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Based on the NEC

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- System types
- How PV power merges with utility
- Bi-directional metering
- Installation methods
- Sizing conductors
- Disconnects
- Rapid shutdown



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1(800)443-5233



support@jadelearning.com

Welcome Iowa Electricians!

What Does Iowa Require?

18-Hours of Continuing Education Required

- The Iowa electrician must complete no less than 18 Continuing Education Units (CEUs) in each three-year license cycle.
- No less than 6 of those 18 CEUs must focus on the most recent Iowa electrical code.
- JADE Learning's two-hour VILT sessions satisfy ALL of Iowa's requirements for electrical continuing education.
9 VILT sessions provides you all 18 hours.



2020 NEC Changes

Important Changes from the 2020 NEC

Instructor: Jerry Durham

Common reasons for not seeing your CE units posted (yet) on the Iowa website:

- The electrician didn't provide the correct electrical license number to JADE Learning.
- The electrician didn't use their correct name during the class. Make sure your displayed name during the training session is your legal name.
- The electrician didn't complete and submit the survey at the end of class. Iowa does not give continuing education credit until the survey is completed at the end of each class.
- We can fix any of these issues—DON'T WORRY- JUST LET US KNOW!

Thank you!

Questions? Concerns?

Call the JADE Learning office at 1-800-443-5233

2020 NEC Changes

Covering Important Changes From the 2020 NEC

6:00 PM Eastern Time



5:45 PM – 6:00 PM	Registration / Check In
6:00 PM – 7:00 PM	NEC Chapter 6 <i>with poll questions</i>
7:00 PM – 7:10 PM	Break
7:10 PM – 7:55 PM	NEC Chapter 6 <i>with poll questions</i>
7:55 PM – 8:00 PM	Questions for the instructor?

2020 NEC Changes

Covering Important Changes From the 2020 NEC

Quick Summary

Instructor: Jerry Durham

- Stay attentive to the VILT session, your activity is being monitored
- Incorrect answers to Poll Questions **do not count against you**, however, participation in each Poll Question is mandatory to receive course credit
- If you have trouble hearing or need assistance, let us know
- Make sure you have paid and provided your electrical license number.
- Be sure to sign-in/check-in and check your registration information.
- You will be emailed a copy of your certificate within 2 business days.

Questions? Concerns?

Call the office at 1-800-443-5233

Iowa



2020 NEC Changes CHAPTER 6

- 2-Hours Credit

Welcome Iowa



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Chapter 6 is all about *Special Equipment*

Chapter 6 is where we find requirements addressing:

- **Electric Signs**
- **Electric Vehicle Equipment**
- **Swimming Pools**
- **Solar PV Systems**

2020 NEC Changes Chapter 6

600.2 Electric Signs and Outline Lighting. Definitions.



Four new definitions were added to the 2020 NEC for the retrofitting of signs.

1. **Host sign:** A sign already installed in the field that is designated for field conversion with a retrofit kit.
2. **Retrofit Kit, General Use:** A kit consisting of the primary parts (but not all parts) and a list of required parts for subassembly in the field.

(CONT')

600.2 Electric Signs and Outline Lighting. Definitions.

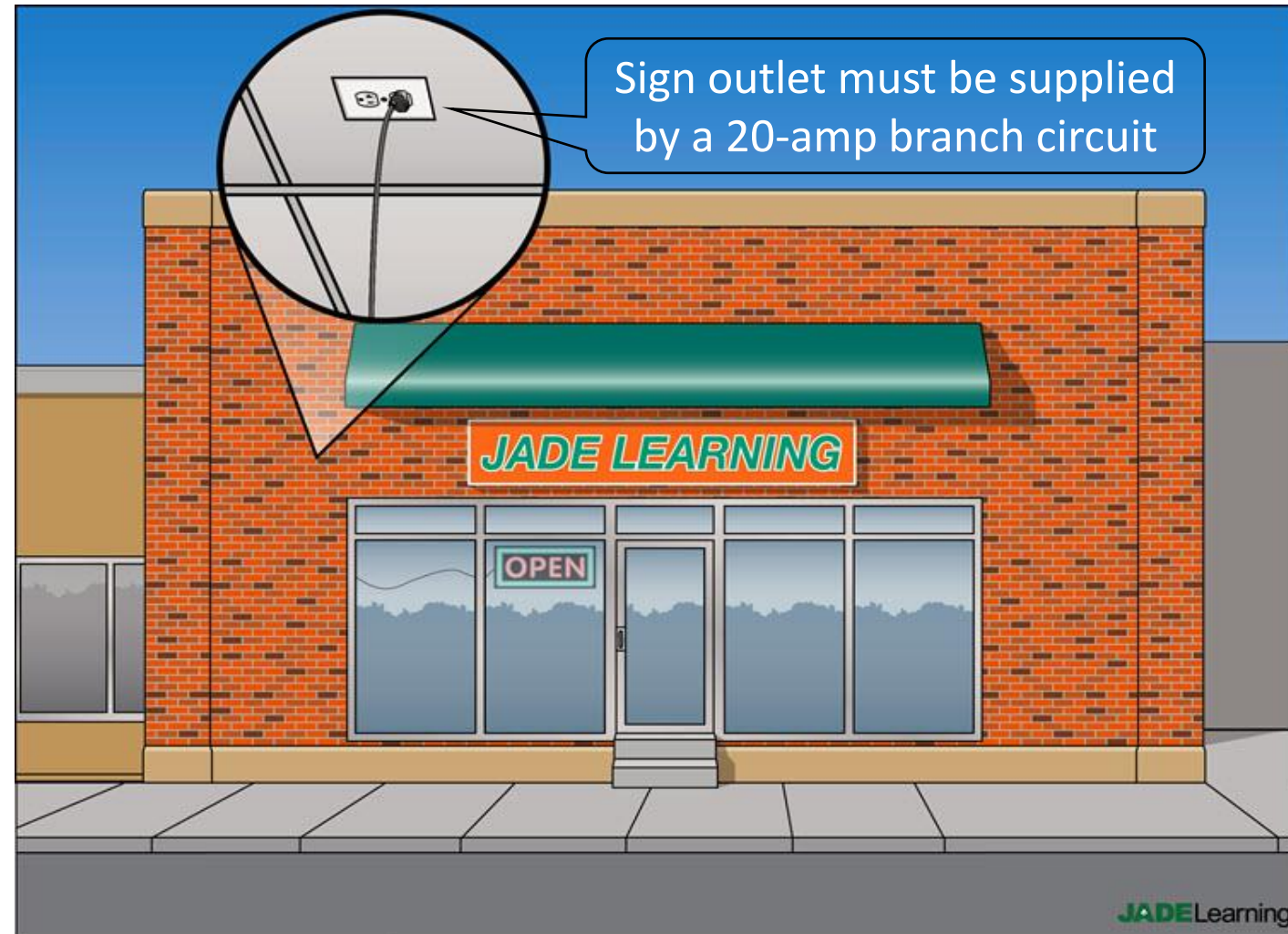


3. Retrofit Kit, Sign Specific: A kit consisting of all parts, hardware, and instructions necessary for field installation in a host sign.

