COLOR CODE INDEX: Turquoise = NEW or Modified Text by ICC in 2021 | Red = Deleted or Modified Text from 2015 to 2018 or 2021

Analysis does not include BIPV sections since BIPV is not permitted when using SolarAPP.

2015 IRC	2021 IRC	Code Analysis
SECTION 202 **DEFINITIONS** **BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.	**SECTION 202** **DEFINITIONS** **[RB] BUILDING-INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.	**Analysis:** No change between 2015 and 2021 Codes.
	[RB] BUILDING-INTEGRATED PHOTOVOLTAIC ROOF PANEL (BIPV Roof Panel). A *photovoltaic panel* that functions as a component of the building envelope.	**Analysis:** New definition added in 2018 brought forward to 2021 Code. **BIPV is not permitted when using SolarAPP.**
PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.	**[RB] PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.	**Analysis:** No change between 2015 and 2021 Codes.
PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit.	**[RB] PHOTOVOLTAIC PANEL.** A collection of *photovoltaic modules* mechanically fastened together, wired and designed to provide a field-installable unit.	**Analysis:** No change between 2015 and 2021 Codes.
PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.	**[RB] PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete *photovoltaic panels*, that converts solar radiation into electricity, including rack support systems.	**Analysis:** No change between 2015 and 2021 Codes.
PHOTOVOLTAIC SHINGLES. A *roof covering* resembling shingles that incorporates photovoltaic modules.	**[RB] PHOTOVOLTAIC SHINGLES.** A *roof covering* that resembles shingles and that incorporates *photovoltaic* modules.	**Analysis:** No change between 2015 and 2021 Codes.
	[RB] SOLAR ENERGY SYSTEM. A system that converts solar radiation to usable energy, including *photovoltaic panel systems* and *solar thermal systems*.	**Analysis:** New definition added in 2018 brought forward to 2021 Code that provides more detail on solar-energy systems.
	[MP] SOLAR THERMAL COLLECTOR. Components in a *solar thermal system* that collect and convert solar radiation to thermal energy.	**Analysis:** New definition added in 2018 brought forward to 2021 Code that provides more detail on solar-energy systems.
	[MP] SOLAR THERMAL SYSTEM. A system that converts solar radiation to thermal energy for use in heating or cooling.	**Analysis:** New definition added in 2018 brought forward to 2021 Code that provides more detail on solar-energy systems.
SECTION 324 **SOLAR ENERGY SYSTEMS** **R324.1 General.** Solar energy systems shall comply with the provisions of this section.	**SECTION 324** **SOLAR ENERGY SYSTEMS** **R324.1 General.** Solar energy systems shall comply with the provisions of this section.	**Analysis:** No change between 2015 and 2021 Codes.
R324.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Chapter 23 and the *International Fire Code*.	**R324.2 Solar thermal systems.** Solar thermal systems shall be designed and installed in accordance with Chapter 23.	**Analysis:** See changes between 2015 and 2021 Codes. Updated provisions provide an equivalency to the currently adopted Houston *Construction Code*.
R324.3 Photovoltaic systems. Photovoltaic systems shall be designed and installed in accordance with Sections R324.3.1 through R324.7.2.5 and NFPA 70ϒ. Inverters shall be *listed* and *labeled* in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.	**R324.3 Photovoltaic systems.** Photovoltaic (PV) systems shall be designed and installed in accordance with Sections R324.3.1 through R324.7.1 and the manufacturer's installation instructions. The electrical portion of solar PV systems shall be designed and installed in accordance with NFPA 70ϒ.	**Analysis:** See changes between 2015 and 2021 Codes. No major changes, updated provisions provides an equivalency to the currently adopted IRC.
R324.3.1 Equipment listings. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.	**R324.3.1 Equipment listings,** *Photovoltaic panels* and modules shall be *listed* and *labeled* in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. Inverters shall be *listed* and *labeled* in accordance with UL 1741. Systems connected to the utility grid shall use inverters *listed* for utility interaction. Mounting systems *listed* and *labeled* in accordance with UL 2703 shall be installed in accordance with the manufacturer's installation instructions and their listings.	**Analysis:** See changes between 2015 and 2021 Codes. Updated provisions provides additional UL standards for compliance and is equivalent to the current adopted IRC.
R324.4 Rooftop-mounted photovoltaic systems. Roof top mounted photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with Section R907.	**R324.4 Rooftop-mounted photovoltaic systems.** Rooftop-mounted *photovoltaic panel systems* installed on or above the roof covering shall be designed and installed in accordance with this section.	**Analysis:** See changes between 2015 and 2021 Codes. No major changes, updated provisions provides an equivalency to the currently adopted IRC.
R324.4.1 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic	**R324.4.1 Structural requirements.** Rooftop-mounted *photovoltaic panel systems* shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof on which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.	**Analysis:** This section has been restructured in IRC 2018 and brought forward to 2021. Updated provisions provide increased fire- and life-safety over current adopted Houston IRC.

