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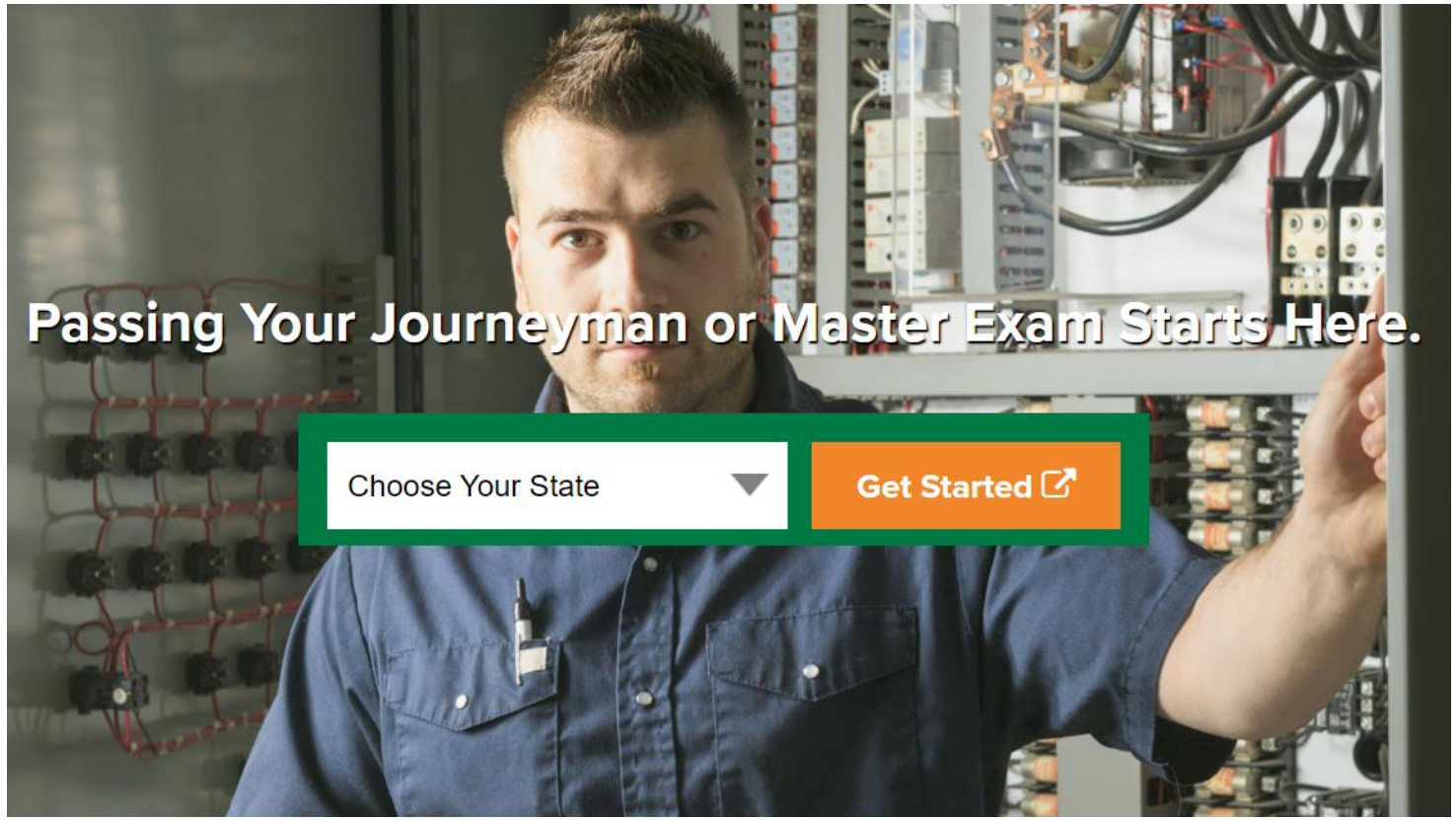

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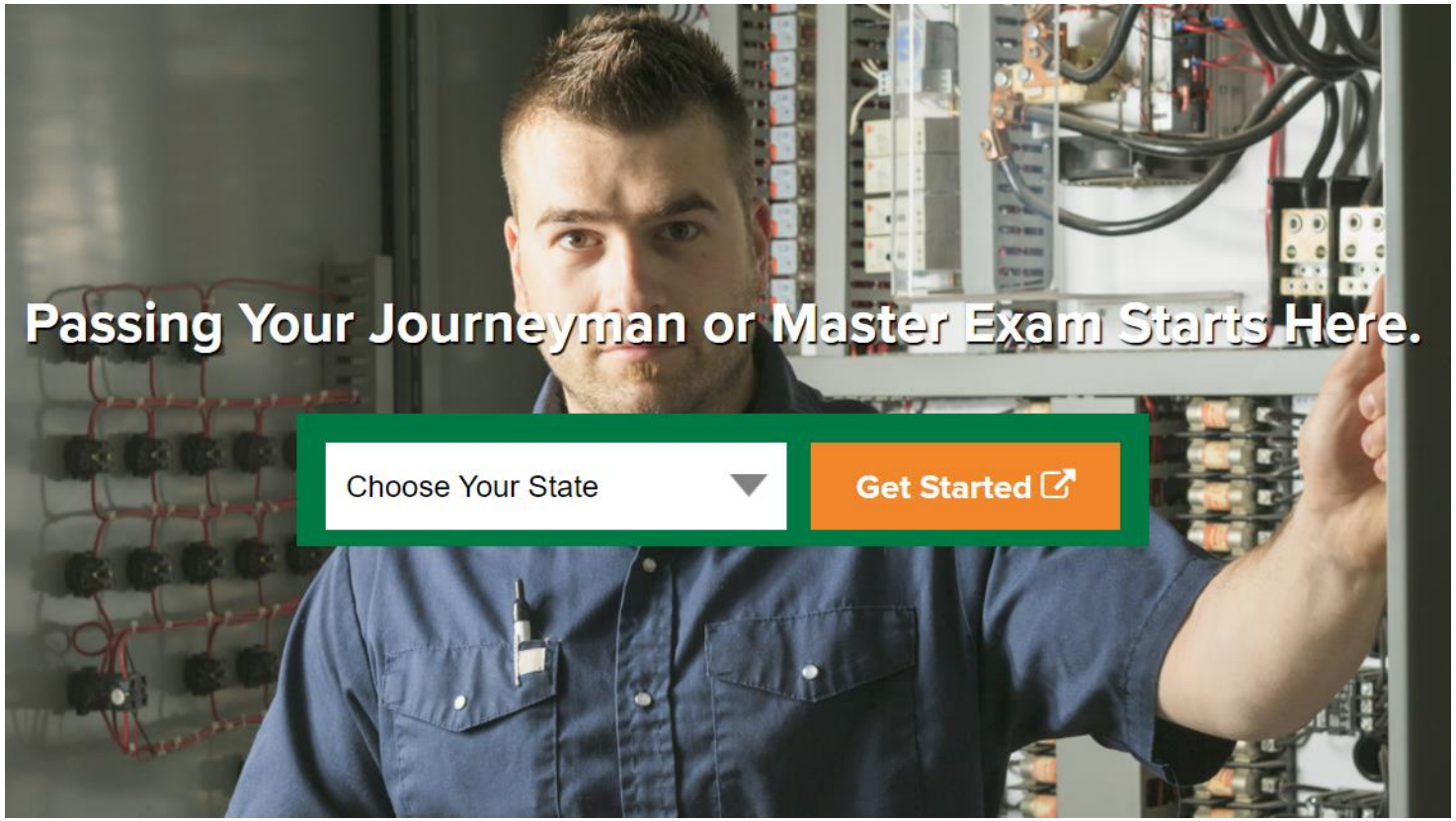

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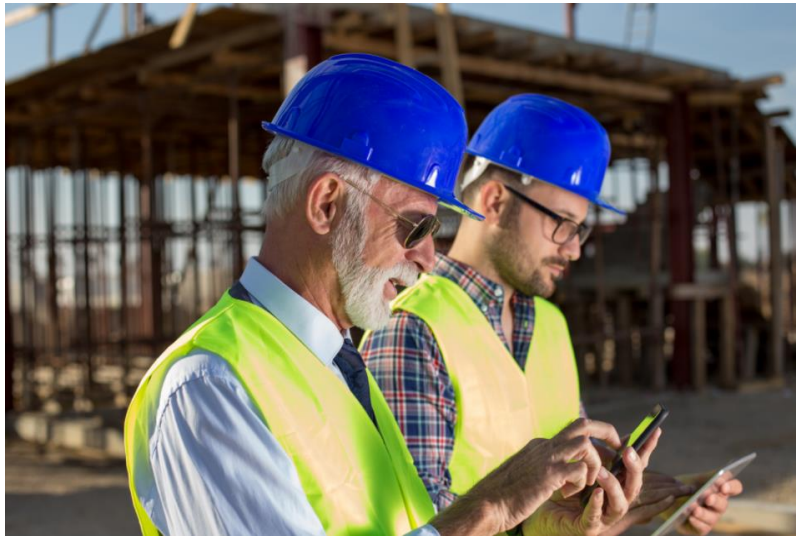

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- Subscribe to the 2020 NEC Challenge
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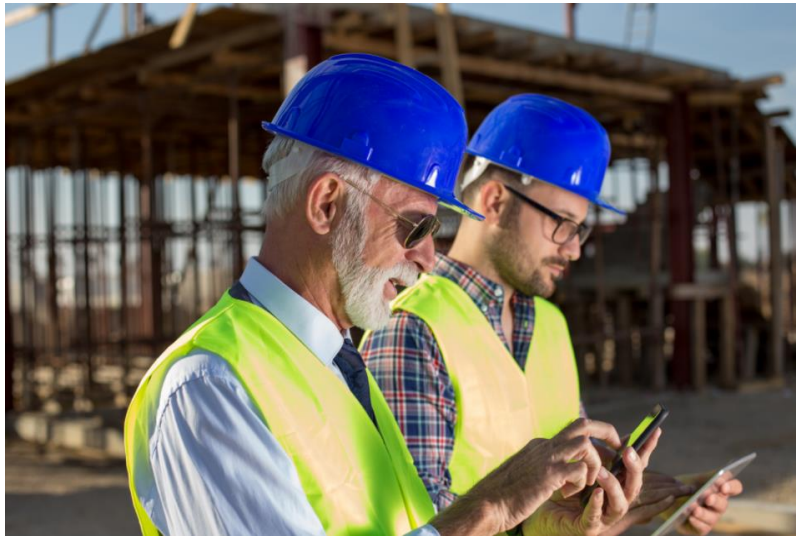

