA ground fault (people) protection. A way to provide both types of protection is to use an AFCI circuit breaker and a GFCI receptacle. Another way is to install a dual function device that provides both AFCI and GFCI protection.

defining the arc fault risk to people and property

WIRING AND INSTALLATION GUIDELINES

There are no special requirements for an AFCI circuit other than proper installation and wiring practices. There are various special considerations that must be given to certain circuits that vary from the norm, such as shared neutral applications, but in general the application of an AFCI is as simple as following the installation instructions that come from the manufacturer.

As with any change in the required protection for the electrical system, there have been many discussions and deliberations both for and against arc fault protection being a part of the NEC. Some have argued that the cost of installing AFCIs is higher than the cost of installing standard devices and, as such, it costs too much to provide the increased protection. Others have argued that since it is a relatively new type of protection, it does not have the history on which to base a decision as to whether to support or not.

These issues have been debated thoroughly and completely. It is important to keep a few critical facts in mind.

- The cost to install AFCI circuit breakers in the home is insignificant when compared to the number of lives and property the device helps protect.
- The additional cost to install AFCIs is insignificant compared to the total cost of a new home, typically less than 0.1%.
- The Consumer Product Safety Commission staff report on Estimated Residential Structure Fires on Selected Electrical Equipment (October 2006) from 1999-2003 reported that 142,300 electrical distribution fires occurred on all distribution components. Installed wiring fires were estimated to have occurred in 50,200 instances.
- Using the same report, the CPSC projected that there were 910 deaths attributed to electrical distribution equipment during that five-year period. Installed wiring led to approximately 210 deaths as a part of that total.

Applying technology to improve the electrical safety of the home is a wise investment for both the homeowner and the community at large. Reducing fires of electrical origin and saving lives is an important responsibility of the entire construction and regulatory community. Taking these CPSC statistics into account, one has to ask, if a portion of the 50,200 fires could have been prevented, would the increase in cost have been worth the added protection AFCIs provide the homeowner?

what is the price of new safety technology worth?

When GFCIs were introduced in the 1970s, similar discussions took place regarding the cost/benefit to the consumer, homebuilder and others. GFCIs have been a standard requirement in homes for over 30 years with additional locations and circuits being added over time as well. GFCI also has a statistical track record over time as to the reduction of electrocutions. On an annual basis, in 1983, there were almost 900 electrocutions total per year with approximately 400 being consumer product related. Ten years later, the total was reduced to 650 annually and slightly over 200 consumer product electrocutions annually.

With over 20 years of history, statistically based analysis of GFCIs was built on a solid foundation of data. AFCIs are relatively new and have only been installed in a small fraction of the total number of circuits in U.S. homes. As with all products, given time, they too will be able to provide a solid statistical base of measure.

Some have argued that it should be shown how many times an AFCI has "prevented" a fire from occurring. Of course, this is not a feasible request. The AFCI disconnects the power when an arc fault occurs, therefore no incidence of fire or arc is reported to authorities. The same can be true when a smoke alarm siren alerts the homeowner and the small smoking event is extinguished without incident. Is that statistic reported to the federal government or local fire department? Of course not. Safety prevention is just that: prevention. The only statistics that are reported are those that have resulted in a fire or a response of a fire department. Many safety protection actions go unreported.

If we are to offer consumers a safer home, then the appropriate technology should be put into place.

Removing AFCI as a local or state code requirement is reducing safety requirements. These rules are established by a national body of experts that have heard testimony from many sources as well as reviewed a significant amount of data to make their recommendation. Shouldn't we trust the safety experts that develop our safety procedures?

NEMA AND ELECTRICAL SAFETY

For more than 80 years, manufacturers of low-voltage distribution equipment have been working to ensure public safety through standards writing efforts and the dissemination of important industry information through the National Electrical Manufacturers Association (NEMA), one of the most respected standards development organizations in the world. Headquartered in Rosslyn, Virginia, NEMA has approximately 350 electroindustry member companies, including large, medium and small businesses. To learn more about NEMA visit **www.nema.org**.

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ARC-FAULT CIRCUIT INTERRUPTERS

Protecting Your Home from Fires

Home fires are more deadly and costly than ever. While the number of total fires and fire injuries are decreasing, property damage and fire deaths are on the rise. Each year arc-faults, caused by worn and inadequate wiring, overburdened circuits, outdated technology, and aging electrical systems, start more than **35,000 home fires** causing over **1,130 injuries, 500 deaths,** and **$1.4 billion** in property damage.

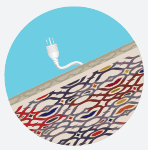
Common Causes of Arc-Faults

Damaged electrical wiring

Wiring damaged by screws or nails

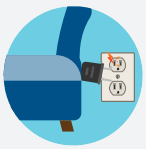
Wiring damaged by doors

Damaged electrical insulation



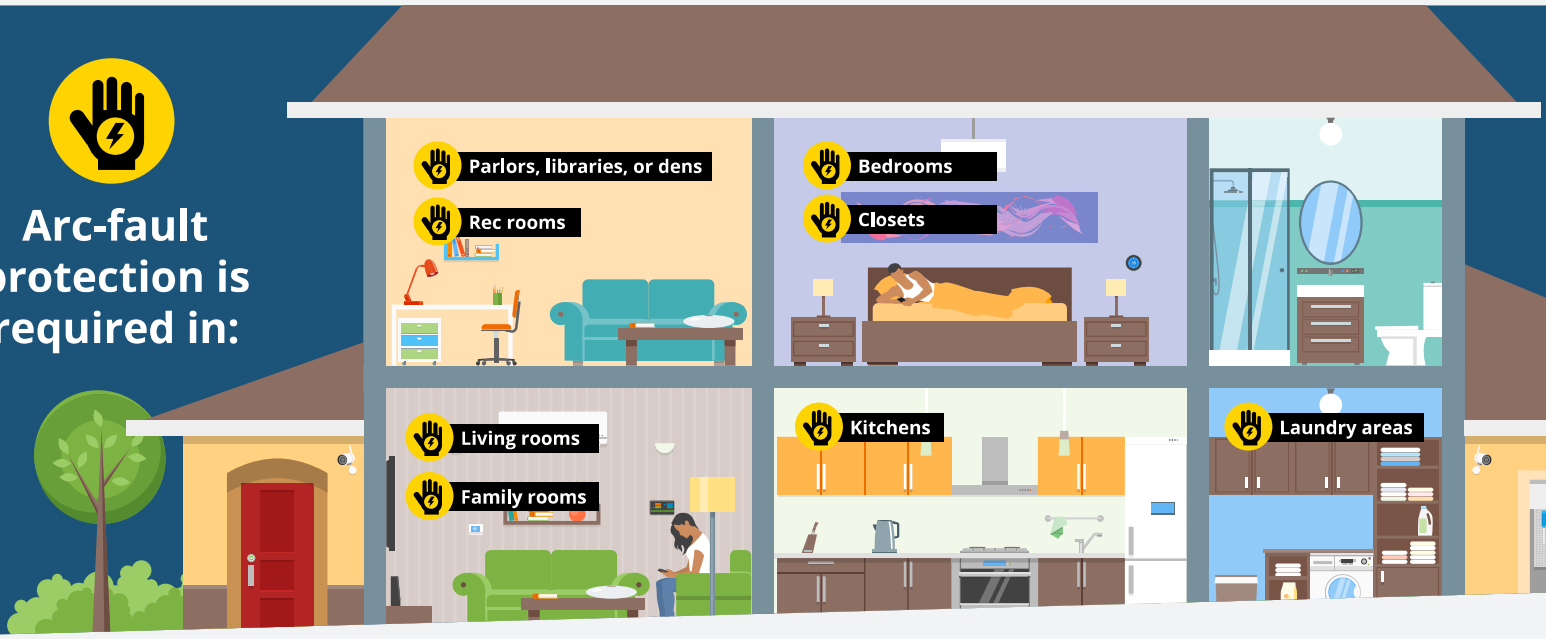
Overheated cords under carpets or rugs

Damaged or loose connections



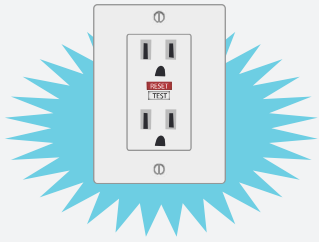
Cords and plugs damaged by furniture

Arc-fault protection is required in:



Types of arc-fault protection:

A listed combination-type AFCI circuit breaker



A listed outlet branch-circuit-type AFCI receptacle

A listed outlet branch-circuit-type AFCI receptacle in combination with a listed branch-circuit overcurrent device

Please share this free resource to save lives

AFCI circuit breakers and receptacles protect all downstream wiring and appliances from arc-faults. Receptacles should be installed at the first outlet box of a circuit.

ESFI.org

www.facebook.com/ESFI.org www.twitter.com/ESFIdotorg www.youtube.com/ESFIdotorg

Insurance Institute for Business & Home Safety®

Electrical Fires and Arc-Fault Circuit Interrupter Protection

January 2017

Electrical Fires and Arc-Fault Circuit Interrupter Protection

Protective devices such as circuit breakers (and fuses before them) have long been used in nearly all homes to reduce the risk of electric fires. These devices protect against excessive current, which can cause overheating and damage to the electrical circuit itself, potentially resulting in fire or explosion. Circuit breakers and fuses are designed to interrupt the current flow when it exceeds the limit the circuit was designed for. However, they do not address another common cause of electric circuit fires—those caused by arcing or leakage of electrical currents (i.e., exposure of electrical currents to air) in a circuit that is energized.[1] It is estimated that at least 65% of the almost 50,000 annual home fires result from these arc faults (Hall, 2013) that can reach temperatures of several thousand degrees Celsius and present a serious fire hazard.

What are Arc Faults?

Common causes of arc faults include:

- Loose connections in outlets, switches and wires in fixtures such as ceiling fans and lights
- Frayed or damaged electrical cords due to impacts, pressure from residing under furniture, or age and normal wear and tear
- Damage to wiring insulation—e.g., damage by nails or screws driven through walls
- Spillage of liquids

Protective Benefits of Arc-Fault Circuit Interrupters

Arc-fault circuit interrupters (AFCIs) are electronic devices designed to detect dangerous arc faults that occur at currents below levels that would trip an ordinary circuit breaker. The precise methods for detecting arc faults differ across manufacturers and devices, but generally speaking, AFCIs continually monitor the current and voltage wave forms in an electrical circuit and interrupt (cut off power to the circuit) if these wave forms have characteristics indicative of dangerous arcing. In addition to detecting problems in electrical wiring and connections, AFCIs can also detect and protect against arcing in connected cords and appliances.

[1]Arcing conditions sometimes result in excessive current through the circuit, the type of condition standard circuit breakers are designed to respond to and protect against. However, in many situations, the high temperatures produced by arc faults can occur without drawing excessive current. In the absence of excess current, standard circuit breakers cannot protect against such arc faults, which they were not designed to detect.

Arc-Fault Circuit Interrupters and the National Electrical Code®(NEC)

The fire risk associated with arc faults has long been recognized. Research in the development of AFCIs took on greater urgency in the 1980s and 1990s in response to growing concern about electrical fires by the Consumer Product Safety Commission (CPSC). The goal was to develop a device that went beyond standard circuit breakers to detect and respond quickly to arc faults before they ignited, while at the same time minimizing nuisance tripping. In 1997, the first AFCIs that could detect and respond to different types of arcing conditions became commercially available. AFCIs were first included in the 1999 NEC[2] with a delayed adoption until 2002 in order to permit a transition period to accommodate the new requirement (Domitrovich & Lippert, 2013). In 1999, Underwriters Laboratories (UL) finalized UL 1699 Standard for Arc-Fault Circuit Interrupters which provides a standard for testing and listing approved AFCIs (Siemens Industry Inc., 2012).

The NEC requirements have evolved and expanded over time. Initially the NEC required protection of 120 volt, 15- and 20-ampere branch circuits that supplied outlets in bedrooms in new construction. Subsequent editions of the NEC have extended these requirements to include AFCI protection for branch circuits in kitchens, family rooms, dining rooms, living rooms, bedrooms, parlors, libraries, dens, sunrooms, recreation rooms, closets, hallways and laundry areas. (Outlets in bathrooms, garages, unfinished basements and outdoors are not required to be AFCI-protected.) Recognizing that electrical fires could also occur in existing dwellings, the NEC also requires AFCI protection where branch circuit wiring in an existing home is modified, replaced or extended (National Fire Protection Agency, 2014).

The NEC provides for multiple methods of protecting branch circuits for arc-fault conditions, but the simplest method of protection (particularly in new construction) can be achieved by installing listed combination-type AFCI devices at the panel box at the origin of the branch circuits. This method of protection may also be preferred when a branch circuit in an existing home is modified. However, an alternative method of providing protection in modifications to existing circuits is to install a listed branch circuit–type AFCI in the first outlet of the circuit, which will provide protection for the outlet and the remaining downstream branch circuit wiring and power supply cords.

Addressing Concerns about AFCIs

Most jurisdictions adopting the NEC do so without modifying the provisions related to arc-fault protection. However, some states have faced occasional efforts to remove or modify the arc-fault protection requirements during their code adoption process. Two of

[2]The NEC (also known as NFPA 70) published by the National Fire Protection Association (NFPA) is the most widely adopted standard for the safe installation of electrical wiring and equipment in the United States.

the most commonly cited arguments against mandating AFCIs are the issues of nuisance tripping and the increased cost of AFCIs over standard circuit breakers.

On occasion, normal operating conditions can mimic arcing conditions that cause AFCIs to interrupt the current (trip) when dangerous conditions do not actually exist. This is referred to as nuisance tripping. Since they became commercially available in 1997, AFCI technology has evolved and improved, resulting in fewer incidences of nuisance tripping while expanding the dangerous conditions they protect against. And it is important to remember that what may be perceived as nuisance tripping may actually be a properly functioning AFCI accurately detecting and responding to dangerous arcing conditions that are not readily apparent.

One source of nuisance tripping may be in the way circuits have been wired by electricians. For example, the practice of having more than one electrical circuit share a neutral line or having crossed neutral lines will cause the ground fault detection function in an AFCI to interrupt the circuit. In such cases, the AFCIs are performing as intended. But the practice of having multiple circuits share a neutral line has recently been prohibited in the 2011 edition of the NEC. Consequently, this should not be a source of nuisance tripping in new homes with AFCIs going forward.

The incompatibility of certain electrical devices has also been cited as a cause of nuisance tripping. A typical home will have multiple electronic devices with different loads on a common circuit and the combination of devices in use can result in a variety or current wave forms flowing through the circuit under normal operating conditions. Additionally, some electronic devices will have operational or “safe arcing” as part of their normal operating conditions. Treadmills, televisions and fluorescent lights have been known to create wave forms that mimic those of dangerous arcing. AFCIs are designed to analyze a range of current wave forms flowing through a circuit and distinguish between those that represent dangerous arcing versus those that are present under normal operating conditions and do not pose a risk. The technology for doing so is not perfect. However, before AFCIs are listed by UL (under standard UL 1699) and make it to market, they are tested not only to ensure they respond quickly to dangerous arcing conditions, but also to make sure they do not respond to a variety of safe conditions that resemble dangerous arcing conditions (Underwriters Laboratories, 2006).

The other cited issue is cost. Standard circuit breakers sold in big-box hardware retailers cost between $3.72 and $4.56, while circuit breakers with arc-fault protection cost between $37.97 and $42.97. In a typical 2,500-square-foot home requiring 12 breakers, the difference in the cost of the two types of breakers could be between $400 and $470. According to the U.S. census, the median price of a new home in 2015 was $271,300, so the cost of upgrading all of the circuit breakers to AFCIs represents a tiny fraction (about 0.15%) of the price of a typical new home. Safety advocates agree this is a small price to pay for the potential reduction in human and property losses that could be realized with the widespread use of AFCI protection.