Analysis based on the following Files:

2015 IBC | 2015 IRC | 2015 IFC | 2018 Codes used to find changes | 2018 IFC
2021 IBC | 2021 IRC | 2021 IFC | 2018 IRC | 2018 IBC

ϒNFPA 70 refers to National Electrical Code 2020 Edition

panel systems shall be designed for live load, LR, for the load case where the photovoltaic panel system is not present.	**R324.4.1.1 Roof load.** Portions of roof structures not covered with *photovoltaic panel systems* shall be designed for dead loads and roof loads in accordance with Sections R301.4 and R301.6. Portions of roof structures covered with *photovoltaic panel systems* shall be designed for the following load cases: 1. Dead load (including *photovoltaic panel* weight) plus snow load in accordance with Table R301.2. 2. Dead load (excluding *photovoltaic panel* weight) plus roof *live load* or snow load, whichever is greater, in accordance with Section R301.6.	
	R324.4.1.2 Wind load, Rooftop-mounted *photovoltaic panel* or *module* systems and their supports shall be designed and installed to resist the component and cladding loads specified in Table R301.2.1(1), adjusted for height and exposure in accordance with Table R301.2.1 (2).	**Analysis:** New section added in 2018 brought forward to 2021 Code. Updated provisions provide increased fire- and life-safety over current adopted Houston IRC.
	R324.4.2 Fire classification. Rooftop-mounted *photovoltaic panel systems* shall have the same fire classification as the *roof assembly* required in Section R902,	**Analysis:** New section added in 2018 brought forward to 2021 Code. Updated provisions provide increased fire- and life-safety over current adopted Houston IRC.
	R324.4.3 Roof penetrations. Roof penetrations shall be flashed and sealed in accordance with Chapter 9.	**Analysis:** New section added in 2018 brought forward to 2021 Code. Updated provisions provide increased fire- and life-safety over current adopted Houston IRC.
	R324.6 Roof access and pathways. Roof access, pathways and setback requirements shall be provided in accordance with Sections R324.6.1 through R324.6.2.1. Access and minimum spacing shall be required to provide emergency access to the roof, to provide pathways to specific areas of the roof, provide for smoke ventilation opportunity areas, and to provide emergency egress from the roof. **Exceptions:** 1. Detached, nonhabitable structures, including but not limited to detached garages, parking shade structures, carports, solar trellises and similar structures, shall not be required to provide roof access. 2. Roof access, pathways and setbacks need not be provided where the code official has determined that rooftop operations will not be employed. 3. These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (17-percent slope) or less. 4. BIPV systems *listed* in accordance with Section 690.12(B)(2) of NFPA 70ϒ, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards.	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. Exception 4 has been added in 2021 edition. Requirements provide an equivalency to currently adopted IRC. Exception 4 **SHALL NOT** be used since BIPV is not permitted when using SolarAPP.
	R324.6.1 Pathways. Not fewer than two pathways, on separate roof planes from lowest roof edge to ridge and not less than 36 inches (914 mm) wide, shall be provided on all buildings. Not fewer than one pathway shall be provided on the street or driveway side of the roof. For each roof plane with a photovoltaic array, a pathway not less than 36 inches wide (914 mm) shall be provided from the lowest roof edge to ridge on the same roof plane as the photovoltaic array, on an adjacent roof plane, or straddling the same and adjacent roof planes. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions such as vent pipes, conduit, or mechanical equipment.	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. New section added in 2018 brought forward to 2021 Code. Requirements provide an equivalency to currently adopted IRC.
	R324.6.2 Setback at ridge. For photovoltaic arrays occupying not more than 33 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge. For photovoltaic arrays	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. New section added in 2018 brought forward to 2021 Code. Requirements provide an equivalency to currently adopted IRC.

