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Significant changes in the 2021 Virginia Residential Code & the 2020 National Electrical Code

HENRICO COUNTY

Department of Building Construction and Inspections



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Virginia Residential Code

- The Virginia Residential Code (VRC) combines the 2018 International Residential Code (IRC) and the 2018 Virginia amendments in one document
- The VRC is published by the International Code Council and is available from www.ICCsafe.org



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Chapter 1

New Definitions

NEC 2020 Article 100: Accessible (as applied to equipment)

- The definition of *Accessible* (as applied to equipment) is specified as "**capable of being reached for operation, renewal, and inspection.**"



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Chapter 1

New Definitions

2020 NEC Article 100: Accessory Dwelling Unit (ADU)

- A dwelling unit, on the same lot, that is accessory to the primary residence with separate living, sleeping, eating, cooking and sanitation
- May share living space, utilities
- Return air within two-family dwellings are permitted to discharge into either dwelling unit (M1602.2.7)
- Even though it may share a means of egress with the primary dwelling, an ADU must have a code compliant means of egress
- For one or more occupants



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Chapter 1

New Definitions

2020 NEC Article 100: Habitable Room

- A room in a building for living, sleeping, eating, or cooking, but excluding bathrooms, toilet rooms, closets, hallways, storage or utility spaces, and similar areas.



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Chapter 1

New Definitions

2020 NEC Article 100: Reconditioned

- Electromechanical systems, equipment, apparatus, or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis.
- **Informational Note:** The term reconditioned is frequently referred to as rebuilt, refurbished, or remanufactured.



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Chapter 2

Branch Circuits

2020 NEC Article 210.8: Measurements for GFCI Protection (Revision)

- Revision removes "door" and "doorway" as items the supply cord of an appliance connected to the receptacle should not pass through in order to satisfy measurement requirements for GFCI protection.
- When determining if GFCI protection for personnel is required and a measurement is involved, the distance from the receptacle is required to be measured as the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or the shortest path without passing through a window.



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Chapter 2

Branch Circuits

2020 NEC Article 210.8 (A): Dwelling Unit GFCI Protection (Revision)

- GFCI protection for personnel at dwelling units has been expanded to include all 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts to ground in the specific locations specified at 210.8 (A) (1) through (A) (11) (bathrooms, kitchens, etc.).
- The list of required locations now includes 11 items (was 10) - adding "Indoor damp and wet locations."



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2020 NEC Article 210.8 (A) (5) GFCI Protection for Basements (Revision)

Chapter 2

Branch Circuits

- GFCI protection is now required for **ALL** dwelling unit basements (not just unfinished portions of basements.)
- All 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in any and all dwelling unit basements require ground-fault-interrupter (GFCI) protection for personnel.



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2020 NEC Article 210.8 (D): GFCI Protection for Specific Appliances (New)

Chapter 2

Branch Circuits

- New text at new 210.8 (D) titled "specific appliances" and the move of the GFCI requirement for dishwashers correlates the requirements found in 422.5 (B) (Type and location for GFCI protection for appliances) and refers to the list of appliances requiring GFCI protection in 422.5 (A).
- Dishwasher GFCI protection was moved from 210.8 (D) to 422.5 (A) (7)
- Vending machine GFCI protection cannot be factory installed within the appliance.



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Chapter 2

Branch Circuits

2020 NEC Article 210.8 (E): GFCI Protection for Equipment Requiring Servicing (New)

- GFCI protection is now required for the receptacles required by 210.63 for HVAC equipment, indoor service equipment, and indoor equipment requiring dedicated equipment space.



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Chapter 2

Branch Circuits

2020 NEC Article 210.8 (F) & VRC E3902.17: VA Deletes Section 210.8 (F) / VRC 2018 E3902.17 in its Entirety (GFCI Protection for Outdoor Outlets) (Deletion VA)

- Currently, separate standards for the tripping current of GFCI devices and the allowable leakage current of air conditioner condenser units **creates an incompatibility issue.**
- If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm.
- **VA Proposals RE2701.1.1-21 and RE3902.17-21**



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Chapter 2

Branch Circuits

2020 NEC Article:210.11 (C) (3) Bathroom Branch Circuit(s) (Revision)

- The one 20-amp branch circuit traditionally required by NEC Section 210.11 (C) (3) to feed only receptacles in dwelling unit bathroom(s) is now restricted to feeding **only countertop receptacles** in those same bathroom(s).
- The receptacles permitted on this newly defined branch circuit include any countertop receptacles required to be within 3 feet of the bathroom's sink basin and any other receptacle(s) installed to serve countertops or similar work surface in these bathroom(s). Feeding receptacles located elsewhere in the bathroom with the branch circuit required in Section 210.11 (C) (3), is no longer permitted
- As long as at least one 20-amp branch circuit supplies the bathroom receptacle(s) required by 210.52 (D) and any countertop and similar work surface receptacle outlets, any other installed branch circuit supplying receptacles not serving the countertop can be 15 or 20-amp rated.



