

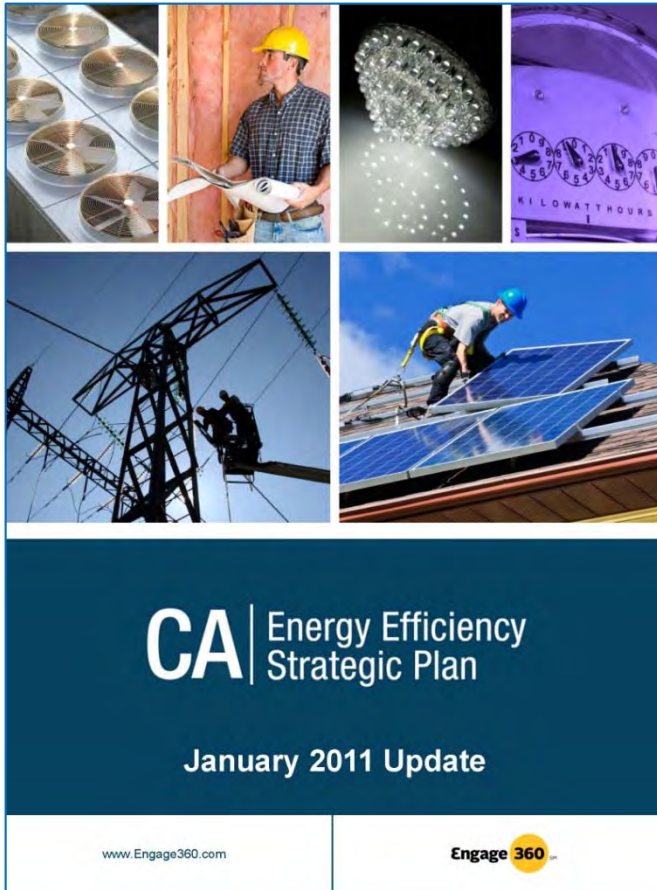


2013 Title 24, Part 6 Energy Standards

Brief Introduction to 2013 Title 24
Part 6 Requirements for
Nonresidential Alterations.



When, Where and Why



■ When (current schedule):

- Any projects that apply for permit on or after January 1, 2014 will be subject to the 2013 Standards.
- Exception: Nonresidential Registry January 1, 2015
- Appliance efficiency update 2015
- **Where can you find?** *CEC website*
- Standards, Residential and Nonresidential Manuals:
- http://www.energy.ca.gov/title24/2013standards/supporting_docs.html

■ Why?

- Net Zero goals:
 - Residential: 2020
 - Nonresidential: 2030



Overview: Occupancy Groups Covered

Nonresidential Standards cover the following occupancy groups

Occupancy Group		Example
A	Assembly	Theaters, churches, etc.
B	Businesses	Office buildings
E	Educational facilities	K-12 schools
F	Factories, low & moderate hazard	
H	High hazard facilities	
M	Mercantile	Grocery store, department store
R	Residential	Apartment buildings with four or more habitable stories, hotels/motels, long-term care facilities
S	Storage, low & moderate hazard	
U	Utility	Garages, towers



Mandatory, Prescriptive, Performance: Defining the Difference

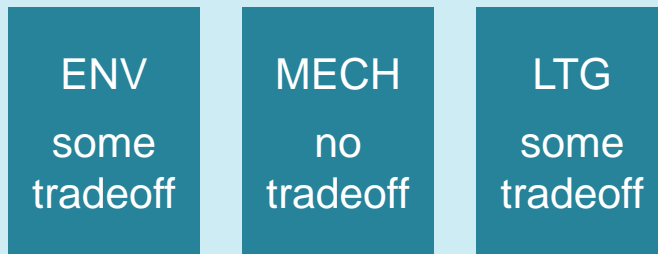
Mandatory Measures



Two Ways to Comply with the Standards



Prescriptive Approach



No tradeoffs between
ENV, MECH, and LTG

Performance Approach



Standard Design



Proposed Design

Tradeoffs



* See notes for restrictions

Compliance Documentation

Some prescriptive requirements likely 'traded away' via performance method
Look for features that were **improved** to compensate for the "tradeoff"



Envelope





Envelope:

What's New?

