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1996







*Iowa State-Approved*

# Electrical Continuing Education







# Virtual Instructor-Led Training (VILT)



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# Complete Exam Prep and Practice Tests to Prepare You For Your Next Iowa Electrical Exam!

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comprehensive  
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Online Exam Prep

2020 NEC Changes

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# 2020 NEC Challenge



For just \$60, the most important NEC updates for 2020 are at your fingertips.

**Spend less time searching the Code and more time on-the-job with JADE Learning's new 2020 NEC Challenge!**



**Subscribe to the 2020 NEC Challenge**



**Receive Questions and Code Explanations for a Year**



**Master the 2020 NEC!**





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**2020 NEC Changes**

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# INSTALLING PHOTOVOLTAIC SYSTEMS

*Based on the NEC*

## Solar PV Training Course Based on the NEC

Learn:

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



**ONLY  
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Installing  
Photovoltaic  
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**Email or Call JADE Learning for more information**



**1(800)443-5233**



[support@jadelearning.com](mailto: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**



# Iowa



## 2020 NEC Changes CHAPTER 7

- 2-Hours Credit

Welcome Iowa



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# 2020 NEC Changes Chapter 7



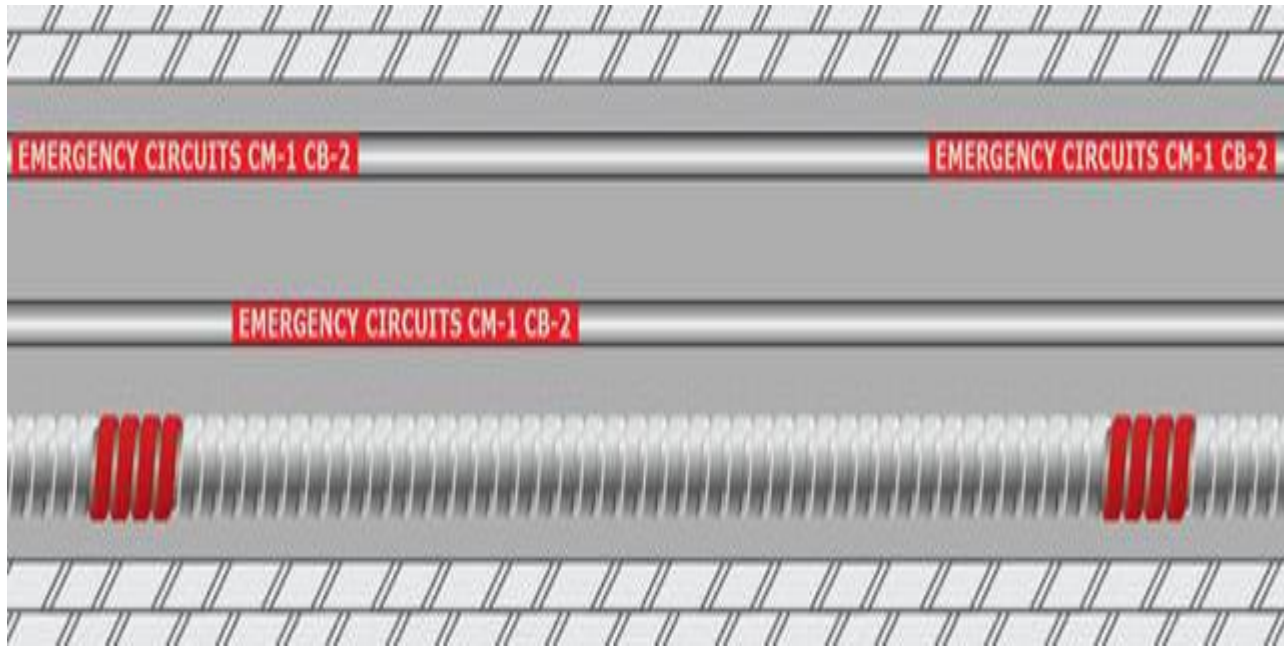
# 700.5(A) Emergency Systems. Transfer Equipment.

## New in the 2020 NEC:

- Meter-mounted transfer switches are no longer permitted for emergency system use.
- All emergency system transfer switches must now be listed and marked for emergency use.