Public and Private Organizations Endorse AFCI Technology

Laboratory-tested AFCI devices have proven to be effective in detecting and isolating wiring problems that could lead to electrical fires and fatalities (Domitrovich & Lippert, 2013). The same NFPA study that estimated an average of nearly 50,000 electrical fires between 2007 and 2011 also estimated that these fires resulted in an annual average of 455 civilian deaths, 1,518 civilian injuries, and $1.48 billion in direct property losses (Hall, 2013). The CPSC estimates 50% or more of these electrical fires could be prevented by the use of AFCI protection (Karels, 2003). Over their nearly 2 decades of commercial availability, AFCIs have gained the endorsement of many organizations.

- **Consumer Product Safety Commission (CPSC).** A letter to jurisdictions considering adopting the 2008 NEC stated, “The CPSC staff is a strong proponent of the implementation of AFCIs as a powerful tool in mitigating fires that originate in the electrical distribution system” (Trotta, 2008).
- **U.S. Fire Administration (USFA).** USFA literature highlights the value of AFCIs. “Arc fault circuit interrupters (AFCIs) shut off electricity when a dangerous situation occurs. Have a licensed electrician install them in your home” (U.S. Fire Administration, 2012).
- **National Association of State Fire Marshals (NASFM).** “The National Association State Fire Marshals (NASFM) strongly supports the broad adoption of AFCI technology through national, state, and local building codes. AFCIs are the most welcome addition to fire prevention in decades. AFCIs promise to save hundreds of lives every year,” says NASFM President John C. Dean (Siemens Industry Inc., 2012).
- **National Association of Home Inspectors (NAHI).** “NAHI strongly encourages its members to educate all of their clients about the life- and property-saving benefits of AFCI technology, especially those clients considering the purchase of a home more than 20 years old,” says Executive Director Mallory Anderson (Siemens Industry Inc., 2012).
- **Electrical Safety Foundation International (ESFI).** “ESFI urges that AFCI technology be installed in all new and existing housing to protect homes and families from fires caused by electrical arcing,” observes ESFI President Brett Brenner (Siemens Industry Inc., 2012).
- **The Federal Emergency Management Agency (FEMA).** FEMA recommends installation of AFCIs as a mean of preventing electrical fires (National Fire Data Center, 2014).

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UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: March 10, 2003

TO : William H. King, Jr., ESEE

THROUGH: Warren J. Prunella, Associate Executive Director For Economic Analysis

FROM : Terrance R. Karels, EC

SUBJECT : Economic Considerations --- AFCI Replacements

You asked that Economic Analysis provide you with some preliminary estimates of the costs and benefits of replacement of circuit breakers with newer-technology arc-fault circuit interrupters (AFCIs). The following estimates are based on staff reports, contacts with trade and industry sources, and other readily available information regarding residential fires and AFCIs.

Electrical Fire Cost to Society

The Commission's Directorate for Epidemiology reports that there were an average of 41,500 residential fires involving residential electrical distribution systems over the 9 year period 1990-1998.[1] These fires resulted in an average of 326 deaths, 1,481 injuries, and $646 million in property losses per year over that period. For analytical purposes, the CPSC assigns a statistical value per life of $5 million; using the CPSC's Injury Cost Model, the estimated average cost of fire-related injury (including burns and smoke inhalation) is about $56,000. Adding each of these three cost elements, the average total estimated cost to society of these residential electrical fires would be about $2.360 billion per year ($1.630 billion+$83 million+$646 million).

It should be noted that "societal costs" is confined in this analysis to consumer deaths, injuries, and property loss to residents involved in a residential fire. Deaths and injuries sustained by fire personnel and the cost of fighting fires were not included in the society cost estimate.

Costs by Age of Housing Units

According to a 1990 CPSC Epidemiological study, "Residential Electrical Distribution System Fires," 85% of all such fires involved housing over 20 years old.[2] Thus, the societal costs of these fires in older homes would be significantly greater than that for newer housing. If

[1] Revised Residential Fire Loss Estimates, 1980-1998, National Estimates of Fires, Deaths, Injuries, and Property Losses from Non-Incendiary, Non-Suspicious Fires, July, 2002.
[2] The study was based on 149 investigated fires in 16 cities, and do not represent a statistically representative sample.

residential fires for the period 1990-98 (the period for which fire incident data were used) tracked the same pattern as the 1990 study, some 85% of fires --- and 85% of the expected societal costs--- would occur with housing over 20 years old. According to data derived from the **Annual Housing Survey, 1999** (US Census Bureau), there was an average of about 98.7 million housing units during the period 1990-98 (the period for which fire incident data were used). Over this period, an average of 70 million housing units (or 71%) were over 20 years old.

Thus, it appears that the age of housing units is a significant factor in the risk of residential fire involving electrical distribution systems. For houses under 20 years of age, the societal cost of these fires would be $354 million per year ($2.36 billion x .15). Since there were an average of 28.7 million houses under 20 years old over the period, the average expected societal cost would be $12.33 per year ($354 million / 28.7 million) per housing unit.

For housing over 20 years old, the societal costs would be $2.01 billion per year. For the 70 million houses that were over 20 years old, the expected societal costs of these fires would be $28.66 per unit per year ($2.006 billion /70 million).

Savings Over the Life of the AFCI

The CPSC's Engineering staff estimate that current-technology AFCIs may remain in service for 40 years or more, based on the industry's reported rate of replacement of existing circuit breakers in the US. For the purpose of this preliminary estimate, we assume that AFCIs will experience a service life of 30 to 40 years. Benefits associated with their use would accrue over the entire lifetime of the products.

The total benefits would be the present discounted value of the reduction in societal costs associated with residential electrical fires. Since the electrical fires appear concentrated after the structure is over 20 years old, the societal costs would differ depending upon when the AFCIs were installed. The following table shows the expected societal costs that would be addressed by AFCIs, under several scenarios. All societal costs were discounted at a rate of 3%.

	Present Value of Societal Costs Addressed by AFCIs	
	If a 30-year life	If a 40-year life
If installed at initial construction[3]	$324	$425
If installed after 10 years[4]	$429	$530
If installed after 20 years[5]	$572	$673

The discount rate has a significant effect on the present value of societal costs. For example, at a 7% discount rate, the discounted addressable societal costs for AFCIs installed at initial construction decline to $184 (if a service life of 30 years) and to $208 (if a 40 year service life). If AFCIs are installed after the housing was 10 years old, the discounted societal costs would

[3] This example assumes societal costs of $12.33 annually for the first 20 years, and $28.66 thereafter
[4] This example assumes societal costs of $12.33 annually for 10 years, and $28.66 thereafter
[5] This example assumes societal costs of $28.66 annually

range from $243 (if 30 year service life) to $267 (if 40 year service life). If installed in housing over 20 years old, the discounted societal costs would range from $363 (if 30 year service life) to $387 (if 40 year service life).

Cost of AFCIs

According to Engineering Sciences staff (ES), the average cost differential of residential AFCI circuit breakers compared to residential circuit breakers without the AFCI feature is $15 to $20 per unit. Staff also estimate that an average of 10 additional circuits per household would require AFCI protection beyond those currently required by the National Electrical Code. Thus, the cost of adding AFCI protection would total about $150 to $200 per housing unit. For the purposes of this preliminary analysis, we have used $175 (the midpoint of the estimates) as the cost of adding AFCI protection, per housing unit.

Effectiveness and Comparison of Costs and Benefits

As noted earlier, industry estimates put replacement sales of circuit breakers at levels that suggest that circuit breakers experience useful lives in excess of 40 years. If AFCIs experience a service life of 40 years (the most likely scenario based on the useful life of current-technology circuit breakers), and are installed at the time of initial construction of the residence, the inclusion of AFCIs would need to achieve effectiveness of about 41% in order for the estimated discounted benefits (the reduction in societal costs) to be equal to the costs of installation of the AFCIs ($175 in costs/$425 in benefits).

If the AFCIs were installed after the housing units were 10 years old (as might occur with early housing renovations), AFCIs would need only a 33% effectiveness in order to achieve cost-effectiveness ($175/$530). And if AFCIs were installed after the housing units were 20 years old (a likely time frame for major housing renovations), a 26% rate of effectiveness would yield benefits equivalent to costs ($175/$673).

Using a 30-year useful life for AFCIs, if installed at the time of initial construction, AFCIs would need to be about 54% effective in order to be cost-effective ($175/$324). If installed after the housing were over 10 years old, an effectiveness rate of 41% would yield a balance of costs and benefits ($175/$429). And if the AFCIs were installed after the housing was 20 years old, an effectiveness of 31% would result in costs in balance with benefits ($175/$572).

The inclusion of AFCI protection is expected to reduce, but not eliminate residential fires from electrical distribution systems. Citing reviews of in-depth investigations, ES staff estimate that the inclusion of AFCI protection in circuit breakers could have prevented 50% or more of these fires.

Thus, if the ES staff estimate of 50% effectiveness is correct (and assuming a 3% discount rate), the preliminary estimate of benefits of installing AFCI protection would exceed the costs in all but one scenario: for AFCIs with a 30-year useful life installed at the time of the initial construction, the projected benefits would be $162 (50% of $324), while the expected costs would be $175.

However, it should be noted that the results of the analysis are sensitive to the discount rate used. If a 7% discount rate is applied to the societal costs, the benefits of installing AFCI protection expected to last 30 to 40 years in *new* housing could be less than the costs: $92 to $104 (50% of $189 and $208, respectively); if AFCIs were installed in housing over 10 years old, the benefits would be $122 to $134 (50% of $243 and $267, respectively). However, the installation of AFCIs in housing over 20 years old still results in significant benefits over costs: $181 to $194 (50% of $363 to $387, respectively).

Aggregated Benefits and Costs

The preceding section described the expected benefits and costs of requiring AFCIs on a per-house basis. However, because industry sources indicate that about 1.9 million housing units undergo major electrical renovations annually, we can also describe the aggregate discounted benefits and costs associated with these renovations over the expected useful lives of the installed AFCIs. While the average age of this housing is unknown, it is likely that they are older residences. If AFCIs were incorporated in these older housing as renovations were conducted, and if such renovations involved housing over 20 years old, the aggregate discounted benefits (i.e., the reduction in societal costs) could be in the range of $286 to $336[6] each, or $543 to $638 million for all 1.9 million houses. The total cost of the addition of AFCIs would total $175 per housing unit, or $332 million for all renovated houses. Thus, in this scenario, the total benefits of such an action are almost double the expected costs.

[6] Based on 50% effectiveness and 3% discount rate, and 30-year and 40-year expected life.

South Carolina Department of Labor, Licensing and Regulation
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2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Residential Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: E4002.14 Tamper-resistant receptacles.

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

Delete mention of 250 volt

E4002.14 Tamper-resistant receptacles. In areas specified in Section E3901.1, 15- and 20-ampere, 125- ~~and 250-~~-volt nonlocking-type receptacles shall be listed tamper-resistant receptacles. [406.12]

In 200 characters or less, please briefly describe the justification for this modification request.

see attached

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 15:59:33 -04'00' Date: _____

Title: Executive Director

Reason:

This amendment retains the provisions of the 2017 NEC. This requirement was added in the 2008 edition of the National Electrical Code (NEC) and is not based on sound technical information which adequately substantiates that it will result in protecting small children from burns or injury. During the revision cycle leading up to the 2008 edition the supporting documentation for the proposal was based on the summarization of several National Electronic Injury Surveillance System reports from 1991-2001. The NEISS system gathers its data by sampling a group of monitored hospitals for the total number of injuries treated. They then take these figures and calculate the estimated national average.

Public comment from electrical contractors criticized the conclusions drawn from the report. They stated that the report did not identify if the incidents were occurring in newer or older homes. Older homes generally have more electrical hazards which can lead to a higher incidence of shocks.

The NEISS reports also did not provide any supporting information of where the child was located at the time the injury occurred, much less that that all incidents occurred in dwelling units or if any child safety devices were present at the time the injury occurred. There is no scientific research available which has proven tamper- resistant (TR) receptacles are more effective than other safety devices that are currently available on the market. The fact sheet, produced by the National Fire Protection Association, states that TR receptacles are preferred over plastic safety caps for the reason that the caps may be lost and may be a choking hazard for some ages. However, the Consumer Product Safety Commission (CPSC) suggests the use of outlet safety covers on their website Childproofing Your Home- 12 Safety Devices to Protect Your Children, and safety covers available in stores today are large enough not to constitute a choking hazard. It's fair to say CPSC would not advocate their use if there were safety concerns.

Another concern that was shared by many on the technical review committee was the amount of force that must be applied to insert plugs into the tamper-resistant device and how it will affect the elderly community. The devices are designed in a way that the springs will not open unless the prongs are properly aligned with the shutters and are receiving equal amounts of pressure. Many on the panel voiced concern that there was a lack of product testing showing whether there will be an impact to the aging community's ability to use the new devices.

Notes/additional background:

During the 2008 revision Cycle, the National Electrical Manufacturers Association submitted the proposal to require tamper-resistant receptacles in all areas of a dwelling as indicated in Article 210.52 of the NEC. Over 29 negative comments were submitted in response to the proposal and all 29 comments were rejected by the technical committee. The negative comments were submitted by electrical contractors, electrical inspectors, and some manufactures. Below is a list of concerns that were raised:

1. The required force to insert cords into the device may prove too much for the elderly or disabled.

2. There is no scientific data directly comparing current available safety devices to tamper-resistant receptacles to support the claim that TR are more effective and will reduce the number of accidents.

3. That the proponent should provide data listing the areas of the dwelling where injuries have occurred, thereby proving the need for tamper receptacle in areas such as attics, crawlspaces, mechanical rooms, countertops and other areas where the receptacles are normally out of reach of children.

4. At the time the proposal was approved, it was unknown whether any manufacturers were producing tamper-resistant devices that were compatible or integrated with arc-fault and ground-fault circuit interrupters.

5. The supporting documentation submitted by the proponent clearly stated “the results of these incidents are rarely fatal”, and that further research should be conducted along with more product development before any such mandate should be implemented.

6. That the technical committee should remember, the code is not able to protect each person, in every situations, from every conceivable harm and should not be used as a tool to differ the responsibilities of the parent or caregiver who should be monitoring the children.

7. That the substantiation lacked any credible justification for disallowing the use of plastic safety caps other than claiming that they could be lost or become a choking hazard.

8. Why limit tamper-resistant receptacles to dwellings? There are several other occupancies that do not require these devices, yet children are present and the receptacles are accessible.

9. Tamper-resistant receptacles should be an option for dwellings that children occupy and not mandatory for dwellings where children are not present.

10. Scarcity of product.

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331 USA
+1.248.848.3700
www.concrete.org

South Carolina Department of Labor, Licensing and Regulations
South Carolina Building Codes Council
Attention: South Carolina Building Codes Council Board Members
110 Centerview Drive
Columbia, South Carolina 29211

June 29, 2021

Re: Code Change Proposal – 2021 Building Code, Section 101.4.7

Dear SC BCC Board Members,

Please find included with this letter a copy of the code change proposal form and supporting information submitted by ACI on behalf of the ACI Carolinas Chapter, as well as other local industry supporters.

Please contact me directly if you have any questions.