New Construction

- Mandatory
 - Insulation requirements
- Prescriptive:
 - Cool roof revised, roof insulation trade-off Table 140.3 for aged solar reflectance
 - Fenestration:
 - Dynamic glazing, window films and VT (visual light transmittance)

Alterations

- Mandatory
 - Insulation requirements
- Prescriptive:
 - Cool roof: trade-off Table 141.0-B
 - Fenestration: Different prescriptive requirements from new construction.



Alterations NR Envelope:

Mandatory Insulation

Roof/Ceiling

Low sloped exposed to roof deck:

CZ 1, 3-9: R-8

CZ 2, 10-16: R-14

Highrise & hotel/motel: All CZ R-14

Wall

Metal building: R-13; U-factor = 0.113

Metal framed: R-13; U-factor = 0.217

Wood framed: R-11; U-factor = 0.110

Spandrel wall: R-4; U-factor = 0.280

Demising (framed): R-13

Floor

Raised mass: None

Other: Wood framed with R-11

U-factor = 0.071

Heated slab: CZ 1-15 = R-5

CZ 6 = R-10



NR Envelope "Alterations": Prescriptive

TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (INCLUDING RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE ONLY IN SPECIFIC CLIMATE ZONE; NOT INCLUDING HIGH-RISE RESIDENTIAL BUILDINGS AND GUEST ROOMS OF HOTEL/MOTEL BUILDINGS)				Climate Zone															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Envelope	Maximum U-factor	Roofs/ Ceilings	Metal Building	Continuous insulation or U-factor: CZ1, 3-9=R-8 (0.082), CZ2, 10-16=R-14 (0.055), unless Table 141.0-B Trade-off used															
			Wood Framed and Other																
		Walls	Metal Building	0.113	0.061	0.113	0.061	0.061	0.113	0.113	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.061
			Metal-framed	0.098	0.062	0.082	0.062	0.062	0.098	0.098	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
			Mass Light ¹	0.196	0.170	0.278	0.227	0.440	0.440	0.440	0.440	0.440	0.170	0.170	0.170	0.170	0.170	0.170	0.170
			Mass Heavy ¹	0.253	0.650	0.650	0.650	0.650	0.690	0.690	0.690	0.690	0.650	0.184	0.253	0.211	0.184	0.184	0.160
			Wood-framed and Other	0.102	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.059	0.059	0.059	0.059	0.042	0.059
	Roofing Products	Floors/ Soffits	Mass	0.092	0.092	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.092	0.092	0.092	0.092	0.092	0.058
			Other	0.048	0.039	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.039	0.071	0.071	0.039	0.039	0.039
		Low-sloped	Aged Solar Reflectance	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
			Thermal Emittance	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		Steep-Sloped	Aged Solar Reflectance	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
			Thermal Emittance	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Cool Roof

50% or more than 2,000 sf . Table 141.0-B Roof insulation trade-off for Aged Solar Reflectance.

Exception: Aged Solar Reflectance of 0.63 if U-factor = Table 141.0-B Trade-off

Fenestration

Exception: 150 sf or less altered, 50 sf or less added

CZ 1-2, 4, 6-16:

U-factor = 0.47

CZ 3 and 5:

