

LOS ANGELES BASIN CHAPTER OF ICC  
MONTHLY CHAPTER MEETING  
ALHAMBRA, CA

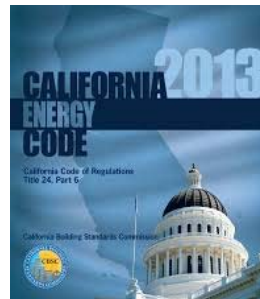
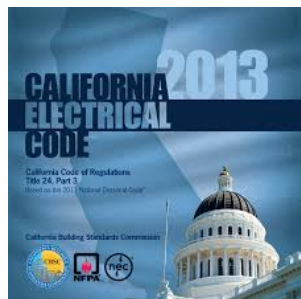


**TOP 10 CHANGES**  
**2013 CALIFORNIA ELECTRICAL CODE**  
**2013 CALIFORNIA ENERGY CODE (ELECTRICAL)**

RON TAKIGUCHI, P.E.

BUILDING OFFICIAL - CITY OF SANTA MONICA  
BOARD OF DIRECTORS – CALBO  
BOARD OF DIRECTORS – LOS ANGELES BASIN CHAPTER

**LOS ANGELES BASIN CHAPTER OF ICC**



**2013 CALIFORNIA ELECTRICAL CODE**  
**2013 CALIFORNIA ENERGY CODE (ELECTRICAL)**

## Top 10



**Statement:**

*The Top 10 Changes are Presented with the Particular Audience in Attendance – Not All Changes are Presented Which May Have an Equal or Greater Effect on Design, Construction and Compliance.*

### **2013 California Building Codes**



State Buildings, Parking Lot & Walkway Lighting for:  
UC, Cal-State, CC



HCD1, HCD2, HCD-AC



OSHPD 1, 2, 3, 4 **NEW** OSHPD 3SE (Special Exemption)

### 2013 California Building Codes



State Buildings, Parking Lot & Walkway Lighting for:  
UC, Cal-State, CC



HCD1, HCD2, HCD-AC



OSHPD 1, 2, 3, 4 **NEW** ~~OSHPD 3SE (Special Exemption)~~



DSA-AC, DSA-SS **NEW** ~~DSA-SS/CC (Community Colleges)~~



SFM

5

### STATE AGENCY AMENDMENTS 2013 CALIFORNIA ELECTRICAL CODE

- BSC
- SFM
- HCD-1
- HCD-2
- OSHPD 3
- DPH
  
- DSA-AC
- DSA-SS
- DSA-SS/CC
- OSHPD 1
- OSHPD 2
- OSHPD 4

## STATE AGENCY AMENDMENTS

### 2013 CALIFORNIA ELECTRICAL CODE

• BSC	2 Amendments
• SFM	7 Amendments
• HCD-1	3 Amendments
• HCD-2	3 Amendments
• OSHPD 3	37 Amendments
• DPH	4 Amendments
• DSA-AC	3 (notes only)
• DSA-SS	0 Amendments
• DSA-SS/CC	0 Amendments
• OSHPD 1	58 Amendments
• OSHPD 2	52 Amendments
• OSHPD 4	55 Amendments

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• OSHPD 4	55 Amendments
<b><i>TOTAL</i></b>	<b><i>74 Amendments</i></b>

## STATE AGENCY AMENDMENTS 2013 CALIFORNIA ELECTRICAL CODE

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<b>TOTAL</b>	<b>74 Amendments</b> ➡ <b>56 Local</b>

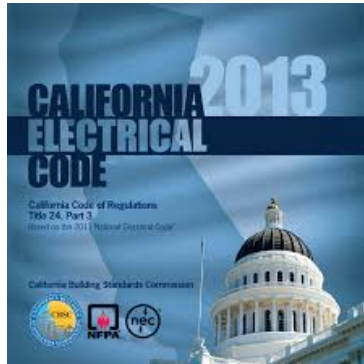
## State Agency Amendments to the 2011 National Electrical Code



### **C** Chapter 1

- A**
- Add definition Ballasted Solar Photovoltaic System  
[BSC, HCD 1, HCD 2, SFM, OSHPD]  
**C** **Ballasted Solar Photovoltaic System** A roof mounted system  
**A** composed of solar photovoltaic panels and supporting members that  
**C** are  
**A** unattached or partially attached to the roof and must rely on their  
**C** weight, aerodynamics and friction to counter the effect of wind and  
**A** seismic  
**C** forces.  
**A**
  - Section 110.13 Exception Mounting of Equipment Ballasted PV  
**C** System  
**A**

