

Recommended Changes to the Proposed 2016 California Building Energy Efficiency Code

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Section 100.1 – Definitions and Rules of Construction

New Proposed Definitions:

Service as defined in California Electrical Code

Feeder as defined in California Electrical Code

Integrated LED lamp (provide the definition provided in ANSI/IES RP-16-2010)

Nonintegrated LED lamp ((provide the definition provided in ANSI/IES RP-16-2010))

New Code Proposed Definition:

Current Proposed Language:

Recessed Luminaire is a luminaire that is mounted above the ceiling or behind a wall or other surface with the opening of the luminaire level with the interior surface.

Recommended Change of Language:

Recessed Luminaire is a luminaire that is mounted ~~above~~ in the ceiling or behind a wall or other surface(s) with the opening of the luminaire ~~level~~ flush with the ~~interior~~ surface.

Reason for the Proposals:

1. The word “Service” is used in numerous locations within section 130.5; however, nowhere in the code it defines what it is. This new definition will clarify the intent of that section.
2. The word “Feeder” is proposed to be used in section 130.5 and providing a definition for this term will clarify the intent of the proposed revised section.
3. Section 130.0(c)9C refers to these lamps and sends you to ANSI/IES RP-16-2010 for the definitions. The energy code should provide this definition instead of referring it to another source as not everyone may have access to the ANSI standard or have to purchase the standard in order to know what it means! The code should be self-sufficient as much as possible.
4. The luminaire is usually installed in a ceiling and the term flush is the standard industry term for “recessed” and the deletion of interior is due the fact that this type of luminaire not only can be installed indoors but they are also installed outdoor in an outside wall.

Section 130.0 – Lighting Controls And Equipment – General

Section 130.0(c)6:

Current Proposed Language:

6. Luminaires with permanently installed or remotely installed ballasts. The wattage of such luminaries ~~shall be determined as follows:~~
 - A. ~~Wattage shall be the operating input wattage of the rated lamp/ballast combination published in ballast manufacturer's catalogs based on independent testing lab reports as specified by UL 1598.~~
 - B. ~~Replacement of lamps in a luminaire manufactured or rated for use with linear fluorescent lamps, with linear lamps of a different technology such as linear LED lamps, shall not be recognized as converting the fluorescent luminaire to a different technology for compliance with Part 6.~~

Recommended Change of Language:

1. Luminaires with permanently ~~installed~~ or remotely installed ballasts or drivers. The wattage of such luminaries shall be determined as follows:
 - A. ~~Wattage shall be~~ The operating input wattage of the rated lamp/ballast combination published in ballast manufacturer's catalogs based on independent testing lab reports as specified by UL 1598.
 - B. The maximum input wattage of the rated driver published in driver's manufacturer catalogs based on independent testing lab reports as specified by UL 8750. ~~Replacement of lamps in a luminaire manufactured or rated for use with linear fluorescent lamps, with linear lamps of a different technology such as linear LED lamps, shall not be recognized as converting the fluorescent luminaire to a different technology for compliance with Part 6.~~

Reason for the Proposals:

The current language does not address permanently or remotely installed LED lamp drivers and many installers try to use the LED lamp rating in-lieu of the driver rating, since these LED's can easily be replaced with higher wattage rated LED and the actual total installed wattage as is the case with ballasted system is not accounted for, thus increased unaccounted energy use. And, the word installed does not need to be repeated within the same sentence.

Section 130.1 – INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

EXCEPTION 3 to Section 130.1(c)1:

Current Proposed Language:

EXCEPTION 3 to Section 130.1(c)1: In ~~office~~-buildings, up to 0.05 watts per square foot of lighting in any area within a building may be continuously illuminated, provided that the area is designated an emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1.

Recommended Change of Language:

EXCEPTION 3 to Section 130.1(c)1: In ~~office~~-all buildings, up to 0.05 watts per square foot of lighting in any area within a building may be continuously illuminated, provided that the area is designated an emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Part 1.

Reason for the Proposals:

The change provides clear understanding of the intent.

Section 130.5 – ELECTRICAL POWER DISTRIBUTION SYSTEMS

Section 130.5(a)

Current Proposed Language:

~~Terms and phrases in Section 130.5 shall be as specified in Section 100.1. Terms and phrases not found in Section 100.1 shall be defined as specified in Title 24, Part 3, Article 100 of the California Electrical Code.~~

(a) **Service Metering.** Each electrical service shall have permanently installed ~~user accessible~~ metering system which measures of total electrical energy use ~~per~~ as specified by TABLE 130.5-A.