Sincerely,

Kerry Sutton, PE
American Concrete Institute
Code Advocacy Engineer
[redacted]

Attachment 1 - Letter of Support from ACI Carolinas Chapter
Attachment 2 – Photocopy of applicable code section
Attachment 3 – Justification for proposed modification
Attachment 4 – Additional letters of support

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr • Columbia • SC • 29210
P.O. Box 11329 • Columbia • SC • 29211-1329
Phone: 803-896-4688 • contact.bcc@llr.sc.gov • Fax: 803-896-4814
llr.sc.gov/bcc

2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: American Concrete Institute

Address: 38800 Country Club Drive (Street) Farmington Hills (City) MI (State) 48331 (Zip)

Name: Kerry Sutton, PE Title/Position: Code Advocacy Engineer

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Building Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: [A] 101.4.7, add 101.4.7.1

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

Reference to ACI 562
Chapter 1
SC Building Code
[A] 101.4.7 add 101.4.7.1

[A] 101.4.7 Existing buildings. The provisions of the South Carolina Existing Building Code shall apply to matters governing the repair, alternation, change of occupancy, addition to and relocation of existing buildings.

(101.4.7.1 Structural Concrete. In addition, assessment, repairs, and restoration of structural concrete in accordance with ACI 562 shall be permitted.
Exception:
ACI 562 shall not be used for the evaluation or design of repairs or rehabilitation of elements of seismic force-resisting system that result in strength, stiffness, or ductility of those elements different from the pre-damage condition.)

Add new referenced standard to Chapter 16 as follows:

ACI American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
Standard reference number Title Referenced in code section number
562-19 Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures
101.4.7.1

In 200 characters or less, please briefly describe the justification for this modification request.

This proposed amendment adds ACI 562: Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures, to establish minimum requirements for the evaluation, design, construction, repair, and rehabilitation of concrete structural elements in buildings for various levels of desired performance as deemed appropriate for the project. This proposal is intended for consideration where the requirements of the South Carolina State Building Code are used for existing buildings. Please see Attachment 3, which includes additional information.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Kerry Sutton	Code Advoacy Engineer	American Concrete Institute	[redacted]	[redacted]
Keith Kesner	Senior Project Manager	CVM	[redacted]	[redacted]
Dave Tepke	Senior Engineer	SKA Consulting Engineers/ACI Carolinas Chapter	[redacted]	[redacted]
John McDougall	Dir. of Business Dev.	Baker Roofing/ICRI	[redacted]	[redacted]
Steve Szoke	Code Advocacy Engineer	American Concrete Institute	[redacted]	[redacted]

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature:_____ Date: 6-29-2021

Title: Code Advocacy Engineer

ATTACHMENT 3

Reference to ACI 562
Chapter 1
SC Building Code

[A] 101.4.7; add 101.4.7.1

[A] 101.4.7 Existing buildings. The provisions of the *South Carolina Existing Building Code* shall apply to matters governing the *repair, alternation, change of occupancy, addition* to and relocation of *existing buildings.*

***(101.4.7.1 Structural Concrete**. In addition, assessment, repairs, and restoration of structural concrete in accordance with ACI 562 shall be permitted.*

***Exception**:*
ACI 562 shall not be used for the evaluation or design of repairs or rehabilitation of elements of seismic force-resisting system that result in strength, stiffness, or ductility of those elements different from the pre-damage condition.)

Add new referenced standard to Chapter 35 as follows:

ACI		American Concrete Institute 38800 Country Club Drive Farmington Hills, MI 48331
Standard reference number	Title	Referenced in code section number
562-19	*Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures*	101.4.7.1

Justification - This proposed amendment adds ACI 562: *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures*, to establish minimum requirements for the evaluation, design, construction, repair, and rehabilitation of concrete structural elements in buildings for various levels of desired performance as deemed appropriate for the project. This proposal is intended for consideration where the requirements of the South Carolina State Building Code are used for existing buildings.

In addition to improved life safety, the requirements clearly define objectives and anticipated performance for the code official, owners, designers, contractors, and installers. The proposed language is not exclusive as *Section 104.11 Compliance Alternative* of the South Carolina Building Code allows for alternative design and methods of construction. Citing this reference provides the building official a baseline for considering approval of design requirements and methods of construction. Further the baseline is beneficial for product suppliers, owners, designers, contractors and most importantly the expectation of a reasonable level of safety for the residents of the State of South Carolina.

ACI 562 complements the Building Code by providing specific direction on how to evaluate, design, and construct repairs to structural concrete and how to address the unique construction methods and problems associated with repair. This standard helps the designer assess the existing structure. The standard then provides the requirements that bridge the inconsistencies and gaps in acceptable criteria that occur from the two following situations that a designer must solve:

1. Repairing a structure according to the original building code used at the time it was built using today's construction methods and materials; or
2. Repairing a structure built according to an older building code but repaired according to the latest building code.

ACI 562 permits flexibility in evaluation, design, construction, and repair materials to provide economies while establishing expected performance for the service-life of the rehabilitation or repairs. Note that ACI 562 does not address the evaluation of lateral-force resisting systems in high seismic areas. ASCE 41 *Seismic Evaluation and Retrofit of Existing Buildings* would be the appropriate standard for this situation as stated in ACI 562.

Benefits – There are many benefits that ACI 562 provides for the designer, owner, contractor, materials providers, building code official and the citizens residing in and working in the State of South Carolina. A few of these benefits are:

- Provides a level of expectation of life safety to the public in buildings where repairs or rehabilitation is performed on concrete structural elements.
- Provides clearly defined, uniform requirements aimed at extending the service life of existing structures.
- Provides minimum requirements for efficiency, safety, and quality of concrete repair.
- Establishes clear responsibilities between owners, designers, and contractors.
- Provides building code officials with a means to evaluate rehabilitation designs.
- Provides specific repair requirements that often result in less costly repairs compared to repairs required to meet only new construction requirements.
- References standard specifications for materials used in concrete repairs that are not addressed in the code requirements for new construction such as fiber reinforced polymer (FRP) reinforcement and polymer concrete.

It is noteworthy that ACI has been publishing and making available guidance documents on evaluation and repair of concrete for more than five decades and still it is reported that more than 50% of all structural

concrete repairs are found to fail in 20 years or less and 20% of repairs to structural concrete fail within 5 years. Recognizing this as putting the public at risk, ACI Committee 562 saw the need for and developed the *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* as an ACI standard intended for adoption in building codes. ACI continues to maintain and develop additional resources to support assessment, repairs, and rehabilitation of structural concrete in accordance with ACI 562. Among these are:

- *Concrete Repair Manual: Fourth Edition 2013*
- ACI 563-18, *Specifications for Repair of Structural Concrete in Buildings*
- MNL-3(20) *Guide to the Code for Assessment, Repair, and Rehabilitation of Existing Concrete Structures*

These resources are readily available to provide greater understanding of assessment, repair, and rehabilitation of concrete structural elements. ACI MNL-3 provides case studies demonstrating the ease of use of ACI 562. Numerous technical notes, reports, guides, and specifications that provide background information and technical support are available through other organizations, such as American Society of Civil Engineers, British Research Establishment, Concrete Society, International Concrete Repair Institute, National Association of Corrosion Engineers, Post-Tensioning Institute, Society for Protective Coatings, and US Army Corps of Engineers. Many of these organizations' publications related to concrete repair can be found in the Concrete Repair Manual.

Estimated impact on life safety – Structural failure, spalling concrete, and failure of connections and anchors all pose a life safety threat to the public. This code will provide minimum requirements for assessment, repair, and rehabilitation of existing structural concrete buildings, members, systems and where applicable, nonbuilding structures, thus having a positive impact on satisfying the intent of the code.

Estimated impact on cost - The use of this referenced standard should in many cases reduce the cost of repair. Too often in the process of repair, there is insufficient information to determine acceptance criteria that is amicable to both the owner and the building code official. The result is the determination that the repair must meet the latest building code requirements for new construction. This standard increases the options available for repair and provides the acceptance criteria necessary to permit these options. A case study that illustrates this point: "ACI 562 has been referenced in expert reports for litigation cases, resulting in significantly reduced financial settlements. Denver-based J. R. Harris & Company recently used the code as a standard in several litigation reports assessing damages in existing concrete structures. As an approved consensus standard, according to American National Standards Institute (ANSI) procedures, ACI 562-13 has been accepted as the source standard to use for damage assessment and repair on individual projects by Greenwood Village and Pikes Peak Regional Building Departments in Colorado. Based on this acceptance, the consulting engineer was able to cite the code in their recommendation for structural remediation and determination of damages. In one case involving rehabilitation work on four buildings with faulty construction, J.R. Harris was able to reduce the repair costs from $12 million to $3 million, with a repair plan based on the lesser of the demand-capacity ratio based on either the original or current building code per ACI 562."

Resiliency – This proposal will increase Resiliency. Use of the ACI 562 standard helps ensure that repairs are properly performed and will satisfy an acceptable service life. Without minimum standards, repairs may not satisfy the intent of the code or the expectations of the owners or public. Proper evaluation and repairs will improve resiliency of the building. News coverage demonstrates the potential risk to life safety due to deteriorating concrete and inappropriate repairs. A news investigation of parking structures in the City of Pittsburgh, PA is an example of such coverage.

Sustainability - Reference of ACI 562 in the *South Carolina Building Code* will help improve the confidence of owners, builders, and developers regarding effective repairs, upgrades, and reuse of existing buildings in lieu of demolition and replacement. Typically, extending the life of existing buildings is substantially more sustainable than demolition and new construction. Adoption of ACI 562 by reference is needed to help facilitate efforts that conserve energy and resources while maintaining a minimum level of requirements to ensure reasonable levels of life safety, and welfare are afforded to the public.

ACI 562 is already being used in several major jurisdictions:

City of Los Angeles, California
Florida
Hawaii
New York City
Ohio

APPLIED BUILDING SCIENCES

Date: June 17, 2021

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr.
Columbia, SC 29210

Subject: Support for Adoption by Reference of ACI 562 in the South Carolina Building Code

SC Building Codes Council Members:

This letter is in support of approval of adoption by reference of ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* in the South Carolina State Building Code as presented in the code change proposal submitted by the American Concrete Institute.

Applied Building Sciences is directly involved in the design of repairs of concrete buildings. Applied Building Sciences, located in North Charleston, SC employs 24 South Carolinians and directly contributes in sales and taxes to the South Carolina economy.

We find that it is increasingly more important to establish minimum requirements for evaluation, repair, and rehabilitation of structural concrete in existing buildings undergoing alternations, additions, renovations, or changes in occupancy to safeguard the public and minimize disruption of businesses. The requirements provided in ACI 562 improve the clarity of expectations by owners, designers, contractors, officials, material providers, and other relevant parties regarding repairs and rehabilitation of structural concrete and, where appropriate, provide a benchmark for use by building officials responsible for approving other means and methods.

Helping to assure that delivery of products and services are consistent with the expectations of all parties involved saves costs associated with unnecessary direct costs and indirect costs associated with due to construction delays when there are discrepancies in the various expectations.

Adoption by reference of ACI 562 helps ensure minimum levels of life safety, health and general welfare are being provided for the public. In addition, adoption of ACI 562 will improve the confidence for building owners, developers, and officials regarding the extended life and re-use of concrete buildings. This is not only important for the specific project but also is typically more sustainable than demolition and replacement.

The use of ACI 562 provides an increased level of anticipated outcome associated with repairs and rehabilitation regarding the ability to satisfy the intent of the code and provides information that can facilitate the efforts of officials involved in the project. Where repairs meet minimum

requirements for life safety, for businesses will have increased confidence that they may be able to safely operate with less frequent interruptions while remaining in or relocating to existing buildings.

Other jurisdictions have adopted ACI 562. ACI 562 has been adopted in Hawaii, Ohio, and Florida. It is also referenced by the New York City building department and the City of Los Angeles building department.

While this proposal simply establishes a minimum level of expected performance of structural concrete for a design service life specified for the project, the change does not specify a design service life. Selection of a design service life continues to reside with the owners, owner's representatives, and where applicable, officials of the authority having jurisdiction. Also, the proposal is permissive and does not exclude other means and methods approved by the building official.

We have reviewed the code change proposal submitted by ACI and recommend the code change proposal be approved as submitted. We believe that this addition to the SC State Building Code will help ensure repairs to structural concrete will satisfy the intend of the code, result in affordable repairs with reasonable minimum levels of life safety, and support business operations with minimal disruption. The latter is important, not just for business operations, but also to maintain a consistent flow of revenue to the state resulting from these businesses.

Thank you in advance for your consideration of this recommendation.

Sincerely,
APPLIED BUILDING SCIENCES, INC.

Al Schweickhardt, PE, SE

cvm

June 11, 2021

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr.
Columbia, SC 29210

RE: Letter in Support of Proposal to Adopt ACI 562-19 by Reference

Dear SC Building Codes Council Members,

I am writing this letter in support of the proposal to allow use of ACI 562-19 into the South Carolina State Building Code as presented in the code-change proposal submitted by the American Concrete Institute. As the chair of the ACI 562 committee that developed ACI 562-19, I strongly believe that design professionals in South Carolina will benefit from the use of ACI 562-19. I have worked on numerous evaluation and repair projects in South Carolina and am familiar with the challenges of working on existing structures in an area with significant coastal exposure conditions. ACI 562-19, and the documents developed that support the standard are important tools for design professionals working on these types of structures.

When I began my career as a civil/structural engineer, it was never my intention to become the chair of a committee responsible for the development of an ACI Standard. I initially got involved with the American Concrete Institute to improve my technical knowledge related to repair and rehabilitation of existing structures. Hearing, and witnessing the variations in repair practice, I soon recognized a need for minimum standards for the repair and rehabilitation of existing concrete structures.

The ACI 562-19 Standard provides code minimum requirements for evaluation of existing structures and provisions that will improve the repair design practice, and the durability and reliability of repaired structures. These requirements have the potential to improve repair practice and decrease the likelihood of repair failure. Further, by encouraging evaluation of existing structures, use of ACI 562-19 on concrete repair projects will potentially reduce repair scope uncertainty. Repair failure and changes in scope are major sources of cost uncertainty.

In my opinion, use of ACI 562-19 will be cost-neutral or potentially reduce the total cost of concrete repairs. In examining the cost of concrete repairs, the greatest risk to the owner is having to re-repair a structure due to a repair failure. ACI 562-19 implementation has the potential to mitigate the widespread premature failure of repairs. Use of ACI 562-19 for repair also provides design professionals a standard to follow, potentially allowing existing structures to be repaired rather than replaced.

Please feel free to contact me if you have any comments regarding the material discussed in this letter.

Sincerely,

Keith Kesner

Keith Kesner, PhD, PE, SE, FACI
Chair ACI 562-19
Senior Project Manager – CVM

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King of Prussia, PA 19406

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cvmprofessional.com

CONCRETE REPAIR
Restore | Repurpose | Renew

June 13, 2021

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Code Council
110 Centerview Drive
Columbia, SC 29210

RE: Support for Adoption by Reference of ACI 562
in the South Carolina Building Code

Dear SC Building Code Council Members:

Please accept this letter of recommendation from the International Concrete Repair Institute (ICRI) Carolinas Board of Directors for approval of adoption of ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* into the South Carolina State Building Code as presented in the building code change proposal submitted by the American Concrete Institute (ACI).

We find that it is imperative to establish minimum requirements for the evaluation, repair, and rehabilitation of structural concrete in existing buildings to ensure the public's health, safety, and welfare. The ACI 562 Code provides clarity and direction to design professionals, contractors, materials manufacturers, and testing agencies. ACI 562, written and maintained by industry experts, will help the design professionals and contractors improve the design and execution of concrete repairs. Adopting ACI 562 will ultimately deliver safer structures and reduce the life cycle cost of concrete structures and minimize disruption to businesses.

ICRI is the only non-profit organization that is dedicated solely to the repair of concrete structures. ICRI has over 2500 members and 39 local chapters across the United States and Canada, with a local chapter in South Carolina. The ICRI Carolinas chapter members include South Carolina registered Professional Engineers, contractors, technicians, materials manufacturers, and material distributors. We are dedicated to improving the quality of concrete restoration, repair, and protection, through education and communication among the members and those who use their services.