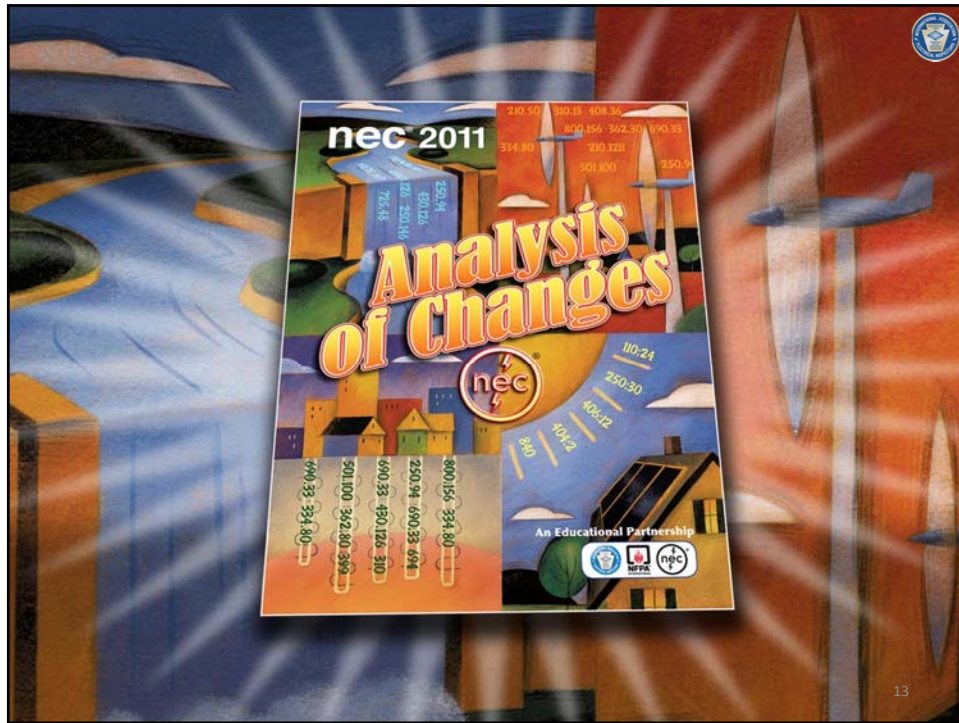
## 2013 CALIFORNIA ELECTRICAL CODE



## Analysis of Changes – 2011 NEC

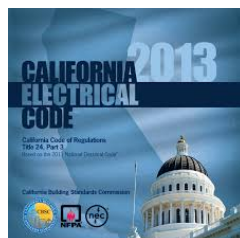


Training Presentation by:  
International Association of Electrical Inspectors



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# 10

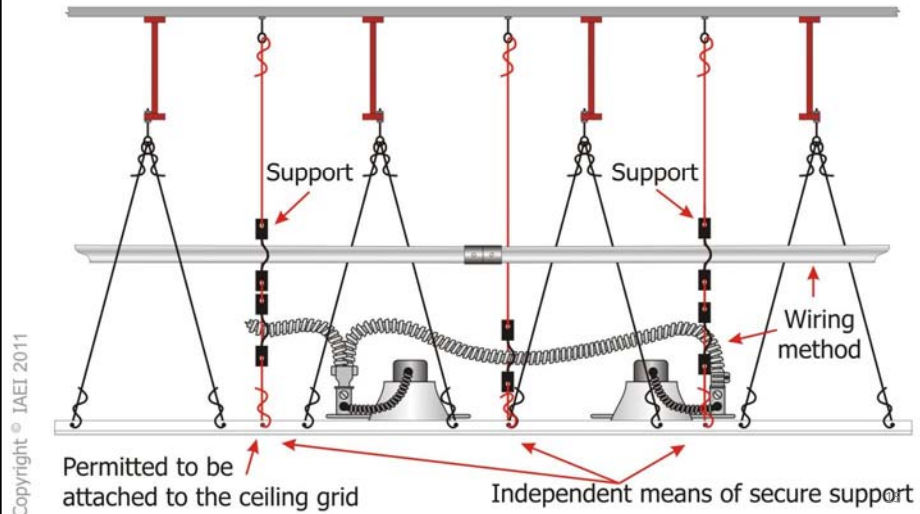


### 300.11(A)(2) Non-Fire-Rated Assemblies



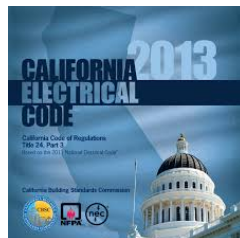
An independent means of secure support to be provided for wiring methods

Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means



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# 9



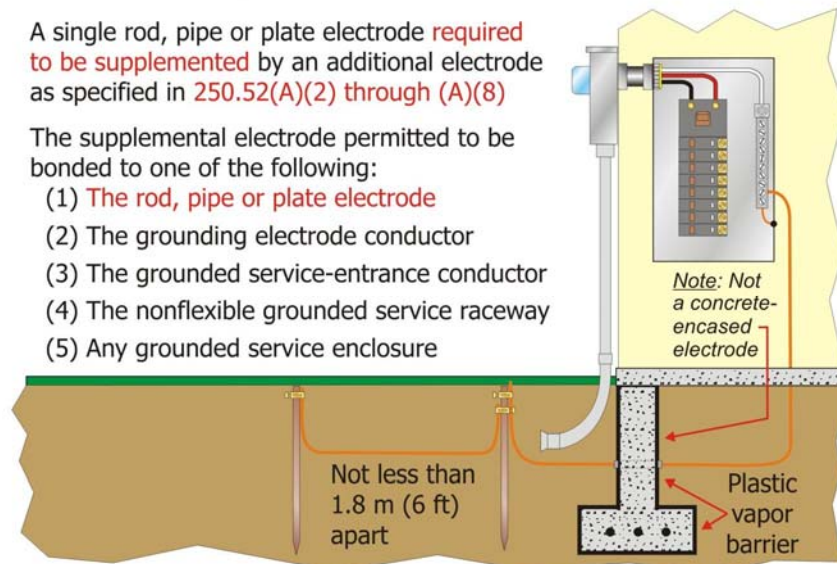


## 250.53(A) Rod, Pipe, and Plate Electrodes

A single rod, pipe or plate electrode **required to be supplemented** by an additional electrode as specified in 250.52(A)(2) through (A)(8)

The supplemental electrode permitted to be bonded to one of the following:

- (1) **The rod, pipe or plate electrode**
- (2) The grounding electrode conductor
- (3) The grounded service-entrance conductor
- (4) The nonflexible grounded service raceway
- (5) Any grounded service enclosure

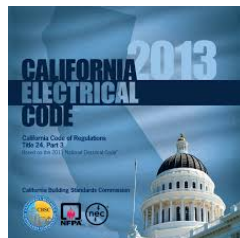


**Exception:** If a single rod, pipe, or plate grounding electrode has a resistance to earth of **25 ohms or less**, the supplemental electrode shall not be required

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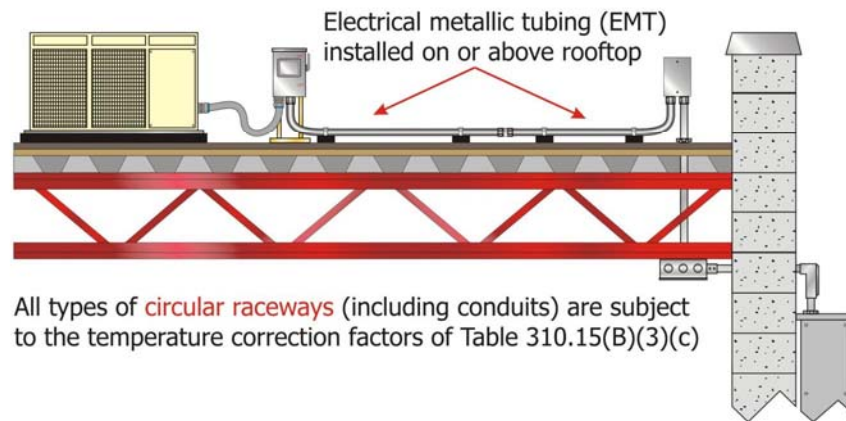
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### 310.15(B)(3)(c) Circular Raceways on Rooftops

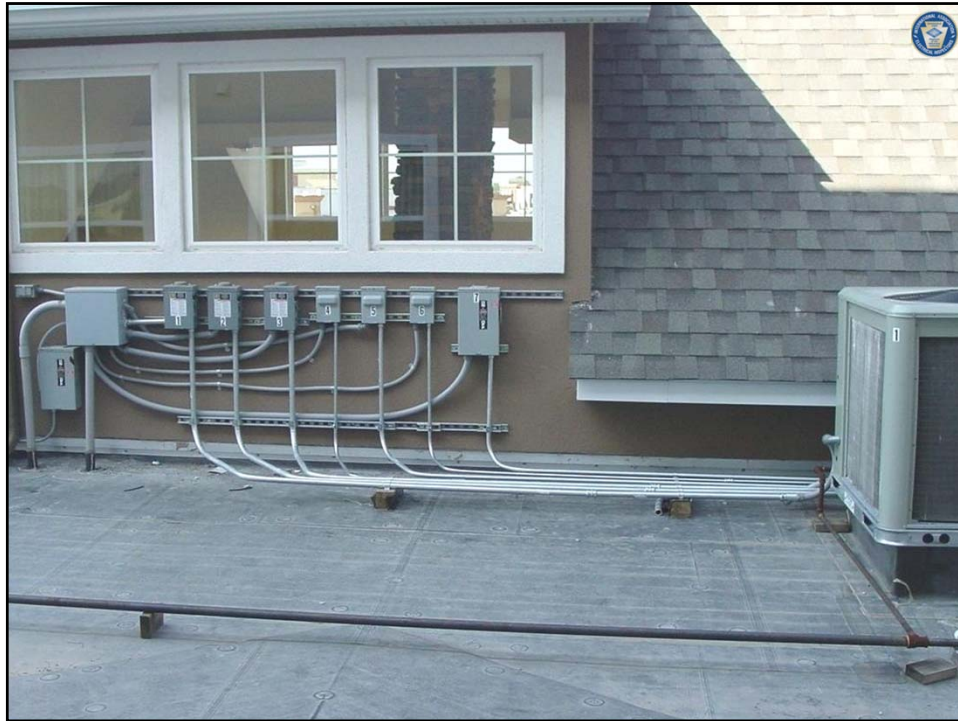


Conductors or cables installed in **circular raceways** exposed to direct sunlight on or above rooftops require adjustments shown in Table 310.15(B)(3)(c)