U-factor = 0.58

CZ 2, 4, 6-15

SHGC = 0.31

CZ 1, 3, 5, 16

SHGC = 0.41

Minimum VT per Table 140.3-B, C and D

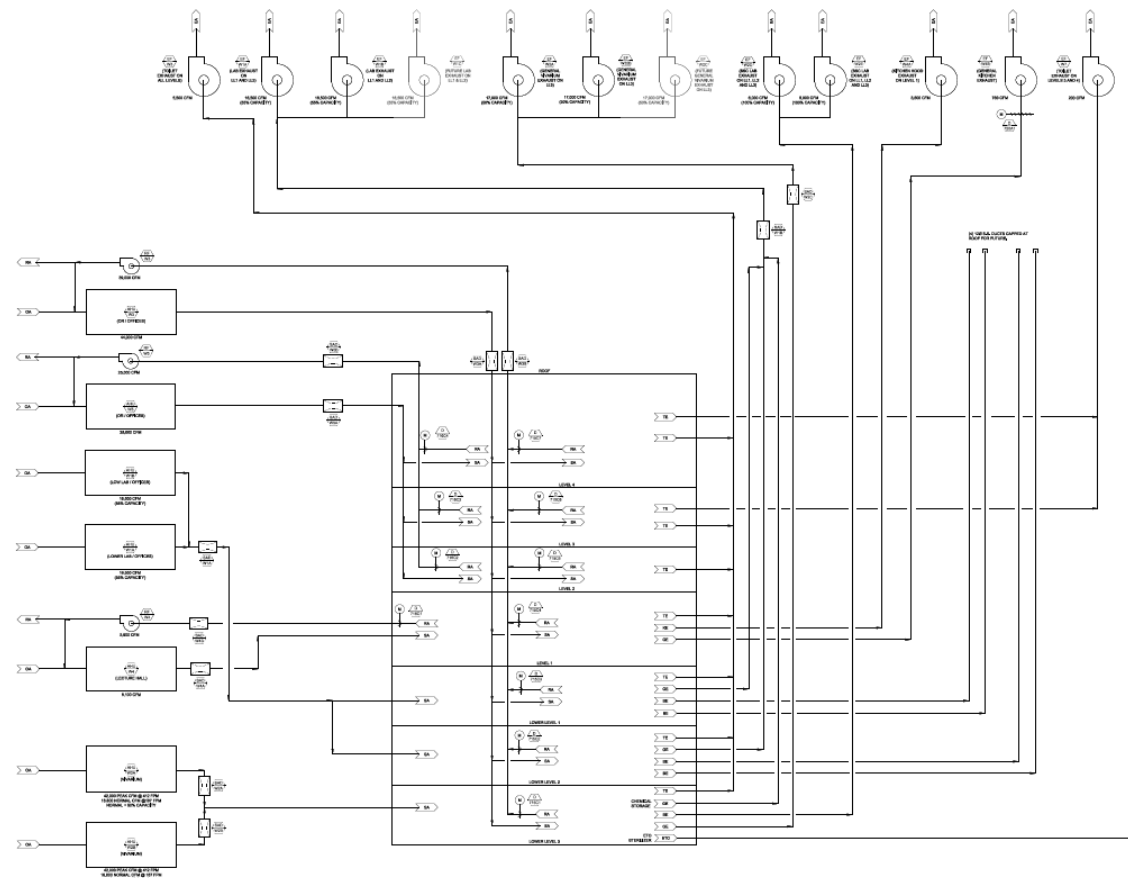


NR Envelope "Alterations": Performance

Altered Component	Standard Design Without 3 rd Party Verification	Standard Design WITH 3 rd Party Verification
Roof	Table 141.0-C (CZ 1, 3-9 = U-factor of 0.082; CZ 2, 10-16 = U-factor of 0.055)	
Cool Roof	Prescriptive (NR Bldg: low slope = 0.63 /steep sloped = 0.20) or Aged Solar Reflectance of 0.63 if U-factor = Table 141.0-B Trade-off	
Wall	Metal Building = U-factor of 0.113; metal framed U = 0.217; wood framed and other U = 0.110 and spandrel/curtain walls U = 0.28	
Floor	Raised framed floors U=0.071; raised mass NR bldg =no minimum	
Fenestration: <u>New windows</u> Allowed area to be smaller of either: a. Proposed area OR b. Larger of 1. Existing area OR 2. Prescriptive allowance of 40%	CZ 1-2, 4, 6-16: U-factor = 0.47 CZ 3 and 5: U-factor = 0.58 CZ 2, 4, 6-15: SHGC = 0.31 CZ 1, 3, 5, 16: SHGC = 0.41	Existing condition
<u>Window Film</u>	U-factor = 0.40 / SHGC = 0.35	Default values of Table 110.6-A / 110.6-B
HVAC and ducts	Prescriptive alteration requirements Section 141.0 (b)2C, D and E	
Lighting	Prescriptive alteration requirements Section 141.0 (b)2F through K	
Service Water heating	Per Section 140.5 without solar water heating requirements (High rise and Hotel/Motel)	
All others	Proposed efficiency levels	



