

Code Review

2018 Changes to International Codes

IRC - BUILDING - ELECTRICAL - ELECTRICAL TAC

W A R N I N G

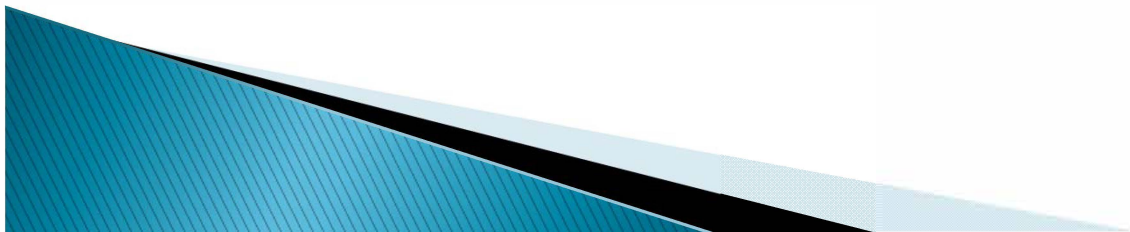
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W A R N I N G



Residential Code (IRC)–(Electrical)

RCCIWG and
Electrical Technical Advisory Committee (TAC)



**2018 International Residential Code – Electrical
Electrical TAC**

IRC-B Code Change No.	IRC-B Section	Change Summary b/t 2015 IRC-B and 2018 IRC-B	Change Summary b/t 2017 IRC-B and 2018 IRC-B	Staff comments
RB164-16	R324.3, R324.3.1, R324.4, R324.4.1, R324.5, R324.5.1, R324.5.2 (New), R907, R907.1, R907.2, R907.3, R907.4, R907.5, R909, R909.1, R909.2, R909.3	<p>Modifies Sections R324.3 “Photovoltaic systems”, R324.3.1 “Equipment listings”, R324.4 “Rooftop-mounted photovoltaic systems”, R324.4.1 “Structural requirements”, R324.4.1.1 “Roof live load”, R324.4.1.2 “Wind resistance”, R324.4.2 “Fire classification”, R324.4.3 “Roof penetrations”, R324.5 “Building-integrated photovoltaic systems”, R324.5.1 “Photovoltaic shingles”, Section R907 “ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS”. Adds new Section R324.5.2 “Fire classification”.</p> <p>Deletes Section R907.4 “Installation”, R907.5 “Photovoltaic panels and modules”, SECTION R909 “ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS”.</p> <p>Proposal RM98-13 established R324, which was intended to consolidate and organize all the requirements, with necessary section revisions and section additions, in an easily-used format that assists the user to find all the applicable requirements – fire, electrical, structural, plumbing, and mechanical – related to solar thermal and photovoltaic systems. The intent of this proposal is to address redundant code requirements and consolidate/reorganize requirements that were also included in Chapter 9 during the last code cycle. These changes will help to address any confusion regarding the installation of photovoltaic systems.</p> <p>Cost Impact: Will not increase the cost of construction. The proposal clarifies the applicable requirements for photovoltaic systems.</p>	Same as change between 2015 IRC-B and 2018 IRC-B	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

RCCIWG – Comment	TAC Action	Commission Action		TAC	Commission
Impactful (Explain) <input type="checkbox"/>	Accommodate Florida Specific Need: YES (Select Criteria) <input type="checkbox"/> NO: <input type="checkbox"/> a. <input type="checkbox"/> b. <input type="checkbox"/> c. <input type="checkbox"/> d. <input type="checkbox"/> e. <input type="checkbox"/> f. <input type="checkbox"/> Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) <input type="checkbox"/> NO: <input type="checkbox"/> a. <input type="checkbox"/> b. <input type="checkbox"/> c. <input type="checkbox"/> d. <input type="checkbox"/> e. <input type="checkbox"/> f. <input type="checkbox"/> Others (Explain):	<input type="checkbox"/> No Action Needed	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/> Overlapping provisions	<input type="checkbox"/>	<input type="checkbox"/>