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Chapter 2

Branch Circuits

2020 NEC Article: 210.11 (C) (4) Garage Branch Circuits(s) (Revision)

- Garage receptacle outlet 120-volt, 20-ampere branch circuits are only required for the receptacles required by 210.52 (G) (1) for attached garages and in detached garages with electric power.



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Chapter 2

Branch Circuits

2020 NEC Article 210.52 (C): Countertops and Work Surfaces (Revision)

- Change clarifies that the receptacle outlets installed for countertop or work surfaces [210.52 (C)] are not permitted to satisfy the requirement for receptacle outlet placement (wall spacing) as provided in 210.52 (A).



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2020 NEC Article 210.52 (C) (2): Island and Peninsular Countertop and Work Surfaces (Revision)

Chapter 2

Branch Circuits

- Revision creates two separate List items for wall space, and island and peninsular countertops and work surfaces.
- For island and peninsular countertop and work surfaces, the horizontal measurement was changed to a square foot calculation to determine the number of receptacles required.



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Chapter 2

Feeders

2020 NEC Article 215.9: GFCI Protection for Feeders (Revision / Deletion)

- Revision provides correlation with GFCI protection requirements in 210.8 by removing the existing limitations of a feeder to provide GFCI protection to only 15 and 20-ampere receptacle branch circuits.



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Chapter 2

Branch-Circuit: Feeder, and Service Load Calculations.

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2020 NEC Article **220.53: Appliance Load** **Dwelling Unit(s)** **(Revision)**

- All household electric cooking equipment that is fastened in place (not just an electric range) has been added to the list of appliances that cannot be included in the four or more appliances eligible for a 75% derating demand factor.
- Another change involving 220.53 was to add a qualifier to the size of the appliance that can be included in the 75% derating.
 - By limiting the size of motor leads to $\frac{1}{4}$ hp or greater or 500 watts or greater, this standard will limit the "four or more" appliances to larger appliances as intended.



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Chapter 2

Outside Branch Circuits and Feeders

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2020 NEC Article 225.30 (B): Common Supply Equipment (Feeders) (New)

- **Summary:** New section permits more than one feeder to supply a building.
- New provisions are added to allow up to **six feeders** originating in the same panelboard, switchboard, or other distribution equipment, with each feeder terminating in a single disconnecting means.
- Each disconnect shall be marked to indicate the load served.
- This new section specifies that language in 225.33 (permitting up to six disconnects per feeder) cannot be used. If 225.33 was permitted, there could be up to 36 grouped disconnect switches on a building that a first responder would have to deal with during an emergency.



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2020 Article 230.46: Spliced and Tapped Conductors (Revision and relocation)

Chapter 2 Services

- The language previously located in 314.28 (E) (1) was revised and relocated to 230.46 and now applies to power distribution blocks used with service-entrance regardless of the enclosure type they are used in.
- The revised 2020 requirements specify the following:
 - Power distribution blocks, pressure connectors, and devices for splicing or tapping service-entrance conductors shall be listed
 - Power distribution blocks installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.
 - Effective January 1, 2023, not just power distribution blocks, but any pressure connector or device used to splice or tap service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.



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Chapter 2

Services

2020 NEC Article 230.67: Surge Protection for Dwelling Units (New)

- A surge-protective device (SPD) is now required at the service panel.



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Chapter 2

Services

2020 NEC Article 230.71 (A) and (B): Maximum Number of Disconnects (Revision)

- This **revision** eliminates more than one service disconnecting means in the same panelboard or other enclosure unless the requirements of 230.71 (B) are met, which provide four specific service configurations.
 - (1) Separate enclosures with a main service disconnect in each enclosure
 - (2) Panelboards with a main service disconnect in each panelboard enclosure.
 - (3) Switchboards where there is only one service disconnect in each separate vertical section where there are barriers separating each vertical section
 - (4) Service disconnects in switchgear or metering centers where each disconnect is located in a separate compartment.