Mechanical





Mechanical:

What's New



The 2013 Standards Will Go Into Effect January 1, 2014

The Blueprint is your guide to information, training and resources for the 2013 Building Energy Efficiency Standards. The California Energy Commission has partnered with the Statewide Codes & Standards Program to provide training and resources for building officials. California's building energy code can help save energy, keep our air cleaner and offset the need to build new power plants. We understand it can be quite technical and difficult to navigate new standards, especially when time and resources are limited.

The Statewide Codes & Standards Program offers free energy code training, tools and resources for building department personnel, as well as others who need to understand and meet the requirements of Title 24, Part 6. Designed to improve compliance with the state's building energy code, the program aims to

advance the adoption and effective implementation of energy efficiency measures and building practices to lock in long-term energy savings. The program recognizes that codes and standards are one of the most effective pathways to ensuring sustained market transformation. The key to making them work well is found in the enforcement efforts of building department professionals. Program offerings are designed for counter staff, plans examiners, field inspectors and building officials.

The California Statewide Codes & Standards Program is funded by California utility customers under the auspices of the California Public Utilities Commission and implemented by Pacific Gas and Electric Company, San Diego Gas and Electric, Southern California Edison and Southern California Gas, in support of the California Energy Commission.

Fall 2013 Classroom Trainings Offered

- ▶ Title 24 Residential or Nonresidential Standards Essentials for Plans Examiners & Building Inspectors
- ▶ Residential Lighting: Title 24 & Technology Update
- ▶ Retail Lighting: Title 24 and Technology Update
- ▶ Title 24 Standards Essentials for Supermarket Refrigeration
- ▶ Title 24 Standards Essentials for Residential AC Quality Installation Contractors
- ▶ Title 24 Standards Essentials for Small Commercial AC Quality Installation Contractors

Courses are offered at utility energy training centers and at special locations upon request. For more information please email wendy@mbeaenergy.com. For scheduled classes, check these energy center websites to register:

- ▶ <http://www.pge.com/pec>
- ▶ <http://www.sdge.com/eic>
- ▶ <http://www.socalgas.com/innovation/energy-resource-center>
- ▶ <https://www.sce.com/wps/portal/home/business/consulting-services/energy-education-centers>

Mechanical

1. Added requirements for Fan Control and Integrated Economizers. Packaged units down to 6 tons must be VAV with the ability to modulate cooling capacity to 20% of maximum. Economizers must also be able to modulate cooling capacity to match VAV units. (§140.4(c) & (e))
2. Reduced ability for HVAC systems to reheat conditioned air. (§140.4(d))
3. Increased chiller efficiency requirements, consistent with ASHRAE 90.1-2010. (§140.4(i))
4. Increased cooling tower energy efficiency and WATER Savings. (§140.4(k)2)
5. Added requirements for commercial boiler combustion controls. (§140.4(k)3)
6. Added acceptance tests for HVAC sensors and controls, including those for demand controlled ventilation. (§120.5(a))
7. Added efficiency requirements for small motors. (§140.4(c)4)
8. Added credit for evaporative systems that meet the Western Cooling Efficiency Challenge (WCEC program to acknowledge high energy and water efficiency in evaporative systems).
9. Moving Fault Detection and Diagnostics (FDD) protocols for air temperature, economizers, damper modulation, and excess outdoor air to mandatory measures from the current compliance option. (§120.2(i))



Mechanical:

Mandatory Measures

HVAC DRY SYSTEM REQUIREMENTS	
PROJECT NAME:	
Equipment Tags and System Description ¹	
MANDATORY MEASURES	T-24 Sections
Heating Equipment Efficiency ³	110.1 or 110.2(a)
Cooling Equipment Efficiency ³	110.1 or 110.2(a)
HVAC or Heat Pump Thermostats	110.2(b), 110.2(c)
Furnace Standby Loss Control	110.2(d)
Low leakage AHUs	110.2(f)
Ventilation ⁴	120.1(b)
Demand Control Ventilation ⁵	120.1(c)4
Occupant Sensor Ventilation Control ⁶	120.1(c)5, 120.2(e)3
Shutoff and Reset Controls ⁷	120.2(e)
Outdoor Air and Exhaust Damper Control	120.2(f)
Isolation Zones	120.2(g)
Automatic Demand Shed Controls	120.2(h)
Economizer FDD	120.2(i)
Duct Insulation	120.4

Title 20 efficiencies to be updated 1/1/2015. Many added and updated equipment types.

If using in performance calculations, must meet HERS verification requirements.

Required in:
Multipurpose rooms less than 1,000 sf, classrooms greater than 750 sf, conference, convention, auditorium and meeting centers greater than 750 sf.

VAV systems: dynamic controls to maintain outside air rates within 10% of required rate at full and reduced supply airflow conditions. Constant volume: measured outside air rates within 10% of required outside air.

Air cooled unitary DX units with economizers and cooling capacity 54,000 BTUH or higher, must include fault detection and diagnostic system.

Features added: Facility operators can disable, and manually control adjustment of set points globally from single point in EMCS, and upon receipt of a demand response signal conduct a centralized demand shed.



Mechanical: Prescriptive Air Systems

PRESCRIPTIVE MEASURES

Equipment is sized in conformance with 140.4 (a & b)

Supply Fan Pressure Control

Simultaneous Heat/Cool⁸

Economizer

Heat and Cool Air Supply Reset

Electric Resistance Heating⁹

Duct Leakage Sealing and Testing.¹⁰

140.4(a & b)

140.4(c)

140.4(d)

140.4(e)

140.4(f)

140.4(g)

140.4(l)

Fan less than 1 hp or less, and 1/12HP or greater shall be electronically-commutated motors or have efficiency of 70% rated at full load conditions (brushless DC motors).

Required when total cooling capacity over 54,000 BTUH (Or trade off with higher efficiency per Table 140-1-A, which is 65% for CZ4).

Dew Point, Fixed Enthalpy, Electronic Enthalpy and Differential Enthalpy Controls not allowed (only Fixed and Differential Dry Bulb and Fixed Enthalpy/drybulb) .

Air Economizer Construction

If cooling fan system over 45,000 BTUH, factory warranty, testing, minimized air and return damper leakage, fixed controls to have adjustable setpoint , calibration, high limit sensor location correct, relief air to not over-pressurize building.

Minimum compressor unloading

100% open for mechanical cooling, not close until leaving temp less than 45°F

DX Constant volume system: 2 stage control $\geq 75,000$ BTUH

DX Variable volume system: 3 stage control $\geq 65,000$ & $< 240,000$ BTUH

4 stage control $\geq 240,000$ BTUH



Solar Ready

15% of total roof area
excluding skylights,
EXCEPT:

- Covered occupancy:
 - Hotel/motel and high rise residential: 11 stories or more
 - All other nonresidential: 4 or more stories
 - Roof used for vehicular traffic parking, heliport
- PV system = 1 watt per sq. ft. of roof area
- Solar hot water system with solar savings fraction:
 - 20% = CZ1 through 9
 - 35% = CZ 10-16
- 50% *potential* solar zone area provided
- High Rise Residential:
 - *Demand response thermostats*
 - *High efficacy lights at kitchen, bathrooms (with vacancy sensor), utility rooms, garages and outside (with occupancy and photo sensor)*
 - *Every room has a switched receptacle*



Covered Processes





Covered Processes:

What's New

Covered Processes

The 2013 Standards now cover some specific process energy applications, such as supermarket refrigeration, refrigerated warehouses, commercial kitchen ventilation requirements, laboratory exhaust, parking garage ventilation, compressed air, and computer rooms.