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- System components
- System types
- How PV power merges with utility
- Bi-directional metering
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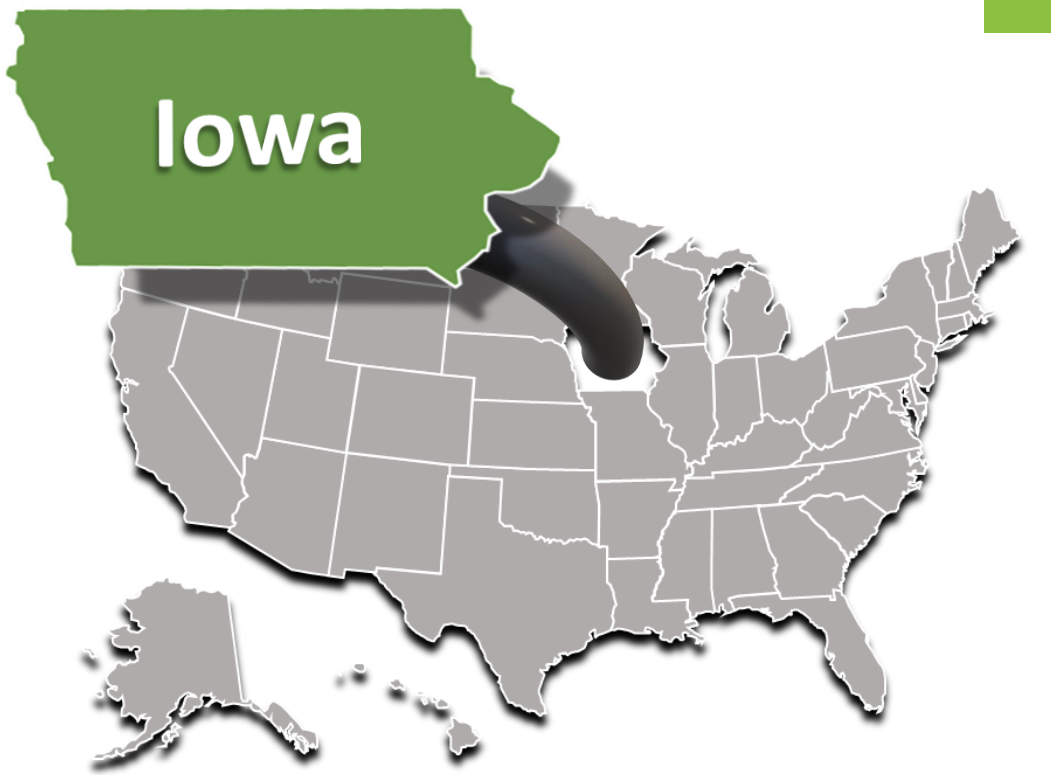
Electrical Continuing Education for Iowa
Today's Session

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.



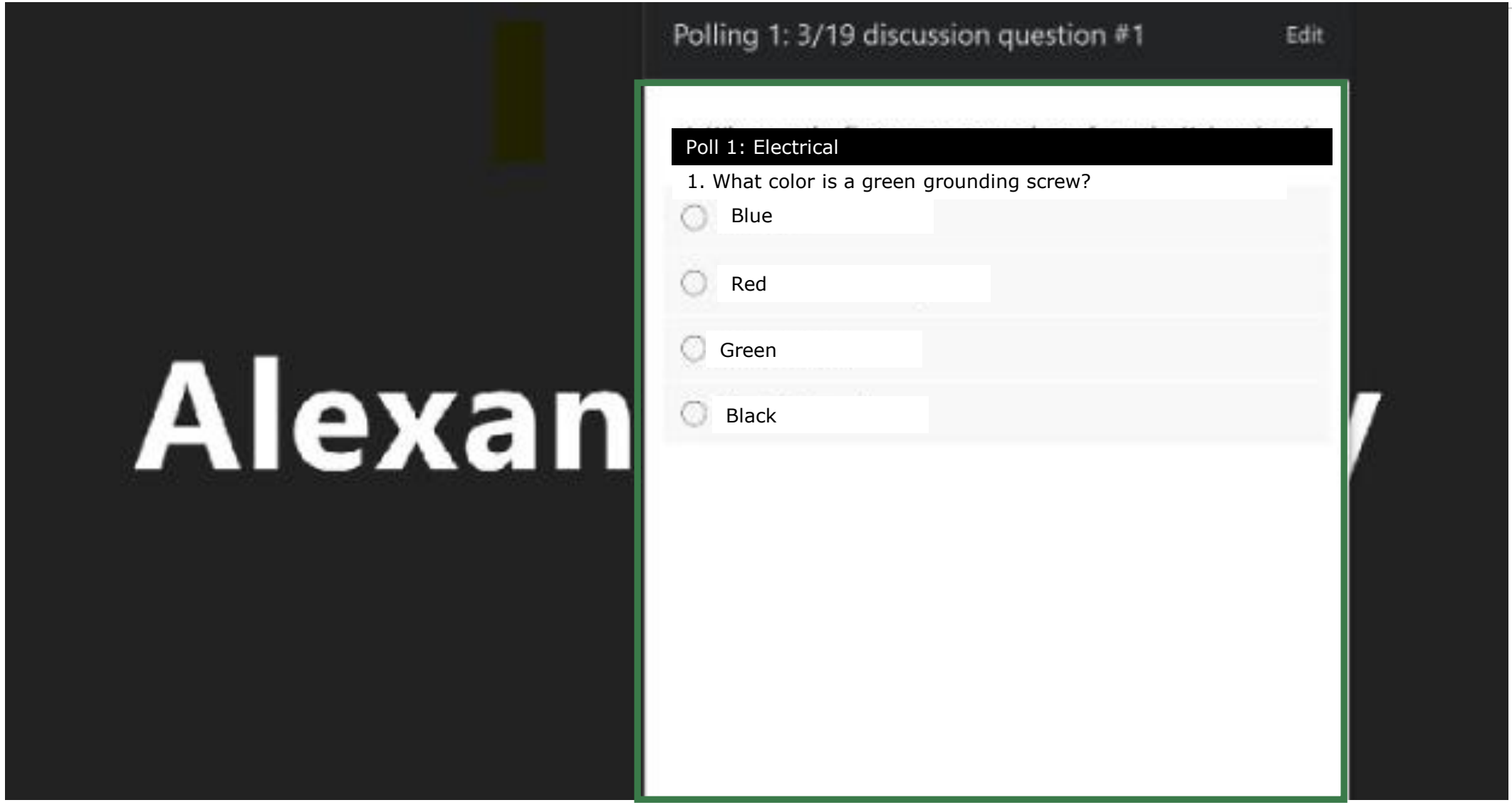
2020 NEC Changes

Important Changes from the 2020 NEC

6:00 PM Eastern Time ← **5 PM in Iowa**

5:40 PM – 6:00 PM	**Registration / Check In**
6:00 PM – 7:00 PM	**NEC Chapter 2b** *with poll questions*
7:00 PM – 7:10 PM	**Break**
7:10 PM – 7:55 PM	**NEC Chapter 2b (Continued)** *with poll questions*
7:55 PM – 8:00 PM	**Questions for the instructor?**

Poll Question *Example*:



2020 NEC Changes

Important Changes from the 2020 NEC

Instructor: Jerry Durham

Quick Summary

- 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 JADE Learning your electrical license number.
- Be sure to sign-in/check-in and confirm your registration information is correct.
- You will be emailed a copy of your certificate within 2 business days.
- You must complete a short survey at the end of class to receive credit from the state. Your instructor will provide the link and answer any questions.

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Iowa

2020 NEC Changes
CHAPTER 2b

- **2-Hours Credit**

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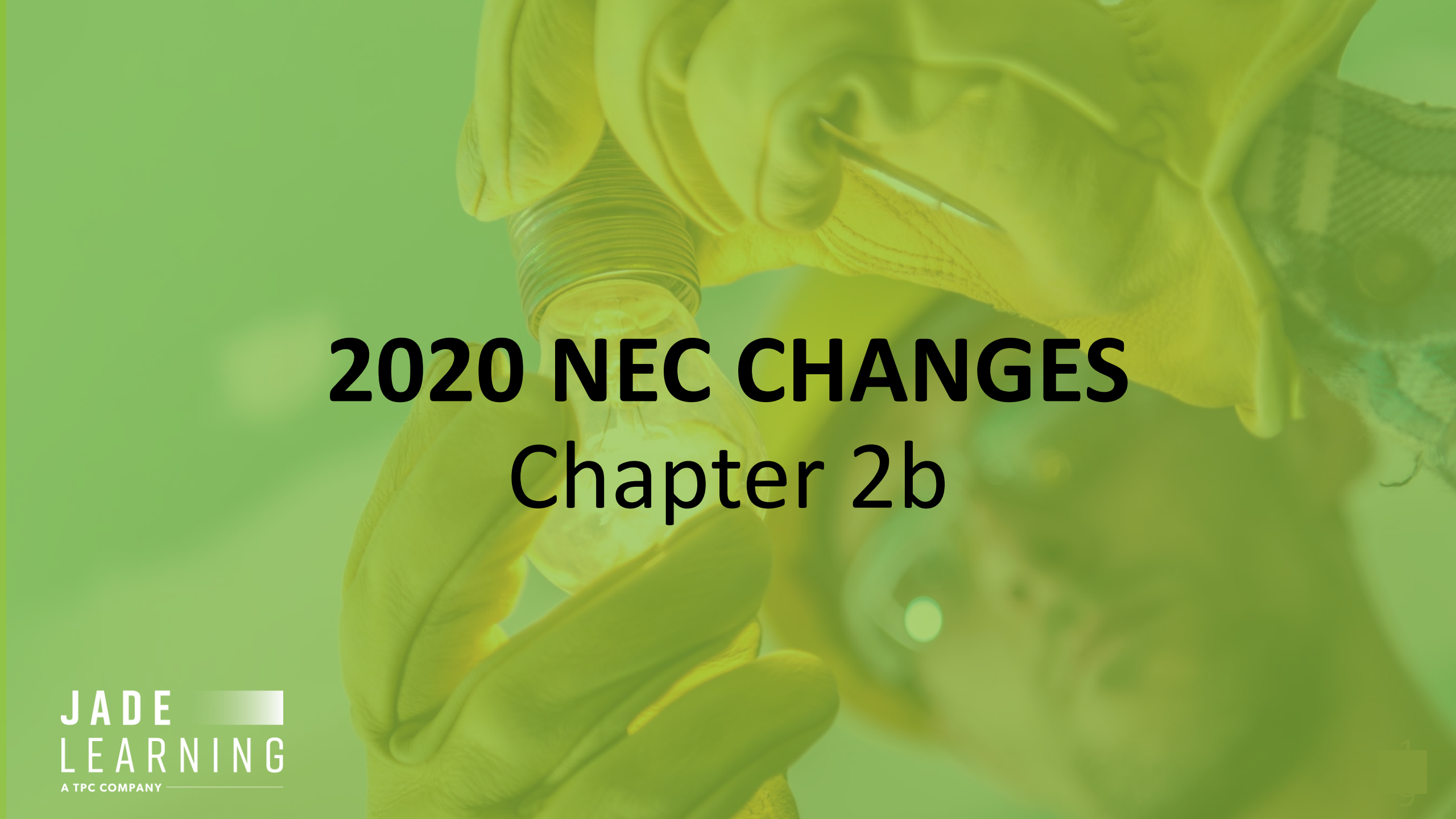