# 700.12(B), (H), Emergency Systems. General Requirements. Equipment Design and Location. DC Microgrid Systems.



## New in the 2020 NEC:

- The 2020 NEC requires emergency system equipment not protected by a fire suppression system to be in a space with a 2-hour fire rating (2017 NEC required 1 hour).
- DC microgrid systems are now permitted for emergency system use.

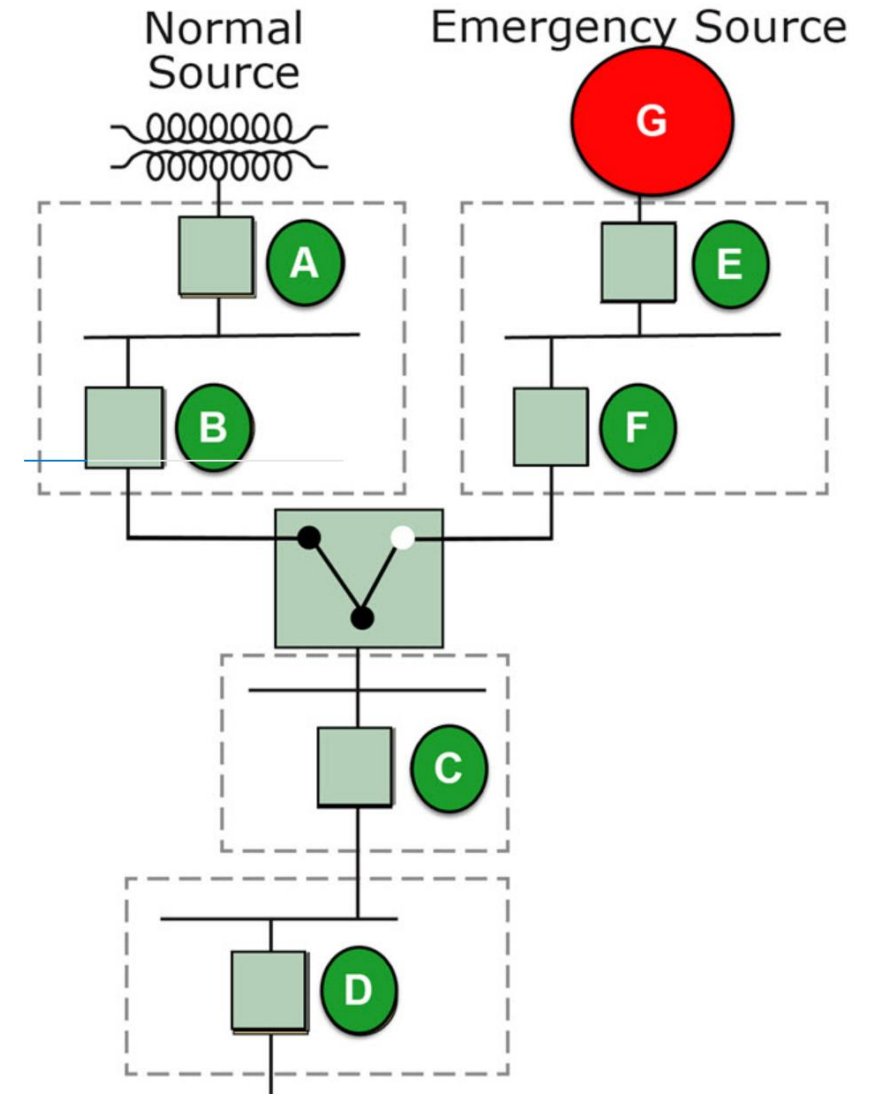


# 700.32 Emergency Systems. Selective Coordination.

## New in the 2020 NEC:

A new informational note and diagram have been added to Section 700.32 in the 2020 NEC. The new diagram provides an example of the relationships of OCPDs in a selectively coordinated emergency system.

*What is Selective Coordination?*



# 702.7(A) Optional Standby Systems. Signs. Standby.



## New in the 2020 NEC:

Section 702.7(A) now contains separate sign requirements for Optional Standby Systems at commercial and industrial properties vs. one- and two-family dwellings.

- For commercial and industrial installations, a sign must be posted near the service entrance equipment.
- For one- and two-family dwellings, a sign must be placed at the service disconnecting means required in NEC 230.85; it must indicate the location of each on-site optional standby power source disconnect.