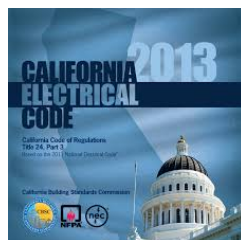
All types of **circular raceways** (including conduits) are subject to the temperature correction factors of Table 310.15(B)(3)(c)





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7





## Chapter 3

### Article 310 - Ampacity Tables

- Complete Re-Numbering
- *Table 310.16* now *Table 310.15(B)(16)*
- Ambient Temperature Correction Factors now *Table 310.15(B)(2)(a)*

#### **Table 310.15(B)(16)**

#14 AWG = 15A (~~20A~~)  
 #12 AWG = 20A (~~25A~~)  
 #10 AWG = 30A

23

### **Table 310.15(B)(16) (in part)**



**Table 310.15(B)(16) Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60° C Through 90° C (140°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)\***

Size AWG or kcmil	Temperature Rating of Conductor [See Table 310.13(A)]						Size AWG or kcmil
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	
COPPER				ALUMINUM OR COPPER-CLAD ALUMINUM			
18**	—	—	14	—	—	—	—
16**	—	—	18	—	—	—	—
14**	15	20	25	—	—	—	—
12**	20	25	30	15	20	25	12**
10**	30	35	40	25	30	35	10**
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	145	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0

\*Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 30°C (86°F).

\*\*Refer to 240.4(D) for conductor overcurrent protection limitations.

Reproduction of NEC Table 310.16 (in part)

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**Table 310.15(B)(2)(a) Temperature Correction Factors**

**Ambient Temperature Correction Factors Based on 30°C (86°F)**  
 For ambient temperatures other than 30°C (86°F), multiply the allowable ampacities specified in the ampacity tables by the appropriate factor shown below

Ambient Temperature (°C)	Temperature Rating of Conductor			Ambient Temperature (°F)
	60°C	75°C	90°C	
10 or less	1.29	1.20	1.15	50 or less
11-15	1.22	1.15	1.12	51-59
16-20	1.15	1.11	1.08	60-68
21-25	1.08	1.05	1.04	69-77
26-30	1.00	1.00	1.00	78-86
31-35	0.91	0.94	0.96	87-95
36-40	0.82	0.88	0.91	96-104
41-45	0.71	0.82	0.87	105-113
46-50	0.58	0.75	0.82	114-122
51-55	0.41	0.67	0.76	123-131
56-60	—	0.58	0.71	132-140
61-65	—	0.47	0.65	141-149
66-70	—	0.33	0.58	150-158
71-75	—	—	0.50	159-167
76-80	—	—	0.41	168-176
81-85	—	—	0.29	177-185

25

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**Table 310.15(B)(3)(a) Adjustment Factors for More Than Three Current-Carrying Conductors in a Raceway or Cable**

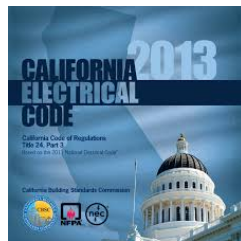
Number of Conductors <sup>1</sup>	Percent of Values in Tables 310.15(B)(16) through 310.15(B)(19) as Adjusted for Ambient Temperature if Necessary
4-6	80
7-9	70
10-20	50
21-30	45
31-40	40
41 and above	35

<sup>1</sup>Number of Conductors is the total number of conductors in the raceway or cable adjusted in accordance with 310.15(B)(5) and (6).

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## 2013 CALIFORNIA ELECTRICAL CODE

# 6



### 406.4(D)(4) Receptacle Replacement (AFCI)



Arc-fault circuit-interrupter protection is required for replacement receptacle outlets where a receptacle outlet is supplied by a branch circuit that requires AFCI protection elsewhere in the Code (effective date January 1, 2014)

Replacement receptacle outlet can be protected by a listed outlet branch circuit type AFCI receptacle or a listed combination type AFCI circuit breaker

### 406.4(D)(5) Receptacle Replacement Tamper-Resistant Receptacles



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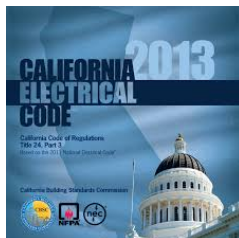
Listed tamper-resistant receptacles are required for replacement receptacle outlets where a receptacle outlet is required to be tamper-resistant elsewhere in the Code

See 406.12, 406.13, and 406.14 for tamper-resistant receptacle requirements

29

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# 5

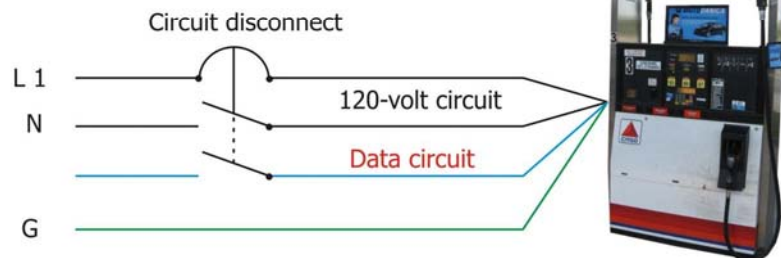


## 514.11 Circuit Disconnects (Motor Fuel Dispensing Facilities)



Circuit disconnects must open simultaneously all conductors of the associated power (including any grounded conductor), **communication, data, and video circuits** supplying the dispensers

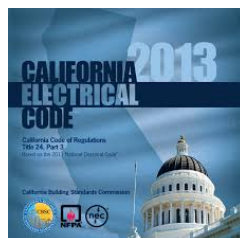
Handle ties on single-pole breakers are not acceptable for this purpose



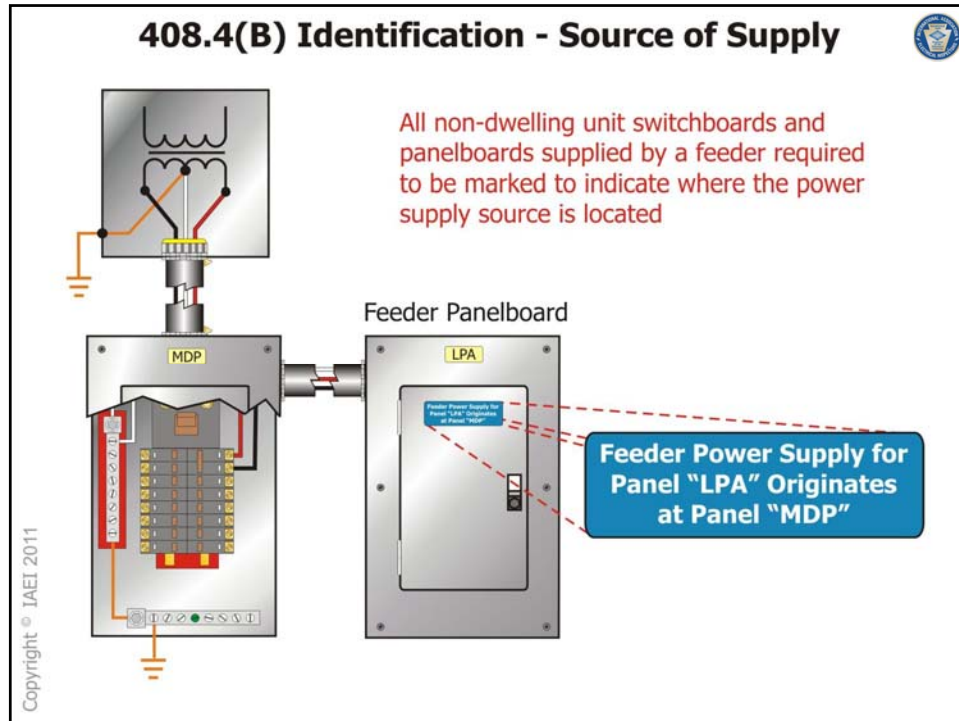
This same basic change of adding communication, data, and video circuits to the disconnecting means requirement also occurred at 514.13 (Provisions for Maintenance and Servicing of Dispensing Equipment)