RB171-16	<p>R201 (New), R327.1 (New), R327.2 (New), R327.3 (New), R327.4 (New), R327.5 (New), R327.6 (New)</p>	<p>Adds definition “BATTERY SYSTEM, STATIONARY STORAGE.” Adds new Section R327 “STATIONARY STORAGE BATTERY SYSTEMS”. Adds new standard “A review of the standard(s) proposed for inclusion in the code, UL 9470-2014, Outline of Investigation for Energy Storage Systems and Equipment.”</p> <p>An increased number of electrical energy storage systems (ESS) utilizing stationary storage batteries are appearing on the market to help meet the energy needs of society. This proposal does not mandate that ESS or stationary battery storage systems be provided, but includes basic safety requirements that should be applied if such systems are provided. The code change was further modified by the Committee. The modification limits the application to areas other than habitable spaces in dwelling units. This technology already exists and we need something to move it forward in a safe way.</p> <p>Cost Impact: Will increase the cost of construction. Any cost increases for code compliant installations will be minimal, provide the equipment is installed per NFPA 70 which will require an inverter and other code mandated criteria. Listed ESS units are currently available and the proposal allows for non- listed ESS installations also.</p>	Same as change between 2015 IRC-B and 2018 IRC-B		
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RCCIWG – Comment	TAC Action	Commission Action		TAC	Commission
Impactful (Explain) <input type="checkbox"/>	Accommodate Florida Specific Need: YES (Select Criteria) <input type="checkbox"/> NO: <input type="checkbox"/> a. <input type="checkbox"/> b. <input type="checkbox"/> c. <input type="checkbox"/> d. <input type="checkbox"/> e. <input type="checkbox"/> f. <input type="checkbox"/> Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) <input type="checkbox"/> NO: <input type="checkbox"/> a. <input type="checkbox"/> b. <input type="checkbox"/> c. <input type="checkbox"/> d. <input type="checkbox"/> e. <input type="checkbox"/> f. <input type="checkbox"/> Others (Explain):	<input type="checkbox"/> No Action Needed	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/> Overlapping provisions	<input type="checkbox"/>	<input type="checkbox"/>

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following:

a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

Code Change No: **RB164-16**

Original Proposal

Section: R324.3, R324.3.1, R324.4, R324.4.1, R324.5, R324.5.1, R324.5.2 (New), R907, R907.1, R907.2, R907.3, R907.4, R907.5, R909, R909.1, R909.2, R909.3

Proponent: Joseph Cain, SunEdison, representing Solar Energy Industries Association (SEIA) (joecainpe@aol.com); Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

Revise as follows:

R324.3 Photovoltaic systems. Photovoltaic systems shall be designed and installed in accordance with Sections R324.3.1 through ~~R324.6.1 and R324.5.2.5~~, NFPA 70. ~~Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction manufacturers installation instructions.~~

R324.3.1 Equipment listings. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

R324.4 Rooftop-mounted photovoltaic systems. Rooftop-mounted ~~photovoltaic panel systems~~ photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with ~~Section R907~~ this section.

~~R909.2~~ **R324.4.1 Structural requirements.** Rooftop-mounted ~~photovoltaic panel systems~~ photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

~~R324.4.1~~ **R324.4.1.1 Roof live load.** *No change to text.*

~~R907.2~~ **R324.4.1.2 Wind resistance.** *No change to text.*

~~R907.3~~ **R324.4.2 Fire classification.** Rooftop-mounted ~~photovoltaic panels or modules~~ photovoltaic panel systems shall have the same fire classification as the roof assembly required in Section R902.

~~R909.3~~ **R324.4.3 Installation-Roof penetrations.** ~~Rooftop-mounted photovoltaic systems shall be installed in accordance with the manufacturer's instructions.~~ Roof penetrations shall be flashed and sealed in accordance with ~~this chapter~~ Chapter 9.

R324.5 Building-integrated photovoltaic systems. Building-integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section R905.

R324.5.1 Photovoltaic shingles. Photovoltaic shingles shall comply with Section R905.16.

Add new text as follows:

R324.5.2 Fire classification. Building-integrated photovoltaic systems shall have a fire classification in accordance with Section 902.3.

Revise as follows:

SECTION R907 ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

R907.1 Rooftop-mounted photovoltaic panel systems. Rooftop-mounted photovoltaic panels or modules ~~photovoltaic panel systems~~ shall be designed and installed in accordance with ~~this section,~~ Section R324 and NFPA 70.

Delete without substitution:

~~**R907.4 Installation.** Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's instructions.~~

~~**R907.5 Photovoltaic panels and modules.** Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed instructions.~~

~~SECTION R909 ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS~~

~~**R909.1 General.** The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with this section, Section R324 and NFPA 70.~~

Reason: Proposal RM98-13 established R324, which was intended to consolidate and organize all the requirements, with necessary section revisions and section additions, in an easily-used format that assists the user to find all the applicable requirements – fire, electrical, structural, plumbing, and mechanical – related to solar thermal and photovoltaic systems. The intent of this proposal is to address redundant code requirements and consolidate/reorganize requirements that were also included in Chapter 9 during the last code cycle. These changes will help to address any confusion regarding the installation of photovoltaic systems.

The following explains the changes proposed:

1. Load requirements for rooftop mounted photovoltaic system installations are partially covered in R907.2 and R324.4.1. Relocating R907.2 to be a subsection of R324.4 consolidates the load requirements. The structural requirements (Section R909.2) are relocated to be a subsection of R324.4.
2. Fire classification requirements (Section R907.3) are for rooftop mounted photovoltaic systems, not rooftop mounted photovoltaic panels and modules, and are referenced in Section R324.4.2. The fire classification requirements for building-integrated photovoltaic systems are not linked in Section R324 or R905.16 (see new Section R324.5.2).
3. Installation in accordance with the manufacturer's installation instructions (Sections R907.4 and R907.5 and R909.3) are consolidated into Section R324.3.
4. Listed and labeled rooftop mounted panels and modules (Section 907.5) is already required by Section R324.3.1.
5. Two separate sections (Section 907 and 909) are not needed for rooftop-mounted photovoltaic panel systems.
6. Flashing of roof penetrations for rooftop-mounted photovoltaic systems (Section R909.3) is addressed in Section R324.4.3.
7. Equipment listing requirements relocated from Section R324.3 to R324.3.1 to consolidate in one location these requirements.