# 706.1, 706.2 Energy Storage Systems. Scope. Definitions.

- This section applies to Emergency Storage Systems (ESS) having a capacity greater than 1kWh.
- A new informational note states ESS can include batteries, capacitors, and kinetic energy devices (*e.g., flywheels and compressed air*).



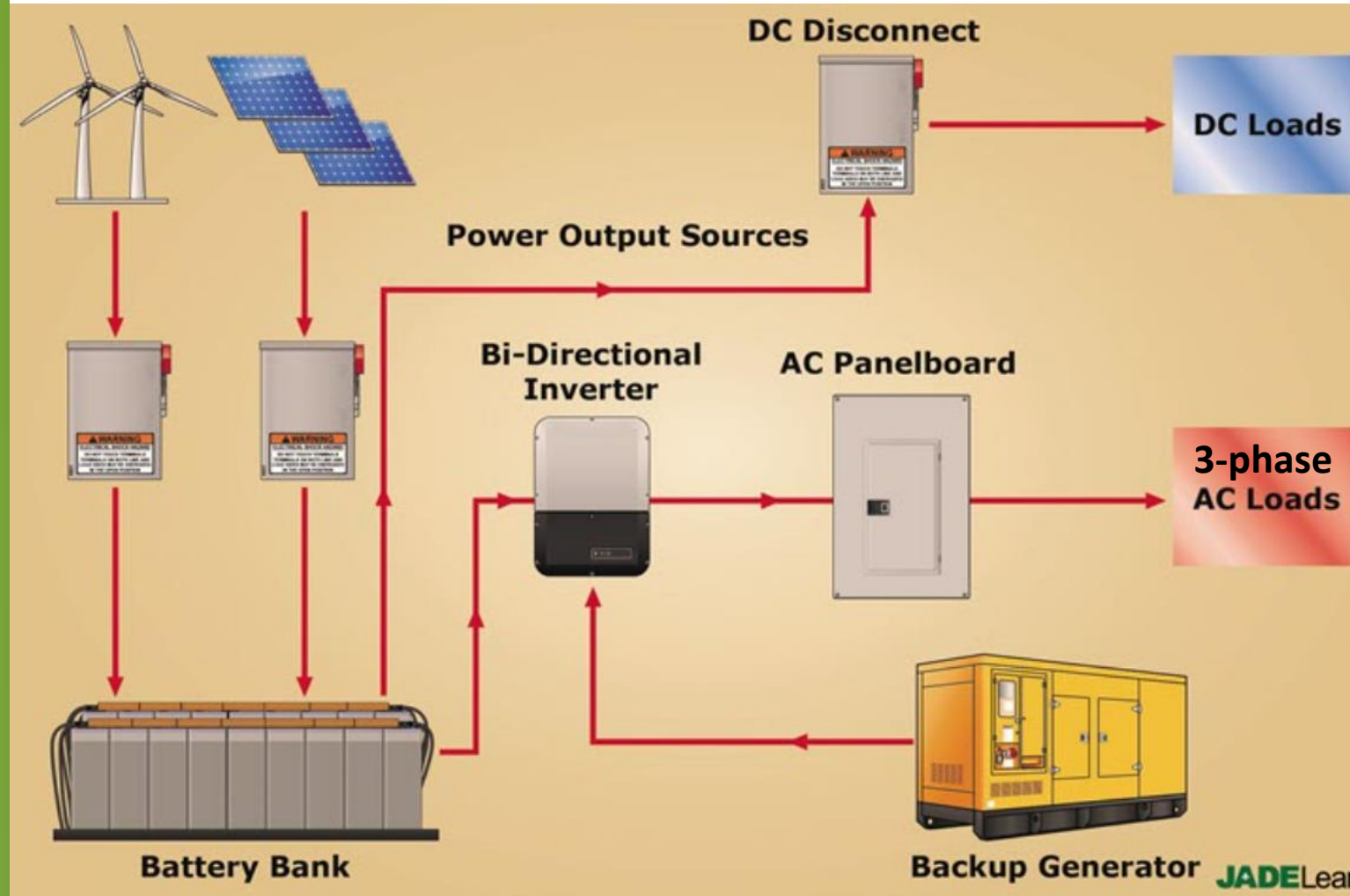
# 708.24(D) COPS. Bypass Isolation Automatic Transfer Switches.