Definitions for Covered Processes and Exempt Processes were added. Covered Processes are defined as processes for which there are listed requirements. All other processes are Exempt Processes. Specific requirements for Covered Processes are in separate sections (§120.6 Mandatory and §140.9 Prescriptive). It should be noted that the HVAC equipment efficiencies in §110.1 and §110.2 also apply to Covered Processes. In the 2013 Standards, the Covered Processes include:

1. Increased mandatory requirements for refrigerated warehouses. (§120.6(a))
2. Added mandatory requirements for commercial supermarket refrigeration (§120.6(b))
3. Added mandatory ventilation control requirements for parking garages (§120.6(c))
4. Added mandatory requirements for process boilers (§120.6(d))
5. Added mandatory requirements for storage and unloading for compressed air systems (§120.6(e))
Added prescriptive requirements for HVAC systems serving computer rooms (§140.9(a))
6. Added prescriptive ventilation control requirements for commercial kitchens. (§140.9(b))
7. Added prescriptive requirements for variable air volume for laboratory exhaust systems. (§140.9(c))



5. Computer Rooms



Prescriptive:

Economizers

- A. Integrated air economizer capable of providing 100% of the expected system cooling load at outside temperatures of 55°F and below; OR
- B. Integrated water economizer capable of providing 100% of the expected system cooling load at outside temperatures of 40°F and below.

Exception: Individual computer room under 5 tons in a building that has no economizers.

- 2. Reheat: Controls that prevent reheating, recooling, and simultaneous provisions of heating and cooling to the same zone.
- 3. Humidification: Non-adiabatic humidification (steam, infrared) prohibited. Only adiabatic humidification permitted (direct evaporation, ultrasonic)
- 4. Fan power: Not to exceed 27 w/kBtuh of net sensible cooling capacity.
- 5. Fan control: 2-speed or variable speed control that will result in fan motor demand of no more than 50% of design wattage at 66% of design fan speed.
- 6. Containment: if air-cooled, design load exceeding 175 kW/room, air barriers to prevent discharge air to recirculate back to computer inlets through cooling system.



Lighting





Lighting



WHAT'S NEW IN THE 2013 CODE?

Changes to mandatory Title 24 lighting requirements

California's new Building Energy Efficiency Standards take effect in 2014. They improve the energy efficiency of homes by 25 percent and make nonresidential buildings 30 percent more efficient than the previous 2008 standards. This brief guide offers an overview of important requirements and major updates to the lighting code.

New requirements for lighting controls constitute one of the biggest changes to Title 24 standards. The latest version of the standards also includes more stringent requirements for the testing and certification of controls commissioning.

All lighting control systems with two or more components—in both residential and non-residential spaces—must meet the requirements of 2013 Title 24 standards, **Section 110.9**. Both stand-alone and luminaire-integrated lighting controls, such as vacancy sensors and photocells, must now comply with Title 20 regulations.

NON-RESIDENTIAL INDOOR LIGHTING REQUIREMENTS

All interior luminaires in non-residential buildings must have manual on/off controls, and each area must be independently controlled. Dimmer switches must allow manual on/off functionality, with some exceptions such as public restrooms with two or more stalls, which do not need a publicly accessible switch.

MULTI-LEVEL LIGHTING CONTROLS

In areas larger than 100 ft², installed luminaires must:

- Incorporate multi-level lighting controls or continuous dimming, depending on the lamp type
- Meet the uniformity requirements in **Table 130.1-A**
- Have at least one of the following types of controls for each luminaire:
 - Manual continuous dimming and on/off control (**Section 130.1(a)**)
 - Lumen maintenance (**Section 100.1**)
 - Tuning (**Section 100.1**)
 - Automatic daylighting controls (**Section 130.1(d)**)
 - Demand response controls (**Section 130.1(e)**)

Classrooms are one of the rare exceptions to the multi-level requirements. Instead, if they have a connected general lighting load $\leq 0.7 \text{ W/ft}^2$, they must have at least one control step between 30% and 70% of full-rated power.

