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

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

**Total 74 Amendments**
State Agency Amendments to the 2011 National Electrical Code

Chapter 1
• Add definition Ballasted Solar Photovoltaic System
[BSC, HCD 1, HCD 2, SFM, OSHPD]

Ballasted Solar Photovoltaic System A roof mounted system composed of solar photovoltaic panels and supporting members that are unattached or partially attached to the roof and must rely on their weight, aerodynamics and friction to counter the effect of wind and seismic forces.

• Section 110.13 Exception Mounting of Equipment Ballasted PV System
2013 California Electrical Code

Analysis of Changes – 2011 NEC

Training Presentation by:
International Association of Electrical Inspectors
2013 CALIFORNIA ELECTRICAL CODE

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.

2013 California Electrical Code
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.

2013 California Electrical Code
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)
2013 California Electrical Code

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)**

<table>
<thead>
<tr>
<th>Size (AWG)</th>
<th>#14 AWG</th>
<th>#12 AWG</th>
<th>#10 AWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>#14</td>
<td>15A</td>
<td>20A</td>
<td>30A</td>
</tr>
<tr>
<td>#12</td>
<td>20A</td>
<td>25A</td>
<td></td>
</tr>
<tr>
<td>#10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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).

<table>
<thead>
<tr>
<th>Size AWG or kcmil</th>
<th>Copper</th>
<th>Aluminum or Copper-Clad Aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/0</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td>2/0</td>
<td>145</td>
<td>175</td>
</tr>
<tr>
<td>3/0</td>
<td>165</td>
<td>200</td>
</tr>
<tr>
<td>4/0</td>
<td>195</td>
<td>230</td>
</tr>
</tbody>
</table>

*Refer to Table 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)
### Table 310.15(B)(2)(a) Temperature Correction Factors

<table>
<thead>
<tr>
<th>Ambient Temperature (°C)</th>
<th>Temperature Rating of Conductor</th>
<th>Ambient Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60°C</td>
<td>75°C</td>
</tr>
<tr>
<td>10 or less</td>
<td>1.29</td>
<td>1.20</td>
</tr>
<tr>
<td>11-15</td>
<td>1.22</td>
<td>1.15</td>
</tr>
<tr>
<td>16-20</td>
<td>1.15</td>
<td>1.11</td>
</tr>
<tr>
<td>21-25</td>
<td>1.08</td>
<td>1.05</td>
</tr>
<tr>
<td>26-30</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>31-35</td>
<td>0.91</td>
<td>0.94</td>
</tr>
<tr>
<td>36-40</td>
<td>0.82</td>
<td>0.88</td>
</tr>
<tr>
<td>41-45</td>
<td>0.71</td>
<td>0.82</td>
</tr>
<tr>
<td>46-50</td>
<td>0.58</td>
<td>0.75</td>
</tr>
<tr>
<td>51-55</td>
<td>0.41</td>
<td>0.58</td>
</tr>
<tr>
<td>56-60</td>
<td>—</td>
<td>0.47</td>
</tr>
<tr>
<td>61-65</td>
<td>—</td>
<td>0.33</td>
</tr>
<tr>
<td>66-70</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>71-75</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>76-80</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>81-85</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Number of Conductors¹</th>
<th>Percent of Values in Tables 310.15(B)(16) through 310.15(B)(19) as Adjusted for Ambient Temperature if Necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-6</td>
<td>80</td>
</tr>
<tr>
<td>7-9</td>
<td>70</td>
</tr>
<tr>
<td>10-20</td>
<td>50</td>
</tr>
<tr>
<td>21-30</td>
<td>45</td>
</tr>
<tr>
<td>31-40</td>
<td>40</td>
</tr>
<tr>
<td>41 and above</td>
<td>35</td>
</tr>
</tbody>
</table>

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

2013 California Electrical Code
408.4(B) Identification - Source of Supply

All non-dwelling unit switchboards and panelboards supplied by a feeder required to be marked to indicate where the power supply source is located.

Feeder Panelboard

Feeder Power Supply for Panel “LPA” Originates at Panel “MDP”

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.