- 708.24(D) addresses *Bypass Transfer Switches for COPS (Critical Operations Power Systems)*. These systems supply power to essential operations if primary power is lost.
- The 2020 NEC now requires a bypass isolation switch if there is only one automatic transfer switch in the COPS.
- Bypass isolation switches allow repair to COPS systems without power loss to critical systems.





# 710.15 Stand-Alone Systems. General.



## New in the 2020 NEC:

Stand-alone systems may now power three-phase systems.

Stand-alone systems are not connected to any electric power production & distribution network(s).

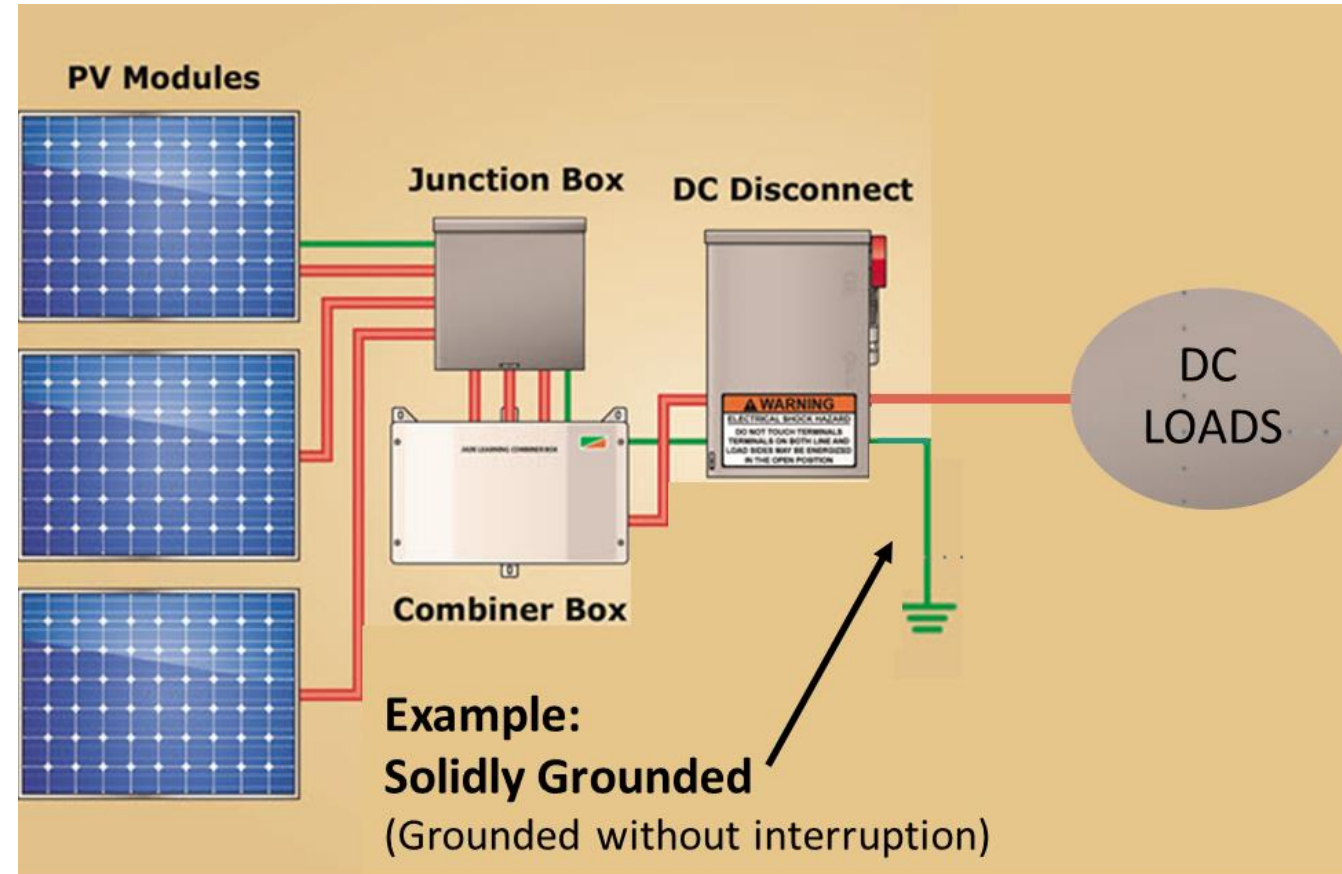
Meaning stand-alone systems are “off-grid” and not connected to the utility provider.