2020 NEC CHANGES

Chapter 2b

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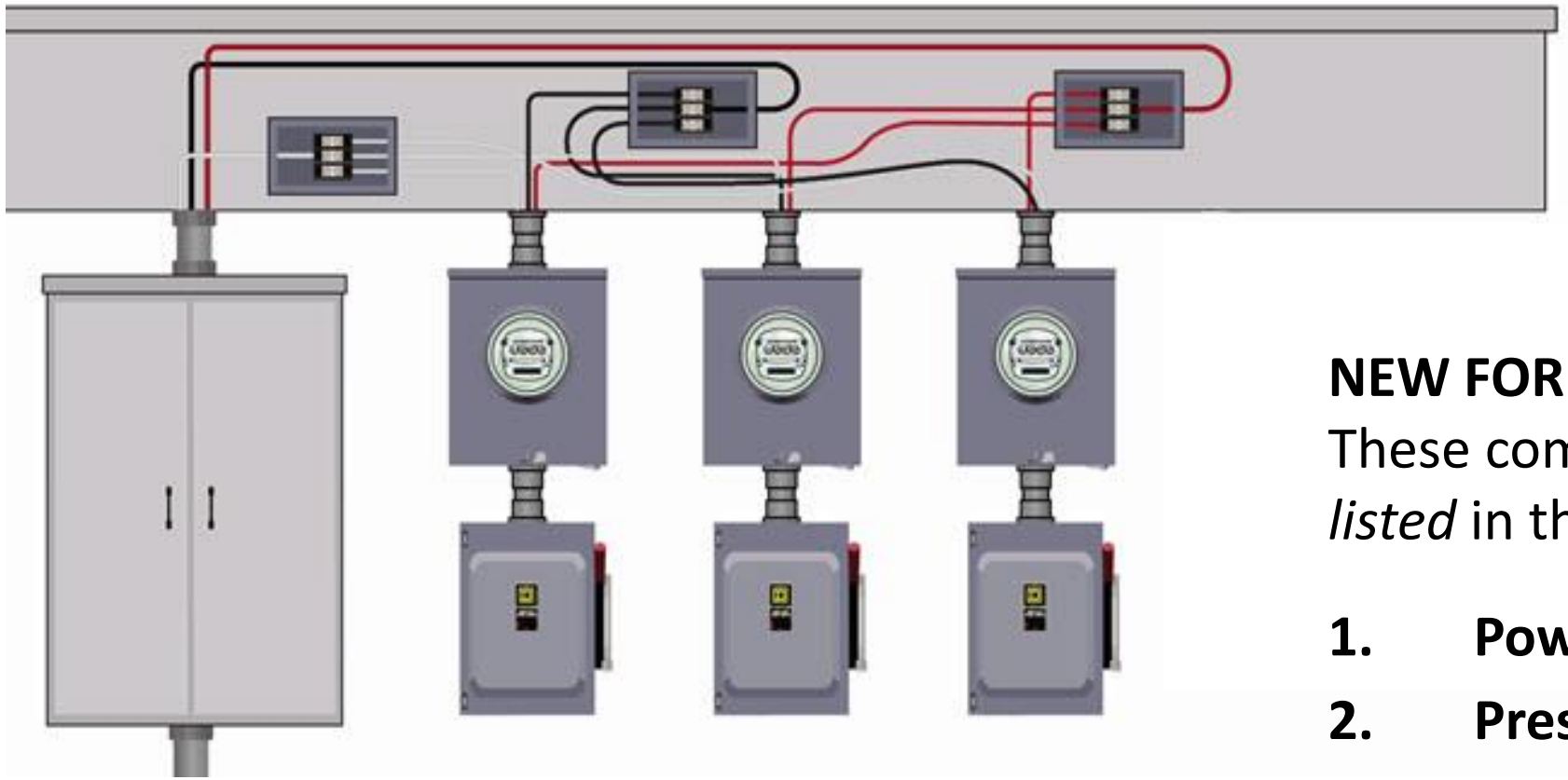
230.46 Spliced and Tapped Conductors.



NEW FOR 2020 NEC-

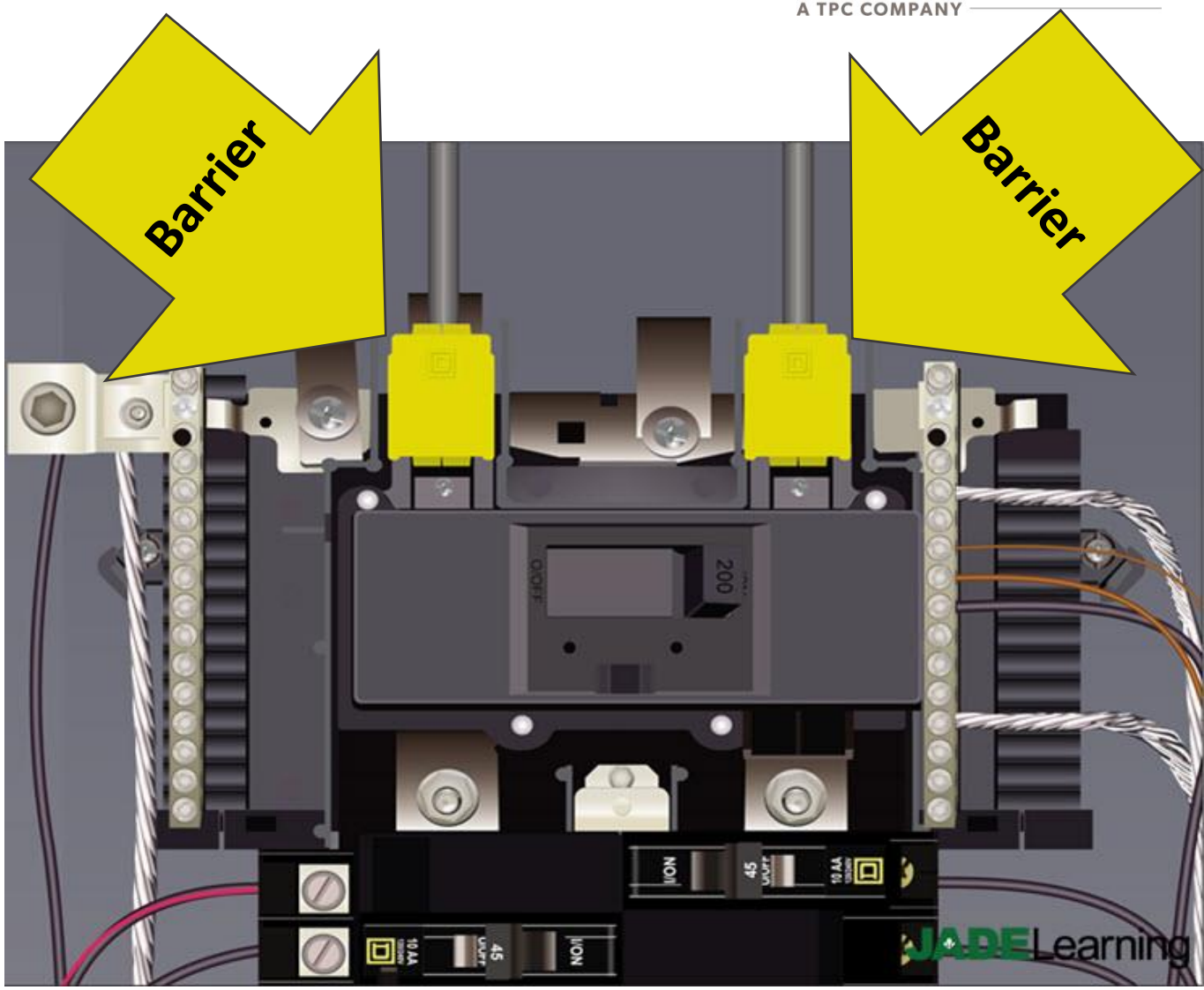
These components must now be *listed* in the 2020 NEC:

1. **Power distribution blocks**
2. **Pressure connectors**
3. **Devices for splices and taps**

230.62(C) Service Equipment- Enclosed or Guarded. Barriers.

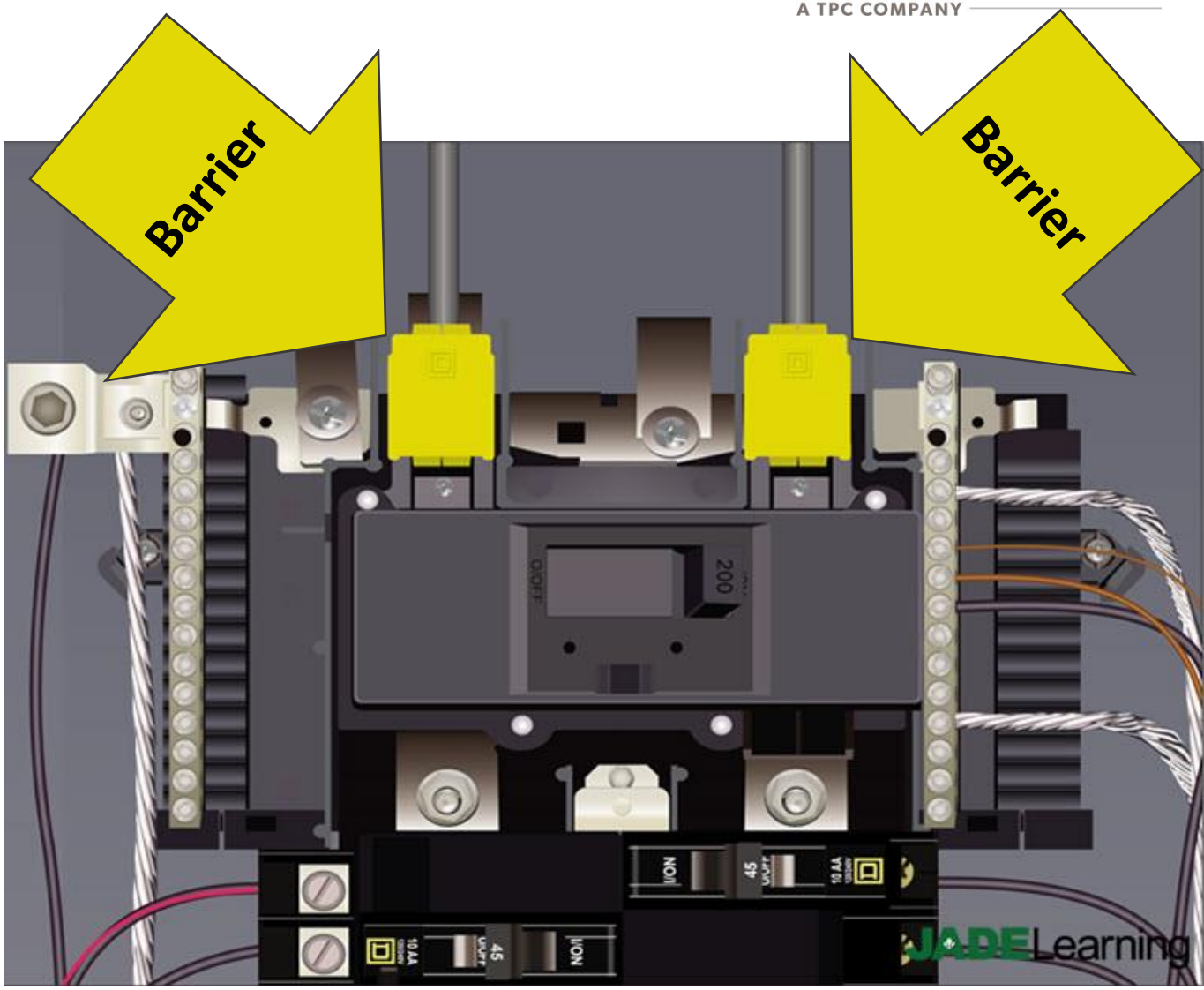
New for 2020 NEC-

- Barrier requirements were revised and moved from Article 408 to Section 230.62(C).
- Barriers are required inside **ALL SERVICE EQUIPMENT** (meaning panels/enclosures that include a **main disconnect**) but they are NOT required inside sub-panels.