4. Subassembly: Component parts or a segment of a sign, retrofit kit, or outline lighting system that, when assembled, forms a complete unit or product.

600.5(A) Electric Signs and Outline Lighting. Required Branch Circuit.

- Section 600.5 now clarifies which entrances must have the required sign outlet(s).
- Sign outlets are not required *at entrances for deliveries, service corridors, or service hallways that are intended to be used only by service personnel or employees.*



600.35 Electric Signs and Outline Lighting. Retrofit Kits.

Brand-new NEC Section 600.35 addresses retrofit kit:
Installation — Marking — Wiring methods — Damaged components



625 and 625.1 Electric Vehicle Power Transfer System. Scope. (1 of 2)



The scope of Article 625 has been revised in the 2020 NEC as follows:

The Code now recognizes electric vehicles are able to transfer on-board battery power to homes and businesses when they are in need of power.

625.2 Electric Vehicle Power Export Equipment (EVPE) (2of2)



Electric Vehicle Power Export Equipment (EVPE):

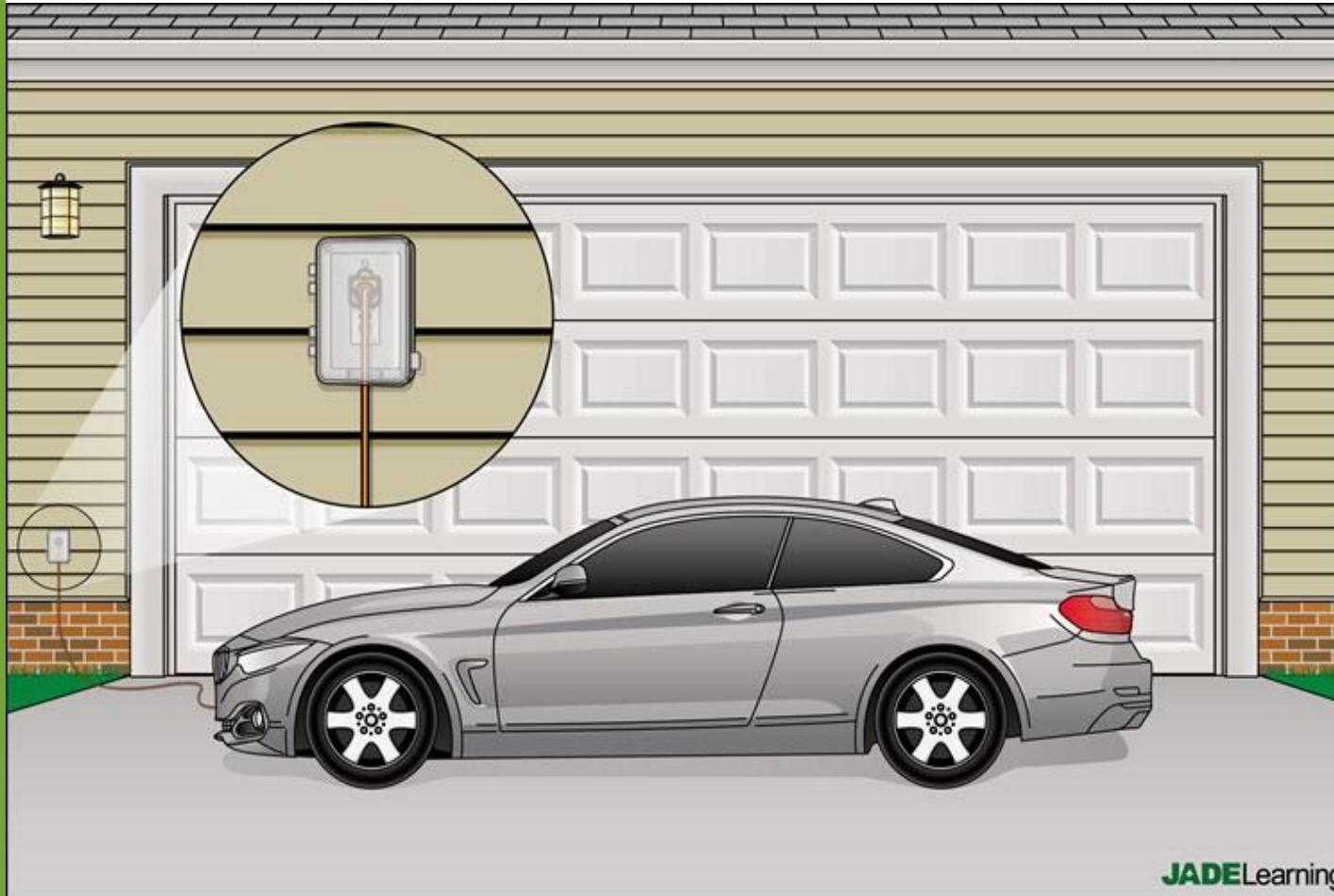
The equipment, including the outlet on the vehicle, that is used to provide electrical power at voltages greater than or equal to 30 Vac or 60 Vdc to loads external to the vehicle, using the vehicle as the source of power.

625.54 Electric Vehicle Power Transfer System. GFCI Protection for Personnel.

- GFCI protection is now required for **ALL** outlets used for electric vehicle power transfer.
- In the 2017 NEC, GFCI protection was only required for single-phase receptacles rated 150 volts to ground or less and 50 amps or less.



625.56 Electric Vehicle Power Transfer System. Receptacle Enclosures.



- In the 2020 NEC, all electric vehicle charging receptacles in wet locations must be protected by a weatherproof enclosure.
- The hood of the enclosure must be **listed** and identified as **extra duty**.

625.60 Electric Vehicle Power Transfer System. AC Receptacle Outlets Used for EVPE.

- Section 625.60 is new for the 2020 NEC and ensures that vehicle power export installations are safe.
- This Code section covers the types and ratings of receptacles used, overcurrent protection, and GFCI requirements.



680.2 Swimming Pools, Fountains, and Similar Installations. Definitions.



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- The definition of “fountain” in the 2020 NEC has been revised to clarify its meaning and purpose in Article 680.
- The term fountain in the 2017 NEC could have caused confusion as to whether it meant water cooler.
- The 2020 NEC explains that water coolers, used for dispensing potable water, are not the types of water fountains addressed in Article 680.

680.4 Swimming Pools, Fountains, & Similar Installations. Inspections After Installation.

Section 680.4 in 2020 NEC states:
The authority having jurisdiction shall be permitted to require periodic inspection and testing.

- This section allows for periodic electrical inspections of pools, fountains, and similar installations, **indefinitely** — even after the installation is complete.



680.21(C) Swimming Pools, Fountains, and Similar Installations. Motors. GFCI Protection.