Other states and jurisdictions have supported the ACI 562 code and adopted it. The ICRI Carolinas Chapter recommends that the State of South Carolina also realize the benefit of this code and adopt the proposed code change to the South Carolina State Building Code.

If you have any questions, feel free to contact us at your convenience.

Respectively submitted,
ICRI Carolinas Chapter Board

Courtney S. Green, P.E.
President, ICRI Carolinas Chapter
[redacted]

William Brickey, P.E.
Vice-President, ICRI Carolinas Chapter
[redacted]

CONCRETE REPAIR
Restore | Repurpose | Renew

June 9, 2021

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr.
Columbia, SC 29210

RE: Support for Adoption by Reference of ACI 562
in the South Carolina Building Code

SC Building Codes Council Members:

I am writing this letter as President of the International Concrete Repair Institute (ICRI) in support of approval of adoption by reference of ACI 562-19 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* into the *South Carolina Building Code* as presented in the code change proposal submitted by the American Concrete Institute (ACI).

ICRI is the only non-profit organization that is dedicated solely to the repair of concrete structures. ICRI has over 2500 members and 38 local chapters across the United States and Canada, with a local chapter serving South Carolina.

For the past 33 years, ICRI has developed and promoted best practices for concrete repair and has developed consensus document guidelines for the repair of deteriorated concrete structures. These guidelines have been published and used to result in more durable concrete repairs. It has been proven that poor performance of concrete repairs is a serious issue in the industry, and improvements are needed in concrete repair practices. Several studies indicate that **less than 50%** of concrete repairs perform satisfactorily, posing a significant danger to the health, safety and welfare of the public. This is a tremendous burden on owners, municipalities and the economy.

As a repair industry professional and the President of an organization that represents contractors, design professionals and material manufacturers that are involved in the repair of existing concrete buildings, both I and ICRI as an organization recognize the need for standards that will help design professionals and contractors improve the design, implementation and performance of concrete repairs.

The ACI 562-19 code provides minimal requirements for assessment, design and construction, and implementation of repairs and rehabilitation, including quality assurance requirements, for structural concrete **in service.** ACI 562 encourages evaluation of the structure, and a better evaluated structure is potentially less risky to repair. ACI 562 also requires consideration of durability in design, likely leading to better repair performance and less premature repair failure.

The concrete repair industry utilizes many unique repair strategies. The Code provides latitude and flexibility to the licensed design professional to prepare a design to address the specific issues encountered on an existing building while still meeting the requirements of ACI 562. The ACI 562 code will serve to unify and strengthen concrete evaluation, repair, and rehabilitation projects while accommodating the diverse and unique repair strategies and materials used in the repair industry, making existing structures safer. All of these goals are consistent with the mission of ICRI.

In examining the cost of concrete repairs, the greatest cost to the owner is having to remove and replace previous repairs to a structure due to premature repair failure. I believe the adoption of the ACI 562-19 code has the potential to significantly reduce the long-term life cycle cost of maintaining a structure. I also believe it will provide safer structures with minimal impact on initial cost of repairs.

Any standard that improves the quality of the completed repair work will be a welcome addition to the building code and the concrete repair industry. Use of ACI 562 also contributes to increased sustainability, increasing the probability that a concrete structure will be restored rather than demolished and replaced.

Many leaders in the repair industry support the ACI 562 code and other states, including Hawaii, Ohio and Florida, and jurisdictions have already adopted it. It is also referenced by the New York City building department. This code complements the *South Carolina Building Code* by providing specific direction on how to evaluate and design concrete repairs and how to address the unique construction methods and issues associated with repair. In addition, ACI 562 provides building code officials with a means to evaluate rehabilitation designs.

On behalf of the Board of Directors and members of ICRI, I recommend and hope that South Carolina will also realize the benefit of this code and adopt the code change proposal into the South Carolina Building Code.

If you have any questions regarding my comments or would like to discuss my viewpoints in more detail, please feel free to contact me at your convenience.

Thank you in advance for your time and consideration of this recommendation for support of the proposed code change.

Sincerely,

Elena Kessi
2021 ICRI President
[redacted]

NDT CORPORATION
Concrete & Geophysical Testing

NDT CORPORATION
153 Clinton Road, Sterling, MA 01564
Main: 978-563-1327 | Fax: 978-563-1340
Email: Info@NDTCorporation.com

June 10, 2021

Subject: Support for Adoption by Reference of ACI 562 in the South Carolina Construction Codes

South Carolina Construction Codes Coordinating Board Members:

This letter is in support of approval of adoption by reference of ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* in *South Carolina Construction Codes* as presented in the code change proposal submitted by the American Concrete Institute and its industry partners.

NDT Corporation performs investigations of post-tensioned concrete structures and recommends the adoption of the repair code to help standard expectations and requirements for the repair of concrete structures.

We find that it is increasingly more important to establish minimum requirements for evaluation, repair, and rehabilitation of structural concrete in existing buildings undergoing alternations, additions, renovations, or changes in occupancy to safeguard the public and minimize disruption of businesses. The requirements provided in ACI 562 improve the clarity of expectations by owners, designers, contractors, officials, material providers, and other relevant parties regarding repairs and rehabilitation of structural concrete and, where appropriate, provide a benchmark for use by building officials responsible for approving other means and methods.

Helping to assure that delivery of products and services are consistent with the expectations of all parties involved saves costs associated with unnecessary direct costs and indirect costs associated with due to construction delays when there are discrepancies in the various expectations.

Adoption by reference of ACI 562 helps ensure minimum levels of life safety, health and general welfare are being provided for the public. In addition, adoption of ACI 562 will improve the confidence for building owners, developers, and officials regarding the extended life and re-use of concrete buildings. This is not only important for the specific project but also is typically more sustainable than demolition and replacement.

The use of ACI 562 provides an increased level of anticipated outcome associated with repairs and rehabilitation regarding the ability to satisfy the intent of the code and provides information that can facilitate the efforts of officials involved in the project. Where repairs meet minimum requirements for life safety, for businesses will have increased confidence that they may be able to safely operate with less frequent interruptions while remaining in or relocating to existing buildings.

Other jurisdictions have adopted ACI 562. ACI 562 has been adopted in Hawaii, Ohio, Florida. It is also referenced by the New York City building department.

While this proposal simply establishes a minimum level of expected performance of structural concrete for a design service life specified for the project, the change does not specify a design service life. Selection of a design service life continues to reside with the owners, owner's representatives, and where applicable, officials of the authority having jurisdiction. Also, the proposal is permissive and does not exclude other means and methods approved by the building official.

We have reviewed the code change proposal submitted by ACI and recommend the code change proposal be approved as submitted. We believe that this addition to the South Carolina Construction Codes will help ensure repairs to structural concrete will satisfy the intend of the code, result in affordable repairs with reasonable minimum levels of life safety, and support business operations with minimal disruption. The latter is important, not just for business operations, but also to maintain a consistent flow of revenue to the state resulting from these businesses.

Thank you in advance for your consideration of this recommendation.

Sincerely,

Bill Horne
President
NDT Corporation

GREENSBORO, NC Corporate
7900 Triad Center Drive, Suite 200
Greensboro, NC 27409-9075

SKA CONSULTING ENGINEERS

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June 23, 2021

South Carolina Building Codes Council
110 Centerview Dr.
Columbia, SC 29210

Attention: SC Building Code Council Members

Reference: Letter of Support for Inclusion of ACI 562 into the SC Building Code

Dear SC Building Code Council Members:

Please accept this letter of endorsement for incorporation of *ACI 562-19, Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary* into the *South Carolina Building Code* by reference.

SKA Consulting Engineers, Inc. was established in 1957 with its corporate office in Greensboro, NC and satellite offices in Wilmington, Asheville, Charlotte, Charleston (SC) and Charlottesville (VA). We have experience in new structural design, structural repair and rehabilitation, strengthening, materials evaluations, corrosion mitigation and protective coatings for coastal and inland structures, both historical and contemporary. Although we are not members of the ACI 562 committee that developed this code, SKA has engineers that actively participate in committees and initiatives by professional organizations on the local and/or national level such as American Concrete Institute (ACI), Structural Engineers Association (SEA), American Society for Civil Engineers (ASCE), National Association for Corrosion Engineers / Association for Materials Protection and Performance (NACE / AMPP), Post-Tensioning Institute (PTI), and International Concrete Repair Institute (ICRI).

As structural engineers that practice regularly in the State of South Carolina, we have conducted numerous structural and durability assessments of concrete structures and have been involved in numerous structural concrete repair and rehabilitation projects throughout our history. A considerable number of these repair projects have included severe deterioration requiring shoring, immediate removal of dangerous spalling hazards, and inadequately performing previous repairs.

This code (ACI 562-19) provides useful direction tailored for structural concrete above that provided in the current Existing Building Code for practicing engineers. In our opinion, it will significantly improve the industry standard, leading to more predictable, standardized and sustainable concrete repair and rehabilitation projects. We, as a company and individually as signed below, fully support the incorporation of ACI 562-19 into the South Carolina Building Code for use on existing structures, see the benefits of incorporation and would be willing to discuss our opinions or assist with the adoption process if desired.

Stephen P. Robinson, PE
President

Aaron B. Bopp, PE
Executive VP

Timothy E. Cook, PE
Principal Engineer

David G Tepke, PE
Senior Engineer

John R. Mancuso, PE
Senior Engineer

VECTOR CONSTRUCTION INC.
2504 Main Avenue West, West Fargo, ND 58078
Main: 701-280-9697 | Fax: 701-232-2763
Fargo@Vector-Construction.com

June 10, 2021

Subject: Support for Adoption by Reference of ACI 562 in South Carolina Construction Codes

South Carolina Construction Codes Coordinating Board Members:

This letter is in support of approval of adoption by reference of ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* in *South Carolina Construction Codes* as presented in the code change proposal submitted by the American Concrete Institute and its industry partners.

As a concrete repair contractor, Vector Construction Inc. recommends the adoption of the repair code to help standardize expectations and requirements for the repair of concrete structures. This will lead to better quality and longer lasting repairs and ultimately extend the life of existing buildings.

We find that it is increasingly more important to establish minimum requirements for evaluation, repair, and rehabilitation of structural concrete in existing buildings undergoing alternations, additions, renovations, or changes in occupancy to safeguard the public and minimize disruption of businesses. The requirements provided in ACI 562 improve the clarity of expectations by owners, designers, contractors, officials, material providers, and other relevant parties regarding repairs and rehabilitation of structural concrete and, where appropriate, provide a benchmark for use by building officials responsible for approving other means and methods.

Helping to assure that delivery of products and services are consistent with the expectations of all parties involved saves costs associated with unnecessary direct costs and indirect costs associated with due to construction delays when there are discrepancies in the various expectations.

Adoption by reference of ACI 562 helps ensure minimum levels of life safety, health and general welfare are being provided for the public. In addition, adoption of ACI 562 will improve the confidence for building owners, developers, and officials regarding the extended life and re-use of concrete buildings. This is not only important for the specific project but also is typically more sustainable than demolition and replacement.

The use of ACI 562 provides an increased level of anticipated outcome associated with repairs and rehabilitation regarding the ability to satisfy the intent of the code and provides information that can facilitate the efforts of officials involved in the project. Where repairs meet minimum requirements for life safety, for businesses will have increased confidence that they may be able to safely operate with less frequent interruptions while remaining in or relocating to existing buildings.

Other jurisdictions have adopted ACI 562. ACI 562 has been adopted in Hawaii, Ohio, and Florida. It is also referenced by the New York City building department.

While this proposal simply establishes a minimum level of expected performance of structural concrete for a design service life specified for the project, the change does not specify a design service life. Selection of a design service life continues to reside with the owners, owner's representatives, and where applicable, officials of the authority having jurisdiction. Also, the proposal is permissive and does not exclude other means and methods approved by the building official.

We have reviewed the code change proposal submitted by ACI and recommend the code change proposal be approved as submitted. We believe that this addition to the South Carolina Construction Codes will help ensure repairs to structural concrete will satisfy the intend of the code, result in affordable repairs with reasonable minimum levels of life safety, and support business operations with minimal disruption. The latter is important, not just for business operations, but also to maintain a consistent flow of revenue to the state resulting from these businesses.

Thank you in advance for your consideration of this recommendation.

Sincerely,

Devon Simpson
VP US Construction Operations
Vector Construction Inc.

VECTOR CORROSION SERVICES, INC.
8413 Laurel Fair Circle, Ste 200B, Tampa, FL 33610
Main: 813-501-0500 | Fax: 813-501-1412
Info@VCServices.com

June 10, 2021

Subject: Support for Adoption by Reference of ACI 562 in South Carolina Construction Codes

South Carolina Construction Codes Coordinating Board Members:

This letter is in support of approval of adoption by reference of ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* in the *District of Columbia Construction Codes* as presented in the code change proposal submitted by the American Concrete Institute and its industry partners.

VCS performs investigations and evaluations of reinforced concrete structures. Clearer requirements for investigation are outlined in the code which will improve quality and improve the industry.

We find that it is increasingly more important to establish minimum requirements for evaluation, repair, and rehabilitation of structural concrete in existing buildings undergoing alternations, additions, renovations, or changes in occupancy to safeguard the public and minimize disruption of businesses. The requirements provided in ACI 562 improve the clarity of expectations by owners, designers, contractors, officials, material providers, and other relevant parties regarding repairs and rehabilitation of structural concrete and, where appropriate, provide a benchmark for use by building officials responsible for approving other means and methods.

Helping to assure that delivery of products and services are consistent with the expectations of all parties involved saves costs associated with unnecessary direct costs and indirect costs associated with due to construction delays when there are discrepancies in the various expectations.

Adoption by reference of ACI 562 helps ensure minimum levels of life safety, health and general welfare are being provided for the public. In addition, adoption of ACI 562 will improve the confidence for building owners, developers, and officials regarding the extended life and re-use of concrete buildings. This is not only important for the specific project but also is typically more sustainable than demolition and replacement.

The use of ACI 562 provides an increased level of anticipated outcome associated with repairs and rehabilitation regarding the ability to satisfy the intent of the code and provides information that can facilitate the efforts of officials involved in the project. Where repairs meet minimum requirements for life safety, for businesses will have increased confidence that they may be able to safely operate with less frequent interruptions while remaining in or relocating to existing buildings.

Other jurisdictions have adopted ACI 562. ACI 562 has been adopted in Hawaii, Ohio, and Florida. It is also referenced by the New York City building department.

While this proposal simply establishes a minimum level of expected performance of structural concrete for a design service life specified for the project, the change does not specify a design service life. Selection of a design service life continues to reside with the owners, owner's representatives, and where applicable, officials of the authority having jurisdiction. Also, the proposal is permissive and does not exclude other means and methods approved by the building official.

We have reviewed the code change proposal submitted by ACI and recommend the code change proposal be approved as submitted. We believe that this addition to the South Carolina Construction Codes will help ensure repairs to structural concrete will satisfy the intend of the code, result in affordable repairs with reasonable minimum levels of life safety, and support business operations with minimal disruption. The latter is important, not just for business operations, but also to maintain a consistent flow of revenue to the state resulting from these businesses.

Thank you in advance for your consideration of this recommendation.

Sincerely,

Matt Miltenberger
President
VCS Inc.

VECTOR CORROSION TECHNOLOGIES, INC.
8413 Laurel Fair Circle, Ste 200A, Tampa, FL 33610
Main: 813-830-7566 | Fax: 813-830-7565
Info@Vector-Corrosion.com

June 10, 2021

Subject: Support for Adoption by Reference of ACI 562 in South Carolina Codes

South Carolina Construction Codes Coordinating Board Members:

This letter is in support of approval of adoption by reference of ACI 562 *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures* in the *District of Columbia Construction Codes* as presented in the code change proposal submitted by the American Concrete Institute and its industry partners.