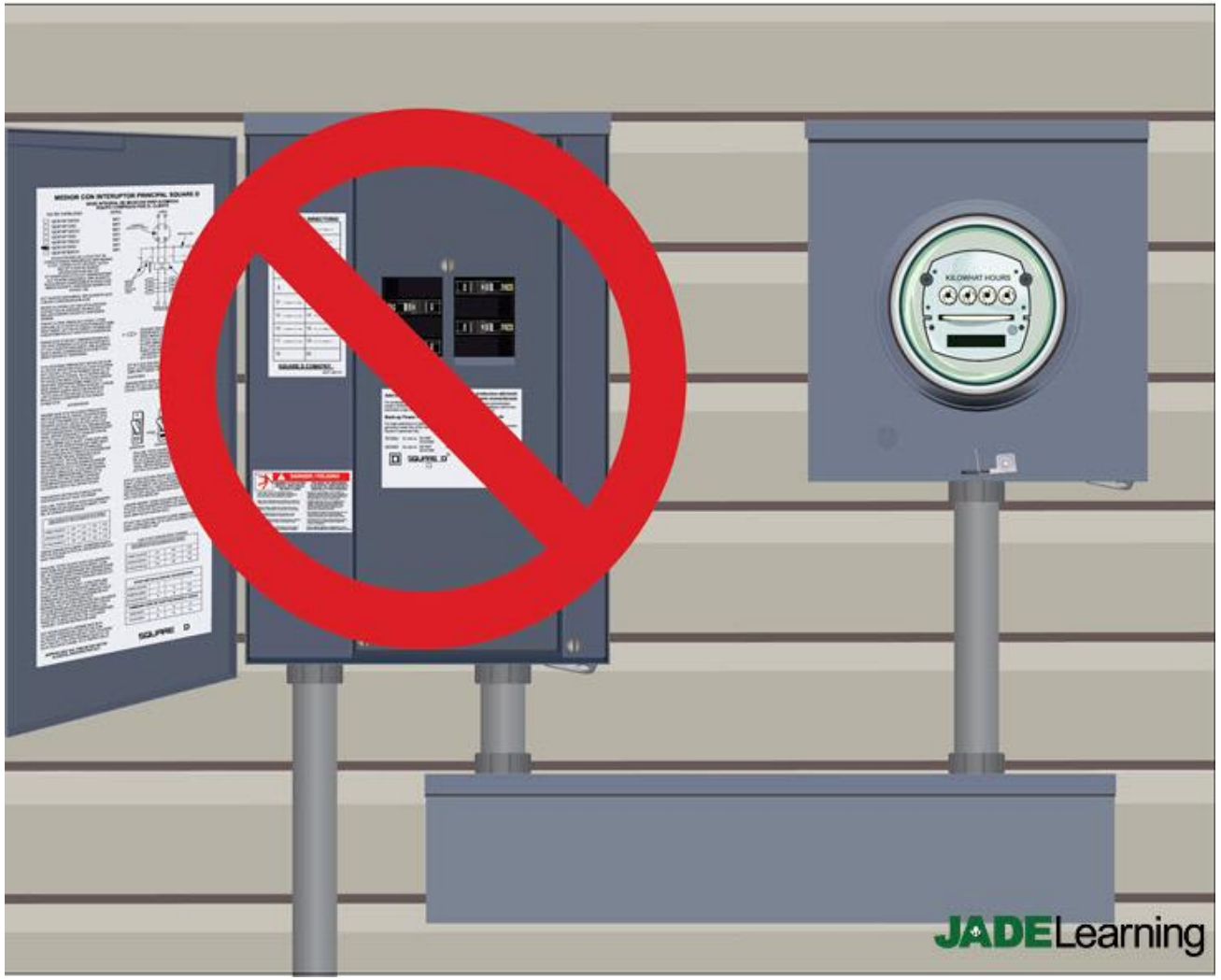


230.62(C) Service Equipment- Enclosed or Guarded. Barriers.

New 2020 Code Language:
230.62(C) Barriers. *Barriers shall be placed in service equipment such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations.*



230.71 Maximum Number of Disconnects.



New for 2020 NEC-

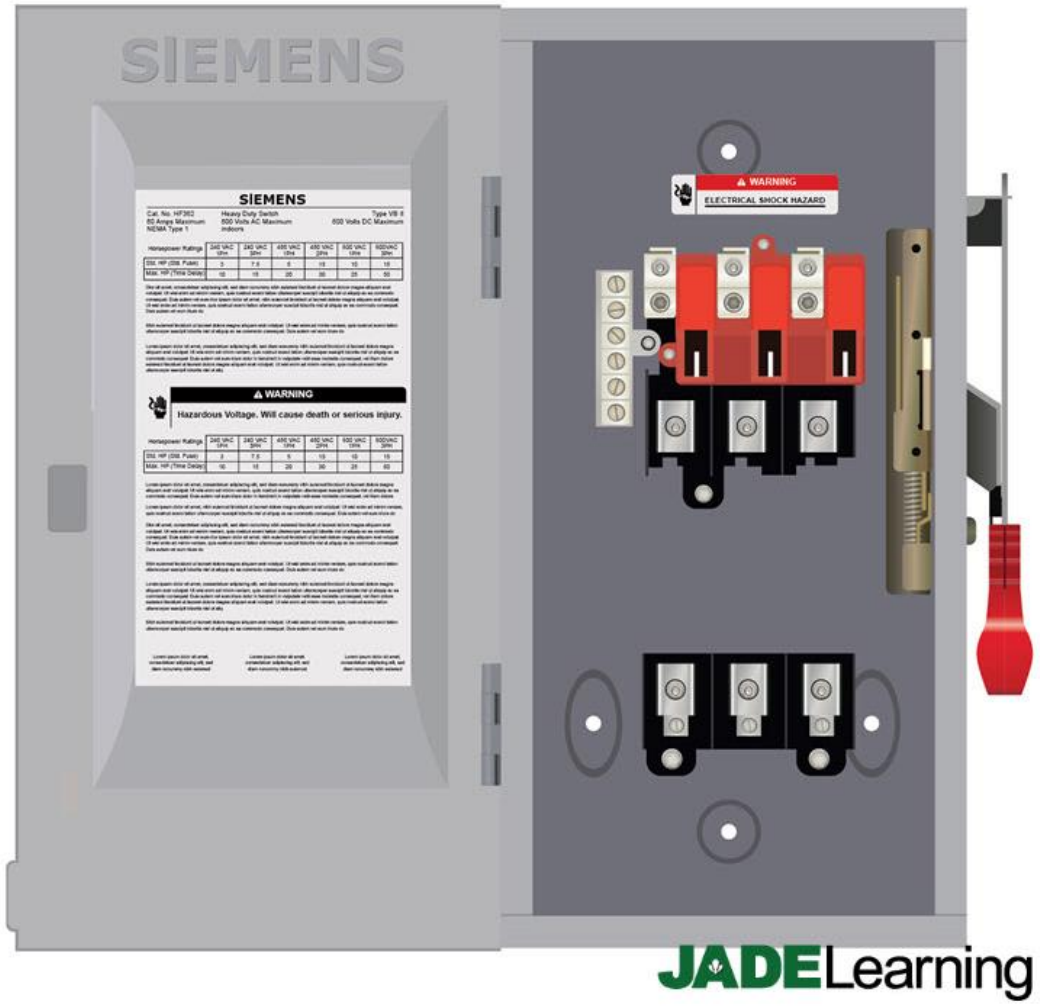
- In 2020 NEC, six switches are no longer allowed inside one enclosure to function as a building's service disconnect.
- Six switches can still serve as one building's service disconnect, but the switches must now occupy separate enclosures.

230.85 Emergency Disconnects.

New for 2020 NEC-

- Section 230.85 requires all one- and two-family homes to have an **EXTERIOR EMERGENCY DISCONNECT**.
- The normal service equipment (if exterior mounted) can serve as the required emergency disconnect— if labeled correctly.
- **A meter base with built-in disconnect switch** can also serve as this required emergency disconnect, but it CANNOT serve as the service equipment.

240.62, 240.88, 240.102 Reconditioned Equipment.



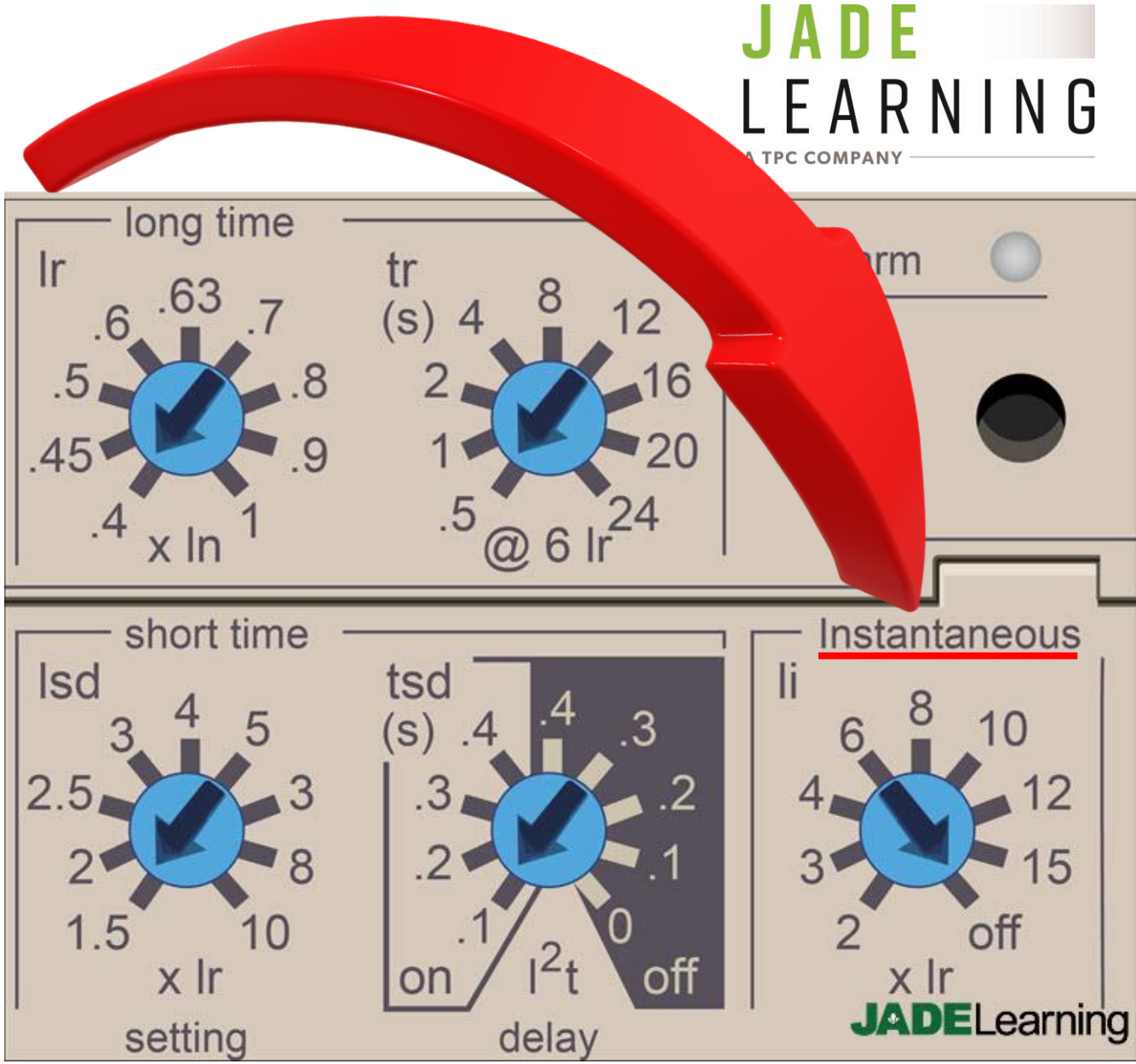
Three new Code sections*: 240.62, 240.88, & 240.102* have been added to the 2020 NEC to address RECONDITIONED EQUIPMENT—

- Low-voltage (1000 volts or less) and medium-voltage (over 1000 volts) fuseholders and nonrenewable fuses are NOT permitted to be reconditioned.
- Molded-case circuit breakers are NOT permitted to be reconditioned, but low- and medium- power circuit breakers, as well as high-voltage circuit breakers are permitted to be reconditioned.