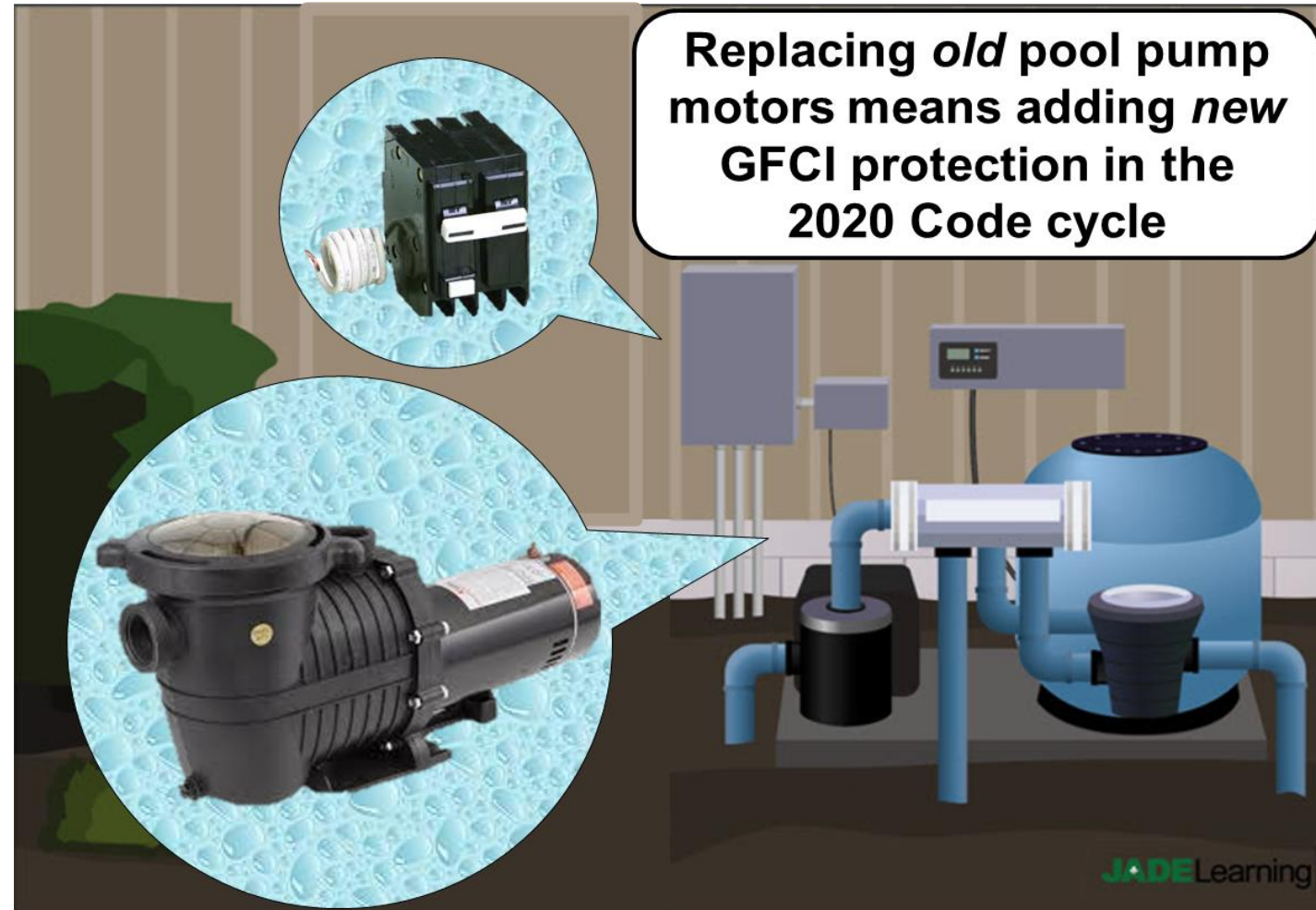


In the 2020 NEC, GFCI protection is required for pool pump motors rated 150 volts or less to ground and 60 amps or less.

The 2017 NEC required GFCI protection for motors rated 120-through 240 volts.

680.21(D) Swimming Pools, Fountains, and Similar Installations. Motors. Pool Pump Motor Replacement.

- Section 680.21(D) is new and requires GFCI protection for pool pump motors when replaced during maintenance or repair.
- This applies to any pool pump motor rated 150 volts or less to ground and 60 amps or less, single- or 3-phase.



680.22(A)(4) Swimming Pools, Fountains, and Similar Installations. Receptacles.



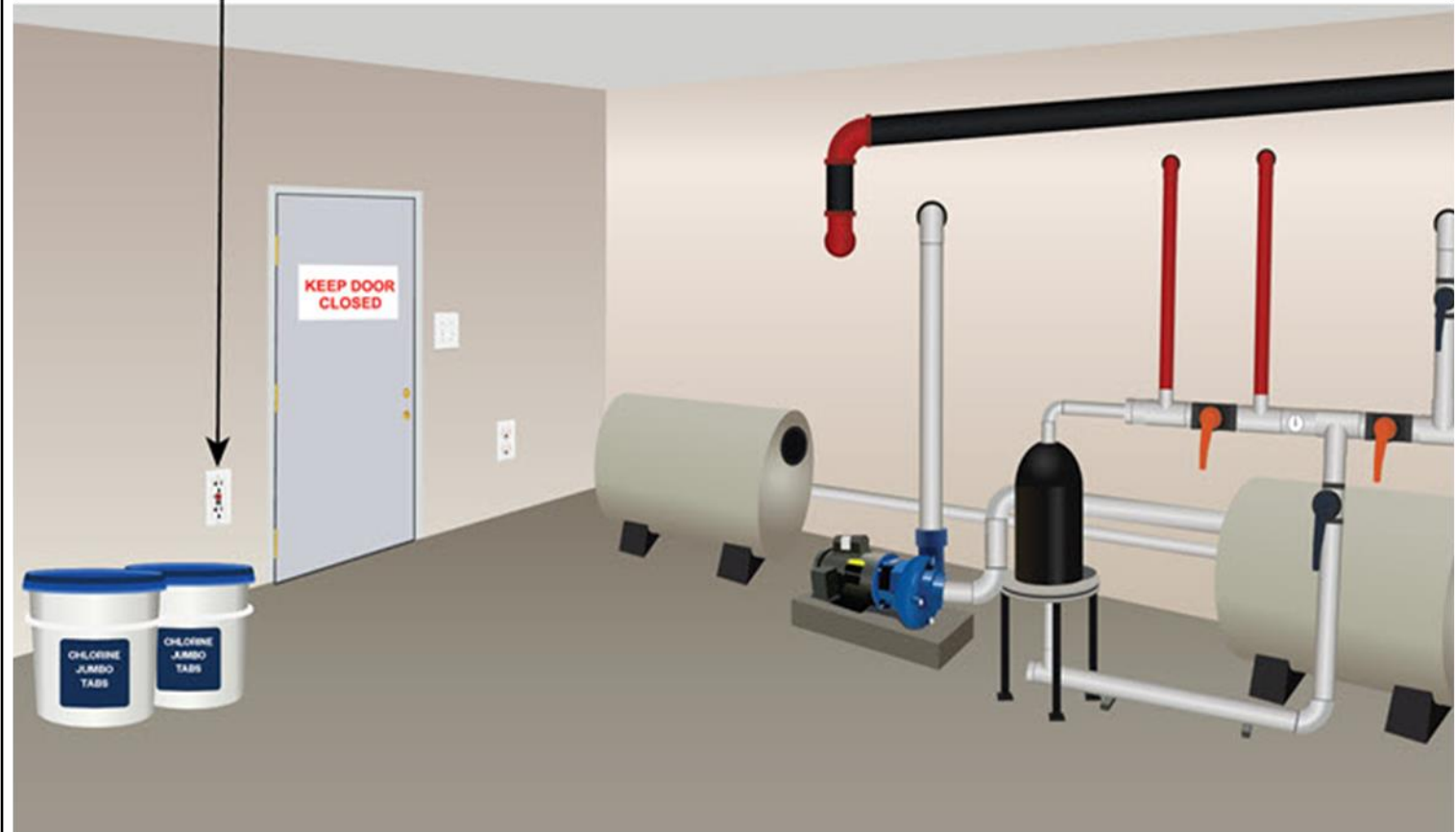
NEC Section 680.22(A)(4):
All 15- and 20-ampere, single-phase, 125-volt receptacles located within 20 feet of the inside walls of a pool shall be protected by a Class A ground-fault circuit interrupter (GFCI).