Vector Corrosion Technologies Inc. is a supplier of corrosion protection products to the concrete repair industry.

We find that it is increasingly more important to establish minimum requirements for evaluation, repair, and rehabilitation of structural concrete in existing buildings undergoing alternations, additions, renovations, or changes in occupancy to safeguard the public and minimize disruption of businesses. The requirements provided in ACI 562 improve the clarity of expectations by owners, designers, contractors, officials, material providers, and other relevant parties regarding repairs and rehabilitation of structural concrete and, where appropriate, provide a benchmark for use by building officials responsible for approving other means and methods.

Helping to assure that delivery of products and services are consistent with the expectations of all parties involved saves costs associated with unnecessary direct costs and indirect costs associated with due to construction delays when there are discrepancies in the various expectations.

Adoption by reference of ACI 562 helps ensure minimum levels of life safety, health and general welfare are being provided for the public. In addition, adoption of ACI 562 will improve the confidence for building owners, developers, and officials regarding the extended life and re-use of concrete buildings. This is not only important for the specific project but also is typically more sustainable than demolition and replacement.

The use of ACI 562 provides an increased level of anticipated outcome associated with repairs and rehabilitation regarding the ability to satisfy the intent of the code and provides information that can facilitate the efforts of officials involved in the project. Where repairs meet minimum requirements for life safety, for businesses will have increased confidence that they may be able to safely operate with less frequent interruptions while remaining in or relocating to existing buildings.

Other jurisdictions have adopted ACI 562. ACI 562 has been adopted in Hawaii, Ohio, and Florida. It is also referenced by the New York City building department.

While this proposal simply establishes a minimum level of expected performance of structural concrete for a design service life specified for the project, the change does not specify a design service life. Selection of a design service life continues to reside with the owners, owner's representatives, and where applicable, officials of the authority having jurisdiction. Also, the proposal is permissive and does not exclude other means and methods approved by the building official.

We have reviewed the code change proposal submitted by ACI and recommend the code change proposal be approved as submitted. We believe that this addition to the South Carolina Construction Codes will help ensure repairs to structural concrete will satisfy the intend of the code, result in affordable repairs with reasonable minimum levels of life safety, and support business operations with minimal disruption. The latter is important, not just for business operations, but also to maintain a consistent flow of revenue to the state resulting from these businesses.

Thank you in advance for your consideration of this recommendation.

Sincerely,

David Whitmore
President
Vector Corrosion Technologies Inc.

ATTACHMENT 2

SC Building Code
Chapter 1 - Scope and Administration
Part 1 - Scope and Application
Section 101 - General

[A] 101.4.6 Energy.

The provisions of the *International Energy Conservation Code* shall apply to all matters governing the design and construction of buildings for energy efficiency.

[A] 101.4.7 Existing buildings.

The provisions of the *South Carolina Existing Building Code* shall apply to matters governing the *repair*, *alteration*, change of occupancy, *addition* to and relocation of existing buildings.

SECTION 102
APPLICABILITY

[A] 102.1 General.

Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

[A] 102.2 Other laws.

The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

CAROLINAS CHAPTER

June 25, 2021

To: South Carolina Building Code Council
110 Centerview Drive
Columbia, South Carolina 29210

Attn: South Carolina Building Code Council Members

Dear Council Members:

Please accept this letter of endorsement from the ACI Carolinas Chapter for incorporation of ACI 562-19, *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary* into requirements of the South Carolina Building Code by reference for use on existing structures. Suitable repair and rehabilitation of existing concrete structures is imperative for the safety, environmental sustainability and economic viability of our communities. This not only includes communities in severe coastal environments susceptible to known rapid and often severe deterioration, but also other communities where typical environmental conditions can result in eventual and progressive deterioration of aging or historical structures, or where defects may be present in more contemporary structures. ACI 562 provides substantial and important information for providing industry standard repairs, supplementing the Existing Building Code and achieving the above-mentioned objectives throughout the state.

The Board of Directors for ACI Carolinas Chapter making this endorsement is comprised of Professional Engineers registered in the State of South Carolina, and those that provide services related to design, construction, repair and rehabilitation, education, materials production, and testing for concrete and other building materials in the State of South Carolina. We believe that ACI 562, written and maintained by industry experts, provides fundamental and important direction for practicing engineers in the interest of safe repair and rehabilitation of existing concrete structures.

ACI Carolinas Chapter is a separate legal entity from ACI International and was formed in 1975. Among its purposes are the active involvement in disseminating technical and educational information for advancing the knowledge-base and ability of local Engineers, Architects, Producers, Contractors, Material Suppliers, Testing Agencies, Students, Educators, Agencies and others for the safe and durable construction and repair of concrete structures.

Please let me know if we can be of further assistance.

Respectfully submitted,
ACI Carolinas Chapter

Chad B. Hensley, P.E.
President

**with*

David G. Tepke, P.E., FACI – Primary Author
Director

ACI CAROLINAS CHAPTER
3122 FINCHER FARM ROAD, SUITE 100 #548
MATTHEWS, NC 28105

American Concrete Institute
38800 Country Club Drive
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+1.248.848.3700
www.concrete.org

South Carolina Department of Labor, Licensing and Regulations
South Carolina Building Codes Council
Attention: South Carolina Building Codes Council Board Members
110 Centerview Drive
Columbia, South Carolina 29211

July 12, 2021

Re: Code Change Proposal – 2021 Building Code, Chapter 17, Section 1703

Dear SC BCC Board Members,

Please find included with this letter a copy of the code change proposal form and supporting information submitted by ACI on behalf of the ACI Carolinas Chapter, as well as other local industry supporters.

Please contact me directly if you have any questions.

Sincerely,

Kerry Sutton, PE
American Concrete Institute
Code Advocacy Engineer
[redacted]

Attachment 1 - Letter of Support from ACI Carolinas Chapter
Attachment 2 – Photocopy of applicable code section
Attachment 3 – Justification for proposed modification

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr • Columbia • SC • 29210
P.O. Box 11329 • Columbia • SC • 29211-1329
Phone: 803-896-4688 • contact.bcc@llr.sc.gov • Fax: 803-896-4814
llr.sc.gov/bcc

2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: American Concrete Institute

Address: 38800 Country Club Drive (Street) Farmington Hills (City) Michigan (State) 48187 (Zip)

Name: Kerry Sutton Title/Position: Code Advocacy Engineer

[redacted]

Please select the applicable code to be modified:

2021 International Building Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: Section 1703.1.3 Add 1703.1.3.1 and Table 1703.1

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

Chapter 17
SC Building Code
Section 1703 APPROVALS

Add new language as follows:

1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising, and evaluating tests and special inspections.

(1703.1.3.1 Concrete Testing Personnel. Individuals with current credentials as provided in Table 1703.1 or equivalent credentials approved by the building official, shall be considered qualified for sampling and testing of concrete.)

Add new Table 1703.1 Concrete Testing Personnel Qualifications

Please see Attachment 3 for proposed added Table 1703.1

In 200 characters or less, please briefly describe the justification for this modification request.

This proposal adds qualifications for conducting sampling and testing of concrete by placing specific requirements in the code. In this way the information is readily visible to the design professionals, building officials, testing agencies, inspectors, owners and contractors. It is important that qualified individuals conduct sampling and testing to ensure proper performance. Please see Attachment 2 for proposed Table 1703.1 and additional information for justification.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Kerry Sutton	Code Advocacy Engineer	American Concrete Institute	[redacted]	
Steve Szoke	Code Advocacy Engineer	American Concrete Institute		
Kenny Johnson	Vice President	Soils Consultants, Inc./ACI Carolinas Chapter		
Chad Hensely	EVP	Wayne Brothers Co./ACI Carolinas Chapter		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature:_____ Date: 7-12-2021

Title: Code Advocacy Engineer

ATTACHMENT 2

SC Building Code
Chapter 17
Section 1703

1703.1.2 Equipment.

An *approved agency* shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

1703.1.3 Personnel.

An *approved agency* shall employ experienced personnel educated in conducting, supervising and evaluating tests and *special inspections*.

1703.2 Written approval.

Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be *approved* in writing after satisfactory completion of the required tests and submission of required test reports.

1703.3 Record of approval.

For any material, appliance, equipment, system or method of construction that has been *approved*, a record of such approval, including the conditions and limitations of the approval, shall be kept on file in the *building official's* office and shall be available for public review at appropriate times.

Attachment 3

SECTION 1703
APPROVALS

Add new language as follows:

1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising, and evaluating tests and special inspections.

*(**1703.1.3.1 Concrete Testing Personnel**. Individuals with current credentials as provided in Table 1703.1 or equivalent credentials approved by the building official, shall be considered qualified for sampling and testing of concrete.)*

Add new Table 1703.1 'Concrete Testing Personnel Qualifications' as follows:

TABLE 1703.1 MINIMUM CONCRETE TESTING QUALIFICATIONS	
Testing	**Minimum Qualifications (refer to key at end of Table)**
Cast-in-place or precast concrete	
Concrete field sampling and testing	A or B
Concrete laboratory testing including strength testing	A or C
Concrete strength testing only	A or D

KEY:

A. Licensed Structural Engineer (SE) or Professional Engineer (PE) specializing in the design of building structures, or Engineer-in Training (EIT) under the direct supervision of a PE and competent in the specific task area.

B. American Concrete Institute (ACI) Concrete Field-Testing Technician with Grade 1 certification

C. American Concrete Institute (ACI) Concrete Laboratory Testing Technician with Level 1 or Level 2 certification.

D. American Concrete Institute (ACI) Strength Testing Technician.

Justification - This proposal addresses the need to better ensure proper sampling and testing of concrete. Improper testing may result in deficiencies regarding the performance of structural concrete. This is especially a concern for concrete, as it is one of the few structural materials that are not in their final form and condition until after being placed on the construction site.

It is important that qualified individuals conduct sampling and testing to ensure proper performance. Improper sampling and testing can lead to costly added testing and construction delays. In some instances, unnecessary removal and replacement of concrete. The latter may result in challenges to ensure proper structural integrity and load paths.

The SC Building Code is somewhat vague on the qualifications of personnel conducting sampling and tests, suggesting that approved agencies shall employ experienced personnel:

"1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising, and evaluating tests and special inspections"

However, in addition to the requirements of Chapter 17, Chapter 19 references ACI 318 Building Code Requirements for Structural Concrete. Chapter 26 of ACI 318 clearly specifies that field testing and laboratory technicians must be certified.

"26.12.1.1 (d) Certified field testing technicians shall perform tests on fresh concrete at the job site, prepare specimens for standard curing, prepare specimens for field curing, if required, and record the temperature of the fresh concrete when preparing specimens for strength tests." – 2019 ACI 318

"26.12.1.1 (e) Certified laboratory technicians shall perform required laboratory tests." – 2019 ACI 318

This code change proposal better allows the building official to identify individuals qualified to conduct sampling and testing.

CAROLINAS CHAPTER

7/9/2021
South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr.
Columbia, South Carolina 29210

Subject: Support for Provisions that Require Qualified Individuals for Sampling and Testing of Concrete
Code Change Proposal

SC Building Codes Council Board Members:

This letter is to recommend approval provisions that set minimum requirements for individuals engaged in the sampling and testing of concrete, to the *South Carolina Building Code,* as presented in the code change proposal initiated by the American Concrete Institute.

The ACI Carolinas Chapter represents Material Suppliers, Engineers, and Contractors involved in concrete design, construction, repair, etc. throughout the Carolinas. These firms directly and indirectly contribute substantially to the South Carolina economy.

Cast-in-place concrete is one of the few building materials formed, cured, and otherwise conditioned to create the final product on the construction site. Proper sampling and testing of cast-in-place concrete and specimens is crucial to assure quality concrete that will satisfy the intent of the building code. The code, directly or indirectly through referenced standards, establishes minimum requirements for the type and frequency of sampling, testing, and inspection. However, the code is remiss in that it does not establish or provide necessary direction to the building official regarding minimum qualifications for individuals conducting sampling and tests of structural concrete. The proposed modification to the SC Building Code identifies qualified individual to perform these duties and establishes a level of competency to aid the building official approving other persons for the purpose of sampling and testing.

Examples of specific existing referenced standard language are:

ASTM C94 *Standard Specification for Ready-Mixed Concrete* referenced in ACI 318:

> 7.2 Tests of concrete required to determine compliance with this specification shall be made by a certified technician in accordance with Practice C1077.

ASTM C1077

6.1.3 Personnel performing laboratory and field testing shall possess current certification(s) that includes a written and performance examination for each relevant standard identified

These standards are applicable to any use of structural concrete, not just buildings. Thus, the needed guidance to assist the building official in the approval process of qualified personnel is not specifically included in the standards. This proposed modification is extremely important for the building officials, owners, public and all effected entities in the building design and construction process to understand the appropriate levels of competency to perform sampling and testing.

In addition to appropriate quality assurances, qualified individuals are necessary to reduce the frequency of improper sampling and testing which results in additional direct costs related to more expensive sampling (coring) and testing and indirect costs due to construction delays.

We find that it is increasingly more important to require qualified individuals because of significant changes in and increased complexities of mix designs, use of high strength and high-performance concrete, combined with improved engineering procedures that permit more economical use and sizing of concrete elements. Sampling and testing of concrete needs to have a level of precision commensurate with the current design and construction requirements.

We have reviewed the code change proposal initiated by ACI and respectfully request that this proposal be approved for inclusion in the South Carolina Building Code.

Thank you in advance for your consideration of this recommendation.

Sincerely,

Chad B. Hensley, P.E.
President
ACI Carolinas Chapter

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331 USA
+1.248.848.3700
www.concrete.org

South Carolina Department of Labor, Licensing and Regulations
South Carolina Building Codes Council
Attention: South Carolina Building Codes Council Board Members
110 Centerview Drive
Columbia, South Carolina 29211

July 12, 2021

Re: Code Change Proposal – 2021 Building Code, Chapter 17, Section 1704

Dear SC BCC Board Members,

Please find included with this letter a copy of the code change proposal form and supporting information submitted by ACI on behalf of the ACI Carolinas Chapter, as well as other local industry supporters.

Please contact me directly if you have any questions.

Sincerely,

Kerry Sutton, PE
American Concrete Institute
Code Advocacy Engineer
[redacted]

Attachment 1 - Letter of Support from ACI Carolinas Chapter
Attachment 2 – Photocopy of applicable code section
Attachment 3 – Justification for proposed modification

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr • Columbia • SC • 29210
P.O. Box 11329 • Columbia • SC • 29211-1329
Phone: 803-896-4688 • contact.bcc@llr.sc.gov • Fax: 803-896-4814
llr.sc.gov/bcc

2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: American Concrete Institute (ACI)

Address: 38800 Country Club Drive (Street) Farmington Hills (City) Michigan (State) 48187 (Zip)

Name: Kerry Sutton, PE Title/Position: Code Advocacy Engineer

Phone No.: [redacted]

Please select the applicable code to be modified:

2021 International Building Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: Section 1704.2.1 Add new language; Add new Table 1704.2

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

Chapter 17
SC Building Code
Section 1704 Special inspector qualifications.

Add new language as follows:

1704.2.1 Special inspector qualifications. Prior to the start of the construction, the approved agencies shall provide written documentation to the building official demonstrating the competence and relevant experience or training of the special inspectors who will perform the special inspections and tests during construction. Experience or training shall be considered relevant when the documented experience or training is related in complexity to the same type of special inspection activities for projects of similar complexity and material qualities. (Individuals conducting special inspections and tests shall be qualified in accordance with Table 1704.2, or shall be otherwise approved by the building official.) These qualifications are in addition to qualifications specified in other sections of this code.