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

Listed Outlet Branch-Circuit Type AFCI Device

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210.12(B) AFCI - Extensions or Modifications

Existing branch circuit No. 1
(No extension or modification)

New outlet added
(extended) from branch circuit No. 2

Listed outlet branch-circuit AFCI
at the first receptacle outlet of
extended branch circuit No. 2

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

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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
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.
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)

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
Section 110.9 Interrupting Rating

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

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.
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.

- 480Y/277-V 3-PH 4-W 60-HZ
- 2500-Ampere Horizontal Bus
- Short-Circuit Current Rating: 63,000 Amperes RMS SYM

Available Fault Current: 49,058 Amperes
Date Calculated: 08/01/08

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.

Questions

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LOS ANGELES BASIN CHAPTER OF ICC

2013 CALIFORNIA ENERGY CODE
2013 California Energy Code

10

2013 California Energy Code

Low Rise Residential  +25%  2008 Stds
Multi-Family Residential  +14%  2008 Stds
Non-Residential  +30%  2008 Stds

Net-Zero, Residential  2020
Net-Zero, Non-Residential  2030
2013 California Energy Code

Certificate of Installation (NRCI)
Certificate of Acceptance (NRCA)
Field Verification & Testing (NRCV)

Electronic Data Registry Jan. 1, 2015
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
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
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”
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 <= 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”
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 190.5(b) Minimum Requirements for Separation of Electrical Load

<table>
<thead>
<tr>
<th>Load Type</th>
<th>Spur Service Rated 55 kVA or Less</th>
<th>Spur Service Rated More Than 55 kVA and Less Than or Equal to 200 kVA</th>
<th>Spur Service Rated More Than 200 kVA and Less Than or Equal to 1000 kVA</th>
<th>Spur Service Rated More Than 1000 kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting (including motor and non-motor)</td>
<td>Not required</td>
<td>All lighting in aggregate</td>
<td>All lighting disaggregated by floor, zone, or area</td>
<td>All lighting disaggregated by floor, zone, or area</td>
</tr>
<tr>
<td>HVAC systems and components (including chillers, fans, boilers, pumps, and related systems and equipment associated with HVAC)</td>
<td>Not required</td>
<td>All HVAC in aggregate</td>
<td>All HVAC in aggregate and each HVAC load rated at least 500 kVA</td>
<td>All HVAC in aggregate and each HVAC load rated at least 500 kVA</td>
</tr>
<tr>
<td>Domestic and service water systems (pumps and related systems and equipment)</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Plug load (including appliances rated less than or equal to 25 kVA)</td>
<td>Not required</td>
<td>All plug load in aggregate</td>
<td>All plug load in aggregate</td>
<td>All plug load in aggregate</td>
</tr>
<tr>
<td>Elevators, escalators, moving sidewalks, and rail systems</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Other industrial or HVAC loads or appliances rated 250 kVA or greater</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Industrial and commercial load sources 25 kVA or greater including:</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable source load or total</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
</tr>
<tr>
<td>Loads associated with renewable energy sources</td>
<td>Not required</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Charging loads for electric vehicles</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
</tbody>
</table>

---

**STATE OF CALIFORNIA**  
**Electrical Power Distribution**  
**Certificate of Compliance**  
**NRC-44C-01-E**  
**Electrical Power Distribution**  
**Page 3 of 3**

**A. Electrical Service Metering**

1. Each newly installed electrical service (in both existing and newly constructed buildings) is required to be metered, as set out in Table 190.5(b), which is reproduced below.

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

<table>
<thead>
<tr>
<th>Electrical Service Schedule</th>
<th>Electrical Service Rating</th>
<th>Metering Capabilities (check all that are present)</th>
<th>Field Inspector</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>Designation and location in building or description</strong></td>
<td><strong>kVA</strong></td>
<td><strong>W</strong></td>
<td><strong>A</strong></td>
</tr>
</tbody>
</table>

---

36
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)

D. Circuit Controls for 120-Volt Receptacles

- Controlled 120-volt receptacles shall be provided, as required by Section 130.8(j) of the Standards.
- In open office areas, controlled circuit receptacles are not required if, at time of final permit, workstations are installed, and such workstation is equipped with an occupant sensing control that is permanently mounted in each workstation, and which controls a hardwired, non-residential-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 kitchens.
  - Receptacles located a minimum of six feet above the floor that are specifically for docks.
  - Receptacles for network copiers, fax machines, AV's and data equipment other than personal computers in copy rooms.
### 2013 California Energy Code