680.22(A)(5) Swimming Pools, Fountains, and Similar Installations. Receptacles.

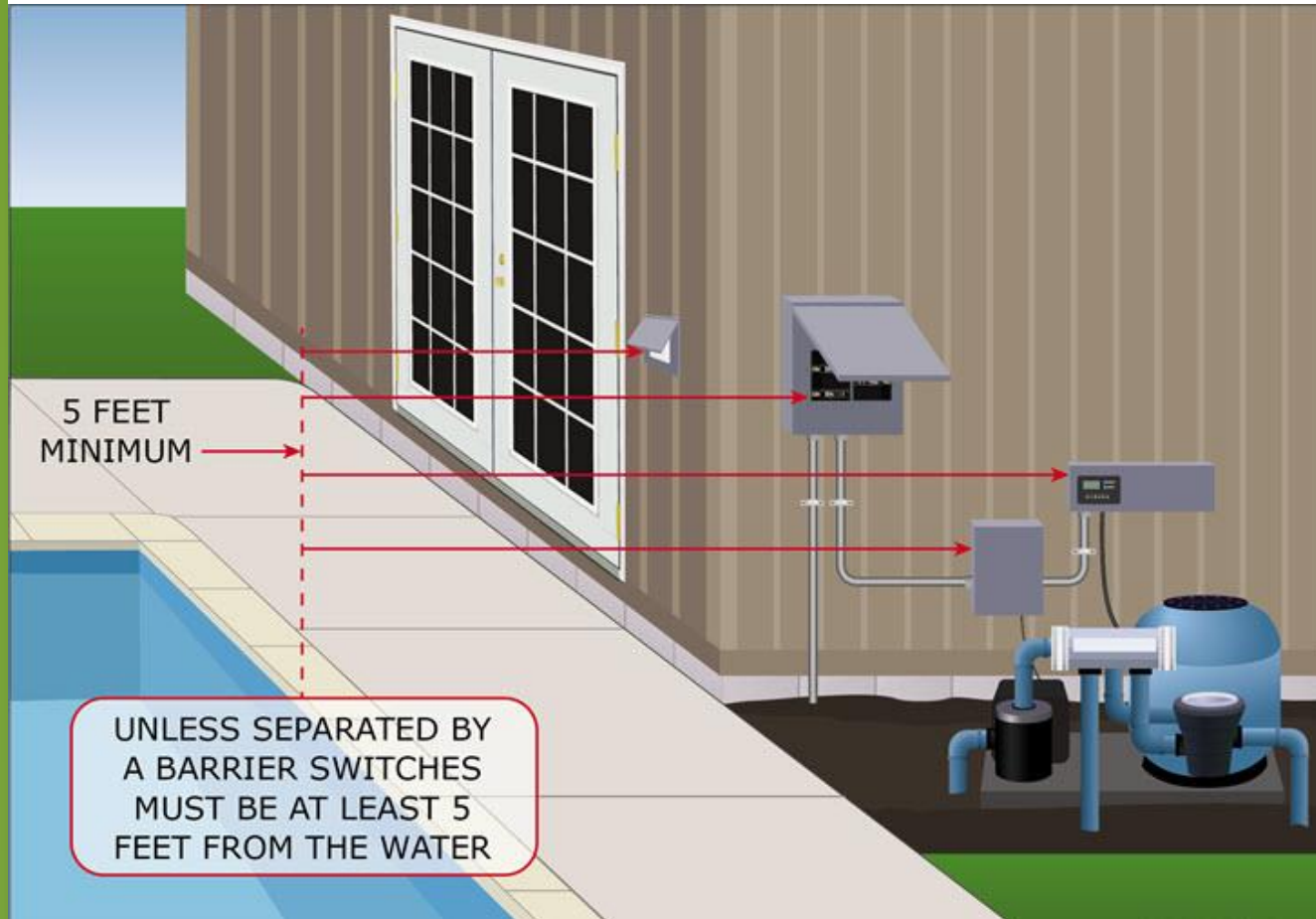
Brand- new Code section
680.22(A)(5) states:

At least one GFCI-protected 125-volt, 15- or 20- ampere receptacle on a general-purpose circuit shall be located within a pool equipment room, and all other receptacles supplied by branch circuits rated 150 volts or less to ground within a pool equipment room shall be GFCI protected.

At least one GFCI-protected 125-volt, 15- or 20-amp general-purpose receptacle must be located within a pool equipment room.