## 712.2 DC Microgrids. Definitions. Grounded, Functionally.

New in the 2020 NEC, a revised definition for:

**Grounded, Functionally** is not grounded without interruption, but instead is grounded through an in-line resistor, inverter, or similar.

**NOTE: Grounded, Solidly** means connected to ground without inserting any resistors or impedance devices.



# 712.10 DC Microgrids. Directory.



## New in the 2020 NEC:

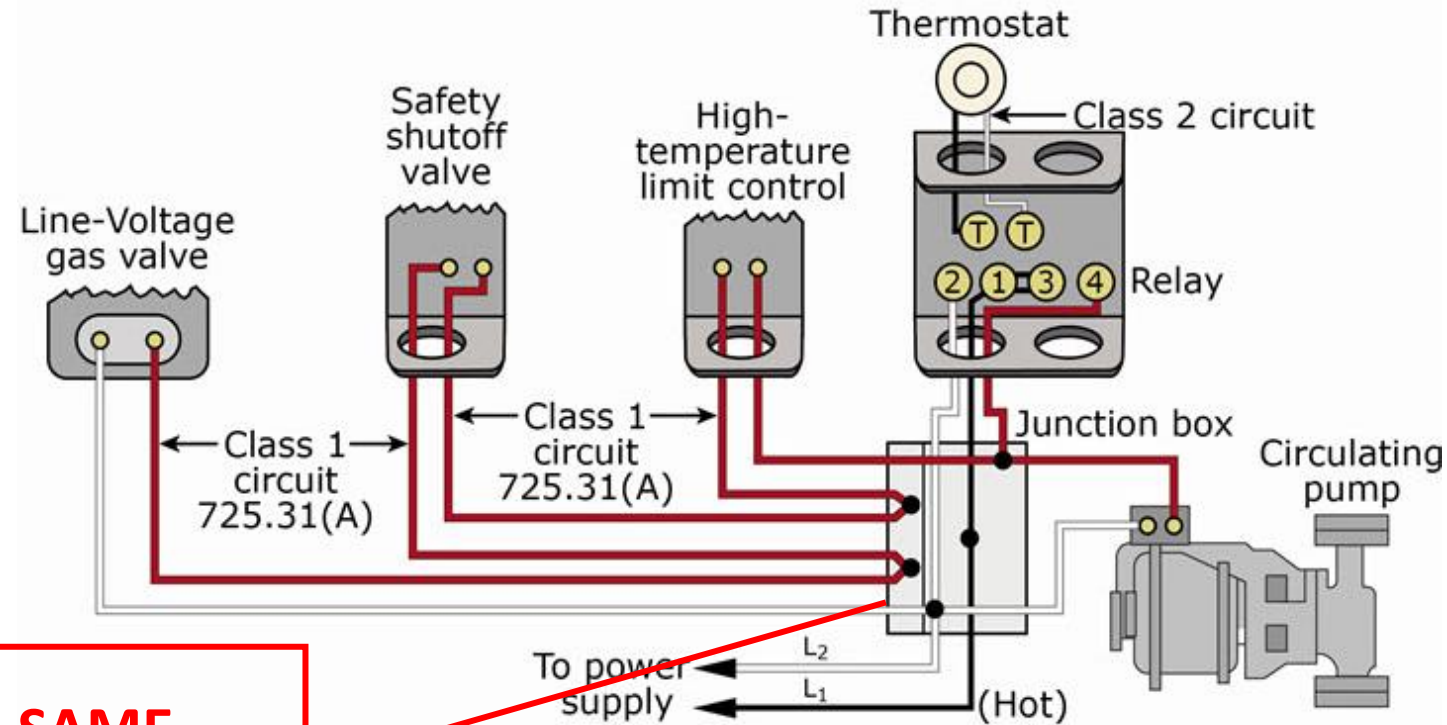
A building supplied by a dc microgrid system must have a permanent plaque or directory installed outside the building at each service equipment location or at an approved readily visible location. The plaque or directory must indicate the location of each power source disconnecting means on or in the building or be grouped with other plaques or directories for other on-site power sources.