The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as the special inspector for the work designed by them, provided they qualify as special inspectors.

Add new Table 1704.2 Concrete Testing Personnel Qualifications

Please see Attachment 3 for proposed added Table 1704.2

In 200 characters or less, please briefly describe the justification for this modification request.

This proposal clarifies qualifications for conducting special inspections by placing specific requirements in the code readily visible to the design professional, owner, testing agency and building official. Please see Attachment 2 for proposed Table 1704.2 and additional information for justification.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Kerry Sutton	Code Advocacy Engineer	American Concrete Institute	[redacted]	
Steve Szoke	Code Advocacy Engineer	American Concrete Institute		
Kenny Johnson	Vice President	Soils Consultants, Inc./ACI Carolinas Chapter		
Chad Hensley	EVP Business Management	Wayne Brothers Companies		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature:_____ Date: 7/12/2021

Title: Code Advocacy Engineer

ATTACHMENT 2

SC Building Code
Chapter 17
Section 1704

1704.2.1 Special inspector qualifications.

Prior to the start of the construction, the *approved agencies* shall provide written documentation to the *building official* demonstrating the competence and relevant experience or training of the *special inspectors* who will perform the *special inspections* and tests during construction. Experience or training shall be considered to be relevant where the documented experience or training is related in complexity to the same type of *special inspection* or testing activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code.

The *registered design professional in responsible charge* and engineers of record involved in the design of the project are permitted to act as the *approved agency* and their personnel are permitted to act as special inspectors for the work designed by them, provided they qualify as special inspectors.

1704.2.2 Access for special inspection.

The construction or work for which *special inspection* or testing is required shall remain accessible and exposed for *special inspection* or testing purposes until completion of the required *special inspections* or tests.

Attachment 3

SECTION 1704
SPECIAL INSPECTIONS AND TESTS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATIONS

Add new language as follows:

1704.2.1 Special inspector qualifications. Prior to the start of the construction, the *approved agencies* shall provide written documentation to the building official demonstrating the competence and relevant experience or training of the special inspectors who will perform the special inspections and tests during construction. Experience or training shall be considered relevant when the documented experience or training is related in complexity to the same type of *special inspection* activities for projects of similar complexity and material qualities. (Individuals conducting special inspections and tests shall be qualified in accordance with Table 1704.2, or shall be otherwise approved by the building official.) These qualifications are in addition to qualifications specified in other sections of this code.

The *registered design professional in responsible charge* and engineers of record involved in the design of the project are permitted to act as the *approved agency* and their personnel are permitted to act as the special inspector for the work designed by them, provided they qualify as special inspectors.

Add new Table 1704.2 'Minimum Special Inspector Qualifications' as follows:

TABLE 1704.2 MINIMUM SPECIAL INSPECTOR QUALIFICATIONS			
Category of Testing and Inspection	Minimum Qualifications (refer to key at end of Table)		
	Shop Testing or Inspection	Field Testing or Inspection	Review Testing, Certification, & Lab Reports
1704.2.5 Inspection of Fabricators			
Pre-cast concrete	A, C or E		
Structural steel construction	C, F, G or H		
Wood construction	A		
Cold formed metal construction	A		
1705.2, 1705.10, 1705.11 & 1705.12 Steel Construction			
Verification of welding consumables, filler metals, procedure specifications, procedure qualification records and personnel performance qualification records			C or F
Nondestructive testing of welding	H	H	
Inspection of welding	C or F	C or F	

TABLE 1704.2 MINIMUM SPECIAL INSPECTOR QUALIFICATIONS	
Category of Testing and Inspection	Minimum Qualifications (refer to key at end of

	Table)		
	Shop Testing or Inspection	**Field Testing or Inspection**	**Review Testing, Certification, & Lab reports**
1705.2, 1705.10, 1705.11 & 1705.12 Steel Construction, continued			
Verification of fabricator and erector documents as listed in AISC 360, chapter N, paragraph 3.2			A or C
Material verification of weld filler materials			C, F or G
Inspection of high strength bolting and steel frame joint Details		A or C	
Inspection of embedments		A, C, F or G	
Inspection of steel elements of composite construction		A, C, F or G	
Verification of reinforcing steel, cold formed steel deck and truss materials			A, C or F
Inspection of reinforcing steel, cold formed steel deck and trusses		A or C	
1705.3 & 1705.12 Concrete			
Reinforcing placement, cast-in-place bolts, post installed anchors concrete and shotcrete placement and curing operations. Inspection of formwork for shape, location and dimensions		A, C or I	
Pre-stressing steel installation		A, C, D or E	
Erection of pre-cast concrete members		A, C or I	
Review certified mill reports			A or C
Verify use of required design mix		A, C or J	
Pre-stressed (pre-tensioned) concrete force application	A, C or E		
Post-tensioned concrete force application		A, C or D	
Review of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs		A, C, D or I	
Reinforcing steel weldability, reinforcing welding, weld filler material		C or F	
Testing of welding of reinforcing steel		H	
Post-installed concrete anchor inspection	A or M	A or M	
Shotcrete installation inspection		A or N	
1705.4 Masonry			
Verification of f'_m and f'_{AAC}		A, C or L	
Mortar joint construction, grout protection and placement, materials proportion, type/size/location of reinforcement, structural elements, anchorage, and connectors		A, C or K	
Observe preparation of masonry prisms for testing of compressive strength of masonry, f'_m and f'_{AAC}		A, C, K or L	
Inspection of welding of reinforcing steel		C or F	
Testing of welding of reinforcing steel		H	
1705.6 & 1804 Soils			
Observe site preparation, fill placement testing of compaction for compliance with the construction documents for the project		A, B, C, J or L	
Observe test bearing materials below shallow foundations for ability to achieve design bearing capacity		A, B, C, L or J (Level III)	
Review compaction testing for compliance with the construction documents for the project			A

TABLE 1704.2 MINIMUM SPECIAL INSPECTOR QUALIFICATIONS

Category of Testing and Inspection	**Minimum Qualifications (refer to key at end of Table)**

	Shop Testing or Inspection	Field Testing or Inspection	Review Testing, Certification, & Lab Reports
1705.5, 1705.10, 1705.11 & 1705.12 Wood Construction			
Observe structural panel sheathing, size of framing members, nail or staple diameter and length, number of fastener lines, and spacing of fastener lines and fasteners for compliance with construction documents for the project		A or C	
Observe temporary and permanent truss member restraint/bracing, field gluing of elements. Observe bolting, anchoring or other fastening of: shear walls, diaphragms, drag struts, braces and hold-downs		A or C	
1705.7, 1705.8, 1705.9 & 1810 Pile and Pier Foundations			
Observe installation		A, B or L	
Observe load tests		A or B	
1705.13 Sprayed Fire-Resistant Materials			
Observe surface conditions, application, average thickness and density of applied material, and cohesive/adhesive bond		A or C	
1705.14 Mastic and Intumescent Fire-Resistant Coatings			
Observe application compliance with AWCI 12-B		A or C	
1705.15 Exterior Insulation and Finish Systems			
Inspect EIFS systems		A or C	
1705.1 Special Cases			
Work of unusual or special nature		A	
1705.16 Fire-Resistant Penetrations and Joints			
See requirements of IBC Section 1705.16.1 and 1705.6.2		A	
1705.10, 1705.11 & 1705.12 Seismic and Wind Resistance			
Periodic inspection of fabrication, installation and/or anchorage of building systems and components		A	

KEY:

A. Licensed Structural Engineer (SE) or Professional Engineer (PE) specializing in the design of building structures, or graduate engineer who has passed the Fundamentals of Engineering examination, Engineer-in-Training (EIT), under the direct supervision of an SE or PE.

B. Geotechnical Engineer (GE), a licensed Professional Engineer (PE) specializing in soil mechanics and foundations.

C. International Code Council (ICC) Special Inspector Certification specific to the particular material and testing methodology applicable to each Category of Testing and Inspection listed in the table.

D. Post-tensioning Institute (PTI) Certification, Level 2, bonded or unbonded as applicable.

E. Pre-stressed Concrete Institute (PCI) Certified Inspector.

F. American Welding Society (AWS) Certified Welding Inspector (CWI) or AWS Certified Associate Welding Inspector working under the direct on-site supervision of a CWI.

G. American Welding Society (AWS)/American Institute of Steel Construction (AISC) certified structural steel inspector.

H. American Society for Nondestructive Testing (ASNT) Level II certification, or a Level III certification if previously certified as a Level II in the particular material and testing methodology applicable to each Category of Testing and Inspection listed in the table.

I. American Concrete Institute (ACI) Concrete Construction Special Inspector.

J. National Institute for Certification in Engineering Technologies (NICET) Level II or higher certification specific to the particular material and testing methodology applicable to each Category of Testing and Inspection listed in the table.

K. ICC/The Masonry Society Masonry (TMS) Construction Inspector Certification.

L. NICET Certified Engineering Technologist (CT).

M. American Concrete Institute (ACI) Post-Installed Concrete Anchor Installation Inspector

N. American Concrete Institute (ACI) Shotcrete Inspector

Justification - This proposal addresses the need to better ensure proper inspection of structural elements. Improper inspection may result in deficiencies regarding the performance of structural concrete. This is especially a concern for concrete, as it is one of the few structural materials that are not in their final form and condition until after being placed on the construction site. It is important that qualified individuals conduct inspections to ensure proper performance.

The Building Code is somewhat vague on the qualifications of personnel conducting special inspections. While it is clear that a registered design professional in responsible charge satisfies the requirements of the code, the code is somewhat vague regarding other qualified individuals approved by the building official. The language in the code is:

> 1704.3 Statement of special inspections. Where *special inspections* or tests are required by Section 1705, the *registered design professional in responsible charge* shall prepare a statement of *special inspections* in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3.
>
> Exception: The statement of *special inspections* is permitted to be prepared by a qualified person *approved* by *the building official* for construction not designed by a *registered design professional*.

The requirements of Section 1704.3 are consistent with the requirements of ACI 318:

> 26.13.1.2 Inspection of concrete construction shall be conducted by the licensed design professional responsible for the design, a person under the supervision of the licensed design professional, or a qualified inspector. The inspection shall verify conformance with construction documents throughout the various Work stages. If an inspector conducts inspection of formwork, concrete placement, reinforcement, and embedments, the inspector shall be certified.

There is no direction in either ACI 318 or the SC Building Code as to what qualifications are necessary for individuals conducting special inspections. While the State of South Carolina Special Inspections Manual (August 26, 2009) lists a limited number of specific certifications or licenses for individuals performing a stipulated test or inspection, as deemed appropriate by the Registered Design Professional, updating and incorporating the requirements directly into the building code better communicates to all parties involved (design professionals, building officials, testing agencies, inspectors, owners, and contractors) qualifications for conducting special inspections. Including a new table, Table 1704.2, in the SC State Building Code will provide additional clarification and reinforce the importance of qualification requirements for all personnel performing special inspection and testing activities.

This proposal is modelled after modification adopted by other authorities having jurisdiction. The Georgia Building Code now includes a table of minimum qualifications for certified inspectors. (See pages 10 through 12).

This proposal still allows approval of qualified individuals by the building code official where the official has confidence based on based on relevant prior experience.

CAROLINAS CHAPTER

7/9/21
South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
110 Centerview Dr.
Columbia, South Carolina 29210

Subject: Support for Provisions that Require Qualified Individuals for Structural Elements Code Change Proposal

SC Building Codes Council Board Members:

This letter is to recommend approval provisions that set minimum requirements for individuals engaged in the inspection of structural elements to the *South Carolina Building Code* as presented in the code change proposals initiated by the American Concrete Institute.

The ACI Carolinas Chapter represents material suppliers, engineers, contractors and testing firms involved in concrete design, construction, repair, and testing. These firms directly and indirectly contribute substantially to the South Carolina economy.

Cast-in-place concrete is one of the few building materials formed, cured, and otherwise conditioned to create the final product on the construction site. Proper sampling and testing of cast-in-place concrete and specimens is crucial to assure quality concrete that will satisfy the intent of the building code. The code, directly or indirectly through referenced standards, establishes minimum requirements for the type and frequency testing and inspection. However, the code is remiss in that it does not establish or provide necessary direction to the building official regarding minimum qualifications for individuals conducting tests and inspections of concrete or other structural elements. The proposed modifications to the SC Building Code identifies qualified individuals to perform these duties and establishes a level of competency to aid the building official approving other persons for the purpose of testing and inspecting.

Examples of specific existing referenced standard language testing and inspection of structural concrete are:

- ACI 318 *Code Requirements for Structural Concrete,* referenced in the SC Building Code:
  26.13.1.2 Inspection of concrete construction shall be conducted by the licensed design professional responsible for the design, a person under the supervision of the licensed design professional, or a qualified inspector.

ASTM C94 *Standard Specification for Ready-Mixed Concrete* referenced in ACI 318:
7.2 Tests of concrete required to determine compliance with this specification shall be made by a certified technician in accordance with Practice C1077.

ASTM C1077

6.1.3 Personnel performing laboratory and field testing shall possess current certification(s) that includes a written and performance examination for each relevant standard identified

These standards are applicable to any use of structural concrete, not just buildings. Thus, the needed guidance to assist the building official in the approval process of qualified personnel is not specifically included in the standards. These proposed modifications are extremely important for the building officials, owners, public and all effected entities in the building design and construction process to understand the appropriate levels of competency to perform testing and inspection.

We have reviewed the code change proposals initiated by ACI and respectfully request that this proposal be approved for inclusion in the South Carolina Building Code.

Thank you in advance for your consideration of this recommendation.

Sincerely,

Chad B. Hensley, P.E.
President
ACI Carolinas Chapter

2021 International Fire Code
South Carolina Building Codes Council
Proposed Modification Continuations from 2018

2021 Code Section: 6110.1 Temporarily out of service

Modification: Changed the section heading and modified text.

The section now states:

Containers not connected for service at customer locations. LP-gas containers at customers' locations that are not connected for service shall comply with both of the following:

1. Have LP-gas container outlets, except relief valves, closed and plugged or capped.

2. Be positioned with the relief valve in direct communication with the LP-gas container vapor space.

Reason: To reflect the original intent of the section.

Proponent: South Carolina Fire Marshal's Association

Previous Code Cycles	Previous Modification Number	Previous Code Section
IFC 2018	IFC 2018 21	6110.1
IFC 2015	IFC 2015 23	6110.1
IFC 2012	IFC 2012 23	6110.1

Comments: The 2021 IFC changed the header and removed the word "temporary" from the first sentence.

2021 IFC: 6110.1 Removed from service.

LP-gas containers whose use has been discontinued shall comply with all of the following:

1. Be disconnected from appliance piping.
2. Have LP-gas container outlets, except relief valves, closed or plugged.
3. Be positioned with the relief valve in direct communication with the LP-gas container vapor space.

7/27: Tabled for meeting on 8/19. Molly will talk to association about possibly adding language with regards to a time frame for LPG Dealers to safely remove tanks that are out of service.
8/19: Tabled for meeting on 9/28.

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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P.O. Box 11329 • Columbia • SC • 29211-1329
Phone: 803-896-4688 • contact.bcc@llr.sc.gov • Fax: 803-896-4814
llr.sc.gov/bcc

2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
- A cover letter from the local jurisdiction or professional association stating that the individual is authorized to present the proposed amendment; and verification that the proposed amendment has the support of at least a majority of the members of the board or council governing the local jurisdiction or professional association proposing the modification.
- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Fire Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 903.3.1.2 NFPA 13R sprinkler systems

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

903.3.1.2 NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with NFPA 13R where the Group R occupancy meets all of the following conditions:

1. Four stories or less above grade plane.
2. The floor level of the highest story is ~~30~~ 35 feet (~~9144~~ 10668 mm) or less above the lowest level of fire department vehicle access.
3. The floor level of the lowest story is 30 feet (9144 mm) or less below the lowest level of fire department vehicle access.