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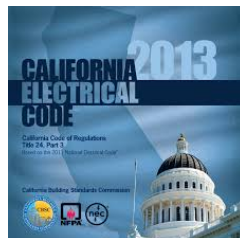






## 2013 CALIFORNIA ELECTRICAL CODE

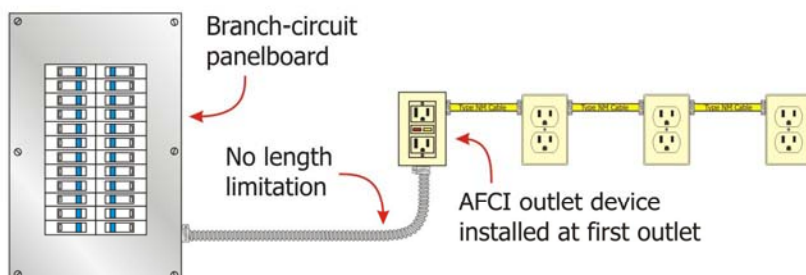
# 3



## 210.12(A) Ex. No. 1 Outlet Type AFCI



Main rule at 210.12(A) requires AFCI combination-type protection installed to provide protection of the entire branch circuit



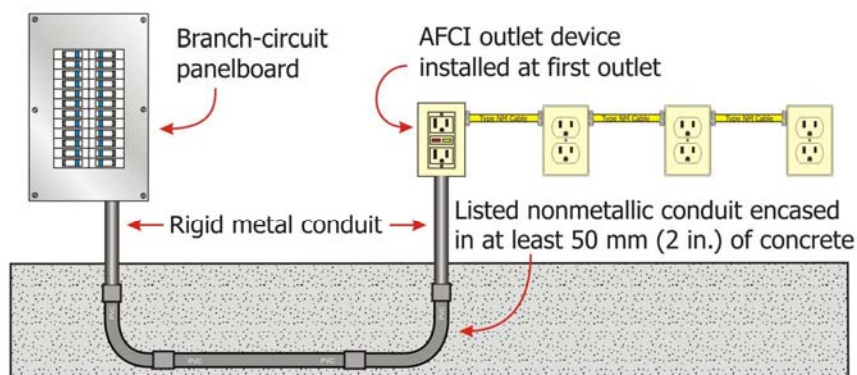
**Ex. No. 1:** If RMC, IMC, EMT, **Type MC** or steel armored Type AC cables meeting the requirements of 250.118 and metal outlet and junction boxes are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a **outlet branch-circuit Type AFCI** at the first outlet to provide protection for the remaining portion of the branch circuit.

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## 210.12(A) Ex. No. 2 Outlet Type AFCI



Main rule at 210.12(A) requires AFCI combination-type protection installed to provide protection of the entire branch circuit



**Ex. No. 2:** Where a listed metal or nonmetallic conduit or tubing is encased in not less than 50 mm (2 in.) of concrete (that portion of the branch circuit between the overcurrent device and the first outlet), it shall be permitted to install a **outlet branch-circuit AFCI** at the first outlet to provide AFCI protection for the remaining portion of the branch circuit

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## 210.12(B) and 406.4(D)(4) Arc-Fault Circuit-Interrupter Protection

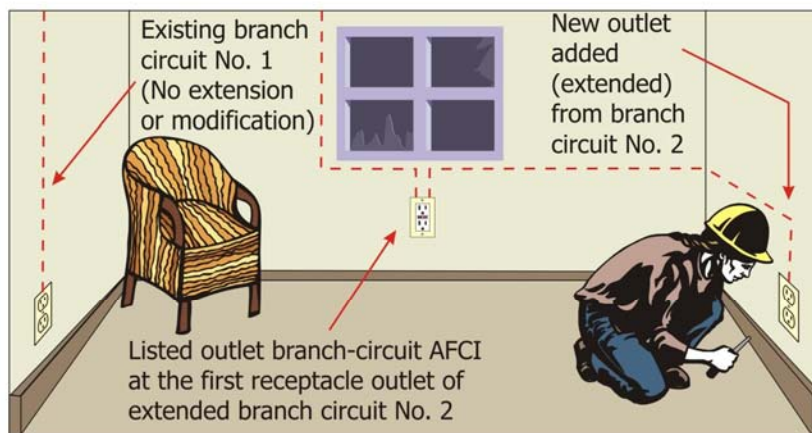


Listed Outlet Branch-Circuit Type AFCI Device

Courtesy of Pass & Seymour/Légrand<sup>37</sup>

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## 210.12(B) AFCI - Extensions or Modifications



In any of the areas specified in 210.12(A), where branch-circuit wiring is modified, replaced or extended, the branch circuit shall be protected by:

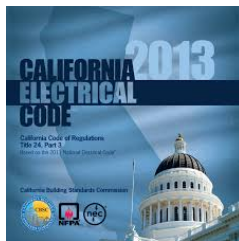
- (1) A listed combination AFCI located at the origin of the branch circuit, or
- (2) A listed outlet branch-circuit AFCI located at the first receptacle outlet of the existing branch circuit

38

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# 2



### Chapter 6 690.4 Solar Photovoltaic (PV) Systems

- Equipment and Systems
- All Associated Wiring
- Interconnections
- Qualified Persons



## 690.4(E) Wiring and Connections



"Qualified persons" required to perform the described work on photovoltaic (PV) systems



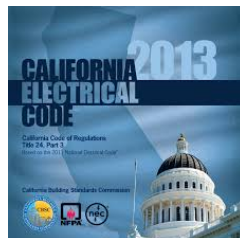
**Qualified Person:** One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved

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41

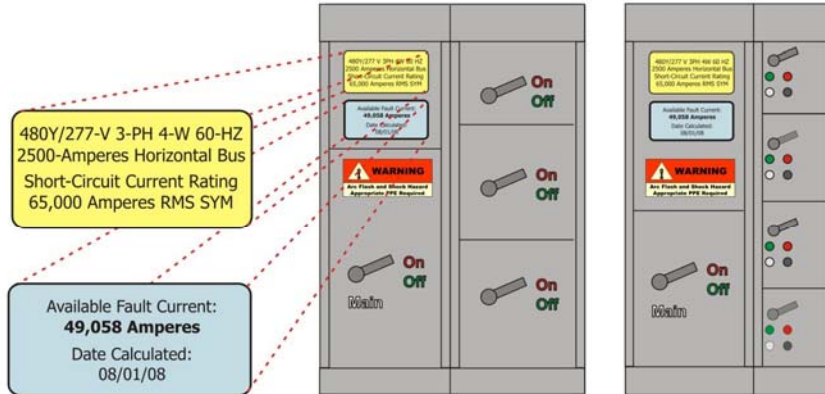
## 2013 CALIFORNIA ELECTRICAL CODE

# 1



## 110.24 Available Fault Current

Non-dwelling unit service equipment required to be field-marked with the amount of available fault current when installed or modified



Service equipment in other than dwelling units shall be legibly marked in the field with the maximum available fault current

The field marking(s) shall include the date the fault current calculation was performed and be of sufficient durability to withstand the environment involved

43

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## Section 110.9 Interrupting Rating

Equipment intended to interrupt current at fault levels shall have an interrupting rating not less than the nominal circuit voltage and the current that is available at the line terminals of the equipment.