# 725.48(B)(1) Class 1, 2, & 3 Remote-Control, Signaling and Power-Limited Circuits. Class 1 Circuits with Power-Supply Circuits. In a Cable, Enclosure, or Raceway.

## New in the 2020 NEC:

A new permission has been granted allowing Class 1 circuit conductors to occupy the same cable, enclosure, or raceway as power-supply circuits, **even when NOT functionally associated.**



**SAME  
ENCLOSURE!**

# Table 725.144 Class 1, 2, & 3 Remote-Control, Signaling and Power-Limited Circuits. Transmission of Power and Data.

Table 725.144

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Table 725.144 Ampacities of Each Conductor in Amperes in 4-Pair Class 2 or Class 3

Data Balanced Twisted-Pair Cables Based on Copper Conductors at an Ambient Temperature of 30°C (86°F) with All Conductors in All Cables Carrying Current, 60°C (140°F), 75°C (167°F), and 90°C (194°F) Rated Cables

AWG	Number of 4-Pair Cables in a Bundle																	
	1-7			8-19			20-37			38-61			62-91			92-192		
	Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating		
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1.00	1.23	1.42	0.71	0.87	1.02	0.55	0.68	0.78	0.46	0.57	0.67	0.45	0.55	0.64	N/A	N/A	N/A
24	1.19	1.46	1.69	0.81	1.01	1.17	0.63	0.78	0.91	0.55	0.67	0.78	0.46	0.56	0.65	0.40	0.48	0.55
23	1.24	1.53	1.78	0.89	1.11	1.25	0.77	0.95	1.10	0.66	0.80	0.93	0.58	0.71	0.82	0.45	0.55	0.63
22	1.50	1.86	2.16	1.04	1.28	1.49	0.77	0.95	1.11	0.66	0.82	0.96	0.62	0.77	0.89	0.53	0.63	0.72

Note 1: For bundle sizes over 192 cables, or for conductor sizes smaller than 26 AWG, ampacities shall be permitted to be determined by qualified personnel under engineering supervision.

Note 2: Where only half of the conductors in each cable are carrying current, the values in the table shall be permitted to be increased by a factor of 1.4.

Informational Note No. 1: Elevated cable temperatures can reduce a cable's data transmission performance. For information on practices for 4-pair balanced twisted pair cabling, see T1A-T5B-184-A, and 6, 4, 7, 6, 6, 3, and Annex G of ANSI/T1A-568-C.2, which provide guidance on adjustments for operating temperatures between 20°C and 60°C.

Informational Note No. 2: The pre-contact current rating of connectors can limit the maximum allowable current below the ampacity shown in Table 725.144.

Table 725.144 for Class 1, 2, & 3 remote-control, signaling, and power-limited circuit conductors now contains updated ampacities.