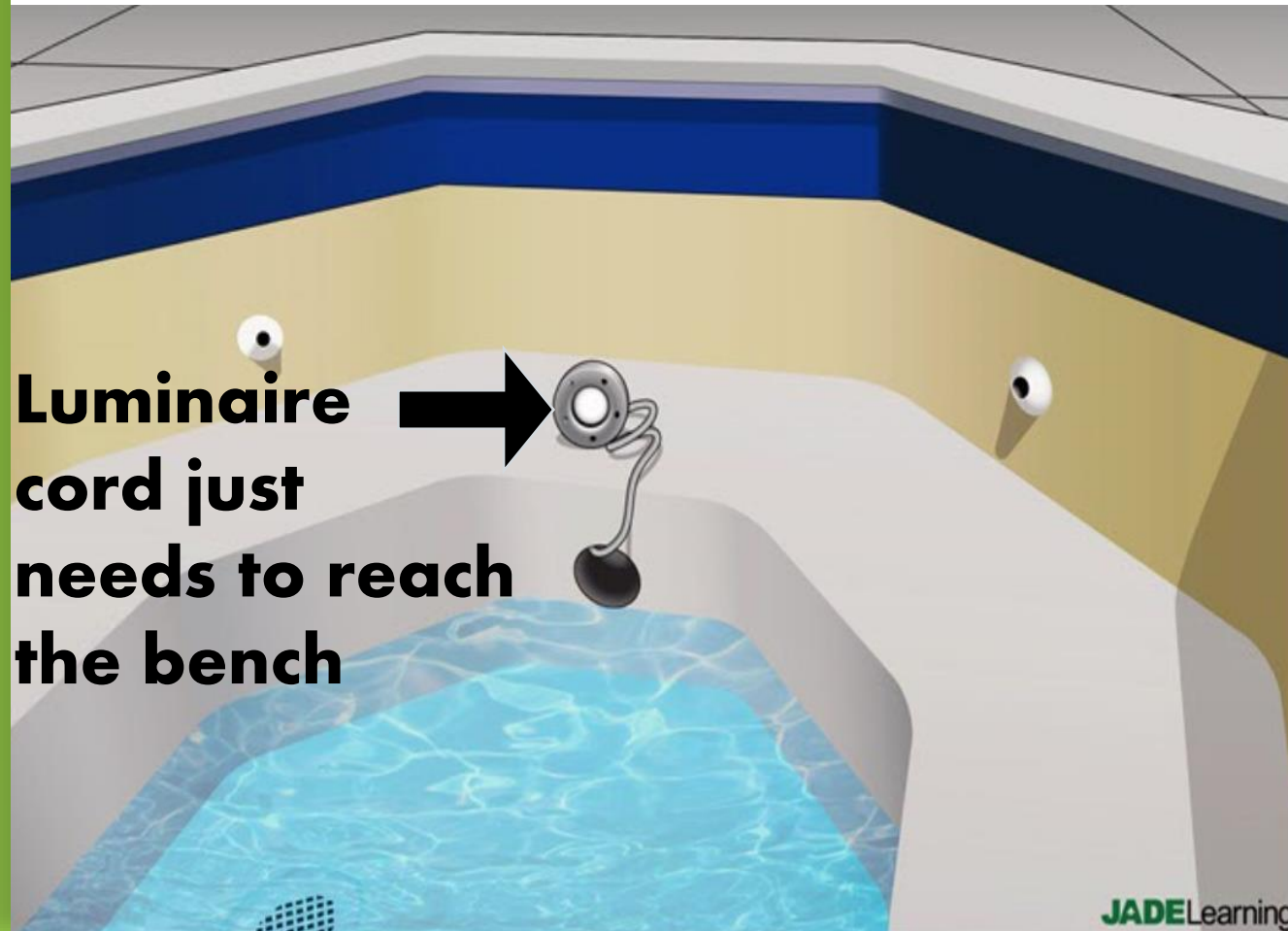


680.22(C) Swimming Pools, Fountains, and Similar Installations. Switching Devices. Other Equipment.



- Switching devices must be located at least 5 feet horizontally from the inside walls of a pool unless separated by a permanent barrier.
- Switches listed as being acceptable for use within 5 feet of a pool are permitted.

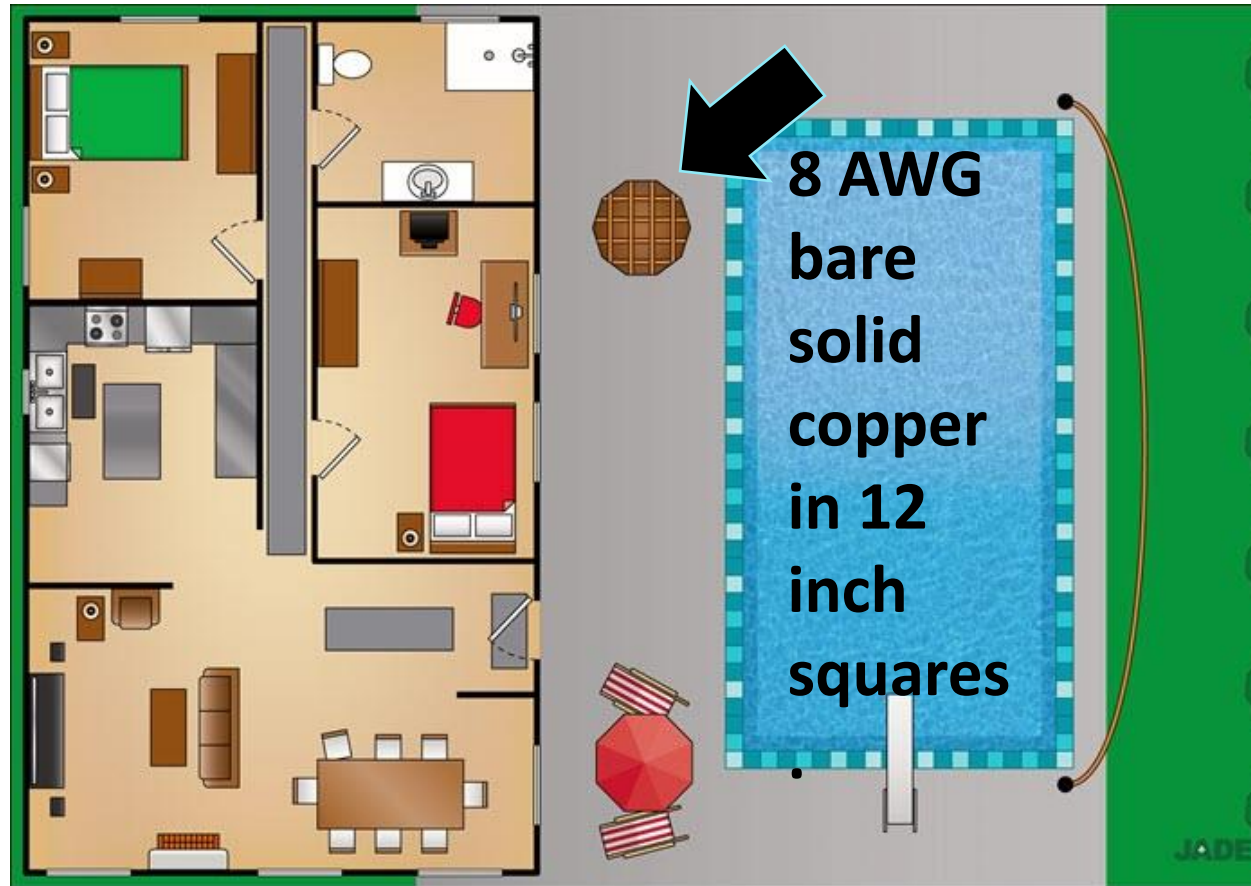
680.23(B)(6) Swimming Pools, Fountains, and Similar Installations. Wet Niche Luminaires. Servicing.