The ICC Building Code Action Committee (BCAC) is a co-proponent of this proposal. BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: [BCAC](#)

Cost Impact: Will not increase the cost of construction
The proposal clarifies the applicable requirements for photovoltaic systems.

**Report of Committee Action
Hearings**

Committee Action:

Approved as Submitted

Committee Reason: This proposal correlates and organizes the provisions in the code.

Assembly Action:

None

Final Action Results

RB164-16

AS

Code Change No: **RB171-16**

Original Proposal

Section: R201 (New), R327.1 (New), R327.2 (New), R327.3 (New), R327.4 (New), R327.5 (New), R327.6 (New)

Proponent: Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org); Michael O'Brian (fcac@iccsafe.org)

Add new definition as follows:

BATTERY SYSTEM, STATIONARY STORAGE. A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls, and associated electrical equipment designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

Add new text as follows:

SECTION R327
STATIONARY STORAGE BATTERY SYSTEMS

R327.1 General. Stationary storage battery systems, where provided, shall comply with the provisions of this section.

R327.2 Equipment listings. Stationary storage battery systems shall be listed and labeled for residential use in accordance with UL 9540.

Exceptions:

1. Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located a minimum five feet (1524 mm) from exterior walls, property lines and public ways.
2. Battery systems that are an integral part of an electric vehicle are allowed provided the installation complies with Section 625.48 of NFPA 70.
3. Battery systems less than 1 KWh (3.6 Mega joules).

R327.3 Installation. Stationary storage battery systems shall be installed in accordance with the manufacturer's instructions and their listing, if applicable, and shall not be installed within a dwelling unit.

R327.4 Electrical installation. Stationary storage battery systems shall be installed in accordance with NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters listed for utility interaction.

R327.5 Ventilation. Indoor installations of stationary storage battery systems that include batteries that produce hydrogen or other flammable gases during charging shall be provided with ventilation in accordance with Section M1307.4.

R327.6 Protection from impact. Stationary storage battery systems installed in a location subject to vehicle damage shall be protected by approved barriers.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:

A review of the standard(s) proposed for inclusion in the code, UL 9470-2014, *Outline of Investigation for Energy Storage Systems and Equipment*

with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

Reason: An increased number of electrical energy storage systems (ESS) utilizing stationary storage batteries are appearing on the market to help meet the energy needs of society. This proposal does not mandate that ESS or stationary battery storage systems be provided, but includes basic safety requirements that should be applied if such systems are provided.

Comments on specific requirements:

The definition provides the code user with information on battery storage systems, and is identical to a definition being proposed for the IFC/IBC.

The UL 9540, *Outline of Investigation for Energy Storage Systems and Equipment* provides construction and performance requirements for investigating and listing stationary storage battery systems. This standard evaluates their ability to operate under both normal operating conditions and under certain fault conditions.

Since ESS is a new, evolving technology, exceptions to R327.2 are provided to allow for installations of repurposed, nonlisted ESS from electric vehicles. However a five foot separation distance from exterior walls, the property line and public ways to mitigate the performance of the equipment under fault conditions, which was not determined as part of a listing investigation. Installations that utilize ESS provided integral to electric vehicles are also allowed, provided they comply with NFPA 70 requirements that specifically cover such installations.

A final exception exempts battery systems under 1 KWh, which is slightly greater than two 12V, 40 A-H batteries. This exempts common household standby power systems for tools, alarm systems, and other appliances from having to comply with this section.

The R327.4 electrical installation requirements are based on R324.3, but include an option for inverters included as part of an ESS UL 9540 listing.

R327.5 includes ventilation requirements that must be provided for indoor installations of ESS technologies, such as those including lead-acid batteries that are capable of producing hydrogen gas during charging.

The R327.6 vehicle protection requirements are based on Section M1307.3.1.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: [BCAC](#). The ICC Fire Code Action Committee (FCAC) also supports this proposal.

Cost Impact: Will increase the cost of construction

Any cost increases for code compliant installations will be minimal, provide the equipment is installed per NFPA 70 which will require an inverter and other code mandated criteria. Listed ESS units are currently available and the proposal allows for nonlisted ESS installations also.

Analysis: A review of the standard(s) proposed for inclusion in the code, UL 9570, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

Report of Committee Action Hearings

Committee Action:

Approved as Modified

Modify as follows:

R327.3 Installation. *Stationary storage battery systems* shall be installed in accordance with the manufacturer's instructions and their listing, if applicable, and shall not be installed within the habitable space of a dwelling unit.

Committee Reason: The modification limits the application to areas other than habitable spaces in dwelling units. This technology already exists and we need something to move it forward in a safe way.

Assembly Action

None

Final Action Results

RB171-16

AM