# 760.121(B) Fire Alarm Systems. Power Sources for PFLA Circuits. Branch Circuits.

## New in the 2020 NEC:

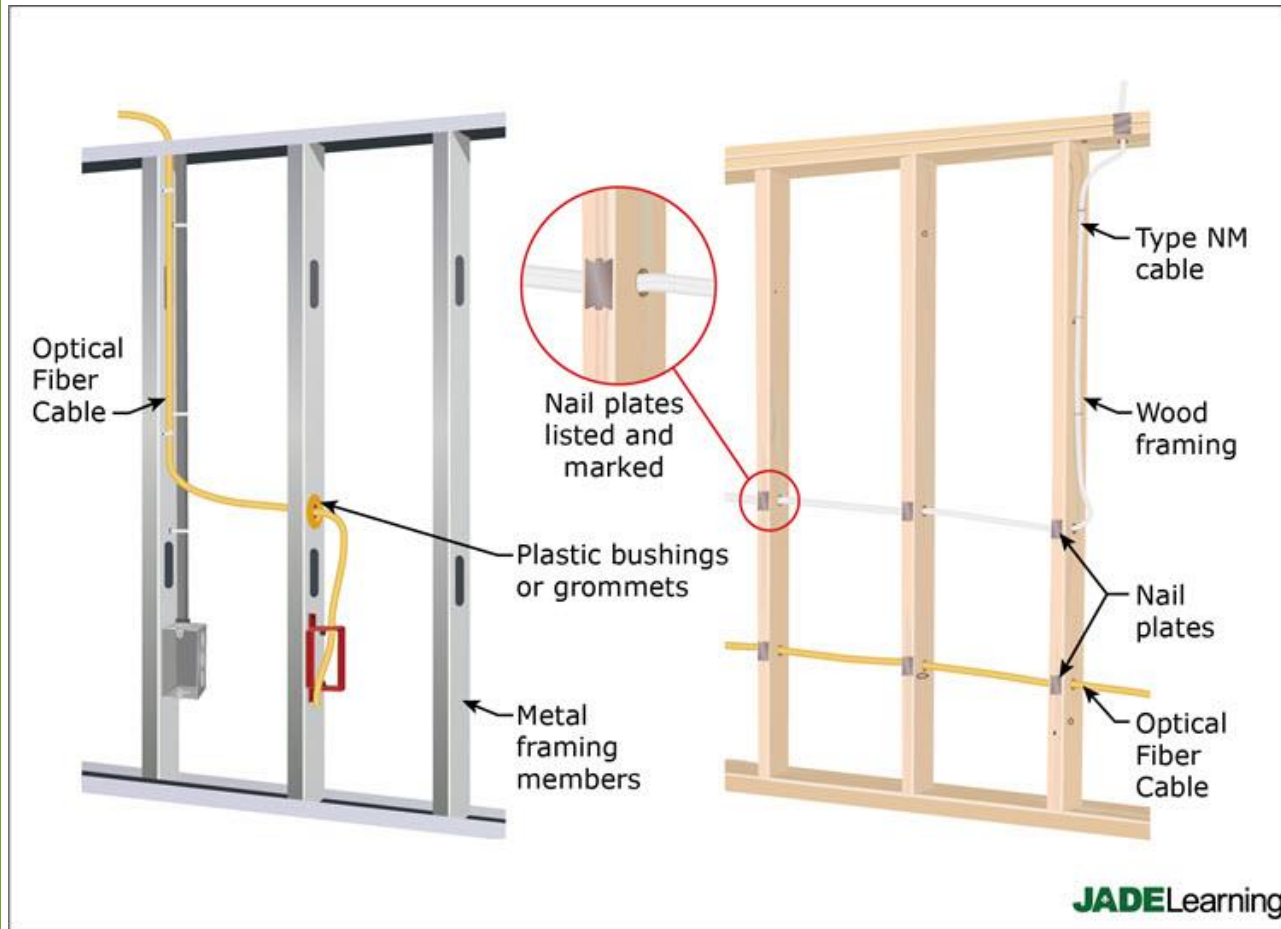
- Section 760.121(B) permits branch-circuit disconnecting means to be secured to the “on” position.
- Breaker lockouts and similar devices may be placed on PFLA OCPDs to keep people from accidentally disconnecting power to PFLA systems.

**(PLFA) = Power-Limited Fire Alarm**





# 770.24 Optical Fiber Cables. Mechanical Execution of Work.



## New in the 2020 NEC:

### For Optical Fiber Cables

- All of Section 300.4 must now be followed.
- Optical fiber cables must now be protected against physical damage.
- Nonmetallic accessories (cable ties) in plenum spaces must now be listed as having low smoke and heat release properties.