44



## Section 110.9 Interrupting Rating

- Circuit Breakers & Fuses
- Current Ratings
  - Operational – e.g. 20A, 100A, 2000A
  - Interrupting Rating – e.g. 10KAIC, 42KAIC
  - Amperes Interrupting Capacity (AIC)

45



## Section 110.9 Interrupting Rating

- Amperes Interrupting CAPACITY
  - Ability to interrupt short circuits
  - Must have CAPACITY to interrupt magnitude of short circuit
  - EVERYWHERE in the electrical system

46





## Section 110.9 Interrupting Rating

- Amperes Interrupting CAPACITY
  - Utility contribution
  - Voltage, Amp Rating
  - Reduction – Impedance, Distance
  - Increase – Motor Contribution

47



## Section 110.9 Interrupting Rating

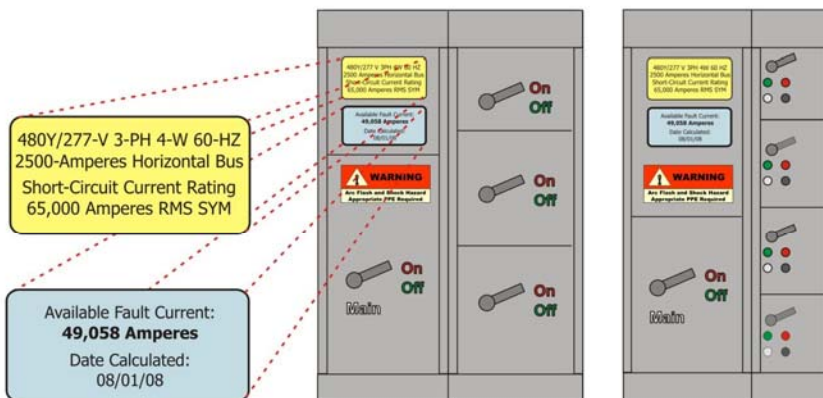
- AVAILABLE Short Circuit Current vs OCD AIC Rating
  - e.g.*
  - 1200Amp, 277/480V, 3Ø, 4W Service
  - AIC Rating of Components = **30,000 AIC**
  - Fully Rated or Series Rated
  - Available Short Circuit Current = **23,000 Amps SCC**
  - + Motor Contribution ⇒ O.K.

48



## 110.24 Available Fault Current

Non-dwelling unit service equipment required to be field-marked with the amount of available fault current when installed or modified



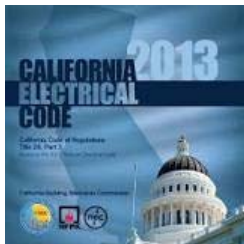
Service equipment in other than dwelling units shall be legibly marked in the field with the maximum available fault current

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49

## Questions

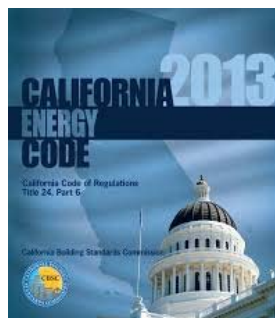


[ron.takiguchi@smgov.net](mailto:ron.takiguchi@smgov.net)

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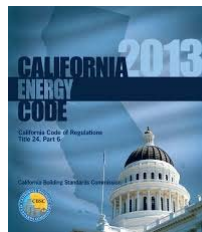
## LOS ANGELES BASIN CHAPTER OF ICC



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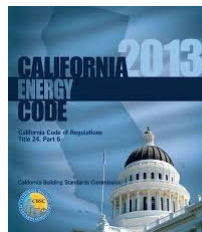
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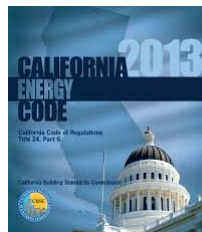
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Low Rise Residential	<b>+25%</b>	2008 Stds
Multi-Family Residential	<b>+14%</b>	2008 Stds
Non-Residential	<b>+30%</b>	2008 Stds
Net-Zero, Residential	<b>2020</b>	
Net-Zero, Non-Residential	<b>2030</b>	



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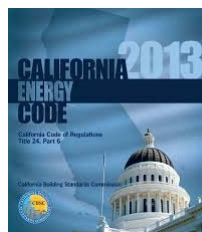
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## 2013 CALIFORNIA ENERGY CODE

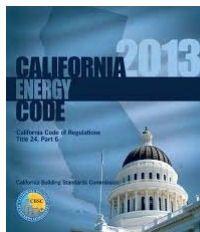
Certificate of Installation	<i>(NRCI)</i>
Certificate of Acceptance	<i>(NRCA)</i>
Field Verification & Testing	<i>(NRCV)</i>

Electronic Data Registry	<i>Jan. 1, 2015</i>
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## **2013 CALIFORNIA ENERGY CODE**

# 8



## **2013 CALIFORNIA ENERGY CODE**

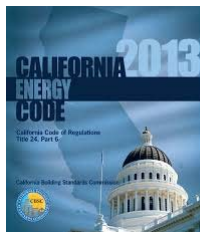
### **Section 120.8**

#### **Building Commissioning (Non-Res)**

- Energy Portions moved from *CALGreen* to *CEC*
- Owner's Project Requirements (OPR)
- Basis of Design (BOD)
- Design Phase Design Review
- Commissioning Documents on Drawings
- Commissioning Plan
- Functional Testing
- <10,000SF – Only Design Phase Review & Drawings

## **2013 CALIFORNIA ENERGY CODE**

7



### **Section 110.9**

#### **Mandatory Req's for Lighting Control Devices and Systems**

- **110.9(c)**  
**(c) Track Lighting Integral Current Limiter**
  - Certified CEC
  - Installation Requirements 130.4
  - Mfg of Current Limiter Same Mfg of Track
  - Permanently Attached but Destructive Removal
  - Tamper Resistant Fasteners Wiring Compartment
  - VA Rating
  - Factory Label Warning
  - Electrical Panel marked:

## Section 110.9

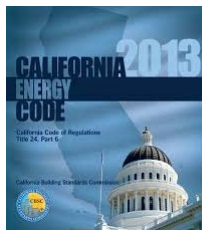
### Mandatory Req's for Lighting Control Devices and Systems

- 110.9(c)  
(c) Track Lighting Integral Current Limiter

*NOTICE: Current limiting devices installed in track lighting integral current limiters connected to this panel shall only be replaced with the same or lower amperage. Adding track or replacement of existing current limiters with higher continuous ampere rating will void the track lighting integral current limiter certification, and will require resubmittal of compliance documentation to the enforcement agency responsible for compliance with the California Title 24, Part Building Energy Efficiency Standards.*

## 2013 CALIFORNIA ENERGY CODE

# 6



## Section 110.9

### Mandatory Req's for Lighting Control Devices and Systems

- 110.9(d)

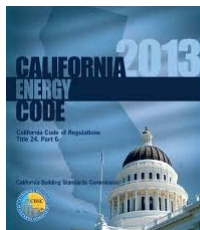
#### (d) Track Lighting Supplementary Overcurrent Protection Panel

- Only for (Line-Voltage) Track Lighting
- No other lighting or power circuits
- Installed in an electrical room, or adjacent to the supply
- Labeled:

***“NOTICE: This Panel For Track Lighting  
Energy Code Compliance Only”***

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5





## Section 110.10

### Mandatory Req's for Solar Ready Buildings

- SFD = Subdivision, 10 or More
- Low-Rise MFD
- High-Rise MFD
- Hotels, Motels
- Non-Res = Three Stories and Less

## Section 110.10

### Mandatory Req's for Solar Ready Buildings

- **Solar Zone** = A section of the roof designated and reserved for the future installation of a solar electric or solar thermal system.
- Access, Pathway, Smoke Ventilation, Spacing: Part 9
- No Shading in Solar Zone
- Min Dimension :
  - 80SF, Roof Area  $\leq$  10,000SF
  - 160SF, Roof Area  $>$  10,000SF

## Section 110.10

### Mandatory Req's for Solar Ready Buildings

- Dead Load, Live Load Indicated on Plans (but does not require load for future)
- Pathway for Routing of Conduit on Plans
- Documentation Provided to Occupant
- SFD: **Minimum 200A** (Sub-Div, 10 or More)
  - Reserved Space 2-Pole CB
  - Opposite End From Main CB
  - Space Marked: "For Future Solar Electric"

STATE OF CALIFORNIA  
**MINIMUM SOLAR ZONE AREA WORKSHEET**  
 CEC-NRCC-SRA-02-E (Revised 06/13)

CALIFORNIA ENERGY COMMISSION  
 NRCC-SRA-02-E

CERTIFICATE OF COMPLIANCE  
 Minimum Solar Zone Area Worksheet (Page 1 of 3)

Project Name: \_\_\_\_\_ Date Prepared: \_\_\_\_\_

---

**Step 1: Determine Minimum Solar Zone Area**

Calculate the minimum solar zone area using one of the two options provided below. Use option 2 if your roofs and overhangs are shaded.

**Method 1: Minimum Solar Zone Area Based on Total Roof Area (requirements in 110.10(b)(18))**

New Construction: Total roof area (sqft)	A	
Additions: Total roof area added to building (sqft)		
New Construction: Area of roof covered with skylights (sqft)	B	
Additions: Area of new roof area covered with skylights (sqft)		
Minimum solar zone area	$C = 0.15 \times (A - B)$	

*Note: For additions, if AS 2,000 ft<sup>2</sup> then addition does not need to comply with solar zone requirements*

**Method 2: Minimum Solar Zone Area Based on Potential Solar Zone (requirements in Exception 3 to 110.10(b)(18))**

The enforcement agency may require additional documentation that describes how the reduced solar zone area was determined.

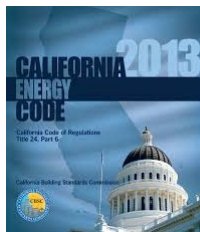
Method/Tool(s) used to quantify annual solar access: (for example, "Software X", "CAD Tool Y")		
Area of low-sloped roof (ratio of rise to run of 2:12 or less) where the annual solar access is 70 percent or greater.* (sqft)	D	
Area of steep-sloped roof (ratio of rise to run is greater than 2:12) that is oriented between 110 and 270 degrees and annual solar access is 70 percent or greater.* (sqft)	E	
Minimum solar zone area	$F = 0.5 \times (D + E)$	

\* For new construction consider total roof area; for additions consider newly added roof area

Minimum solar zone area (either C or F) (sqft)	G	
--	---	--

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# 4



## Section 130.5

(Non-Res, High-Rise Res, Hotels/Motels)  
Electrical Power Distribution Systems

### a) Service Metering

Metering of Total-Energy Use = Table 130.5-A

Table 130.5-A - MINIMUM REQUIREMENTS FOR METERING OF ELECTRICAL LOAD

Meter Rating (kVA)	50 kVA or less	More than 50kVA and less than or equal to 250 kVA	More than 250 kVA and less than or equal to 1000kVA	Services rated more than 1000kVA
Instantaneous (at the time) kW demand	Required	Required	Required	Required
Historical peak demand (kW)	Not required	Not required	Required	Required
Resettable kWh	Required	Required	Required	Required
kWh per rate period	Not required	Not required	Not required	Required

TABLE 130.5-B MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD

LOAD TYPE	SERVICES RATED 50 KVA OR LESS	SERVICES RATED MORE THAN 50KVA AND LESS THAN OR EQUAL TO 250 KVA	SERVICES RATED MORE THAN 250 KVA AND LESS THAN OR EQUAL TO 1000KVA	SERVICES RATED MORE THAN 1000KVA
Lighting including exit and egress lighting and exterior lighting	Not required	All lighting in aggregate	All lighting disaggregated by floor, type or area	All lighting disaggregated by floor, type or area
HVAC systems and components including chillers, fans, heaters, furnaces, package units, cooling towers and circulation pumps associated with HVAC	Not required	All HVAC in aggregate	All HVAC in aggregate and each HVAC load rated at least 50 kVA	All HVAC in aggregate and each HVAC load rated at least 50kVA
Domestic and service water system pumps and related systems and components	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Plug load including appliances rated less than 25 kVA	Not required	All plug load in aggregate Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area All groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf
Elevators, escalators, moving walks and transit systems	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Other individual nonHVAC loads or appliances rated 25kVA or greater	Not required	All	Each	Each
Industrial and commercial load centers 25 kVA or greater including theatrical lighting installations and commercial kitchens	Not required	All	Each	Each
Renewable power source (net or total)	Each group	Each group	Each group	Each group
Loads associated with renewable power source	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Charging stations for electric vehicles	All loads in aggregate	All loads in aggregate	All loads in aggregate	All loads in aggregate

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**Electrical Power Distribution**  
 CEC-NRCC-ELC-01-E (Revised 06/13)  
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Electrical Power Distribution

(Page 2 of 9)

Project Name:

Date Prepared:

**A. Electrical Service Metering**

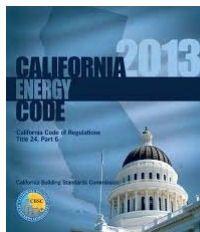
☐ Each newly installed electrical service (in both existing and newly constructed buildings) is required to be metered, as set out in Table 130.5-A, which is reproduced below.

☐ Fill out a separate line for each electrical service that is connected to the building.

Electrical Service Schedule	Electrical Service Rating	Metering Capabilities (check all that are present)				Field Inspector	
		C	D	E	F	G	
		Instantaneous (kW)	Historical peak demand (kW)	Resettable kWh	kWh per rate period	Pass	Fail
Designation/location in building/description	kVA						

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# 3



### **Section 130.5**

**(Non-Res, High-Rise Res, Hotels/Motels)**  
**Electrical Power Distribution Systems**

**d) 120-Volt Receptacles: Circuit Controls**

**All Buildings**

**Controlled & Uncontrolled Receptacles SHALL BE PROVIDED**

**Private Offices, Open Office Areas, Lobby ,Conference Rooms,  
Copy Room, Kitchenette in Office**

**Controlled Receptacles = Shut-Off Controls**

## Section 130.5

(Non-Res, High-Rise Res, Hotels/Motels)

### Electrical Power Distribution Systems

#### d) 120-Volt Receptacles: Circuit Controls

##### Uncontrolled Receptacles

Install at Least ONE Controlled Receptacles w/in 6 feet of Uncontrolled Receptacle

Controlled Receptacles Marked (to distinguish from UnControlled)

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CERTIFICATE OF COMPLIANCE		NRCC-ELC-01-E
Electrical Power Distribution		(Page 9 of 9)
Project Name:	Date Prepared:	

#### D. Circuit Controls for 120-Volt Receptacles

- ☐ Controlled 120 volt receptacles shall be provided, as required by Section 130.5(d) of the Standards.
- ☐ In open office areas, controlled circuit receptacles are not required if, at time of final permit, workstations are installed, and each workstation is equipped with an occupant sensing control that is permanently mounted in each workstation, and which controls a hardwired, nonresidential-rated power strip. Plug-in strips and other plug-in devices that incorporate an occupant sensor shall not be used for this exception.
- ☐ Receptacles that are only for the following purposes are exempt:
  - Receptacles specifically for refrigerators and water dispensers in kitchenettes.
  - Receptacles located a minimum of six feet above the floor that are specifically for clocks.
  - Receptacles for network copiers, fax machines, A/V and data equipment other than personal computers in copy rooms.