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Chapter 2

Services

NEC 2020 Article **230.85: Exterior** **Emergency Disconnect(s)** **for Dwelling Units (New)**

- A new requirement is added to require an appropriately marked emergency disconnect at a readily accessible outdoor location for dwelling units.



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Chapter 2

Grounding and Bonding

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NEC 2020 Article 250.64 (B) (2) and (B) (3): Grounding Electro Conductor Protection from Physical Damage (Revision)

- The same wiring methods permitted to provide protection from physical damage in the 2017 NEC are still permitted for the 2020 NEC. However, **Schedule 80 PVC** is now specified as the only type of PVC that can provide protection from physical damage.



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Chapter 2

Grounding and Bonding

NEC 2020 Article 250.148: Continuity of EGC's and Attachment in Boxes (Revision)

- This revision clarifies that all wire-type equipment grounding conductors associated with any of those spliced circuit conductors must be connected within the box or to the box.



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Chapter 3

Conductors for General Wiring

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NEC 2020 Table 310.16: Ampacity Tables (Revision)

- The ampacity tables will simply be titled as Table 310.16 through 310.21.
- (Example: Table 310.15 (B) (16) will now be simply Table 310.16)



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Chapter 3

Outlet, Device, Pull, & Junction Boxes

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2020 NEC Table 314.16 (B) (5): Box Fill Calculations – EGC Conductor Fill (Revision)

- An additional $\frac{1}{4}$ volume allowance is now required to be added to the existing volume allowance of a single conductor volume allowance based on the largest equipment grounding conductor or equipment bonding jumper entering the box.
- New $\frac{1}{4}$ volume allowance to be counted in installations with more than four EGCs or equipment bonding conductors.



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Outlet, Device, Pull, & Junction Boxes

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2020 NEC Table 314.27 **C (1 & 2): Boxes at** **Ceiling-Suspended** **(Paddle) Fan Outlets** **(Revision)**

- C (1) This revision will now require all outlet boxes mounted in a location acceptable for the installation of a ceiling-suspended (paddle) fan in the ceilings of habitable rooms of dwelling units to be listed for the sole support of ceiling suspended (paddle) fan.
- C (2) An outlet box complying with the applicable requirements of 314.27 (luminaire rated box) and providing access to structural framing capable of supporting of a ceiling-suspended (paddle) fan bracket or equivalent.



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Chapter 3

AC Cable

NEC 2020 Article 320.80 (A): Type AC Cable Ampacity-Thermal Insulation (New)

- New Code text was added at **320.90 (A)** requiring armored cable (Type AC cable) to comply with adjustment factors of Table 310.15 (C) (1) when installed without maintaining space.



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Chapter 4

Switches

2020 NEC Article 404.14: Rating and Use of Switches (Revision)

- Switches will now be required to be **listed** and used within their ratings.
- Switches of the types covered in **404.14 (A) through (E)** are limited to the control of loads as specified accordingly.
- Switches used to control **cord-and-plug-connected loads** are limited as covered in **404.14 (F)**.
- Equipment used in electrical installations should be listed or labeled by a qualified, third-party electrical products testing laboratory.
- **UL 20** (Standards for General-Use Snap Switches) and **UL 1472** (Solid-State Dimming Controls) are among the switching device standards that provide the identified construction, performance, and marking requirements for switching devices to be used in accordance with the NEC



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Chapter 4

Receptacles, Cord Connectors, And Attachment Plugs

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NEC 2020 Article 406.5 (G) (2): Receptacle Mounting Under Sinks (New)

- Receptacle outlets are now **prohibited** from being installed in the area **beneath a sink** in the **face-up position**.
- Receptacle outlets have been prohibited from being installed in the face-up position in or on **countertop surfaces or work surfaces** since the **2002 NEC** (dwelling units) and all countertop and work surfaces since the **2014 NEC**.
- It's not uncommon to see plumbing pipes connecting to a sink (supply and drain) leaking from time-to-time under a sink area such as a kitchen sink
- A receptacle installed face-up under the sink is subject to water entering the **polarized slots of the receptacle** creating a hazardous condition
- New language will help mitigate a **potential hazard**.



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Chapter 4

Receptacles, Cord Connectors, And Attachment Plugs

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2020 NEC Article 406.9 (C): Bathtub and Shower Space (New/Revision)

- Receptacles are now prohibited from being installed within a **zone measured 3 ft. Horizontally and 8 ft. Vertically from the top of the bathtub rim or shower stall threshold.** This zone is all-encompassing and includes the space directly over the tub or shower stall.
- In bathrooms with dimensions less than the required zone, receptacle(s) are permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall within the room.