- In the 2020 NEC, electricians & manufacturers no longer have to conceal extra cable that allows the underwater luminaire to be pulled to the top to be serviced.
- Spas may now be drained & luminaires can be serviced down low on the spa bench.

680.26(B)(2) and (B)(5) Swimming Pools, Fountains, and Similar Installations. Equipotential Bonding.

- New for 2020, a **copper grid** is permitted to be built around the pool to bond the walking surfaces if reinforcing steel is not available.
- If used, the copper grid must be solid, bare 8 AWG copper conductors arranged in a network of 12-inch squares.

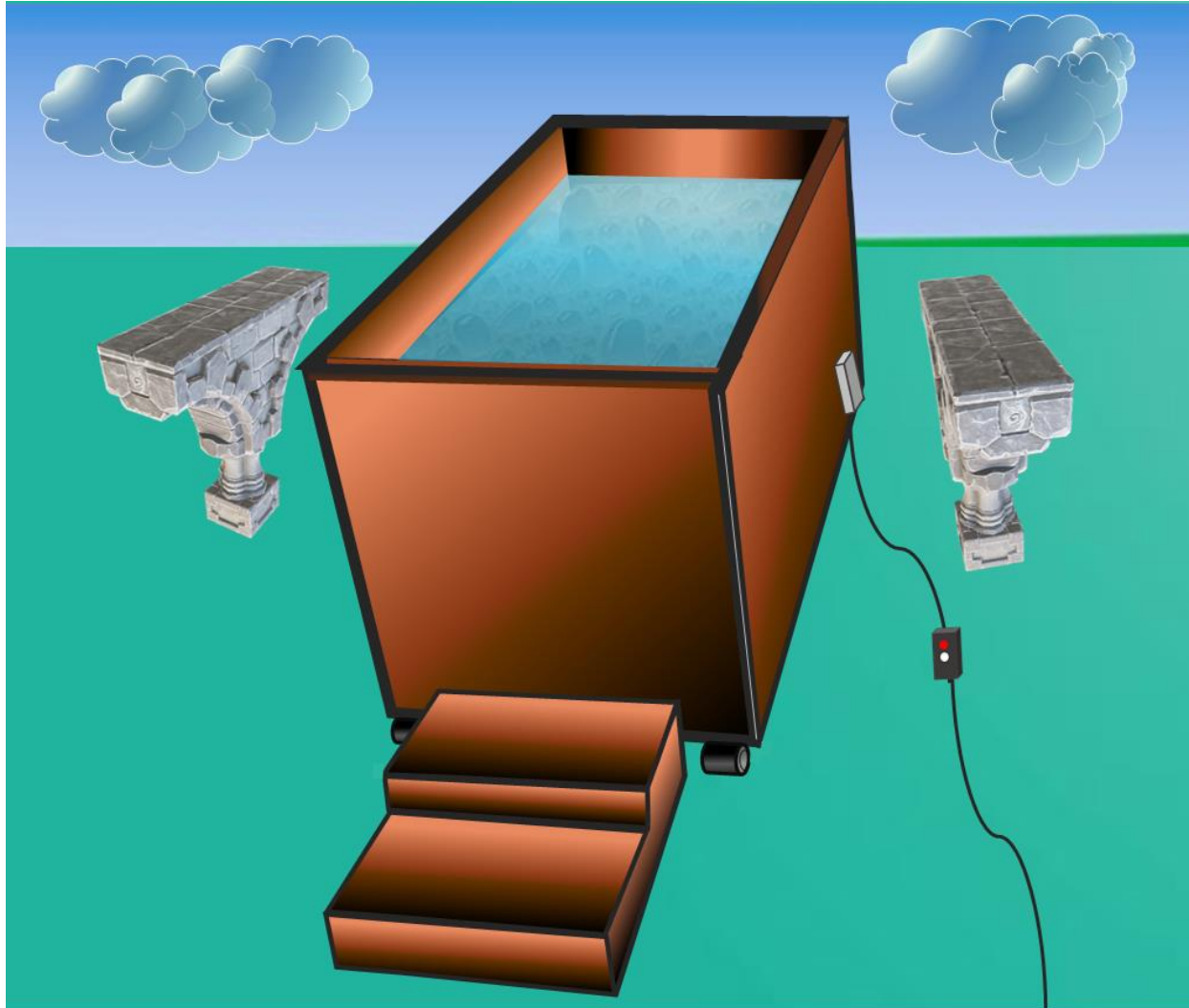


680.26(B)(2) and (B)(5) Swimming Pools, Fountains, and Similar Installations. Equipotential Bonding.

- In the 2020 NEC, 680.26(B)(5) requires all metal fittings, except isolated fittings measuring 4 inches or less, to be bonded.
- Small metal pool cover anchors are exempt from this bonding requirement.



680.35 Swimming Pools, Fountains, and Similar Installations. Storable and Portable Immersion Pools.



Article 680 in NEC 2020 now covers storable & portable immersion pools and includes new installation requirements.

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.

680.45 Swimming Pools, Fountains, and Similar Installations. Permanently Installed Immersion Pools.

- Section 680.45 is new and covers **permanently installed** immersion pools.
- The section details the requirements for cord-and-plug connections, pumps, heaters, audio equipment, and equipotential bonding.



680.59 Swimming Pools, Fountains, and Similar Installations. GFCI Protection for Permanently Installed Nonsubmersible Pumps.



Section 680.59 is new to the 2020 NEC.