The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 of the International Building Code shall be measured from grade plane.

2021 International Building Code

[F] 903.3.1.2 NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with NFPA 13R where the Group R occupancy meets all of the following conditions:

1. Four stories or fewer above grade plane.
2. The floor level of the highest story is ~~30~~ 35 feet (~~9144~~ 10668mm) or less above the lowest level of fire department vehicle access.
3. The floor level of the lowest story is 30 feet (9144 mm) or less below the lowest level of fire department vehicle access.

The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 shall be measured from grade plan

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment revises the permitted height of the floor level of the highest story in a Group R occupancy that allows for NFPA 13R sprinklers. See attached for additional information.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:09:28 -04'00' Date: _____

Title: Executive Director

Reason:

This amendment revises the permitted maximum height from 30-feet to 35-feet for the floor level in aGroup R occupancy that will allow for a NFPA 13R sprinkler system.

NFPA 13R has been the standard for installing fire sprinkler in low-rise residential occupancies since 1989. It is scoped to multifamily buildings with a maximum of four stories, but the 2013 edition allowed these buildings to be on top of a fire-separated podium or pedestal, significantly increasing their overall allowed height to 60 feet. The 2018 editions of the IFC and IBC added requirements to address concernsregarding the fire safety of the attics in these podium-style buildings.

The amended language aims at rectifying a change to the 2021 IFC which limited the permitted height to 30 feet instead of reverting back to the pre-2013 limits of four stories total, This was done even before theeffects of the increased fire safety measures in the 2018 edition could be assessed. This amendment is acompromise between the result of last cycle and the original four-story threshold in the standard. The proposed 35-foot height is well below the 60-foot threshold of previous code editions and more realistically allows for 4-story Group R buildings with floor-to-ceiling heights of 8 to 10 feet which is common in multifamily buildings.

By increasing the permitted height, it will decrease the cost of construction that allows for a 13R sprinkler system instead of a full 13 sprinkler system, which can save over $2,100 per unit in a multi-family building(Home Innovation Research Labs, Cost Analysis of Proposed Group A Code Changes (2018-2019 ICC Code Development Cycle) – October 2018).

Costs associated with requirements for attic protection in NFPA 13 systems not only includes the additional sprinklers and piping but also costs associated with increased hydraulic demand and water supply as well as necessary freeze protection in cold and even moderate climates. Greater density and spacing of sprinklers, larger pipe diameter, sprinklers in concealed spaces, and especially, requirementsfor attic protection (with some exceptions) all contribute to the added cost. This cost increase does not include the final cost with markup to the building owner or the potential need to add a fire pump in the NFPA 13 system.

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

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- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
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- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Fire Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: D102.1 Access and loading

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

D102.1 Access and loading. Facilities, buildings or portions of buildings hereafter constructed shall be accessible to fire department apparatus by way of an approved fire apparatus access road with an asphalt, concrete or other approved driving surface capable of supporting the imposed load of fire apparatus weighing up to 75,000 pounds (34 050 kg).

Exception: Where two fire apparatus access roads are required by Section 503.1.2 or this appendix, the additional fire apparatus access road is permitted to be a driveway, pathway, court or other approved *fire lane* not accessible to public motor vehicles where designed by a registered design professional to meet the loading requirements and minimum specifications of Section 503 and this appendix, and the surface provides all-weather driving capabilities.
Marking or signs shall be provided in accordance with Section 503.3 and Section D103.6.

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment adds an exception permitting fire apparatus access roads to be a driveway, pathway or other approved surface that creates a fire lane not accessible to motor vehicles. Additional reasoning attached.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:09:03 -04'00' Date: _____

Title: Executive Director

Reason:

The current provisions of IFC Section 503, Appendix D and the definition of "fire department apparatus road" as written can be interpreted to require the construction of an actual road, street, lane or other feature potentially accessible to public vehicular traffic as well as fire department vehicles, complete withcurbs and gutters, shoulders and other components and making a complete intersection with a main road, street, highway, etc. adjacent to the development. However, for long, narrow parcels of land which can only be physically accessed along one of the narrow sides, such an interpretation may result in placing the intersection created by the second access road closer to the main access to the developmentthan is permitted by local highway or zoning ordinances.

Nothing in IFC Section 503 or Appendix D requires the additional road intersect a public way at the sameelevation as the public way, or even be a true "road" accessible to vehicular traffic. A code-compliant "road" could simply be a driveway or other pathway primarily intended for pedestrian use but constructed to meet the width, loading and other requirements of a fire apparatus access road. Such a pathway wouldnot need to form a true intersection with public streets but could simply end at a sloped or roll-up curb.
The defined term "fire lane" includes such alternatives.

The pointer to the base code requirements for fire apparatus access roads in Section 503 insures the minimum 20 foot width required per Section 503.2.1, the requirement to maintain the access road or firelane unobstructed per Section 503.4, and the requirements for gates where they are provided are all recognized and maintained, in addition to the dimensional and loading requirements within Appendix D.

The exception could reduce the cost of constructing a fire apparatus access road by allowing for the elimination of curbs and gutters or other elements associated with a road open to public vehicles. The exception would also enable more cost-effective development of sites where the only option under whichdevelopment of the site would otherwise be permitted would be providing alternative, potentially costly, means of fire protection.

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2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

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- Sufficient test information, studies, data, or other documentation that would be necessary to fully explain and justify the proposed amendment
- For local modification requests only: the physical or climatological basis for the request and the reason that the suggested change would correct the condition.
- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2021 International Fire Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: D107.1 One- or two-family dwelling residential developments

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

D107.1 One- or two-family dwelling residential developments. Where required.

Developments of one- or two-family dwellings where the number of dwelling units exceeds 30 shall be provided with two separate and approved fire apparatus access roads.

Exceptions:

1. Where there are more than 30 dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, access from two directions shall not be required.

2. ~~The number of dwelling units on a single fire apparatus access road shall not be increased unless fire apparatus access roads will connect with future development, as determined by the fire code official.~~

3. Where there are not more than 50 dwellings on a single public or private fire apparatus access road complying with Section D107.1.1.

D107.1.1 One- or two-family dwelling residential developments having less than 50 units. Where required. Developments of one- or two-family dwellings where the number of dwelling units does not exceed 50 shall be permitted to have a single approved fire apparatus access road provided all of the following requirements are met:

1. The minimum unobstructed width of the single fire apparatus access road shall be 26 feet (7925 mm) and shall otherwise comply with Section 503 and Appendix Section D103.
2. Where the fire apparatus access road exceeds 150 feet in length the width and turnaround provisions of Section D103.4 shall be met.
3. A minimum of one fire hydrant on each side of the fire apparatus access road in accordance with Section 507.5 shall be provided. The fire code official shall be permitted to require additional hydrants and hydrant spacing based on the length of the fire apparatus access road, fire flow requirements, and the distance from any point on the street or road frontage to a hydrant.
4. The development is not located in a wildland-urban interface area as defined in the International Wildland-Urban Interface Code

D107.1.2 Future Development. The number of dwelling units on a single fire apparatus access road shall not be increased unless fire apparatus access roads will connect with future development, as determined by the fire code official.

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment adds an exception raising the trigger for a second fire apparatus access road to 50 dwellings if the width is 26 feet and the development is not in a wildland-urban interface area.See attached for additional information.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 15:58:54 -04'00' Date: _____

Title: Executive Director

Reason:

One of the barriers to affordable housing frequently cited by HBA members is availability of lots for development. In some cases, the dimensions of such parcels, surrounding development, surrounding terrain or other constraints make it difficult if not impossible to provide a second fire department apparatus road, even if constructed as a sidewalk, bike path or other feature only accessible to fire trucks, not accessible to public motor vehicles. A developer may either be faced with having to sacrifice planned dwelling units or providing alternative, potentially costly, means of fire protection in order to construct the development. Either solution increases the cost of construction for the homes in the development and may render them unaffordable to homebuyers or renters with modest incomes. Or, thedeveloper may be forced to abandon the lot, meaning the IFC has improperly acted as a de facto zoningcode.

The current 30 dwelling trigger is low compared to a multifamily development can contain up to 100 units.One of the reasons for the second fire department apparatus road is in case the primary access to the development is blocked by traffic congestion or an accident. Given the average household size is between 2 and 3 people, clearly a 100-unit multifamily building is likely to generate more traffic than 30 single-family houses. Average lot size has also been shrinking, so if travel distance is a concern, it will take less time for fire equipment to traverse many current single-family developments than it may have previously. There is no reason for such a low trigger as 30 homes.

This amendment adds a new subsection that raises the trigger to 50 dwellings, or half the number of dwelling units at which a multifamily development triggers the second fire department apparatus road, if the minimum unobstructed width of the primary fire department apparatus road is increased to 26 feet in width to aid in both fire department access and evacuation, at least one hydrant be placed on each side of the road to minimize the need to run hoses across a road, obstructing both traffic and fire vehicles, andthe development is not in a wildfire-prone area.

A pointer to the dead-end turnaround requirements in Section D103.4 underscores the fact a single fireapparatus access road needs to comply with all the requirements of Section 503 and Appendix D. It is noted Table D103.4 requires the fire code official to approve the minimum width and turnarounds for dead-end access roads exceeding 750 in length.

This amendment will reduce the cost of constructing for developments of 31 to 50 houses by eliminatingthe need for the second fire apparatus access road and enabling development of slightly larger parcels.The exception would also enable more cost-effective development of sites where the only option under which development of the site would otherwise be permitted would be providing alternative, potentially costly, means of fire protection.

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2021 BUILDING CODE MODIFICATION REQUEST FORM

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- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 210.8(A) Dwelling Units

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

All 125-volt, single-phase, 15- and 20-ampere ~~through 250-volt~~ receptacles installed in the locations specified in 210.8(A)(1) through (A)(11) 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

Exception to (3): Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

4. Crawl spaces -- at or below grade level
5. Basements

Exception to (5): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Receptacles installed under the exception to 210.8(A)(5) shall not be considered as meeting the requirements of 210.52(G).

6. Kitchens -- where the receptacles are installed to serve the countertop surfaces
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

Exception to (1) through (3), (5) through (8), and (10): Listed locking support and mounting receptacles utilized in combination with compatible attachment fittings installed for the purpose of serving a ceiling luminaire or ceiling fan shall not be required to be ground-fault circuit-interrupter protected. If a general- purpose convenience receptacle is integral to the ceiling luminaire or ceiling fan, GFCI protection shall be provided.

11. Indoor damp and wet locations

In 200 characters or less, please briefly describe the justification for this modification request.

This change will require receptacles serving 250-volt appliances, such as stoves and clothes dryers, to have GFCI protection when located in bathrooms, crawl spaces, basements, laundry areas or within 6 feet of sinks, bathtubs or showers. This section previously applied to receptacles up to 125 volts only.

See attached for additional explanation.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:13:45 -04'00' Date: _____

Title: Executive Director

GFCI's for 250-Volt Receptacles

This change will require receptacles serving 250-volt appliances, such as stoves and clothes dryers, to have GFCI protection when located in bathrooms, crawl spaces, basements, laundry areas or within 6 feet of sinks,bathtubs or showers. This section previously applied to receptacles up to 125 volts only.

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. Those were already in place, and it took both to fail for the incident to occur.

The proposed requirement of GFCI protection for all 250-volt receptacles is too broad and not supported by thecommittee'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". It sounds like the tragedy was only possible with older wiring. Thisis another example that shows new construction and updated electrical systems do not constitute the same dangers as those in older homes.

The committee contends that 250-volt receptacles present similar hazards as 125-volt convenience receptaclesand this is not true. 250-volt receptacles are installed behind the range or dryer without being readily accessibleto the consumer. 250-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 250-volt receptacle is specific to that appliance.

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 210.8(A)(5) Dwelling Units

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

210.8(A)(5) Dwelling Units

(5) ~~Basements~~ Unfinished portions or areas of the basement not intended as habitable rooms

Exception to (5): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

Substantiation of actual problems in finished basements was not provided to support expanding this requirement beyond unfinished basements. Not all basements are subject to damp or wet conditions and should not be subject to the same rules as ones that are.

Expanding GFCI coverage to all areas of finished basements even where no water is to be expected is not justified. Finished areas of basements are not as hazardous as bathrooms or kitchens where people use small appliances near sinks and tubs, and no data was presented to prove otherwise. GFCI receptacles were first required in the 1987 edition of the code and expanded to the entire unfinished area of basements in the following edition. There has been no reason to expand coverage to all basements for the past 30 years, which shows there is no known benefit to requiring finished basements to be covered by GFCIs.

The committee statement claims that “basements whether finished or unfinished are prone to moisture including flooding”, but that statement best reflects conditions in older homes. As written, this would affect all new houses but only older homes which have their basement electrical systems updated or expanded. (Building codes have added requirements to address moisture in basements. Newer homes require drain tile and water proofing materials which go beyond the traditional parging mortar of the past.) If the concern is centered on the conditions of older homes, then an expansion of GFCI protection should focus on such homes and not include new construction.

In 200 characters or less, please briefly describe the justification for this modification request.

see above.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:13:11 -04'00' Date: _____

Title: Executive Director

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 210.8(F) Outdoor Outlets

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

~~210.8(F) Outdoor Outlets.~~

~~All outdoor outlets for dwellings, other than those covered in 210.8(A)(3), Exception to (3), that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less, shall have ground-fault circuit-interrupter protection for personnel.~~

~~Exception: Ground-fault circuit-interrupter protection shall not be required on lighting outlets other than those covered in 210.8(C).~~

Reason:

GFCIs are shown to be effective where a corded product is plugged into a standard "convenience" receptacle in a wet or damp location. However, this requirement is for condenser units, which are hardwired.

Data was not provided to supports expanding the use of GFCI protection on these circuits. The event used as substantiation was a result of an unqualified individual performing an electrical installation they never should have attempted. The NEC should not mandate GFCI protection for all outdoor outlets based on very specific unfortunate circumstances.

This requirement is extremely broad and will result in many unintended consequences. For example, it has not been determined if all A/C condenser units will operate on a GFCI protected circuit as sufficient testing has not been conducted. If the condenser unit is affected by high humidity and trips the GFCI, it could result in unhealthy conditions and property damage inside the home due to heat, humidity and mold growth, especially where the home is unoccupied for an extended period. There is also the potential for unwanted tripping and compatibility issues with heat pumps.

Branch circuit extensions or modifications would require the addition of GFCI protection for old condenser units, and it is not known whether the existing equipment is compatible with GFCI This requirement also applies to hardwired connections for effluent pumps and other types of lift station pumps with outdoor connections.

In 200 characters or less, please briefly describe the justification for this modification request.

See above

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 210.12 Arc-Fault Circuit-Interrupter Protection

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter protection shall be provided as required in 210.12(A), (B), and (C). The arc-fault circuit interrupter shall be installed in a readily accessible location.

(A) **Means of Protection** ~~**Dwelling Units.** All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed indwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas shall be protected by any of the means described in 210.12(A)(1) through (6):~~

(A) **Branch Circuit Extensions or Modifications** -- ~~**Dwelling Units and**~~ **Dormitory Units.** In any of the areas specified in 210.12~~(A) or~~ (B), where branch-circuit wiring is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment removes the requirement for AFCI devices for residential dwelling units, including one- and two-family homes, while leaving it in place for hotels, motels and dormitories. The requirement for AFCIs applies predominantly to new homes, although the strongest association with electrical distribution fires was observed in dwellings over 40 years old. The data did not show that AFCIs were necessary when they were first introduced into the electrical code, and it has not supported the devices' continued expansion in the code. See attached for additional reasoning.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Title: Executive Director

Reason:

This amendment retains the provisions of the 2017 NEC. AFCIs were first introduced in the 1999 edition of the National Electrical Code (NEC) with an effective date of Jan. 1, 2002. Code Making Panel 2, which had responsibility over branch circuits where AFCIs are addressed, largely based its approval of the code change on several U.S. Consumer Product Safety Commission (CPSC) reports. **However, the number of incidents cited at the time were several times higher than in later reports, and 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 were overblown.