#### 2

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**Table:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Requirement Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>At least one controlled receptacle is installed within 5 feet of each uncontrolled receptacle, or if several separate receptacles are installed, they are one controlled and one uncontrolled receptacle. This applies in all the following locations:</td>
</tr>
<tr>
<td></td>
<td>Private offices, open office areas, conference rooms, training rooms, and copy rooms.</td>
</tr>
<tr>
<td>2.</td>
<td>Electro circuits serving controlled receptacles are equipped with automatic shut-off controls following the requirements prescribed in Section 106.401 through 106.405. 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.</td>
</tr>
<tr>
<td>3.</td>
<td>Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles.</td>
</tr>
<tr>
<td>4.</td>
<td>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 106.404.4 (B), (C), and (D).</td>
</tr>
<tr>
<td>5.</td>
<td>Residential and residential units (excluding one and two-family dwellings) residence electrical systems are required to be connected to a controlled circuit using Section 106.404.4 (B), (C), and (D).</td>
</tr>
<tr>
<td>6.</td>
<td>Power strips and other plug-in devices that incorporate an occupant switch are not to comply with any of these requirements.</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Load Type</th>
<th>Section rated 600 volts or less</th>
<th>Section rated more than 600 volts and less than or equal to 3,000 volts</th>
<th>Section rated more than 3,000 volts and less than or equal to 6,000 volts</th>
<th>Section rated more than 6,000 volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting either as an integral part</td>
<td>All lighting disaggregated by floor, type or area</td>
<td>All lighting disaggregated by floor, type or area</td>
<td>All lighting disaggregated by floor, type or area</td>
<td>All lighting disaggregated by floor, type or area</td>
</tr>
<tr>
<td>or separately provided</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>Vending systems and components</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>including dividers, lockers, bins,</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>boxes, niches, and similar storage</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>systems associated with</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>system pumps and related systems</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>and components</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
<td>All lighting in aggregate</td>
</tr>
<tr>
<td>Plug load including appliances</td>
<td>All plug load in aggregate</td>
<td>All plug load in aggregate</td>
<td>All plug load in aggregate</td>
<td>All plug load in aggregate</td>
</tr>
<tr>
<td>except those rated 600 volts or</td>
<td>Groups of plug loads</td>
<td>Groups of plug loads</td>
<td>Groups of plug loads</td>
<td>Groups of plug loads</td>
</tr>
<tr>
<td>less than 20 kva</td>
<td>exceeding 25 kva connected load in an area less than 30 ft of</td>
<td>exceeding 25 kva connected load in an area less than 30 ft of</td>
<td>exceeding 25 kva connected load in an area less than 30 ft of</td>
<td>exceeding 25 kva connected load in an area less than 30 ft of</td>
</tr>
<tr>
<td>Other individual non-excess loads or</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>appliances rated 600 volts or less</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
</tr>
<tr>
<td>Industrial and commercial loads</td>
<td>All</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
</tr>
<tr>
<td>including industrial lighting</td>
<td>All</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
</tr>
<tr>
<td>installations and commercial</td>
<td>All</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
</tr>
<tr>
<td>fixtures</td>
<td>All</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
</tr>
<tr>
<td>Electrical power source (net or</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
</tr>
<tr>
<td>total)</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
<td>Each group</td>
</tr>
<tr>
<td>Loads associated with renewable</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>energy sources</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>Charging stations for electric</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
<tr>
<td>vehicles</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
<td>All loads in aggregate</td>
</tr>
</tbody>
</table>
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 190.5-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 buses 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.
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
Questions

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Thank You!

LOS ANGELES BASIN CHAPTER OF ICC
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.

The diagram illustrates the metal frame of a building and the hold-down bolts connected by welding, exothermic welding, usual steel tie wires, or other approved means.
250.32(B) Grounding Separate Buildings

250.32(B)(1)
Grounding at separate building or structure using the required EGC
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)
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 x 600kcmil = 3 x 420A = 1260A
2011 NEC
  1200A : 3 x 500kcmil = 3 x 380A = 1140A
  1200A x .95 = 1140A

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
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.