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Chapter 4

Receptacles, Cord Connectors, And Attachment Plugs

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2020 NEC Article 406.12: Tamper Resistant Receptacles (New/Revision)

- Requirements for tamper-resistant (TR) receptacles were expanded to attached and detached garages and accessory building of dwelling units.
- Common areas of multifamily dwelling units and hotels and motels are included as well.
- New List Item (8) was added for assisted living facilities.



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Chapter 4

Switchboards, Switchgear, and Panelboards

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2020 NEC Article 408.43: Panelboard Orientation (New)

- New 408.43 will now prohibit a panelboard from being mounted in the face-up (or face down) position.



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Chapter 4

Luminaires, Lampholders, and Lamps

2020 NEC Article 410.118: Access to Other Boxes (New)

- This new section has been added to clarify that a luminaire cannot be used to access outlet, pull, or junction boxes, or conduit bodies that are not associated with wiring for that luminaire.



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Chapter 4

Appliances

2020 NEC Article 422.5 (A): GFCI Protection for Appliances (New/Revision)

- Sump pumps has been added to the list of appliances requiring GFCI protection.
- Bottle fill stations was added to GFCI requirements for drinking water coolers.
- GFCI requirements for dishwashers moved from 210.8 (D) to 422.5 (A)(7)



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2020 NEC Article 445.18 (D): Emergency Shutdown Device at Dwelling Units (New)

Chapter 4

Generators

- An **outdoor emergency generator shutdown device** is required for generators installed at one- and two- family dwelling units (other than cord-and-plug- connected generators).



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Chapter 6

Electric Vehicle Charging System

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2020 NEC Article 625.54: GFCI Protection for EV Charging Equipment (New)

- This revision clarifies that all receptacle outlets used for EV charging be provided with GFCI protection for personnel for all cord and plug connected electric vehicle power transfer equipment.



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Chapter 6

Electric Vehicle Charging System

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2020 NEC Article 625.56: WP Enclosure for EV Charging Receptacle Outlets (New)

- New requirement added to require all receptacles installed in a wet location for EV charging to be installed in an enclosure that provides weatherproof protection with or without an attachment plug cap inserted.



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.2 & 680.14: Corrosive Environments (Revision)

- The definition of a "Corrosive Environment" was revised and relocated to 680.2
- The listed and identified wiring methods for a corrosive environment are addressed at 680.14.
- **Definition: Corrosive Environment:** Areas where pool sanitation chemicals are stored, handled, or dispensed, and confined areas under decks adjacent to such areas, as well as areas with circulation pumps, automatic chlorinators, filters, open areas under decks adjacent to or abutting the pool structure, and similar locations.



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.2, 680.35, & 680.45: Immersion Pools (New)

- While the term "immersion" was contained in 3 definitions in Article 680, "Immersion Pools" were not specifically defined.
- New definition added to 680.2 indicates that an immersion pool is "a pool for ceremonial or ritual immersion of users, which is designed and intended to have its contents drained or discharged.
- Two new sections covering immersion pools were added to 680.2 providing installation requirements for a newly added definition at 680.2 "Immersion Pools":
 - New 680.35 was added for "Storable and Portable Immersion Pools"
 - New 680.45 was added for "Permanently Installed Immersion Pools"



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.11: Underground Wiring Around Swimming Pools (Revision)

- The underground wiring methods and restrictions of 680.9 were revised into a list format with three list items added.
- List item 680.11 (A) now states that underground wiring within 1.5 m (5 ft) horizontally from the inside wall of the pool is permitted and then gives a list of wiring methods that are considered suitable for the conditions in these locations.
- Two new wiring methods were added to the list of acceptable wiring methods within this 1.5 m (5 ft) underground zone.
- List Item 680.9 (B) states that underground wiring is not permitted under the pool unless this wiring is necessary to supply pool equipment as permitted by Article 680.
- The minimum burial depth cover requirements are provided at Table 300.5 [see 680.9 (C)].



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.21 (C): GFCI Protection for Motors (New/Revision)

- GFCI protection is applicable to all motors used in pool applications.
- An exception is added for listed low-voltage motors not requiring grounding.
- Outlets supplying **all** pool motors on branch circuits rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase, shall be provided with Class A GFCI protection.



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.22 (A)(5): Pool Equipment Room Receptacle (New)

- New provisions were added to require at least one GFCI-protected receptacle within a pool equipment room.
- All other receptacles in a pool equipment room now require GFCI protection as well.