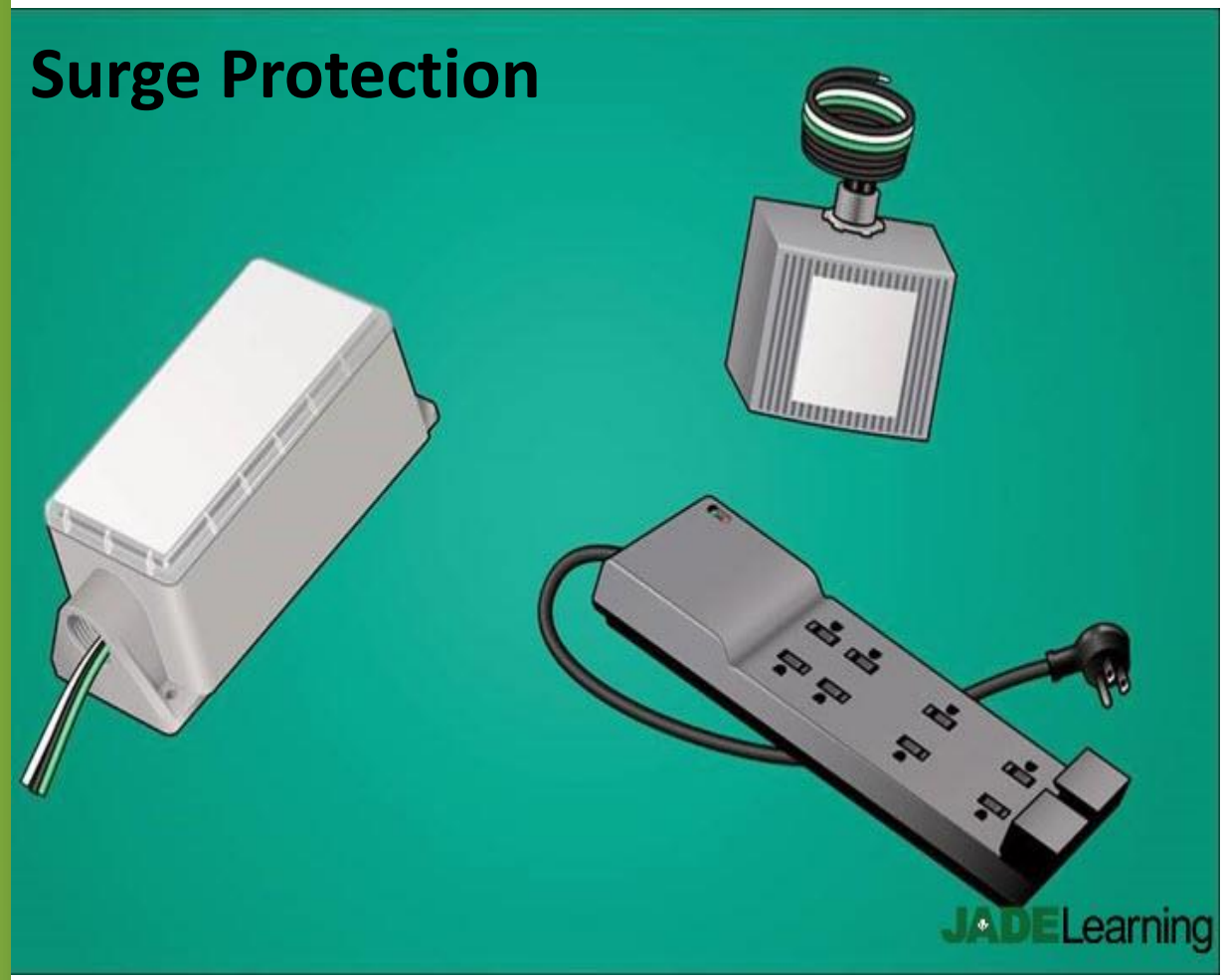
240.87 Arc Energy Reduction.

New for 2020 NEC-

- Arc energy reduction systems must be set to operate at less than the available arcing current of the circuit.
- But temporary adjustment of the instantaneous trip setting is not permitted as a means of compliance.
- Documentation of the system and performance testing must be made available to the AHJ.



242 Overvoltage Protection.



New for 2020 NEC-

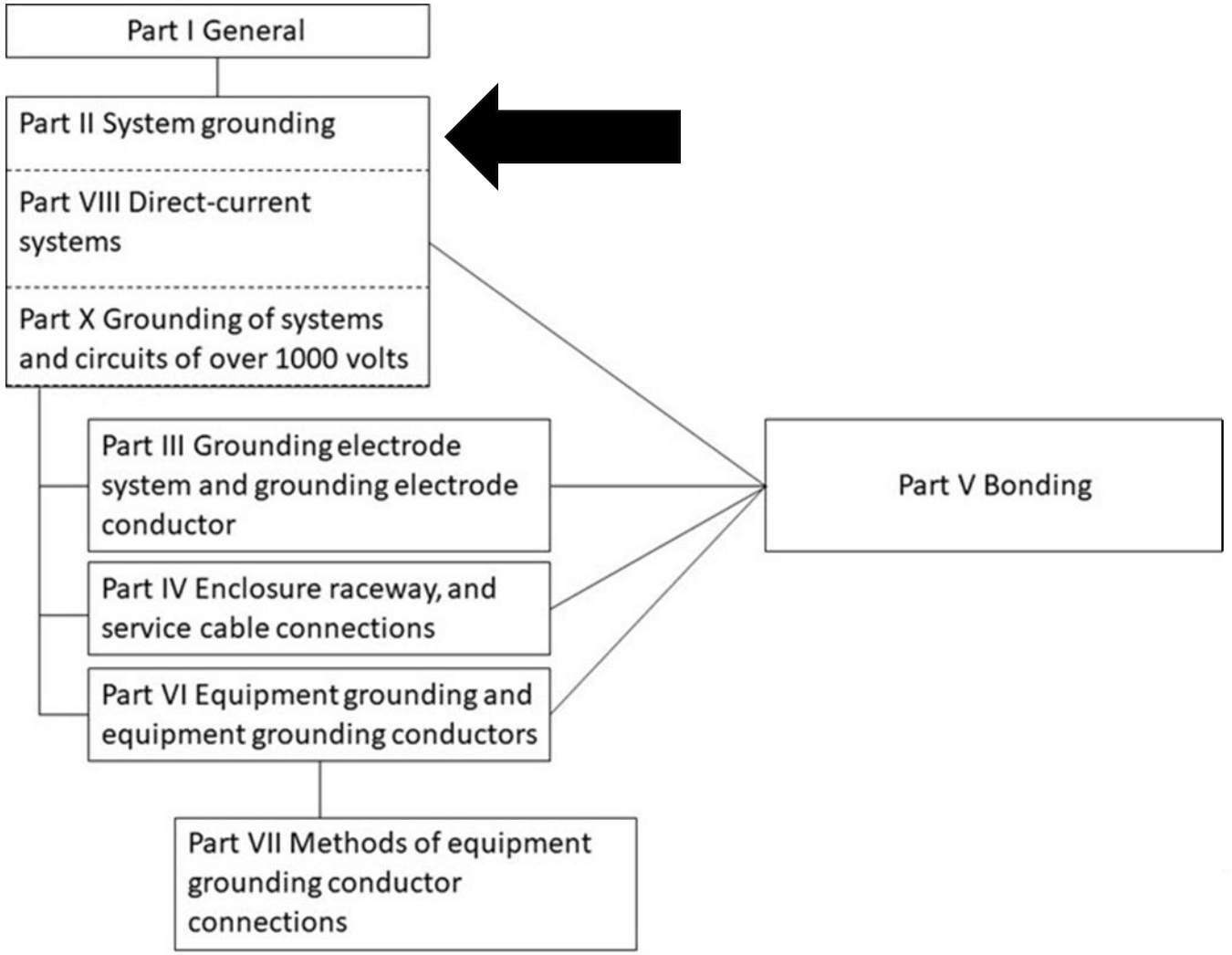
- Brand-new Article 242 now replaces Code requirements previously found in Articles 280 and 285 in the 2017 NEC.
- Four types of **Surge-Protective Device installations** are covered in this new Article:

1. **Line side of service disconnect.**
2. **Load side of service disconnect.**
3. **Portable equipment (multi-outlet plug strip).**
4. **Built into the equipment.**

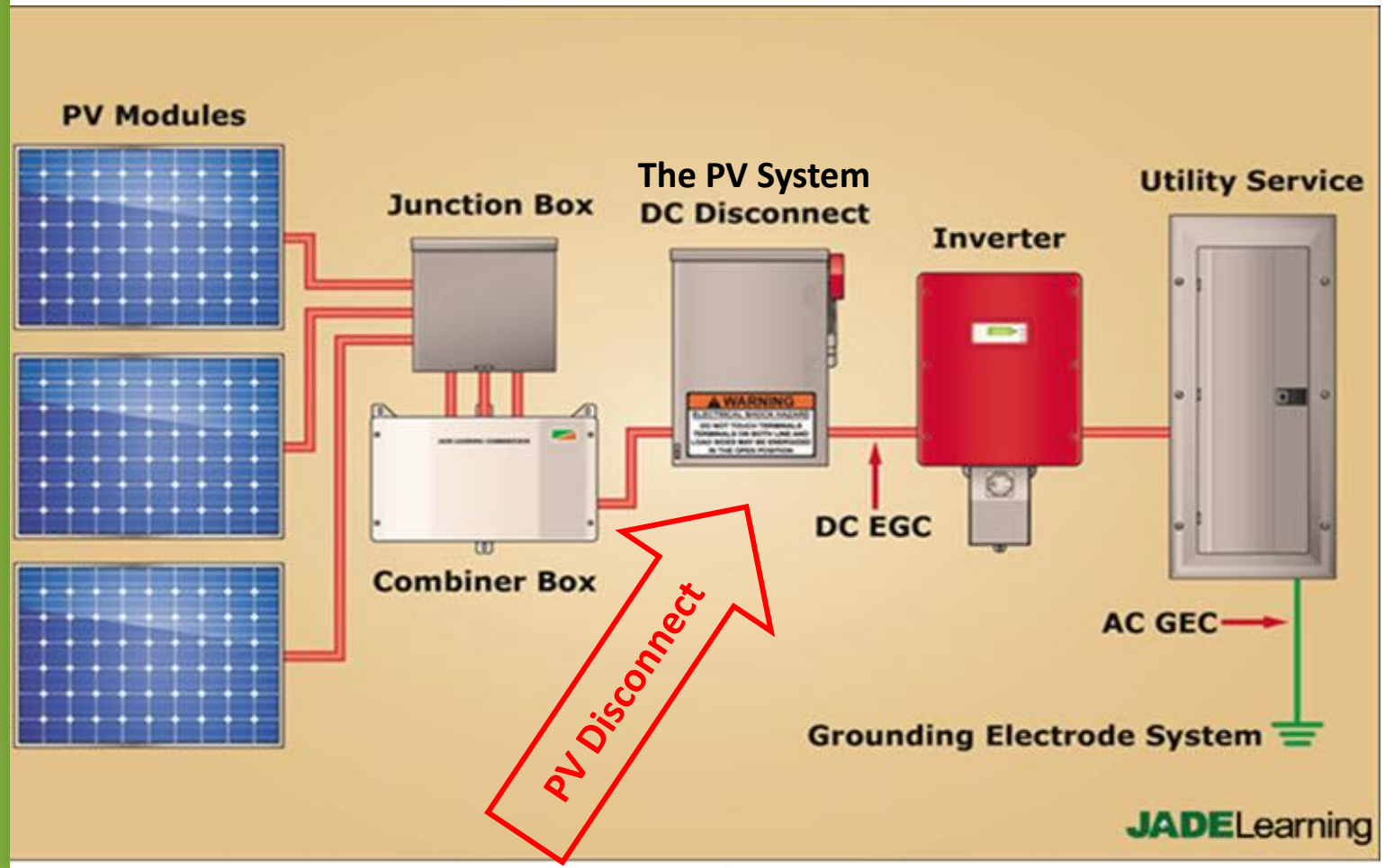
250 Grounding and Bonding.