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NRCC-ELC-01-E

Electrical Power Distribution

(Page 9 of 9)

Project Name:

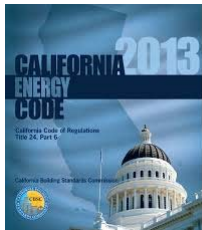
Date Prepared:

	Field Inspector	
	Pass	Fail
1. At least one controlled receptacle is installed within 6 feet of each uncontrolled receptacle, or split-wired duplex receptacles are installed, that have one controlled and one uncontrolled receptacle. This applies in all of the following spaces: <ul style="list-style-type: none"><li>Private offices, open office areas</li><li>Receptions and lobbies</li><li>Conference rooms</li><li>Kitchenettes in office spaces</li><li>Copy room</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
2. Electric circuits serving controlled receptacles are equipped with automatic shut-OFF controls following the requirements prescribed in Section 130.1(c)1 through 5 (in many cases this will mean that the receptacles are connected to the same automatic shut-OFF system as the general lighting of the space).	<input type="checkbox"/>	<input type="checkbox"/>
3. Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles.	<input type="checkbox"/>	<input type="checkbox"/>
4. For open office areas, controlled circuits shall be provided and marked to support installation and configuration of office furniture with receptacles that comply with Section 130.1(a)130.5(d) 1, 2, and 3.	<input type="checkbox"/>	<input type="checkbox"/>
5. For hotel and motel guest rooms at least one-half of the 120-volt receptacles in each guest room are controlled receptacles that comply with Section 130.5(d)1, 2, and 3 (see numbers 1,2 and 3 above). Electric circuits serving controlled receptacles have captive card key controls, occupancy sensing controls, or automatic controls such that, no longer than 30 minutes after the guest room has been vacated, power is switched off.	<input type="checkbox"/>	<input type="checkbox"/>
6. Plug-in strips and other plug-in devices that incorporate an occupant sensor are not used to comply with any of these requirements.	<input type="checkbox"/>	<input type="checkbox"/>

77

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2



## Section 130.5

(Non-Res, High-Rise Res, Hotels/Motels)

### Electrical Power Distribution Systems

#### b) Disaggregation of Electrical Circuits

#### Disaggregation Measurement of Electrical Load Uses

#### Separate Distribution Systems, MCC's, SubPanels

**B. Disaggregation of Electrical Circuits (continued)**

**Table 130.5-B - MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD**

Table 130.5-B sets the upper limit on how many load[s] of each type can be supplied by each feeder. A feeder may not supply loads of more than one type unless the service is rated at 50 kVA or less. For instance, on the fifth row of the table, one feeder on a service >50 kVA could be used to supply all the plug loads on a floor of a building, provided that there are no areas in which more than 25kVA of plug load is supplied to a space less than 5000sf

Load Type	Services rated 50 kVA or less	Services rated more than 50kVA and less than or equal to 250 kVA	Services rated more than 250 kVA and less than or equal to 1000kVA	Services rated more than 1000kVA
Lighting including exit and egress lighting and exterior lighting	Not required	All lighting in aggregate	All lighting disaggregated by floor, type or area	All lighting disaggregated by floor, type or area
HVAC systems and components including chillers, fans, heaters, furnaces, package units, cooling towers, and circulation pumps associated with HVAC	Not required	All HVAC in aggregate	All HVAC in aggregate and each HVAC load rated at least 50 kVA	All HVAC in aggregate and each HVAC load rated at least 50kVA
Domestic and service water system pumps and related systems and components	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Plug load including appliances rated less than 25 kVA	Not required	All plug load in aggregate Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug loads separated by floor, type or area. All groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf
Elevators, escalators, moving walks, and transit systems	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Other individual non-HVAC loads or appliances rated 25kVA or greater	Not required	All	Each	Each
Industrial and commercial load centers 25 kVA or greater including theatrical lighting installations and commercial kitchens	Not required	All	Each	Each
Renewable power source (net or total)	Each group	Each group	Each group	Each group
Loads associated with renewable power source	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Charging stations for electric vehicles	All loads in aggregate	All loads in aggregate	All loads in aggregate	All loads in aggregate



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CERTIFICATE OF COMPLIANCE		NRCC-ELC-01-E
Electrical Power Distribution		(Page 3 of 9)
Project Name:	Date Prepared:	

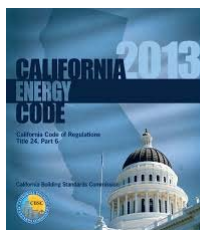
**B. Disaggregation of Electrical Circuits**

- ☐ Each newly installed switchboard, panel, and motor control center (in both existing and newly constructed buildings) is required to be disaggregated according to the requirements of Table 130.5-B, shown on the next page.
- ☐ Individual branch circuits, taps or disconnects that require overcurrent protection devices rated 60A or greater are exempt.
- ☐ As an alternative, current transformers can be added for individual branch circuits and loads throughout the building, and a permanent measurement system can be installed. In this case, disaggregated wiring would not be required as long as the metering system allows the equivalent disaggregated measurements.
- ☐ Fill out a separate line for each switchboard, motor control center, panelboard and subpanel.

81

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# 1



## Section 130.5


(Non-Res, High-Rise Res, Hotels/Motels)

### Electrical Power Distribution Systems

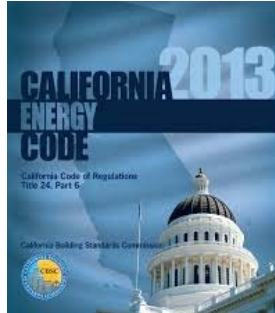
#### c) Voltage Drop

1. Feeders = Maximum **2%** V.D. Design Load
2. Branch Circuits = Max **3%** V.D. Design Load

**Exception: Emergency Services**

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Electrical Power Distribution		(Page 6 of 9)	
Project Name:		Date Prepared:	
<b>C. Voltage Drop</b> <input type="checkbox"/> Attach voltage drop worksheet to this form. <input type="checkbox"/> Field inspector has discretion to approve the worksheets; the tables shown below in this section are advisory only. <input type="checkbox"/> Feeder conductors and branch circuits that are dedicated to emergency services are exempt from these requirements. <input type="checkbox"/> To calculate branch circuit length, the approximate centroid of the load may be used if the actual conductor length is not known. <input type="checkbox"/> When calculating branch circuit loads, receptacle loads may be derated using a load factor of 75%. <input type="checkbox"/> An advisory table of typical power factors is shown below. <input type="checkbox"/> Advisory tables of typical maximum feeder and branch circuit lengths are shown on the following page. Tables assume 1.0 power factor and that the circuit current is 80% of the rated value.			
		Field Inspector	
		Pass	Fail
Feeders. Feeder conductors shall be sized for a maximum voltage drop of 2 percent at design load.		<input type="checkbox"/>	<input type="checkbox"/>
Branch Circuits. Branch circuit conductors shall be sized for a maximum voltage drop of 3 percent at design load.		<input type="checkbox"/>	<input type="checkbox"/>