1. The electrical usage shall be recorded a minimum of every 15 minutes and reported at least hourly, daily, monthly, and annually. The metering system shall be capable of maintaining all data collected for a minimum of 36 months.

~~1.2.~~ For buildings with tenants, these systems shall be separately monitored for the total building and for each individual tenant space. The data for each tenant space shall be made available to that tenant.

EXCEPTION to Section 130.5(a) Buildings for which the utility company provides a meter ~~for occupant or user~~ use that indicates instantaneous kW demand and kWh for a ~~user~~-resettable period.

Recommended Change of Language:

1. **Service or Feeder Metering.** Each electrical service or feeder shall have permanently installed ~~user accessible~~ metering system which measures of total electrical energy use ~~per~~ as specified by TABLE 130.5-A.

1. The electrical usage shall be recorded a minimum of every 15 minutes and reported at least hourly, daily, monthly, and annually. The metering system shall be capable of maintaining all data collected for a minimum of 36 months.

~~1.2. For buildings with tenants, these systems shall be separately monitored for the total building and for each individual tenant space. The data for each tenant space shall be made available to that tenant.~~

EXCEPTION to Section 130.5(a) Buildings Service or feeder for which the utility company provides a meter for occupant or user use complying with provisions of section 130.5(a) that indicates instantaneous kW demand and kWh for a user-resettable period.

Reason for the Proposals:

Metering does not only take place at the service but also at feeders, as is common in multitenant shopping centers. This approach will also eliminate the need for section 130.5(a)2. The revised exception language clarifies that a utility meter has to have the same requirement as it would be for non-utility meter in order to eliminate any confusion that the utility meter can meet different requirements.

Section 130.5(b)

Current Proposed Language:

(b) **Disaggregation of Electrical Circuits / Electrical Energy Monitoring.** Electrical power distribution systems shall allow installation of measurement devices for monitoring the electrical energy usage of load types be designed to permit the disaggregated measurement of electrical load energy uses downstream from the service meter according to TABLE 130.5-B. Additive and subtractive methods may be used to determine aggregate and disaggregated energy use. This may be accomplished by any of the following methods:

1. Separate sSwitchboards, motor control centers, or panelboards to which are connected only the required load for each load type of TABLE 130.5-B and to which allow electrical load energy measurement to be aggregated. Up to 10 percent of the load for each load type of TABLE 130.5-B shall be allowed to be from other electrical load or group of loads; or
2. Additive and subtractive measurement methods may be used to determine electrical energy use. Up to 10 percent of the load for each load type of TABLE 130.5-B shall be allowed to be from other electrical loads Subpanels of the above to which are connected only the required load or group of loads and for which the subpanel load can be independently measured in aggregate; or
3. Buildings for which a complete metering and measurement system is provided that at a minimum measures and reports the loads called for in TABLE 130.5-B Branch circuits, taps or disconnects requiring overcurrent protection devices rated 60 amperes or greater.

~~**EXCEPTION 1 to Section 130.5(b)** Buildings for which a complete metering and measurement system is provided that at a minimum measures and reports the loads called for in TABLE 130.5-B.~~

~~**EXCEPTION 2 to Section 130.5(b)** Alterations where all of the following conditions exist are not required to comply with this section:~~

- ~~A. The following existing equipment remains in place:~~
 - ~~i. Service distribution switchboards or panelboards; and~~
 - ~~ii. Feeders; and~~
 - ~~iii. Motor control centers or panelboards.~~
- ~~B. Existing equipment included in Item A (above) remains unaltered except for:~~
 - ~~i. Changes to load circuit connections; or~~
 - ~~ii. Changes to the quantity of outgoing overcurrent protection devices; or~~
 - ~~iii. Changes to the ampacity of outgoing overcurrent protection devices.~~

Recommended Change of Language:

(b) **Disaggregation of Electrical Circuits / Electrical Energy Monitoring.** Electrical power distribution systems shall allow installation of measurement devices for monitoring the electrical energy usage of disaggregated load types ~~be designed to permit the disaggregated measurement of electrical load energy uses downstream from the service meter according to TABLE 130.5-B. Additive and subtractive methods may be used to determine aggregate and disaggregated energy use.~~ This may be accomplished by any of the following methods:

1. ~~Separate~~ Switchboards, distribution boards, motor control centers, or panelboards loads shall be disaggregated to which are connected only the required load for each specified load type of TABLE 130.5-B and to which allowing their electrical load energy independent energy measurement per Table 130.5-A to be aggregated. Up to 10 percent of the disaggregated connected load type is permitted to be from any for each any other disaggregated load types specified in of TABLE 130.5-B shall be allowed to be from other electrical load or group of loads; or
2. Switchboards, distribution boards, motor control centers, or panelboards may supply other distribution boards or panelboards with their loads disaggregated for each load types per Table 130.5-B. The measured interval demand loads for each board or motor load center must be able to be added or subtracted from the boards or motor load centers supplying them. This method must permit permanent measurement and determination of actual interval demand load value for each disaggregated load in the system. Additive and subtractive measurement methods may be used to determine electrical energy use. Up to 10 percent of the disaggregated connected for each load type is permitted of TABLE 130.5 B shall be allowed to be from any other electrical disaggregated loads types specified in TABLE 130.5 ~~Subpanels of the above to which are connected only the required load or group of loads and for which the subpanel load can be independently measured in aggregate;~~ or
3. Buildings for which a complete metering and measurement system is provided that at a minimum measures and reports the loads called for in TABLE 130.5-B Branch circuits, taps or disconnects requiring overcurrent protection devices rated 60 amperes or greater.

EXCEPTION 1 to Section 130.5(b) Buildings for which a complete metering and measurement system is provided that at a minimum measures and reports the loads called for in TABLE 130.5 B.

EXCEPTION 2 to Section 130.5(b) Alterations where all of the following conditions exist are not required to comply with this section:

- A. ~~The following existing equipment remains in place:~~
 - i. ~~Service distribution switchboards or panelboards; and~~
 - ii. ~~Feeders; and~~
 - iii. ~~Motor control centers or panelboards.~~
- B. ~~Existing equipment included in Item A (above) remains unaltered except for:~~
 - i. ~~Changes to load circuit connections; or~~
 - ii. ~~Changes to the quantity of outgoing overcurrent protection devices; or~~
 - iii. ~~Changes to the ampacity of outgoing overcurrent protection devices.~~

Reason for the Proposals:

Sections 130.5(b) and 130.5(b)1

1. The word disaggregate is within the title of section, so it should also be used within the body the first sentence.
2. Distribution boards are quite often used within the electrical system, so the term should be included.

3. The proposed 10% language is not clear. The revision is intended to clarify its purpose.

Section 130.5(b)2

1. The proposed language does not define as to what are additive and subtractive methods? Nor it defines as to what are the accepted methods. The revised language is an attempt to clarify as to what is accepted and how to comply using the method.
2. The proposed 10% language is not clear. The revision is intended to clarify its purpose.

Section 130.5(c)

Current Proposed Language:

(c) **Voltage Drop**

The conductors for feeders and branch circuits combined shall be sized for a maximum of 5 percent voltage drop total.

1. ~~**Feeders.** Feeder conductors shall be sized for a maximum voltage drop of 2 percent at design load.~~
2. ~~**Branch Circuits.** Branch circuit conductors shall be sized for a maximum voltage drop of 3 percent at design load.~~

~~**EXCEPTION to Section 130.5(c):** Feeder conductors and branch circuits that are dedicated to emergency services systems.~~

Recommended Change of Language:

(c) **Voltage Drop**

Except as required otherwise by the California Electrical Code the system voltage drop shall comply as follows:

1. Conductors for non-motor branch circuits shall be sized to prevent a voltage drop exceeding 3% at the farthest connected load/outlet. Or,
2. The maximum total voltage drop on both installed feeders and branch circuit conductors to the farthest connected non-motor load/outlet shall not exceed 5%.
3. Conductors for motor branch circuits shall be sized to prevent a voltage drop exceeding 6% at the farthest connected load. Or,
4. The maximum total voltage drop on both installed feeders and branch circuit conductors to the farthest connected motor load shall not exceed 10%.

The feeder voltage drop shall be based on maximum current rating of the feeder, when the connected load is less than 70% of the feeder capacity.

~~The conductors for feeders and branch circuits combined shall be sized for a maximum of 5 percent voltage drop total~~

1. ~~**Feeders.** Feeder conductors shall be sized for a maximum voltage drop of 2 percent at design load.~~
2. ~~**Branch Circuits.** Branch circuit conductors shall be sized for a maximum voltage drop of 3 percent at design load.~~

~~**EXCEPTION to Section 130.5(c):** Feeder conductors and branch circuits that are dedicated to~~

~~emergency services systems.~~

The maximum total voltage drop on both installed feeders and branch circuits to the farthest connected motor load shall not exceed 10%.

Reason for the Proposals:

1. An installation may only involve a lighting and appliance branch circuit. With this option, the installer would only be responsible for the voltage drop compliance that is under his/her scope of the work/permit.
2. There needs to be different voltage drop calculation for motor feeder/branch circuits as they are designed to operate with 10% drop due to starting or other operating characteristics.
3. The new revision for the feeder voltage drop calculation accounts for when a new panel with the smallest branch circuit load that may be installed.
4. Emergency branch circuits and feeders are normally supplied from normal source before they are called upon to provide emergency power supply. There is no reason for this system not to comply with the same voltage drop requirements as normal system, since the system will be safer.