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.22 (E): Equipment in Close Proximity to a Pool (New)

- Other equipment (other than traditional pool pump motors and controllers) are now required to generally be located at least 1.5 m (5 ft) horizontally from the inside walls of a pool. (Unless separated from the pool by a solid fence, wall, or other permanent barrier.)



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

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2020 NEC Article 680.59: GFCI Protection for Non submersible Fountain Pumps (New)

- A new section is added to specifically address GFCI protection for non submersible fountain pumps.
- Outlets supplying all permanently installed non submersible pump motors rated 250 volts or less and 60 amperes or less, single- or 3-phase, are required to be provided with GFCI protection.



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Chapter 6

Swimming Pools, Fountains, & Similar Locations

2020 NEC Article 680.84: Receptacles for Electrically Powered Pool Lifts (Revision)

- Provision for **receptacles** for electrically powered pool lifts were added to 680.84 stating that these receptacles operating above the low-voltage contact limit must comply with **680.22 (A)(3)** and **(A)(4)**.
 - Receptacles to be located not less than **1.83 m (6 ft)** from the inside walls of pools.
 - GFCI protection required for all 15- and 20- ampere, single phase, 125-volt receptacles located within **6.0 m (20 ft)** of the inside walls of the pool.
- **2017 NEC Additions/Modifications for Pool Lifts-Reminders:**
 - 680.84 requires switches and switching devices that are operated above the low-voltage contact limit to comply with 680.22 ©, which generally requires switches to be located at least **1.5 m (5 ft) horizontally** from the inside walls of the pool.



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Chapter 6

Solar Photovoltaic Systems

2020 NEC Article 690.12: Rapid Shutdown of PV Systems on Buildings (Revision)

- The requirements for a Rapid Shutdown of PV systems received extensive revision again this Code cycle.
- A new product standard has been developed by UL so that hazardous energy levels within a PV array can be reduced when firefighters or other emergency response personnel are required to enter the array area to mitigate emergency conditions.



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Chapter 6

Solar Photovoltaic Systems

2020 NEC Article 690.13 (A): Photovoltaic System Disconnecting Means (New)

- This new requirement calls for any PV disconnect enclosure with a door or hinged cover that exposes live parts when open to be locked or require a tool to open where a disconnecting means of systems above 30 volts are readily accessible to unqualified persons.



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Chapter 6

Solar Photovoltaic Systems

2020 NEC Article 690.15: Disconnecting Means for Photovoltaic Equipment (Revision)

- The title was changed to "Disconnecting Means for Photovoltaic Equipment" with four subsections; (A) Location, (B) Isolating Device, (C) Equipment Disconnecting Means, and (D) Type of Disconnecting Means.
- This section was revised to emphasize that this section is intended to address isolation of equipment from energized conductors (isolated). This does not necessarily have to be accomplished by an equipment disconnecting means.



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Chapter 6

Solar Photovoltaic Systems

2020 NEC Article 690.41 (B): System Grounding [Solar Photovoltaic (PV) Systems], Ground-Fault Protection (Revision)

- PV system dc circuits (not just the arrays) that exceed 30 volts or 8 amperes are now required to be provided with dc ground-fault protection.
- This section now consists of three subsections; (1) Ground-Fault Detection, (2) Faulted Circuits, and new (3) Indication of Faults



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Chapter 6

Solar Photovoltaic Systems

2020 NEC Article 690.56 (C): ID of Power Sources for Building with Rapid Shutdown(Revision)

- The parent text of 690.56 (C) was revised with the previous text of 690.56 (C)(1) added to this parent text.
- One figure remains with the title of the remaining figure changed to identify this figure as an informational note figure to clarify that the label as shown is merely an example of a rapid shutdown system label.
- The previous language of 690.56 (C)(2) (*Buildings with More Than One Rapid Shutdown Type*), was relocated to 690.56 (C)(1).
- The language at previous 690.56 (C)(3) (*Rapid Shutdown Switch*) is now 690.56 (C)(2).
- Buildings with PV systems shall have a permanent label located at each service equipment location to which the PV systems are connected or at an approved readily visible location and shall indicate the location of rapid shutdown initiation devices.



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Chapter 7

Optional Standby Systems

2020 NEC Article 702.7(A): Sign for On-Site Optional Standby Systems (New)

- A sign is required to be placed at the residential emergency disconnecting means required by 230.85 that indicates the location of each permanently installed on-site optional standby power source disconnect.
- This same requirement would apply to an on-site optional generator to identify the shutdown means of the prime mover as required by 445.18 (D).