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Analysis does not include BIPV sections since BIPV is not permitted when using SolarAPP.

	occupying more than 33 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.	
	R324.6.2.1 Alternative setback at ridge. Where an automatic sprinkler system is installed within the dwelling in accordance with NFPA 13D or Section P2904, setbacks at ridges shall comply with one of the following: 1. For photovoltaic arrays occupying not more than 66 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge. 2. For photovoltaic arrays occupying more than 66 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. New section added in 2018 brought forward to 2021 Code. Requirements provide an equivalency to currently adopted IRC.
	R324.6.3 Emergency escape and rescue openings. Panels and modules installed on dwellings shall not be placed on the portion of a roof that is below an *emergency escape and rescue opening.* A pathway not less than 36 inches (914 mm) wide shall be provided to the emergency escape and rescue opening. **Exception:** BIPV systems *listed* in accordance with Section 690.12(B)(2) of NFPA 70[Y], where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards.	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. New section added in 2018 brought forward to 2021 Code. Exception has been added in 2021 edition. Requirements provide an equivalency to currently adopted IRC. Exception **SHALL NOT** be used since BIPV is not permitted when using SolarAPP.
R324.6 Ground-mounted photovoltaic systems. Ground-mounted photovoltaic systems shall be designed and installed in accordance with Section R301.	**R324.7 Ground-mounted photovoltaic systems.** Ground-mounted photovoltaic systems shall be designed and installed in accordance with Section R301.	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021.
R324.6.1 Fire separation distances. Ground-mounted photovoltaic systems shall be subject to the *fire separation distance* requirements determined by the local *jurisdiction.*	**R324.7.1 Fire separation distances.** Ground-mounted photovoltaic systems shall be subject to the *fire separation distance* requirements determined by the local *jurisdiction.*	**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021.
R324.7 Access and pathways. Roof access, pathways and spacing requirements shall be provided in accordance with Sections R324.7.1 through R324.7.2.5. **Exceptions:** 1. Detached garages and accessory structures to one-and two-family *dwellings* and *townhouses,* such as parking shade structures, carports, solar trellises and similar structures. 2. Roof access, pathways and spacing requirements need not be provided where an alternative ventilation method *approved* by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. See changes between 2015 and 2021 Codes.
R324.7.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires or signs.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.
R324.7.2 Solar photovoltaic systems. Solar photovoltaic systems shall comply with Sections R324.7.2.1 through R324.7.2.5.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.
R324.7.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet by 150 feet (45 720 by 45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet (914 mm) in width.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.

Analysis based on the following Files:

[Y] **NFPA 70 refers to National Electrical Code 2020 Edition**

2015 IBC
2021 IBC

2015 IRC
2021 IRC

2015 IFC
2021 IFC

2018 Codes used to find changes
2018 IRC

2018 IFC
2018 IBC

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R324.7.2.2 Hip roof layouts. Panels and modules installed on *dwellings* with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet (914 mm) in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof. **Exception:** These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (16.6 percent) and less.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.
R324.7.2.3 Single ridge roofs. Panels and modules installed on *dwellings* with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located. **Exception:** This requirement shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (16.6 percent) and less.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.
R324.7.2.4 Roofs with hips and valleys. Panels and modules installed on *dwellings* with roof hips or valleys shall not be located less than 18 inches (457 mm) from a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18-inch (457 mm) clearance does not apply. **Exception:** These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (16.6 percent) and less.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.
R324.7.2.5 Allowance for smoke ventilation operations. Panels and modules installed on dwellings shall not be located less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations. **Exception:** Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.		**Analysis:** Section R324.7 on IRC 2015 has been relocated to section R324.6 on IRC 2021. This section has been restructured in IRC 2018 and brought forward to 2021. This section has been deleted on IRC 2018 and 2021.
SECTION R902 **FIRE CLASSIFICATION** **R902.4 Rooftop-mounted photovoltaic panels and modules.** Rooftop-mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.	**SECTION R902** **FIRE CLASSIFICATION** **R902.4 Rooftop-mounted photovoltaic panel systems.** Rooftop-mounted *photovoltaic panel systems* installed on or above the roof covering shall be tested, *listed* and identified with a fire classification in accordance with UL 2703. Class A, B or C *photovoltaic panel systems* and modules shall be installed in *jurisdictions* designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a *lot line.*	**Analysis:** See changes between 2015 and 2021 Codes. The updated provisions contain no major changes and provide an equivalency to the currently adopted IRC.
	SECTION R905 **REQUIREMENTS FOR ROOF COVERINGS** **R905.1.1 Underlayment.** *Underlayment* for asphalt shingles, clay and concrete tile, *metal roof shingles,* mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes, *metal roof panels* and *photovoltaic shingles* shall conform to the applicable standards listed in this chapter. *Underlayment* materials required to comply with ASTM D226, D1970, D4869 and D6757 shall bear a *label* indicating compliance to the standard designation and, if applicable, type classification indicated in Table R905.1.1(1). *Underlayment* shall be applied in accordance with Table R905.1.1(2). *Underlayment* shall be attached in accordance with Table R905.1.1(3). **Exceptions:** 1. As an alternative, self-adhering polymer-modified bitumen underlayment bearing a label indicating compliance with ASTM D 1970	**Analysis:** Section R905 provides minimum requirements for roof covering. The criteria address the weather-protective barrier at the roof and, in most circumstances, a fire-resistant barrier, but it also recognizes newer products such as photovoltaic shingles. Section modified in 2018 brought forward to 2021 to include photovoltaic shingles. **This section is similar to section 1507.1.1 IBC 2021.**

Analysis based on the following Files:

2015 IBC
2021 IBC

2015 IRC
2021 IRC

2015 IFC
2021 IFC

2018 Codes used to find changes
2018 IRC

2018 IFC
2018 IBC

ϒNFPA 70 refers to National Electrical Code 2020 Edition

2. As an alternative, a minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane bearing a *label* indicating compliance with ASTM D 1970, installed in accordance with the *manufacturer's installation instructions* for the deck material, shall be applied over all joints in the roof decking. An *approved underlayment* complying with Table R905.1.1(1) for the applicable roof covering for areas where wind design is not required in accordance with Figure R301.2.1.1 shall be applied over the entire roof over the 4-inch wide (102 mm) membrane strips. Underlayment shall be applied in accordance with Table R905.1.1(2) using the application requirements for areas where wind design is not required in accordance with Figure R301.2.1.1. Underlayment shall be attached in accordance with Table R905.1.1 (3).

TABLE R905.1.1(1)
UNDERLAYMENT TYPES

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Photovoltaic shingles	R905.16	ASTM D4869 Type I, II, III or IV ASTM D6757	ASTM D4869 Type III or Type IV

Analysis: New table added in 2018 brought forward to 2021. This section shows only photovoltaic shingles. Portions of table and footnotes not shown for clarity. See base code for complete table.
This section is similar to section 1507.1.1 IBC 2021.

TABLE R905.1.1(2)
UNDERLAYMENT APPLICATON

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Photovoltaic shingles	R905.16	For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: Apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.	Underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36 inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.

Analysis: New table added in 2018 brought forward to 2021. This section shows only photovoltaic shingles. Portions of table and footnotes not shown for clarity. See base code for complete table.
This section is similar to section 1507.1.1 IBC 2021.

TABLE R905.1.1(3)
UNDERLAYMENT TYPES

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Asphalt shingles	R905.2	Fastened sufficiently to hold in place	The underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than
Clay and concrete tile	R905.3		
Photovoltaic	R905.16		

Analysis: New table added in 2018 brought forward to 2021. This section shows only photovoltaic shingles. Portions of table and footnotes not shown for clarity. See base code for complete table.
This section is similar to section 1507.1.1 IBC 2021.