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

Table 140.6-A:

Current Proposed Language:

TYPE OF CONTROL		TYPE OF AREA	FACTOR
a. To qualify for any of the Power Adjustment Factors in this table, the installation shall comply with the applicable requirements in Section 140.6(a)2 b. Only one PAF may be used for each qualifying luminaire unless combined below. c. Lighting controls that are required for compliance with Part 6 shall not be eligible for a PAF			
1. Partial-ON Occupant Sensing Control		Any area ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, conference or waiting room.	0.20
2. Occupant Sensing Controls in Large Open Plan Offices		In open plan offices > 250 square feet: One sensor controlling an area that is:	No larger than 125 square feet
			From 126 to 250 square feet
			From 251 to 500 square feet
3. Dimming System	Manual Dimming	Hotels/motels, restaurants, auditoriums, theaters	0.10
	Multiscene Programmable		0.20
4. Demand Responsive Control		All building types less than 10,000 square feet. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF	0.05
5. Combined Manual Dimming plus Partial-ON Occupant Sensing Control		Any area ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, conference or waiting room	0.25

Recommended Change of Language:

TYPE OF CONTROL		TYPE OF AREA		FACTOR	
a. To qualify for any of the Power Adjustment Factors in this table, the installation shall comply with the applicable requirements in Section 140.6(a)2 b. Only one PAF may be used for each qualifying luminaire unless combined below. c. Lighting controls that are required for compliance with Part 6 shall not be eligible for a PAF					
1. Partial-ON Occupant Sensing Control		Any area ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, conference or waiting room.		0.20	
21. Partial-ON Occupant Sensing Controls in Large Open Plan Offices		In open plan offices > 250 square feet: One sensor controlling an area that is:		No larger than 125 square feet	0.40
				From 126 to 250 square feet	0.30
		From 251 to 500 square feet	0.20		
3. Dimming System	Manual Dimming	Hotels/motels, restaurants, auditoriums, theaters		0.10	
	Multiscene Programmable			0.20	
42. Demand Responsive Control		All building types less than 10,000 square feet. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF		0.05	
5. Combined Manual Dimming plus Partial-ON Occupant Sensing Control		Any area ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, conference or waiting room.		0.25	

Reason for the Proposals:

The current provisions has caused nuisance on/off lighting as well as causing temporary light blindness due to creating minimum-to-maximum illumination ratio exceeding 10 to 1. The alternate option would maintain a certain level of illumination.

Table 140.6-C:

Current Proposed Language:

PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER (W/ft ²)	PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER (W/ft ²)	
Auditorium Area	1.51 1.40 ³	Library Area	Reading areas	1.21 1.1 ³
Auto Repair Area	0.90 ²		Stack areas	1.5 ³
Beauty Salon Area	1.7	Lobby Area	Hotel lobby	1.4 0.95 ³
Civic Meeting Place Area	1.3 ³		Main entry lobby	1.5 0.95 ³
Classroom, Lecture, Training, Vocational Areas	1.2 ⁵	Locker/Dressing Room		0.8 0.70
Commercial and Industrial Storage Areas (conditioned and unconditioned)	0.60	Lounge Area		1.4 0.90 ³
Commercial and Industrial Storage Areas (refrigerated)	0.7	Malls and Atria		1.2 0.95 ³
Convention, Conference, Multipurpose and Meeting Center Areas	1.4 1.2 ³	Medical and Clinical Care Area		1.2
Corridor, Restroom, Stair, and Support Areas	0.60	Office Area	> 250 square feet	0.75
Dining Area	1.1 1.0 ³		≤ 250 square feet	1.0
Electrical, Mechanical, Telephone Rooms	0.7 0.55 ²	Parking Garage	Parking Area ¹⁰	0.14
Exercise Center, Gymnasium Areas	1.0		Dedicated Ramps	0.30

Exhibit, Museum Areas		<u>2.0</u> ^{1,8}	Area	Daylight Adaptation Zones ⁹	0.60
Financial Transaction Area		<u>4.2</u> ^{1,0} ³	Religious Worship Area		1.5 ³
General Commercial and Industrial Work Areas	Low bay	0.9 ²	Retail Merchandise Sales, Wholesale Showroom Areas		1.2 ^{6 and 7}
	High bay	1.0 ²			
	Precision	1.2 ⁴	Theater Area	Motion picture	0.90 ³
Grocery Sales Area	1.2 ^{6 and 7}	Performance		1.4 ³	