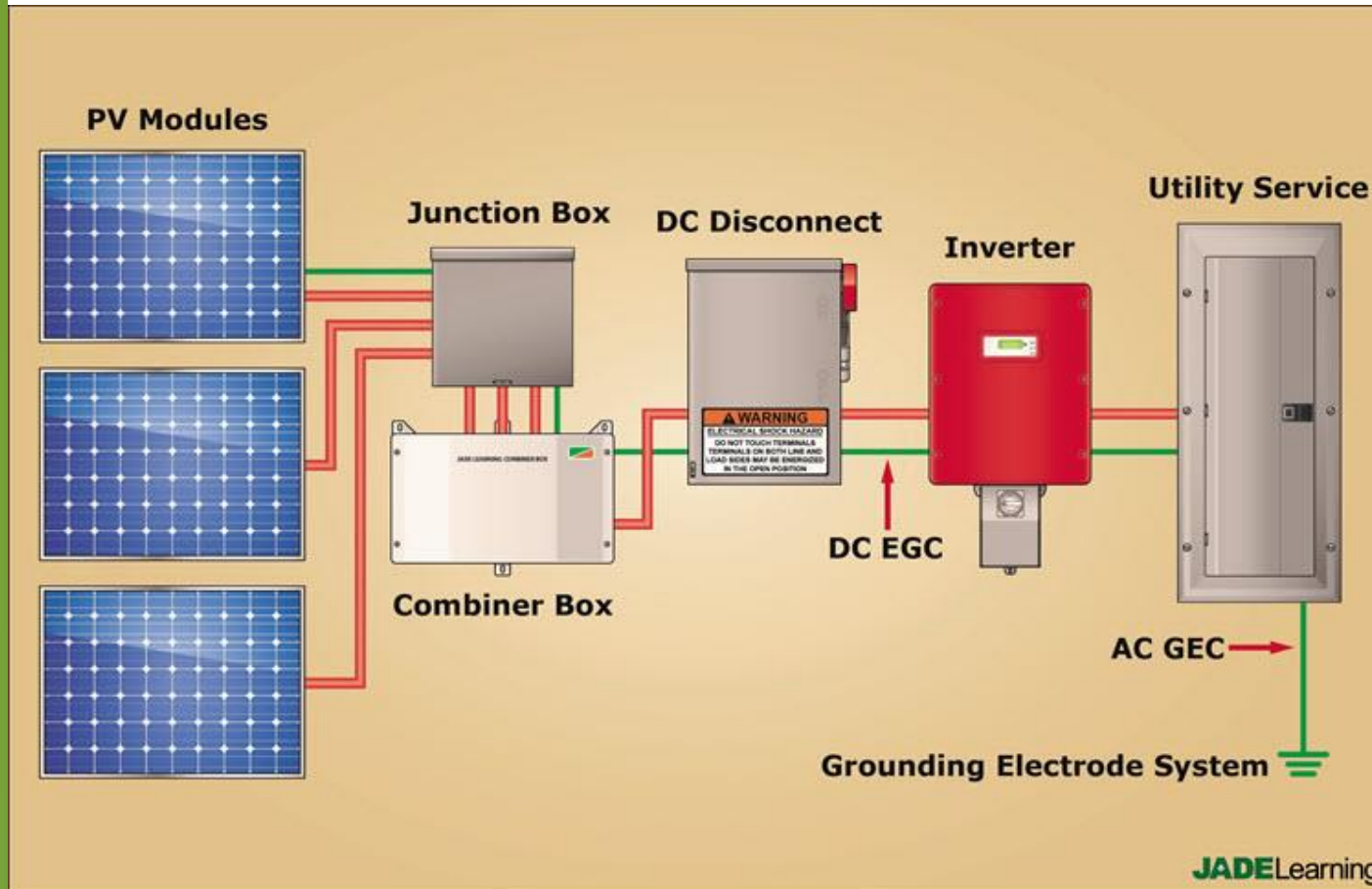
Section 680.59 requires all outlets supplying single-phase or 3-phase pump motors to be provided GFCI protection when pumps are rated 250 volts or less and 60 amps or less.

682.33(C) Natural and Artificially Made Bodies of Water. Bonding of Equipotential Planes.

- Section 682.33(C)(2) provides new equipotential bonding requirements for certain types of outdoor service equipment near bodies of water *other* than pools.
- Walking surfaces below or within 3 feet of the services mentioned above must also be bonded to the equipotential plane.



690.2 Solar PV Systems. Definitions. Grounded, Functionally.



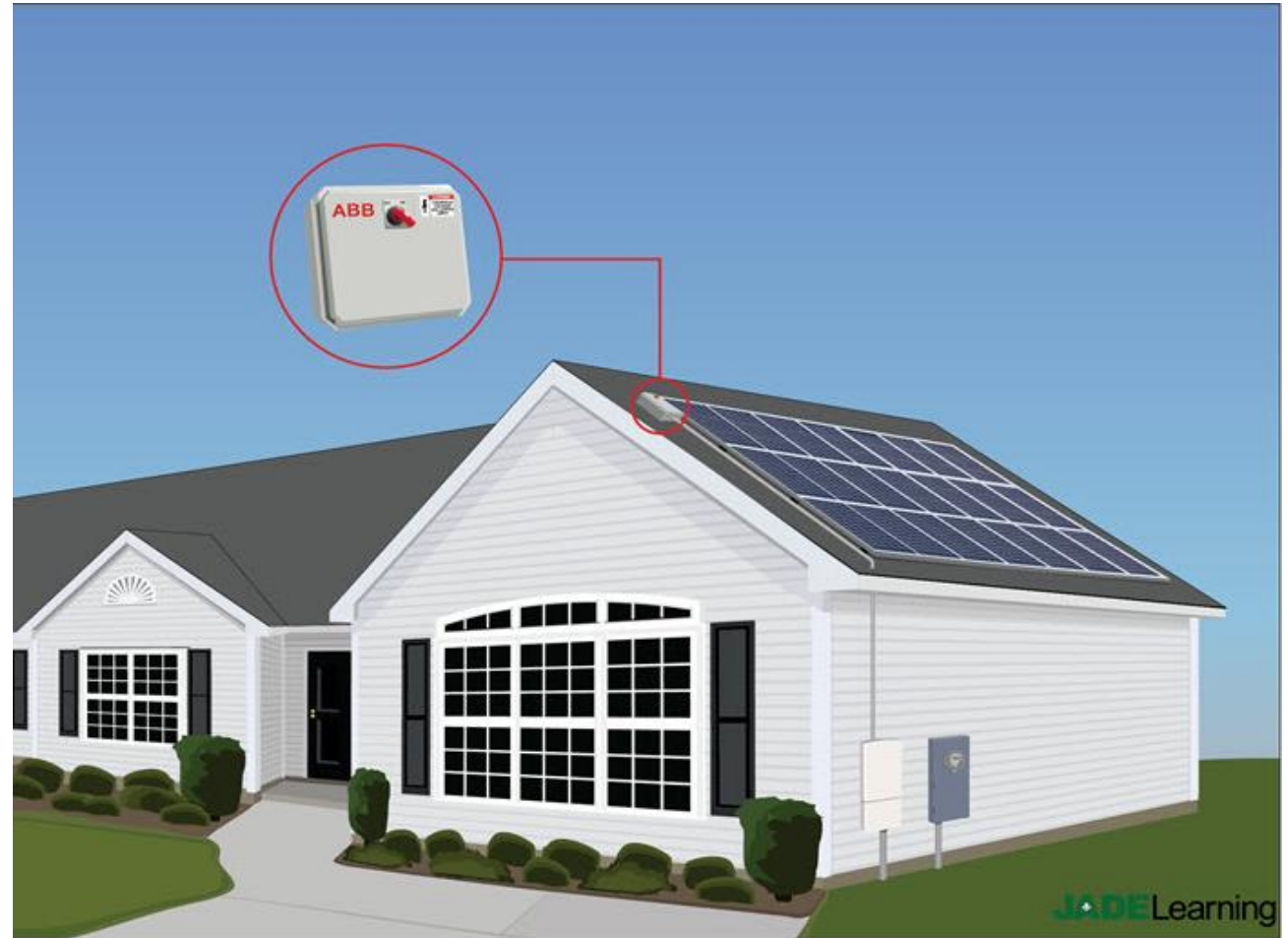
Section 690.2 provides a revised definition for **Grounded, Functionally:**

A system that has an electrical ground reference for operational purposes that is not solidly grounded.