# Questions



[ron.takiguchi@smgov.net](mailto:ron.takiguchi@smgov.net)

85

LOS ANGELES BASIN CHAPTER OF ICC

# *Thank You!*

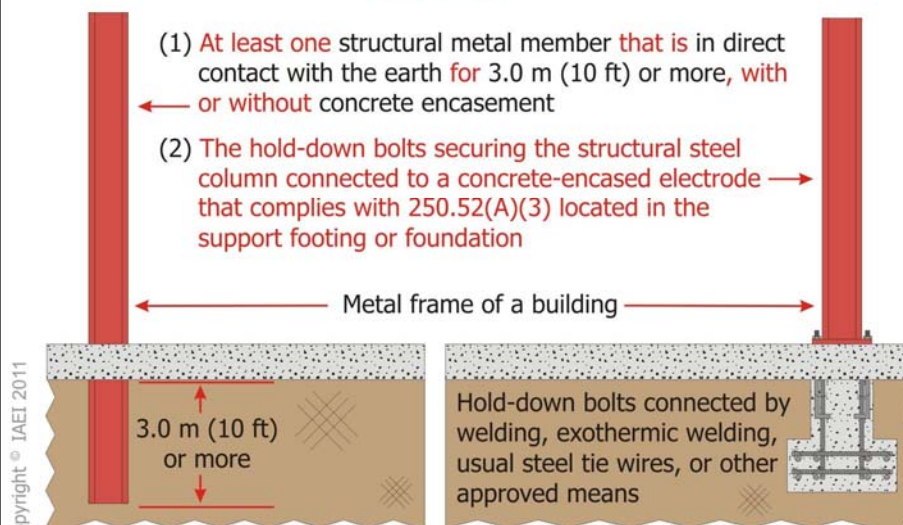


86

## 250.52(A)(2) Metal Frame of Building or Structure

The metal frame of the building permitted as grounding electrode where connected to the earth by **one or more** of the following methods:

- (1) **At least one** structural metal member **that is** in direct contact with the earth **for 3.0 m (10 ft) or more, with or without** concrete encasement
- (2) The hold-down bolts securing the structural steel column connected to a concrete-encased electrode **that complies with 250.52(A)(3) located in the support footing or foundation**



### 250.32(B) Grounding Separate Buildings

**250.32(B)(1)**

← Grounding at separate building or structure using the required EGC in accordance with 250.118

---

**250.32(B)(1) Exception**

← Grounding at separate building using grounded conductor as follows:

Existing installations only under previous Codes, No EGC, No continuous metallic paths, No supply-side GFPE

---

**250.32(B)(2)**

← Where a building or structure is supplied from a separately derived system, the separate equipment or bonding conductor shall be in accordance with 250.30(B)

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### 250.32(B) Grounding Separate Buildings

**250.32(B)(1)**

← Grounding at separate building or structure using the required EGC in accordance with 250.118

---

**250.32(B)(1) Exception**

← Grounding at separate building using grounded conductor as follows:

Existing installations only under previous Codes, No EGC, No continuous metallic paths, No supply-side GFPE

---

**250.32(B)(2)**

← Where a building or structure is supplied from a separately derived system, the separate equipment or bonding conductor shall be in accordance with 250.30(B)

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2011 National Electrical Code  
Model Code Change Highlights



## Chapter 2

### 240.91 Protection of Conductors (Supervised Industrial Installations)

#### 240.91(B) Protection of Conductors Rated Over 800A

- Allowance for the "Round Up" Rule
- Equal To or Greater Than 95% of OCD Rating

e.g. 2008 NEC

$$1200A : 3 \times 600\text{kcmil} = 3 \times 420A = 1260A$$

2011 NEC

$$1200A : 3 \times 500\text{kcmil} = 3 \times 380A = 1140A$$

$$1200A \times .95 = 1140A$$

91

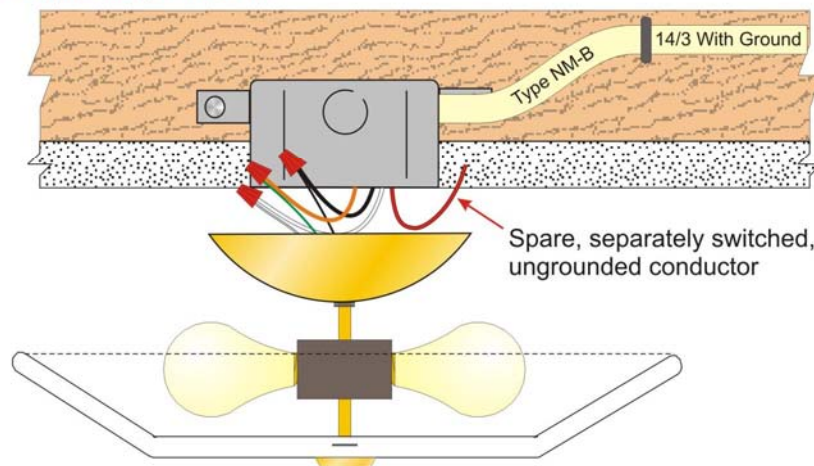
## 404.2(C) Switches for Lighting Outlets

- Generally, where switches control lighting loads from a grounded general-purpose branch circuit, the **grounded circuit conductor** for the controlled lighting circuit **must be present at the switch location**
- Many electronic lighting control devices, such as occupancy sensors require standby current to maintain a ready state of detection for the function of these devices
- Note: See exceptions for boxes feed by raceways and cable assembly boxes with framing cavity open at the top or bottom on the same floor level, or wall, floor, or ceilings unfinished on one side



### 314.27(C) Boxes at Ceiling Fan Outlets

At single or multi-family dwellings, spare, separately switched, ungrounded conductors at ceiling-mounted outlet boxes (in a location acceptable for a ceiling fan) require outlet box or system listed for sole support of a ceiling-suspended (paddle) fan



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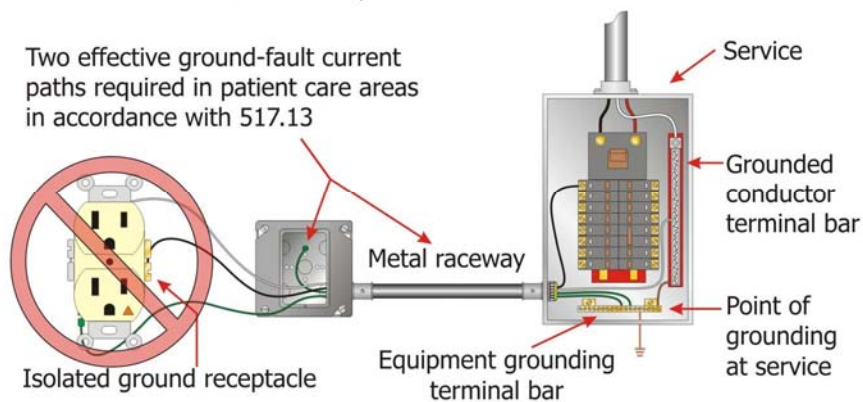




### 517.16 Receptacles with IG Terminals (Patient Care Areas - Health Care Facilities)

The installation of isolated grounding-type receptacles in patient care areas of health care facilities is now prohibited

Two effective ground-fault current paths required in patient care areas in accordance with 517.13



Receptacles with insulated grounding terminals, as described in 250.146(D), shall **not be permitted**