New for 2020 NEC-

- Figure 250.1 was revised to more accurately reflect the contents of Article 250.
- The definition for “Supply-Side Bonding Jumper” was moved from NEC 250.2, to Article 100 *Definitions*.
- The phrase “*and Bonding*” was removed from Article 250, Part II.



250.25 Grounding Systems Permitted to be Connected on the Supply Side of the Disconnect.



New for 2020 NEC-

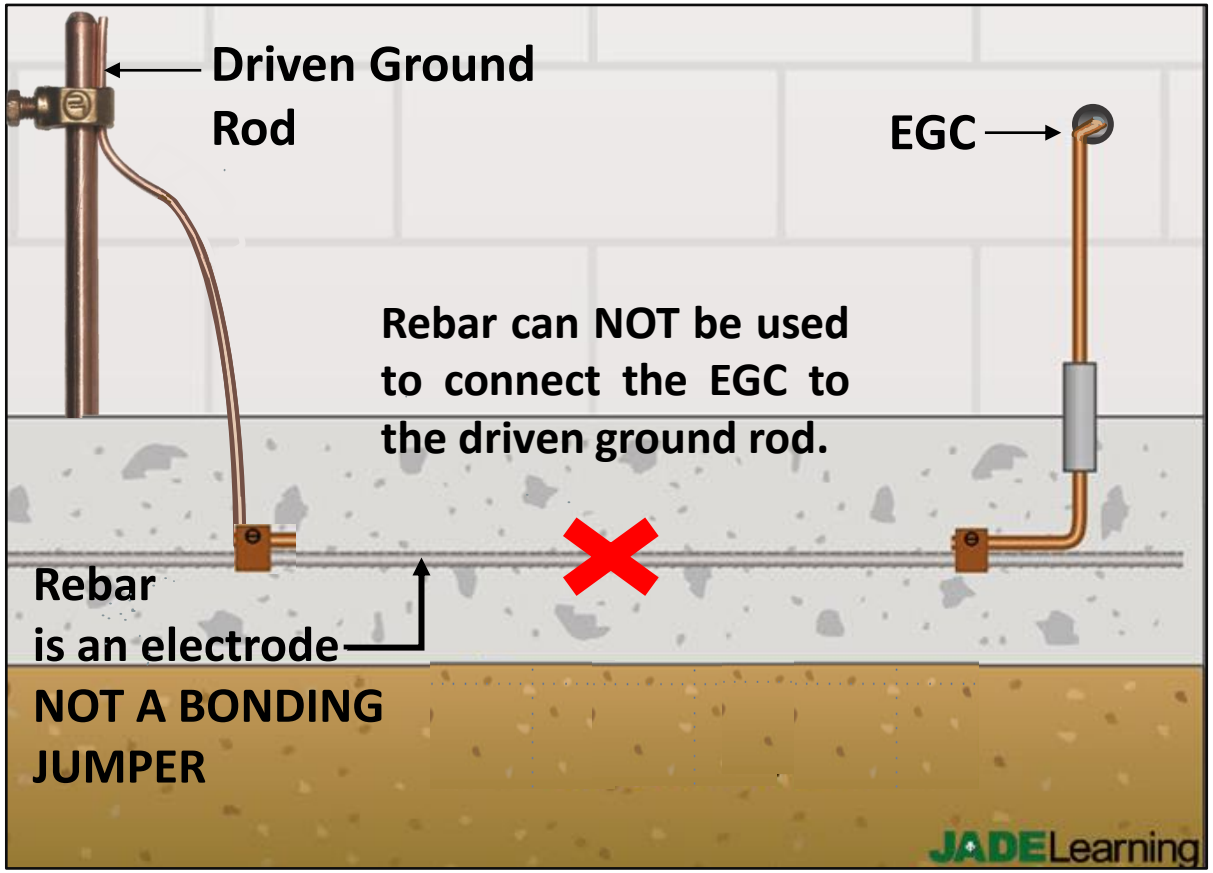
PV system disconnects and similar disconnects that act as the service equipment for add-on electrical systems, when connected to the supply-side of utility-fed electrical systems, now require grounding and bonding according to brand-new Code section 250.25.

Nothing in previous editions of the NEC mentioned these types of disconnects.

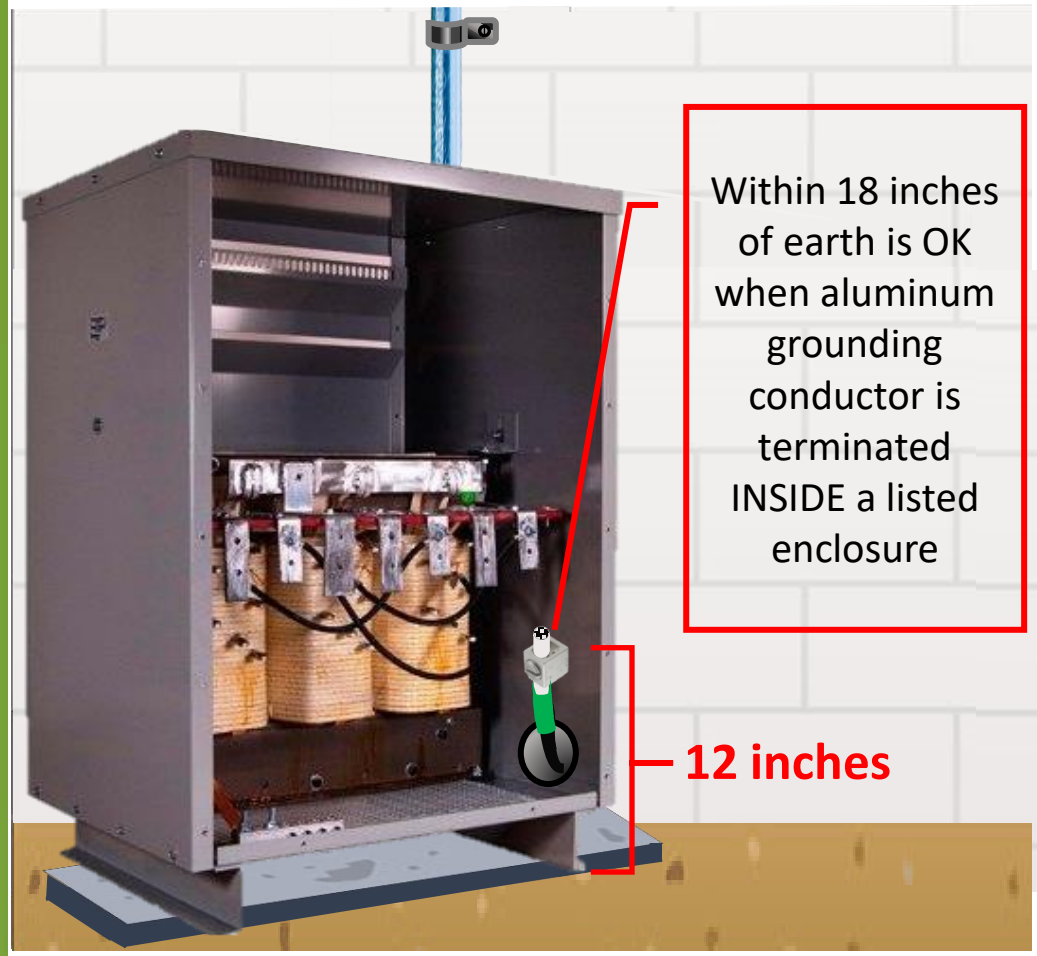
250.53(C) Grounding and Bonding. Grounding Electrode System Installation. Bonding Jumper.

New for 2020 NEC-

- Rebar in a concrete foundation must be used as a grounding electrode but the rebar cannot be used as a bonding jumper to tie together other electrodes.
- A separate bonding jumper (not rebar) must be used to interconnect the electrodes of the grounding electrode system.



250.64(A) Grounding Electrode Conductor. Aluminum or Copper-Clad Aluminum Conductors.



New for 2020 NEC-

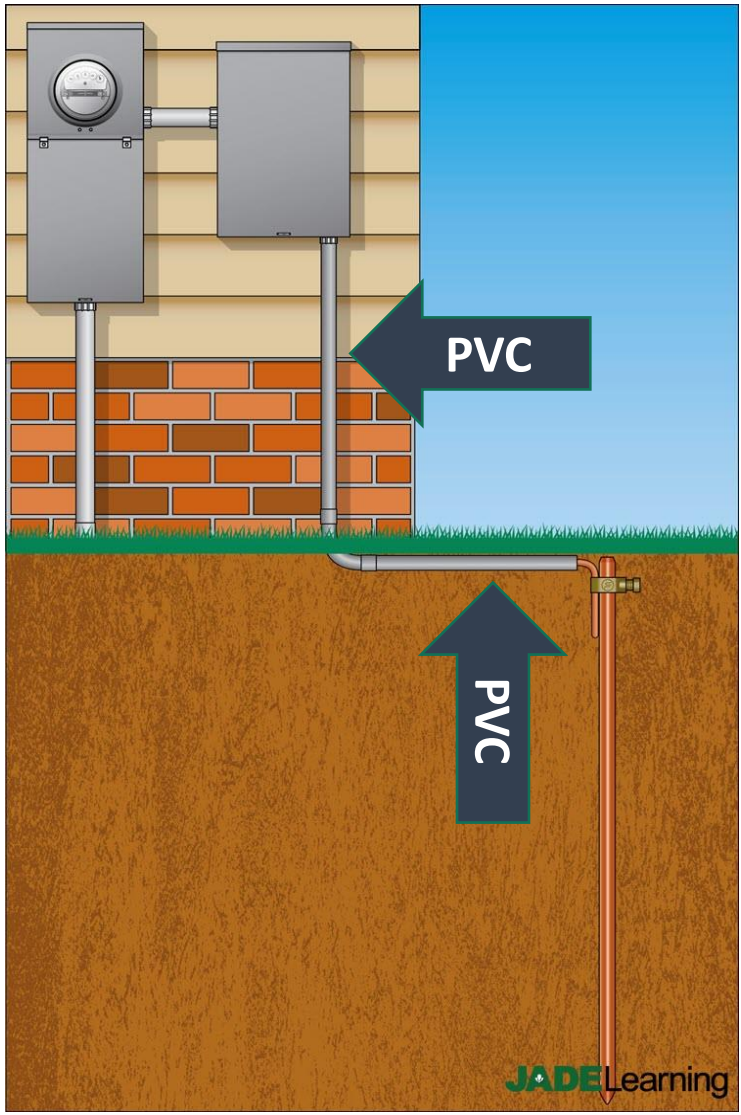
- Outdoor aluminum or copper-clad aluminum conductors are still not permitted to terminate within 18 inches of the earth.
- New 2020 NEC makes it clear: Aluminum conductors **inside of outdoor enclosures** listed for their environment **are** permitted to terminate within 18 inches of the earth.