Recommended Change of Language:

PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER (W/ft ²)	PRIMARY FUNCTION AREA	ALLOWED LIGHTING POWER (W/ft ²)		
Auditorium Area	<u>1.5</u> ^{1,40} ³	Library Area	Reading areas	<u>1.2</u> ¹ ³	
Auto Repair Area	0.90 ²		Stack areas	1.5 ³	
Beauty Salon Area	1.7	Lobby Area	Hotel lobby	<u>1.4</u> ^{0,95} ³	
<u>Break Room Area</u>	<u>0.75</u>		Main entry lobby	<u>1.5</u> ^{0,95} ³	
Civic Meeting Place Area	1.3 ³		<u>Reception</u>	<u>0.80</u> ³	
Classroom, Lecture, Training, Vocational Areas	1.2 ⁵	Locker/Dressing Room		<u>0.80</u> ⁷⁰	
Commercial and Industrial Storage Areas (conditioned and unconditioned)	0.60	Lounge Area		<u>1.4</u> ^{0,90} ³	
Commercial and Industrial Storage Areas (refrigerated)	0.7	Malls and Atria		<u>1.2</u> ^{0,95} ³	
Convention, Conference, Multipurpose and Meeting Center Areas	<u>1.4</u> ^{1,2} ³	Medical and Clinical Care Area		1.2	
Corridor, Restroom, Stair, and Support Areas	0.60	Office Area	> 250 square feet	0.75	
Dining Area	<u>1.1</u> ⁰ ³		≤ 250 square feet	1.0	
Electrical, Mechanical, Telephone Rooms	<u>0.7</u> ^{0,55} ²	Parking Garage Area	Parking Area ¹⁰	0.14	
Exercise Center, Gymnasium Areas	1.0		Dedicated Ramps	0.30	
Exhibit, Museum Areas	<u>2.0</u> ^{1,8}		Daylight Adaptation Zones ⁹	0.60	
Financial Transaction Area	<u>4.2</u> ^{1,0} ³	Religious Worship Area		1.5 ³	
General Commercial and Industrial Work Areas	Low bay	0.9 ²	Retail Merchandise Sales, Wholesale Showroom Areas		1.2 ^{6 and 7}
	High bay	1.0 ²			
	Precision	1.2 ⁴	Theater Area	Motion picture	0.90 ³
Grocery Sales Area	1.2 ^{6 and 7}	Performance		1.4 ³	

Reason for the Proposals:

The current table does not have provisions for reception area in many new lobby designs and does not account for break room areas that are provided to the many employees in commercial buildings. The allocated w/ft² is similar to other parts of the buildings.

SECTION 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES AND TO EXISTING OUTDOOR LIGHTING FOR THESE OCCUPANCIES AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS

Section 141.0(b)(2)(O)

Current Proposed Language:

O. Electrical Power Distribution Systems. When adding, relocating, or replacing service equipment, circuits, or receptacles, the altered component of the electrical power distribution system shall meet the requirements of Section 130.5.

Recommended Change of Language:

O. Electrical Power Distribution Systems. When adding, relocating, or replacing service, switchboards, distribution boards, motor control centers and panelboard equipment, circuits, or receptacles, the altered component of the electrical power distribution system shall meet the requirements of Section 130.5.

EXCEPTION 1 to Section 141.0(b)(2)(O). Addition of 120V outlet receptacle to an existing circuit containing 10 or more receptacles.

EXCEPTION 2 to Section 141.0(b)(2)(O). Replacement of 120V outlet receptacles in an existing circuit.

EXCEPTION 3 to Section 141.0(b)(2)(O). Addition of one 120V outlet receptacle to an existing circuit in an office space.

Reason for the Proposals:

1. In an electrical installation you can replace, relocate, or replace not just the service but all other associate system components such as distribution boards, motor control centers, or panelboards.
2. The Exception 1 addresses existing outlet receptacle circuits that are more than 60% loaded. Requiring a controlled circuit in such installation it would appear to be cost prohibitive and difficult to justify accomplished energy saving, since you would be required to install additional circuit wiring and possibly revise the size of existing home run raceway to a panelboard serving the area.
3. The Exception 2 addresses replacement of existing 120 V outlet receptacles with a new receptacles such as tamper proof, weather proof, GFCI type, etc. Replacement of outlet with another outlet should not trigger compliance.
4. The Exception 3 addresses installation of a receptacle in a small office. The cost of compliance in this case does not appear to warrant the energy savings in this case.