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				0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch into the roof sheathing.	
SECTION R905 **REQUIREMENTS FOR ROOF COVERINGS** **R905.1.2 Ice barriers.** In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier shall be installed for asphalt shingles, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles and wood shakes. The ice barrier shall consist of not fewer than two layers of underlayment cemented together, or a self-adhering polymer-modified bitumen sheet shall be used in place of normal underlayment and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building. On roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall also be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building. **Exception:** Detached accessory structures not containing conditioned floor area.				**R905.1.2 Ice barriers.** In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2, an ice barrier shall be installed for asphalt shingles, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles and wood shakes. The ice barrier shall consist of not fewer than two layers of *underlayment* cemented together, or a self-adhering polymer-modified bitumen sheet shall be used in place of normal *underlayment* and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building. On roofs with slope equal to or greater than 8 units vertical in 12 units horizontal (67-percent slope), the ice barrier shall also be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building. **Exception:** Detached *accessory structures* not containing conditioned floor area.	**Analysis:** Section R905 provides minimum requirements for roof covering. The criteria address the weather-protective barrier at the roof and, in most circumstances, a fire-resistant barrier, but it also recognizes newer products such as photovoltaic shingles. No change between 2015 and 2021 Codes. **This section is similar to section 1507.1.2 IBC 2021.**
R905.16 Photovoltaic shingles. The installation of photovoltaic shingles shall comply with the provisions of this section, Section R324 and NFPA 70ϒ.				**R905.16 Photovoltaic shingles.** The installation of *photovoltaic shingles* shall comply with the provisions of this section, Section R324 and NFPA 70ϒ.	**Analysis:** No change between 2015 and 2021 Codes.
R905.16.1 Deck requirements. Photovoltaic shingles shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.				**R905.16.1 Deck requirements.** *Photovoltaic shingles* shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.	**Analysis:** No change between 2015 and 2021 Codes.
R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of two units vertical in 12 units horizontal (2:12) or greater.				**R905.16.2 Deck slope.** *Photovoltaic shingles* shall be used only on roof slopes of 2 units vertical in 12 units horizontal (2:12) or greater.	**Analysis:** No change between 2015 and 2021 Codes.
R905.16.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 4869 or ASTM D6757.				**R905.16.3 Underlayment.** *Underlayment* shall comply with Section R905.1.1.	**Analysis:** Section R905.16.3 on IRC 2015 has been relocated to section R905.1.1.
R905.16.4 Underlayment application. Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.				**R905.16.3.1 Ice barrier.** Where required, ice barriers shall comply with Section R905.1.2.	**Analysis:** Section R905.16.4 on IRC 2015 has been deleted and referred to section R905.1.2.
R905.16.4.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water, as designated in Table R301.2(1), an ice barrier that consists of not less than two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building. **Exception:** Detached accessory structures that contain no conditioned floor area.					**Analysis:** Section R905.16.4 on IRC 2015 has been deleted and referred to section R905.1.2.
R905.16.4.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 140 mph (63 m/s), in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with the manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the ultimate design wind speed equals or exceeds 150 mph (67 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied as required for asphalt shingles in accordance with Table R905.1.1(2). Underlayment					**Analysis:** Section R905.16.4 on IRC 2015 has been deleted and referred to section R905.1.2.

Analysis based on the following Files:

ϒ**NFPA 70 refers to National Electrical Code 2020 Edition**

2015 IBC | 2021 IBC | 2015 IRC | 2021 IRC | 2015 IFC | 2021 IFC | 2018 Codes used to find changes | 2018 IRC | 2018 IFC | 2018 IBC

COLOR CODE INDEX: **Turquoise** = NEW or Modified Text by ICC in 2021 **Red** = Deleted or Modified Text from 2015 to 2018 or 2021

Analysis does not include BIPV sections since BIPV is not permitted when using SolarAPP.

shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25 mm) with a thickness of not less than 32-gage sheet metal. The cap-nail shank shall be not less than 12 gage (0.105 inches) with a length to penetrate through the roof sheathing or not less than 3/4 inch (19 mm) into the roof sheathing. **Exception:** As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.		
R905.16.5 Material standards. Photovoltaic shingles shall be listed and labeled in accordance with UL 1703.	**R905.16.4 Material standards.** *Photovoltaic shingles* shall be *listed* and *labeled* in accordance with UL 7103 or with both UL 61730-1 and UL 61730-2.	**Analysis:** See changes between 2015 and 2021 Codes. Updated provisions provides additional UL standards for compliance and is equivalent to the current adopted IRC.
R905.16.6 Attachment. Photovoltaic shingles shall be attached in accordance with the manufacturer's installation instructions.	**R905.16.5 Attachment.** *Photovoltaic shingles* shall be attached in accordance with the manufacturer's installation instructions.	**Analysis:** No change between 2015 and 2021 Codes.
R905.16.7 Wind resistance. Photovoltaic shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic shingles shall comply with the classification requirements of Table R905.2.4.1 for the appropriate maximum basic wind speed. Photovoltaic shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1.	**R905.16.6 Wind resistance.** *Photovoltaic shingles* shall comply with the classification requirements of Table R905.16.6 for the appropriate maximum basic wind speed.	**Analysis:** See changes between 2015 and 2021 Codes. Wind resistance requirements are now contained in the 2021 IRC and show equivalency to the currently adopted IRC.
	TABLE R905,16.6 **CLASSIFICATION OF PHOTOVOLTAIC SHINGLES** MAXIMUM ULTIMATE DESIGN WIND SPEED, V_{ult} FROM FIGURE R301.2(2) (mph) / MAXIMUM BASIC WIND SPEED, V_{asd}, FROM TABLE R301.2.1.3 (mph) / UL 7103 SHINGLE CLASSIFICATION 110 / 85 / A, D or F 116 / 90 / A, D or F 129 / 100 / A, D or F 142 / 110 / F 155 / 120 / F 168 / 130 / F 181 / 140 / F 194 / 150 / F For SI: I mile per hour= 1.609 kph	**Analysis:** New table added in 2021 that provides requirements for photovoltaic shingles and show equivalency to the currently adopted IRC.
SECTION R907 **ROOFTOP-MOUNTED PHOTOVOLTAIC SYSTEMS** **R907.1 Rooftop-mounted photovoltaic systems.** Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section R324 and NFPA 70[Y].	**SECTION R907** **ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS** **R907.1 Rooftop-mounted photovoltaic panel systems.** Rooftop-mounted *photovoltaic panel systems* shall be designed and installed in accordance with Section R324 and NFPA 70[Y].	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
R907.2 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).		**Analysis:** This section has been deleted on IRC 2018 and 2021.
R907.3 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.		**Analysis:** This section has been deleted on IRC 2018 and 2021.
R907.4 Installation. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's instructions.		**Analysis:** This section has been deleted on IRC 2018 and 2021.
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.		**Analysis:** This section has been deleted on IRC 2018 and 2021.
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[Y].		**Analysis:** This section has been deleted on IRC 2018 and 2021.

Analysis based on the following Files: 2015 IBC, 2021 IBC | 2015 IRC, 2021 IRC | 2015 IFC, 2021 IFC | 2018 Codes used to find changes, 2018 IRC | 2018 IFC, 2018 IBC

[Y] NFPA 70 refers to National Electrical Code 2020 Edition

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Analysis does not include BIPV sections since BIPV is not permitted when using SolarAPP.

R909.2 Structural requirements. Rooftop-mounted 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.		**Analysis:** This section has been deleted on IRC 2018 and 2021.
R909.3 Installation. 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.		**Analysis:** This section has been deleted on IRC 2018 and 2021.
APPENDIX U **SOLAR-READY PROVISIONS—DETACHED ONE- AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE FAMILY DWELLINGS (TOWNHOUSES)**	**APPENDIX AT [RE]** **SOLAR-READY PROVISIONS-DETACHED ONE- AND TWO-FAMILY DWELLINGS AND TOWNHOUSES**	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)	*The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.* **User note:** ***About this appendix:*** *Harnessing the heat or radiation from the sun's rays is a method to reduce the energy consumption of a building. Although Appendix AT does not require solar systems to be installed for a building, it does require the space(s) for installing such systems, providing pathways for connections and requiring adequate structural capacity of roof systems to support solar systems.* *Section numbers in parenthesis are those in Appendix RB of the residential provisions of the* International Energy Conservation Code.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
SECTION U101 **SCOPE** **U101.1 General.** These provisions shall be applicable for new construction where solar-ready provisions are required.	**SECTION AT101 (RB101)** **SCOPE** **AT101.1 (RB101.1) General.** These provisions shall be applicable for new construction where solar-ready provisions are required.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
SECTION U102 **GENERAL DEFINITIONS** **SOLAR-READY ZONE.** A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.	**SECTION AT102 (RB102)** **GENERAL DEFINITION** **AT102.1 (RB102.1) General.** The following term shall, for the purpose of this appendix, have the meaning shown herein. **SOLAR-READY ZONE.** A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
SECTION U103 **SOLAR-READY ZONE** **U103.1 General.** New detached one- and two-family dwellings, and multiple single-family dwellings (townhouses) with not less than 600 square feet (55.74 m²) of roof area oriented between 110 degrees and 270 degrees of true north shall comply with sections U103.2 through U103.8. **Exceptions:** 1. New residential buildings with a permanently installed on-site renewable energy system. 2. A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually.	**SECTION AT103 (RB103)** **SOLAR-READY ZONE** **AT103.1 (RB103.2) General.** New detached one- and two family dwellings, and townhouses with not less than 600 square feet (55.74 m²) of roof area oriented between 110 degrees and 270 degrees of true north, shall comply with Sections AT103.2 through AT103.10. **Exceptions:** 1. New residential buildings with a permanently installed on-site renewable energy system. 2. A building where all areas of the roof that would otherwise meet the requirements of Section AT103 are in full or partial shade for more than 70 percent of daylight hours annually.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
U103.2 Construction document requirements for solar ready zone. Construction documents shall indicate the solar ready *zone*.	**AT103.2 (RB103.2) Construction document requirements for solar-ready zone.** *Construction documents* shall indicate the solar-ready zone.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
U103.3 Solar-ready zone area. The total solar-ready *zone* area shall be not less than 300 square feet (27.87 m²) exclusive of mandatory access or set back areas as required by the *International Fire Code*. New multiple single-family dwellings	**AT103.3 (RB103.3) Solar-ready zone area.** The total solar-ready zone area shall be not less than 300 square feet (27.87 m²) exclusive of mandatory access or setback areas as required by the *International Fire Code.* New town-houses three stories or	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.