250.64(B)(2) & (B)(3) Grounding Electrode Conductor Protection for Physical Damage.

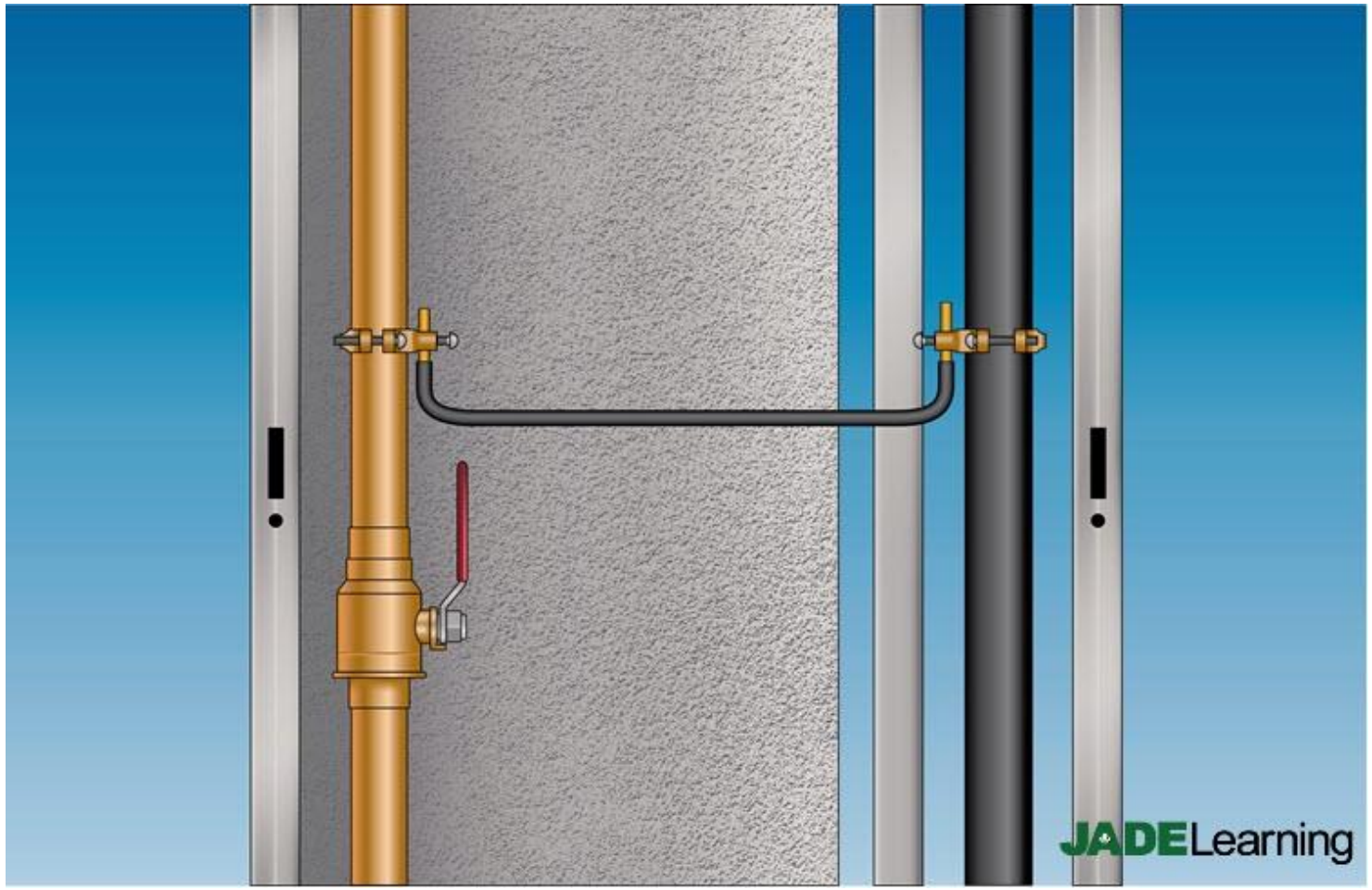
- Size 6 AWG and larger grounding electrode conductors (GECs) must be protected by an approved raceway when exposed to physical damage .
- GECs smaller than 6 AWG must be protected even when NOT exposed to physical damage.

New from the 2020 NEC:

Schedule 80 PVC is now specified as the ONLY type of PVC approved for protecting a GEC from physical damage.



250.104(A)(1) and (A)(3) Bonding Jumpers.



New in 2020 NEC-

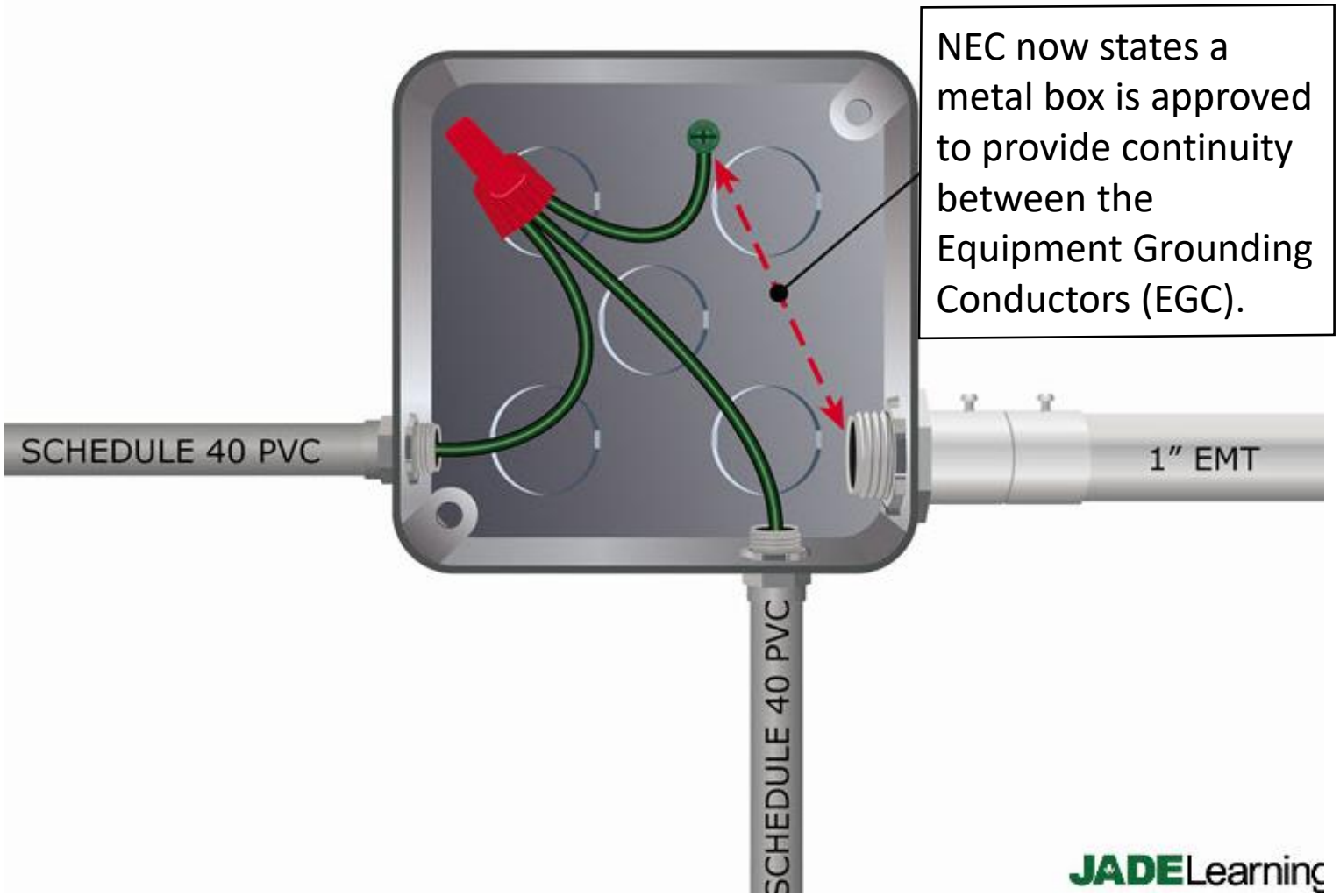
A bonding jumper is still sized from Table 250.102(C)(1) *except that it shall not be required to be larger than 3/0 copper or 250 kcmil aluminum or copper-clad aluminum*.

250.109 Metal Enclosures.

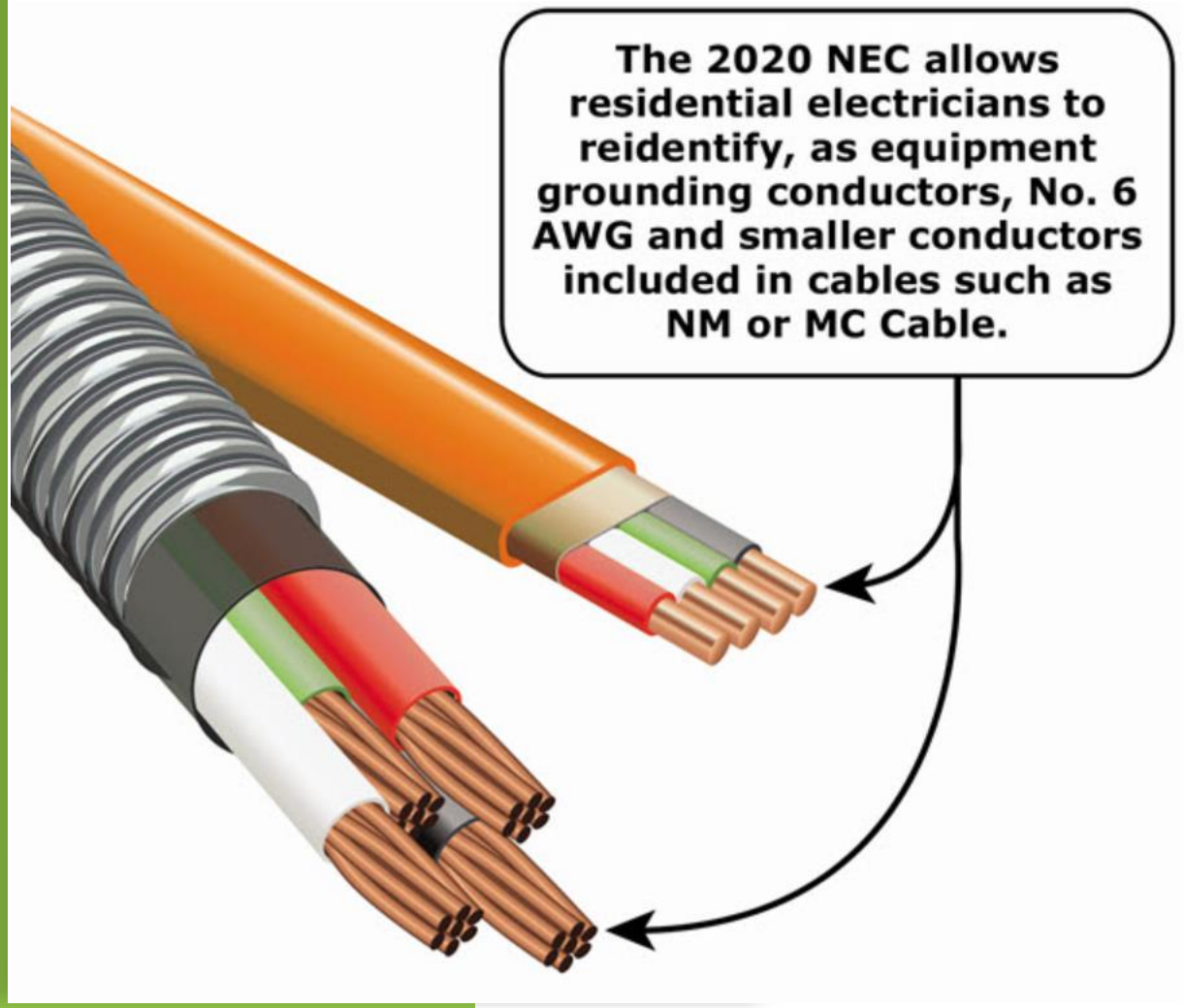
New for 2020 NEC-

The 2020 NEC now declares a metal box can provide continuity between equipment grounding & bonding conductors.