The problems with the rationale were so evident that even electrical manufacturers spoke against the proposal. 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.

When the Home Was Built Is Important

A CPSC epidemiological study, "Residential Electrical Distribution System Fires," showed that 85% of fires of electrical origin occur in homes that are more than 20 years old. 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, 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.

The June 2015 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]." 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 39%, 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.

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. **Even as homes built to today's residential code get older, they will continue to provide protection for families through their improved safety.**

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 150,000 households are priced out of the market for a median-priced new home. 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 $838 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.

T**he total cost to home buyers to install AFCIs is over $430,000,000—per year. This is 24 times the cost of damage per year, and 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.

From 1980 to 2015 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.

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Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 230.67 Surge Protection

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

~~230.67 Surge Protection.~~

~~230.67(A) Surge-Protective Device.~~
~~All services supplying dwelling units shall be provided with a surge-protective device (SPD).~~

~~230.67(B) Location.~~
~~The SPD shall be an integral part of the service equipment or shall be located immediately adjacent thereto.~~

~~Exception: The SPD shall not be required to be located in the service equipment as required in (B) if located at each next level distribution equipment downstream toward the load.~~

~~230.67(C) Type.~~
~~The SPD shall be a Type 1 or Type 2 SPD.~~

~~230.67(D) Replacement.~~
~~Where service equipment is replaced, all of the requirements of this section shall apply.~~

Reason:

The code-making panel did not provide adequate substantiation to clearly identify a risk to equipment or safety concern to warrant this new requirement. Surge protection is currently permitted by the code and can provide a value to the end user, but it should remain up to the consumer as to whether the benefit is worth the investment. There are also potential issues with mandating currently available surge-protection products in all cases. The new language does not specify which conductors are to be protected or what the minimum short circuit current rating, the minimum nominal discharge current rating or the voltage protection rating should be. Market pressures will dictate that the lowest level of protection is installed in most cases, severely limiting the effectiveness of the devices. There is also no guarantee that the devices remain in service, further negating any possible advantages of this new mandate.

During the code development process, the code making panel rejected several public comments to expand the surge-protection requirement to all occupancies and multiple levels of protection because they lacked substantiation. Yet the committee did not provide technical data in their statement showing a problem existed that required this change.

In 200 characters or less, please briefly describe the justification for this modification request.

See above.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

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Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:12:19 -04'00' Date: _____

Title: Executive Director

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- A local jurisdiction or professional association shall not propose a modification which will amend, suspend, eliminate or supersede an existing statute, policy, rule or regulation of any state or federal agency per S.C. Regulation 8-240 (H).
- **A completed modification request must be received with all required documentation before it will be reviewed.**

☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 230.85 Emergency Disconnects.

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

~~230.85 Emergency Disconnects.~~

~~For one- and two-family dwelling units, all service conductors shall terminate in disconnecting means having a short-circuit current rating equal to or greater than the available fault current, installed in a readily accessible outdoor location. If more than one disconnect is provided, they shall be grouped. Each disconnect shall be one of the following:~~

~~(1) Service disconnects marked as follows: EMERGENCY DISCONNECT, SERVICE DISCONNECT~~

~~(2) Meter disconnects installed per 230.82(3) and marked as follows: EMERGENCY DISCONNECT, METER DISCONNECT, NOT SERVICE EQUIPMENT~~

~~(3) Other listed disconnect switches or circuit breakers on the supply side of each service disconnect that are suitable for use as service equipment and marked as follows: EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT~~

~~Markings shall comply with 110.21(B).~~

Reason:

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 and backup generators, will still provide power even after power from the electrical utility is disconnected.

In 200 characters or less, please briefly describe the justification for this modification request.

Emergency Disconnects This new section requires one- and two-family dwelling units to have a labeled disconnecting means installed in a readily accessible outdoor location. See above for reasoning.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:11:46 -04'00' Date: _____

Title: Executive Director

South Carolina Department of Labor, Licensing and Regulation
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2021 BUILDING CODE MODIFICATION REQUEST FORM

Requirements:

- All requests must be submitted by September 22, 2021.
- Each request for code modification must be submitted separately.
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(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

Select One

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 406.4(D)(4) Arc-Fault Circuit-Interrupter Protection.

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

406.4(D)(4) Arc-Fault Circuit-Interrupter Protection. Where a receptacle outlet is located in any areas specified in 210.12~~(A) or~~ (B), a replacement receptacle at this outlet shall be one of the following:

1. A listed outlet branch-circuit type arc-fault circuit-interrupter receptacle
2. A receptacle protected by a listed outlet branch-circuit type arc-fault circuit-interrupter type receptacle
3. A receptacle protected by a listed combination type arc-fault circuit-interrupter

type circuit breaker Exception No. 1: Arc-fault circuit-interrupter protection shall not be required

where all of the following apply:

1. The replacement complies with 406.4(D)(2)(b).
2. It is impracticable to provide an equipment grounding conductor as provided by 250.130 (C).
3. A listed combination type arc-fault circuit-interrupter circuit breaker is not commercially available.
4. GFCI/AFCI dual function receptacles are not commercially available.

Exception No. 2: Section 210.12(B), Exception shall not apply to replacement of receptacles.

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment removes the requirement for AFCI devices to be installed in residential dwelling units, including one- and two-family homes, when a receptacle is replaced, but does not remove it for dormitories.

See attached for more information.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:10:14 -04'00' Date: _____

Title: Executive Director

Reason:

This amendment retains the provisions of the 2017 NEC. AFCIs were first introduced in the 1999 edition of theNational Electrical Code (NEC) with an effective date of Jan. 1, 2002. Code Making Panel 2, which had responsibility over branch circuits where AFCIs are addressed, largely based its approval of the code change on several U.S. Consumer Product Safety Commission (CPSC) reports. **However, the number of incidents cited at the time were several times higher than in later reports, and where the data showed that AFCIswould have a minimal benefit, the results were ignored.** The resulting expected benefits led to AFCI requirements being included in the NEC, but were overblown.

The problems with the rationale were so evident that even electrical manufacturers spoke against the proposal.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.

When the Home Was Built Is Important

A CPSC epidemiological study, "Residential Electrical Distribution System Fires," showed that 85% of fires of electrical origin occur in homes that are more than 20 years old. This means that the bulk of thesehomes 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, 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.

The June 2015 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 40years old having the strongest association with electrical distribution fires** [emphasis added]." The median age of one- and two-family housing in the U.S. is 40 years. The share of housing units built before1970 is 39%, 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, andthose built before 1945 may still have knob and tube wiring.

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 andegress windows installed to today's codes, all of which increase the chances of surviving a fire. **Even as homes built to today's residential code get older, they will continue to provide protection for families through their improved safety.**

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 needfor 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 150,000 households are priced out of the market for a median-priced new home. 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 $838 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, becausethat housing was built to less stringent code requirements.

The total cost to home buyers to install AFCIs is over $430,000,000—per year. **This is 24 times the cost ofdamage per year**, and it is clear that requiring AFCIs in new construction will not prevent all damage. This isdue to the fact that AFCIs cannot prevent all fires and, more importantly, that electrical fires occur overwhelmingly in older houses.

From 1980 to 2015 there has been a significant drop in the number of reported fires, injuries and fatalities inthe United States. During that time period the number of fires has dropped by 50 percent and fatalities havedropped by about the same margin, even as the population increased. The decline was sharpest during the1980s 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.

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☒ Statewide Modification
☐ Local Modification: _____
(List all jurisdictions that apply.)

Association/Jurisdiction: Home Builders Association of South Carolina

Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 406.9(C) Bathtub and Shower Space

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

406.9(C) Bathtub and Shower Space.

Receptacles shall not be installed within ~~a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. The identified zone is all-encompassing and shall include the space~~ or directly over ~~the~~ a bathtub or shower stall.

Exception: In bathrooms with less than the required zone the receptacle(s) shall be permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall within the room.

Reason:

Current code prohibits receptacles from being located directly above a bathtub or in a shower stall. In addition, receptacles in bathrooms are required to be GFCI protected, so further restrictions on their location are not needed.

The submitter of the code change claimed the original language was unclear, but it was easily understood in most cases. And the new language will cause non-uniform enforcement, because it can be interpreted in different ways. Specifically, the zone where receptacles are prohibited extends 3 ft from the bathtub rim. The rim is located on all sides of a bathtub, so does the zone extend 3 ft horizontally in every direction? Note the zone is “all-encompassing” which is defined as “including everything”. This language seems to prohibit a receptacle from being installed within that zone even If there is a wall separating the end of the bathtub from the vanity. A receptacle is even more likely to be prohibited where a fixed glass panel separates the tub or shower from the area where a homeowner would like a receptacle.

Receptacles in proximity to bathtub and shower spaces is addressed for manufactured and mobile homes in the code as well, but distance restrictions are not included. The requirements for site-built homes should not be more restrictive than for manufactured and mobile homes.

In 200 characters or less, please briefly describe the justification for this modification request.

Receptacles Near Bathtub and Shower Spaces

This change prohibits all receptacles from within 3 feet of any bathtub or shower stall unless the bathroom dimensions are too small to provide that clearance.

See above for additional reasoning.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
Andy Barber	HBASC Codes Chairman	HBA of SC		

Affirmation

I certify that all information in this form, including all supplementary documents submitted with this form, are true and correct to the best of my knowledge after undertaking due diligence to determine their accuracy.

Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:11:24 -04'00' Date: _____

Title: Executive Director

South Carolina Department of Labor, Licensing and Regulation
South Carolina Building Codes Council
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Address: 625 Taylor Street (Street) Columbia (City) SC (State) 29201 (Zip)

Name: Mark Nix Title/Position: Executive Director

Phone No.: [redacted] Email Address: [redacted]

Please select the applicable code to be modified:

2020 National Electrical Code

Please list the exact code section, table, figure, or appendix to be modified, and attach a photocopy of the applicable code section: 406.12 Tamper-Resistant Receptacles

Code section as modified:
(Please strike through language being removed, and put language to be added in parentheses. Use additional pages as needed.)

406.12 Tamper-Resistant Receptacles. All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles in the areas specified in 406.12(1) through (7) shall be listed tamper-resistant receptacles.

~~(1) Dwelling units in all areas specified in 210.52 and 550.13.~~
~~(2)~~ (1) Guest rooms and guest suites of hotels and motels.
~~(3)~~ (2) Child care facilities.
~~(4)~~ (3) Preschools and elementary education facilities.
~~(5)~~ (4) Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices, and outpatient facilities.
~~(6)~~ (5) Subset of assembly occupancies described in 518.2 to include places of waiting transportation, gymnasiums, skating rinks, and auditoriums.
~~(7)~~ (6) Dormitories

Exception to (1), (2), (3), (4), (5), and (6), ~~and (7):~~ Receptacles in the following locations shall not be required to be tamper resistant:

(1) Receptacles located more than 1.7m (5-1/2 ft) above the floor.
(2) Receptacles that are part of a luminaire of appliance.
(3) A single receptacle or a duplex receptacle for two appliances located within the dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.10(A)(6), (A)(7), or (A)(8).
(4) Non-grounding receptacles used for replacements as permitted in 406.4(D)(2)(a).

200

In 200 characters or less, please briefly describe the justification for this modification request.

This amendment removes the requirement for tamper-resistant receptacles in one- and two-family homes. See attached for additional information.

Per Regulation 8-240(E)(5), please list the persons with their titles and affiliations, known at the time of submittal, who will provide testimony in favor of the amendment. Due to the possibility of virtual hearings, **all information is the table below is required** to ensure proper notification. Use additional pages as needed.

Name	Title	Affiliation	Phone Number	Email Address
Mark Nix	Executive Director	HBA of SC	[redacted]	
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Affirmation

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Signature: Mark Nix Digitally signed by Mark Nix Date: 2021.08.10 16:10:37 -04'00' Date: _____

Title: Executive Director

Reason:

This amendment retains the provisions of the 2017 NEC. This requirement was added in the 2008 edition of the National Electrical Code (NEC) and is not based on sound technical information which adequately substantiates that it will result in protecting small children from burns or injury. During the revision cycle leadingup to the 2008 edition the supporting documentation for the proposal was based on the summarization of several National Electronic Injury Surveillance System reports from 1991-2001. The NEISS system gathers its data by sampling a group of monitored hospitals for the total number of injuries treated. They then take these figures and calculate the estimated national average.

Public comment from electrical contractors criticized the conclusions drawn from the report. They stated that the report did not identify if the incidents were occurring in newer or older homes. Older homes generally havemore electrical hazards which can lead to a higher incidence of shocks.

The NEISS reports also did not provide any supporting information of where the child was located at the time the injury occurred, much less that that all incidents occurred in dwelling units or if any child safety devices were present at the time the injury occurred. There is no scientific research available which has proven tamper-resistant (TR) receptacles are more effective than other safety devices that are currently available on the market. The fact sheet, produced by the National Fire Protection Association, states that TR receptacles are preferred over plastic safety caps for the reason that the caps **may** be lost and **may** be a choking hazard for some ages. However, the Consumer Product Safety Commission (CPSC) suggests the use of outlet safety covers on their website *Childproofing Your Home- 12 Safety Devices to Protect Your Children*, and safety covers available in stores today are large enough not to constitute a choking hazard. It's fair to say CPSC would not advocate their use if there were safety concerns.

Another concern that was shared by many on the technical review committee was the amount of force that must be applied to insert plugs into the tamper-resistant device and how it will affect the elderly community. The devices are designed in a way that the springs will not open unless the prongs are properly aligned with the shutters and are receiving equal amounts of pressure. Many on the panel voiced concern that there was alack of product testing showing whether there will be an impact to the aging community's ability to use the newdevices.

Notes/additional background:

During the 2008 revision Cycle, the National Electrical Manufacturers Association submitted the proposal to require tamper-resistant receptacles in all areas of a dwelling as indicated in Article 210.52 of the NEC. Over 29 negative comments were submitted in response to the proposal and all 29 comments were rejected by thetechnical committee. The negative comments were submitted by electrical contractors, electrical inspectors, and some manufactures. Below is a list of concerns that were raised:

1. The required force to insert cords into the device may prove too much for the elderly or disabled.
2. There is no scientific data directly comparing current available safety devices to tamper-resistant receptacles to support the claim that TR are more effective and will reduce the number of accidents.
3. That the proponent should provide data listing the areas of the dwelling where injuries have occurred,thereby proving the need for tamper receptacle in areas such as attics, crawlspaces, mechanical rooms, countertops and other areas where the receptacles are normally out of reach of children.
4. At the time the proposal was approved, it was unknown whether any manufacturers were producingtamper-resistant devices that were compatible or integrated with arc-

fault and ground-fault circuit interrupters.

5. The supporting documentation submitted by the proponent clearly stated “the results of these incidentsare rarely fatal”, and that further research should be conducted along with more product development before any such mandate should be implemented.
6. That the technical committee should remember, the code is not able to protect each person, in every situations, from every conceivable harm and should not be used as a tool to differ the responsibilities ofthe parent or caregiver who should be monitoring the children.
7. That the substantiation lacked any credible justification for disallowing the use of plastic safety capsother than claiming that they could be lost or become a choking hazard.
8. Why limit tamper-resistant receptacles to dwellings? There are several other occupancies that do notrequire these devices, yet children are present and the receptacles are accessible.
9. Tamper-resistant receptacles should be an option for dwellings that children occupy and not mandatoryfor dwellings where children are not present.