{townhouses} three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet (185.8 m²) per dwelling shall have a solar-ready *zone* area of not less than 150 square feet (13.94 m²). The solar-ready *zone* shall be composed of areas not less than 5 feet (1.52 m) in width and not less than 80 square feet (7.44 m²) exclusive of access or set back areas as required by the *International Fire Code*.	less in height above *grade plane* and with a total floor area less than or equal to 2,000 square feet (185.8 m²) per dwelling shall have a solar-ready zone area of not less than 150 square feet (13.94 m²). The solar-ready zone shall be composed of areas not less than 5 feet (1524mm) in width and not less than 80 square feet (7.44 m²) exclusive of access or set-back areas as required by the *International Fire Code.*	
U103.4 Obstructions. Solar-ready *zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment.	**AT103.4 (RB103.4) Obstructions.** Solar-ready zones shall be free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
	AT103.5 (RB103.5) Shading. The solar-ready zone shall be set back from any existing or new, permanently affixed object on the building or site that is located south, east or west of the solar zone a distance not less than two times the object's height above the nearest point on the roof surface. Such objects include, but are not limited to, taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings.	**Analysis:** New section added in 2018 brought forward to 2021 that provides increased protection in solar-energy systems.
	AT103.6 (RB103.6) Capped roof penetration sleeve, A capped roof penetration sleeve shall be provided adjacent to a solar-ready zone located on a roof slope of not greater than 1 unit vertical in 12 units horizontal (8-percent slope). The capped roof penetration sleeve shall be sized to accommodate the future photovoltaic system conduit, but shall have an inside diameter of not less than 1¼ inches (32 mm).	**Analysis:** New section added in 2018 brought forward to 2021 that provides increased protection in solar-energy systems.
U103.5 Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.	**AT103.7 (RB103.7) Roof load documentation.** The structural design loads for roof dead load and roof *live load* shall be clearly indicated on the *construction documents.*	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
U103.6 Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the solar-ready *zone* to the electrical service panel or service hot water system.	**AT103.8 (RB103.8) Interconnection pathway.** *Construction documents* shall indicate pathways for routing of conduit or plumbing from the solar-ready zone to the electrical service panel or service hot water system.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
U103.7 Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric.” The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.	**AT103.9 (RB103.9) Electrical service reserved space.** The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be *labeled* "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.
U103.8 Construction documentation certificate. A permanent certificate, indicating the solar-ready *zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.	**AT103.10 (RB103.10) Construction documentation certificate.** A permanent certificate, indicating the solar ready zone and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or *registered design professional.*	**Analysis:** See changes between 2015 and 2021 Codes. Contains minor changes and shows equivalency to currently adopted IRC.