In this image the metal box establishes continuity between the bonding jumper and the 1-inch EMT.



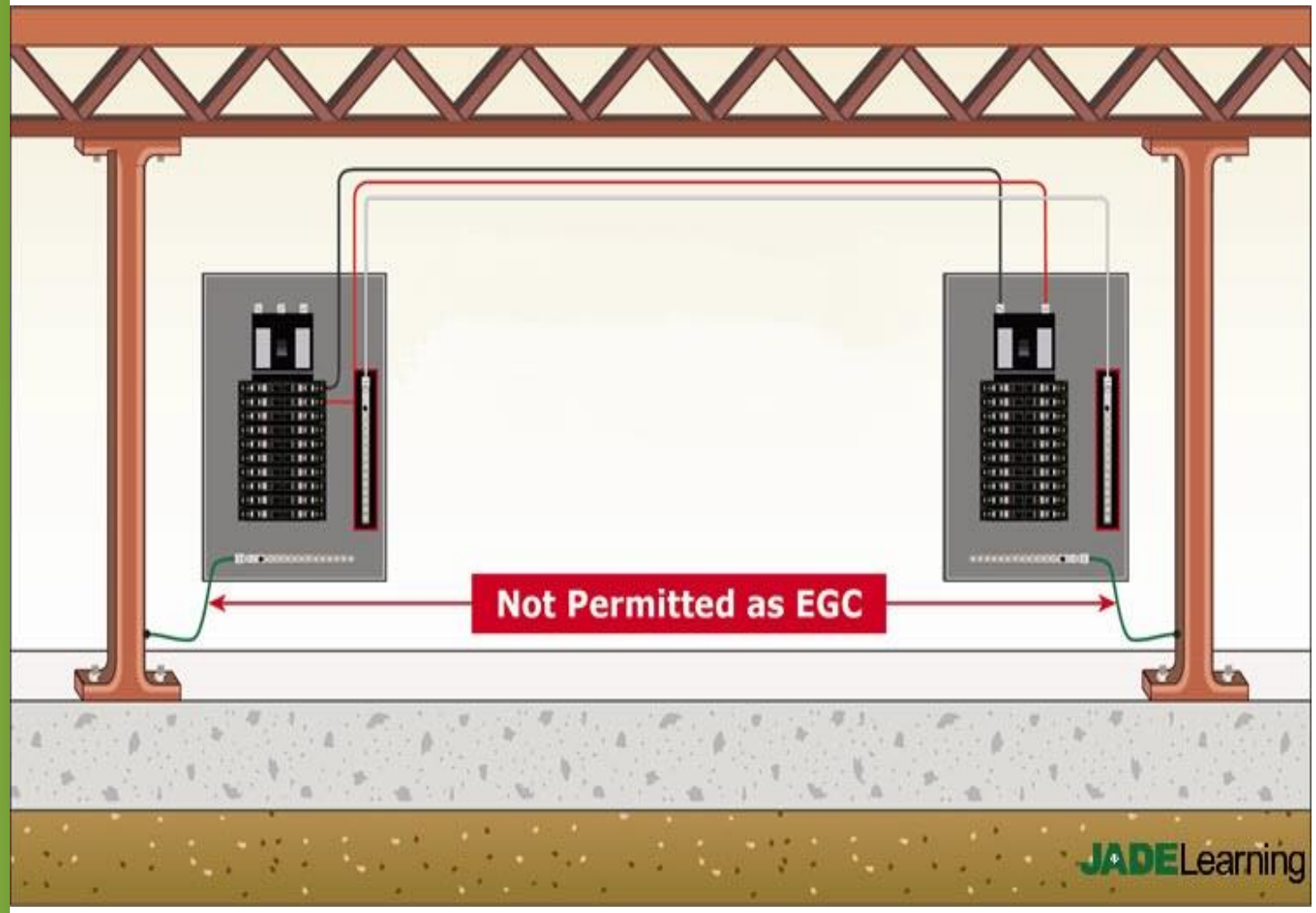
250.119 Identification of Equipment Grounding Conductor.



New for 2020 NEC-

- Electricians are no longer prohibited from reidentifying size 6 AWG and smaller conductors as equipment grounding conductors (EGC).
- In previous Code cycles, reidentifying an EGC was only permitted in a supervised location.

250.121(B) Restricted Use of Metal Frames.



New for 2020 NEC-

250.121(B) says the structural metal framing of a building or structure shall not be used as an equipment grounding conductor (EGC).

The NEC is indicating here that metal buildings are not allowed as electrical paths for fault current.

250.122 Size of Equipment Grounding Conductors.

New for 2020 NEC-

- A EGC no longer needs to be increased in size due to high ambient temperatures or when bundling 4 or more conductors.
- However, EGC size may need to be increased to address voltage drop caused by long conductors, and the increase can now be calculated by a qualified person instead of the NEC.

TABLE 250.122 MINIMUM SIZE EQUIPMENT GROUNDING CONDUCTORS FOR GROUNDING RACEWAY AND EQUIPMENT

RATING OR SETTING OF AUTOMATIC OVERCURRENT DEVICE IN CIRCUIT AHEAD OF EQUIPMENT, CONDUIT, ETC., NOT EXCEEDING (AMPERES)	Size (AWG or kcmil)	
	COPPER	ALUMINUM OR COPPER-CLAD ALUMINUM
15	14	12
20	12	10
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1
500	2	1/0
600	1	2/0
800	1/0	3/0
1000	2/0	4/0
1200	3/0	250
1600	4/0	350
2000	250	400
2500	350	600
3000	400	600
4000	500	750
5000	700	1250
6000	800	1250

Table 250.122 Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment.

New for 2020 NEC-

Table 250.122 has increased the size requirement for Aluminum or Copper-Clad Aluminum EGCs **from 1200 kcmil to 1250 kcmil** for circuits protected by 5,000- and 6,000-amp overcurrent devices.

TABLE 250.122 MINIMUM SIZE EQUIPMENT GROUNDING CONDUCTORS FOR GROUNDING RACEWAY AND EQUIPMENT

RATING OR SETTING OF AUTOMATIC OVERCURRENT DEVICE IN CIRCUIT AHEAD OF EQUIPMENT, CONDUIT, ETC., NOT EXCEEDING (AMPERES)	Size (AWG or kcmil)	
	COPPER	ALUMINUM OR COPPER-CLAD ALUMINUM
15	14	12
20	12	10
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1
500	2	1/0
600	1	2/0
800	1/0	3/0
1000	2/0	4/0
1200	3/0	250
1600	4/0	350
2000	250	400
2500	350	600
3000	400	600
4000	500	750
5000	700	1250
6000	800	1250

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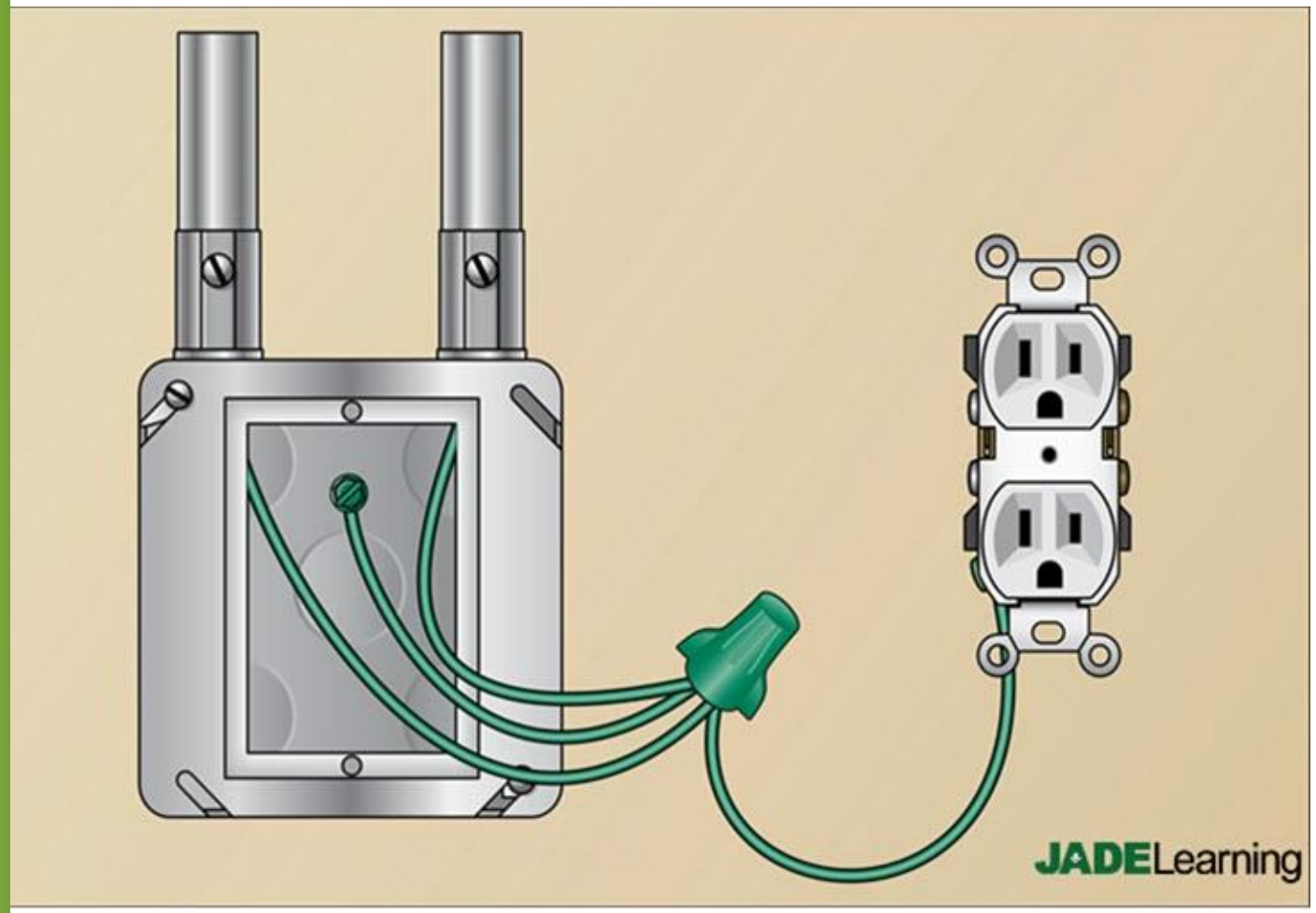
250.148 Continuity of Equipment Grounding Conductors. Attachment in Boxes.



New for 2020 NEC-

- The 2020 NEC has removed the restriction that prohibits solder as the means for connecting EGCs.
- 2020 NEC also makes clear: Only wire-type EGCs are required to adhere to ALL bonding requirements in this Code section.

THANK YOU FOR ATTENDING!

Questions?

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