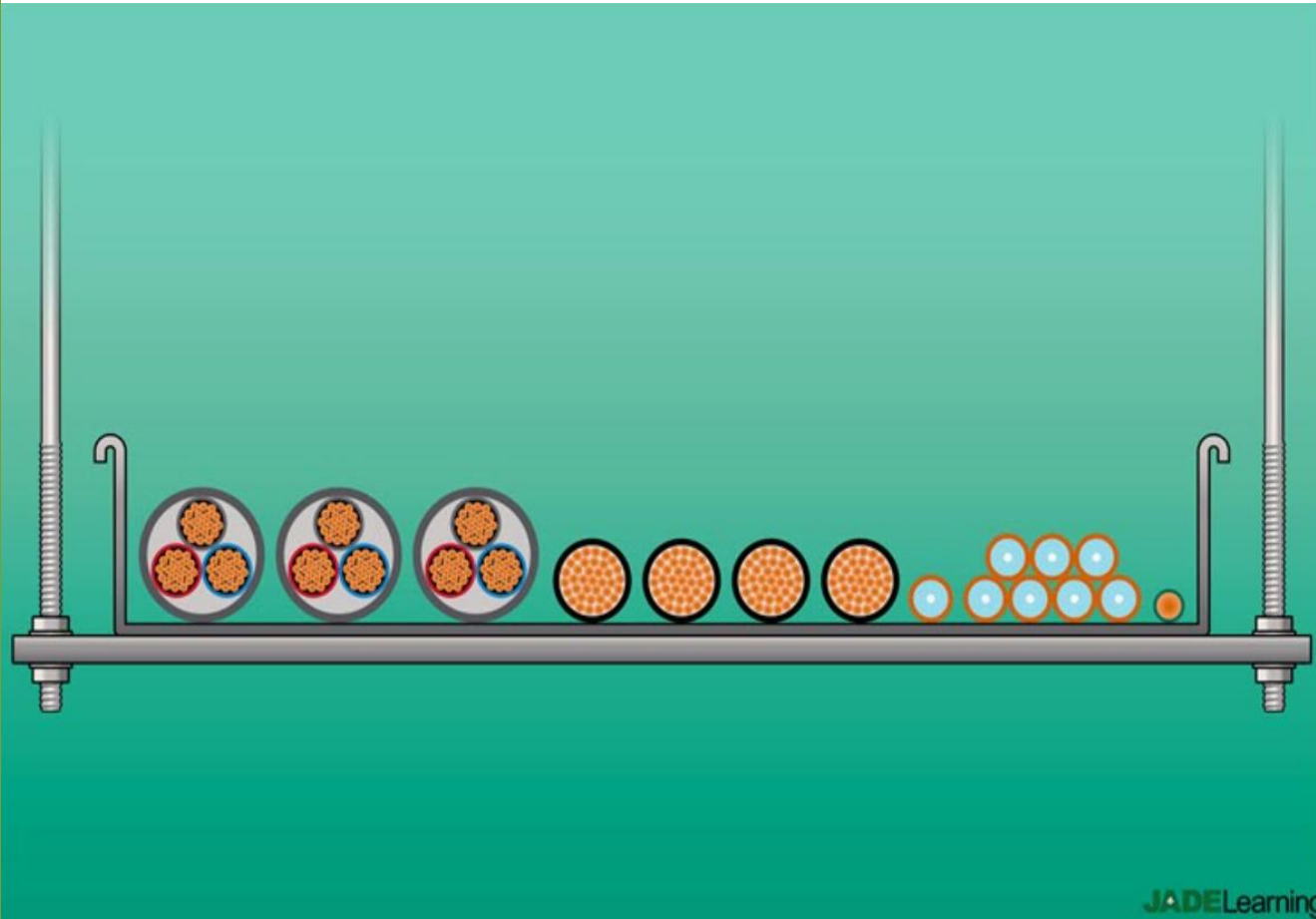
## 770.110(D) Optical Fiber Cables. Cable Trays.

### New in the 2020 NEC:

- Section 770.110(D) was added to the 2020 NEC and permits optical fiber cables to be installed using metal or nonmetallic cable tray systems.
- Nonmetallic cable tray systems must be listed and be flame-retardant and provide voltage isolation.



## 770.133(A), (B) Optical Fiber Cables. Installation of Optical Fibers and Electrical Conductors.



### **New in the 2020 NEC:**

The NEC has determined that armor or metal-clad sheathing covering a optical fiber cable is suitable as a divider against any power and lighting conductors in that same cable tray or raceway.



# THANK YOU FOR ATTENDING!

Questions?

For additional instructor support, please contact  
[instructor@jadelearning.com](mailto:instructor@jadelearning.com)

For questions about your continuing education, please  
contact [registrar@jadelearning.com](mailto:registrar@jadelearning.com)