690.12(A) Solar PV Systems. Rapid Shutdown of PV Systems on Buildings. Controlled Conductors.

The rapid shutdown requirement for PV no longer applies to all conductors, but only to these two types:

1. *PV system dc circuits.*
2. *Inverter output circuits originating from inverters located within the array boundary.*



690.33 Solar PV Systems. Mating Connectors.

The 2020 NEC now addresses **intermatability** between PV mating connectors and they must be one of the following:

1. Of the same type and brand for proper fit...*or*
2. Listed and identified for intermatability.



690.41(B) Solar PV Systems. System Grounding. Ground-Fault Protection.



- New for 2020 NEC, all PV system dc circuits exceeding 30 volts or 8 amps must be supplied dc ground-fault protection.
- In the 2017 NEC, only PV system dc circuits located *WITHIN* the PV Array required dc ground-fault protection.

690.41(B) Solar PV Systems. System Grounding. Ground-Fault Protection.



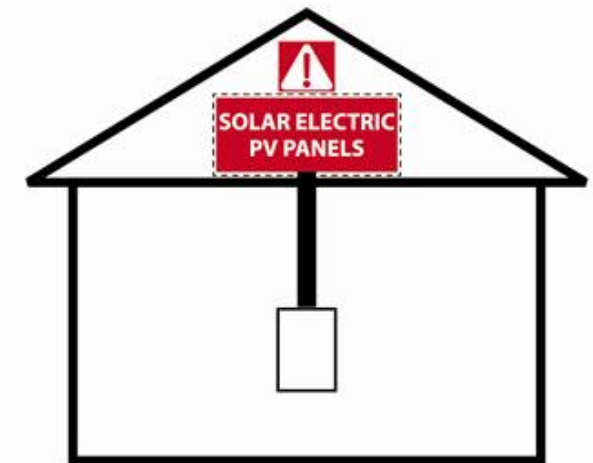
Also new for the 2020 NEC, Section 690.41(B)(3) requires equipment responsible for providing ground-fault protection to PV system dc circuits to indicate (display) in a readily accessible location whenever a ground-fault condition is present.

690.56(C) Solar PV Systems. Identification of Power Sources. Buildings with Rapid Shutdown.

In the 2020 NEC, the Code no longer allows rapid-shutdown systems to control **only** conductors outside of the PV array, so that label option was removed from the NEC.

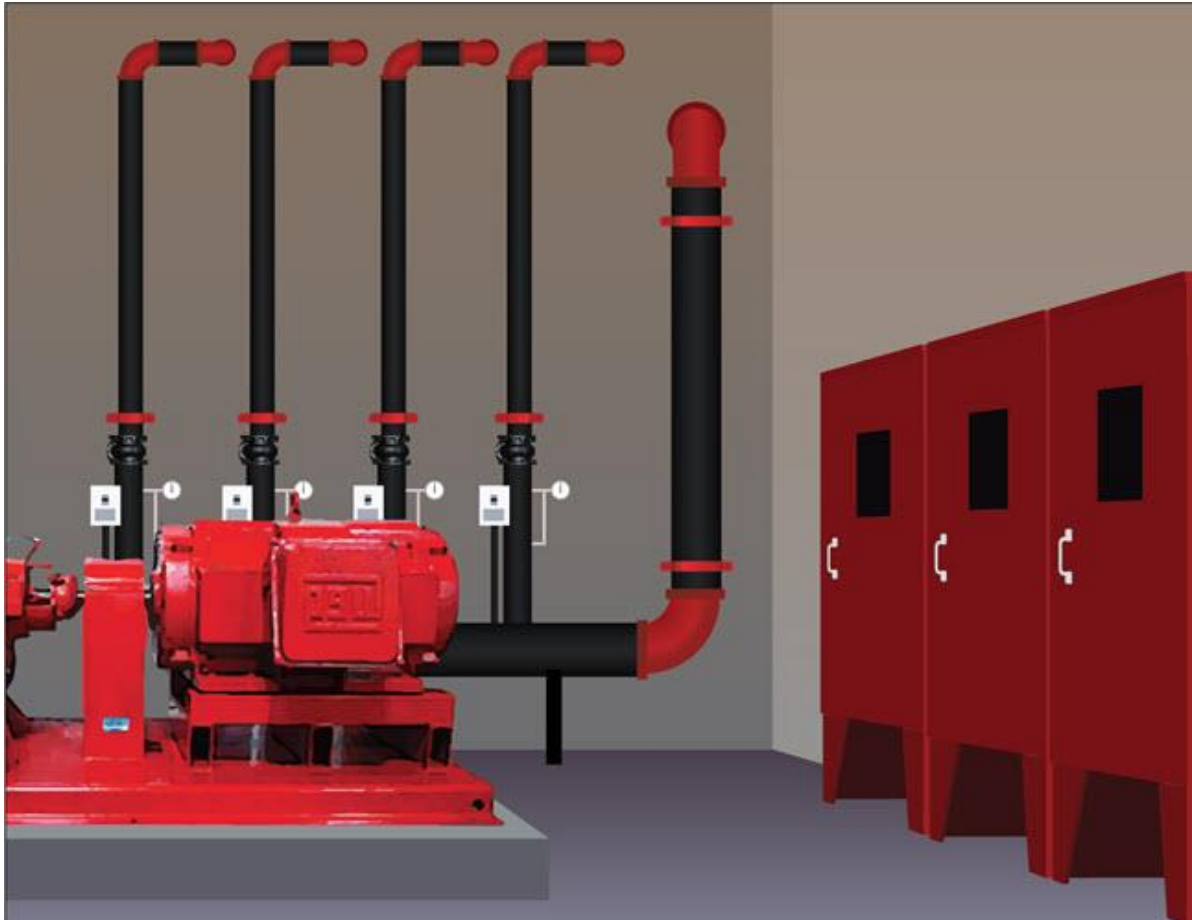
SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

**TURN RAPID SHUTDOWN
SWITCH TO THE "OFF"
POSITION TO
SHUTDOWN CONDUCTORS
OUTSIDE THE ARRAY.
CONDUCTORS WITHIN
ARRAY REMAIN
ENERGIZED IN SUNLIGHT**



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695.3(C)(3) Fire Pumps. Power Source(s) for Electric Motor-Driven Fire Pumps. Multibuilding Campus-Style Complexes.



The 2020 NEC requires selective coordination of OCPDs in multibuilding complexes to be:

1. Performed by a licensed engineer or equivalent.
2. Documented.
3. Made available to individuals who design, install, maintain or operate the system.