CALIFORNIA LIGHTING TECHNOLOGY CENTER · UNIVERSITY OF CALIFORNIA, DAVIS · CLTC.UCDAVIS.EDU

■ <http://cltc.ucdavis.edu/publication/whats-new-title24-2013-code>



Lighting: Mandatory Multi Level Controls

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TABLE 130.1 - A

MULTI-LEVEL LIGHTING CONTROLS AND UNIFORMITY REQUIREMENTS		
Luminaire Type	Minimum Required Control Steps (Percent of Full Rated Power)	Uniform Level of Illuminance Shall Be Achieved by:
Line-voltage sockets except GU-24	Continuous dimming 10–100%	
Low-voltage incandescent systems		
LED luminaires and LED source systems		
GU-24 rated for LED		
GU-24 sockets rated for fluorescent > 20 W	Continuous dimming 20–100%	
Pin-based compact fluorescent > 20 W		
GU-24 sockets rated for fluorescent \leq 20 W	Minimum one step between 30–70%	<ul style="list-style-type: none"> • Stepped dimming or • Continuous dimming or • Switching alternate lamps in a luminaire
Pin-based compact fluorescent \leq 20 W		
Linear fluorescent and U-bent fluorescent \leq 13 W		
Linear fluorescent and U-bent fluorescent > 13 W	Minimum one step in each range: 20–40% 50–70% 80–85% 100%	<ul style="list-style-type: none"> • Stepped dimming or • Continuous dimming or • Switching alternate lamps in each luminaire, having a minimum of 4 lamps per luminaire, illuminating the same area and in the same manner
Track Lighting	Minimum one step between 30–70%	<ul style="list-style-type: none"> • Step dimming or • Continuous dimming or • Separately switching circuits in multi-circuit track with a minimum of two circuits
HID > 20 W	Minimum one step between 50–70%	<ul style="list-style-type: none"> • Stepped dimming or • Continuous dimming or • Switching alternate lamps in each luminaire, having a minimum of 2 lamps per luminaire, illuminating the same area and in the same manner
Induction > 25 W		
Other light sources		



Lighting: Mandatory Automatic Daylighting

AUTOMATIC DAYLIGHTING CONTROLS

Under **Section 140.3 (c)** of the 2008 code, just 50% of the floor area in buildings over 8,000 ft² was required to be in daylighting zones. **Section 140.3 (c)** of the 2013 code requires that floor plans have 75% of their total area in daylight zones, and it applies the rule more broadly, to buildings > 5,000 ft².

In these daylighting zones, controls requirements have also become more stringent. Before, only sky-lit spaces $\geq 2,500$ ft² and side-lit spaces ≤ 250 ft² had to have daylighting controls. **Section 130.1 (d)** of the new code replaces the old size criterion with one for energy use. It requires multi-level automatic daylighting controls in:

- All sky-lit or side-lit zones where the installed general lighting power is ≥ 120 W

New daylighting controls requirements for parking garages are addressed on page 4 of this guide.





Lighting: Mandatory Occupant-Sensing

OCCUPANT-SENSING LIGHTING CONTROLS

Section 119 of the 2013 code requires occupant-sensing lighting controls in the following areas:

- Offices $\leq 250 \text{ ft}^2$
- Conference rooms of any size
- Multipurpose rooms $< 1000 \text{ ft}^2$
- Classrooms of any size
- Secondary spaces
- Indoor parking areas

Indoor parking areas, including parking garages, and secondary spaces are new additions.



Parking Garage Mandatory: Lighting

1. General lighting to be controlled by occupancy sensing controls having at least one control step between 20% and 50% of design lighting power.
2. Combined total of 36 sf or more openings, luminaires for general lighting in primary and secondary sidelite zones to be controlled independently by multi level (continuous dimming or on/off) automatic controls.
3. When primary sidelit zone illuminance level greater than 150% of that provided by electric lighting, controls must reduce controlled power to zero.

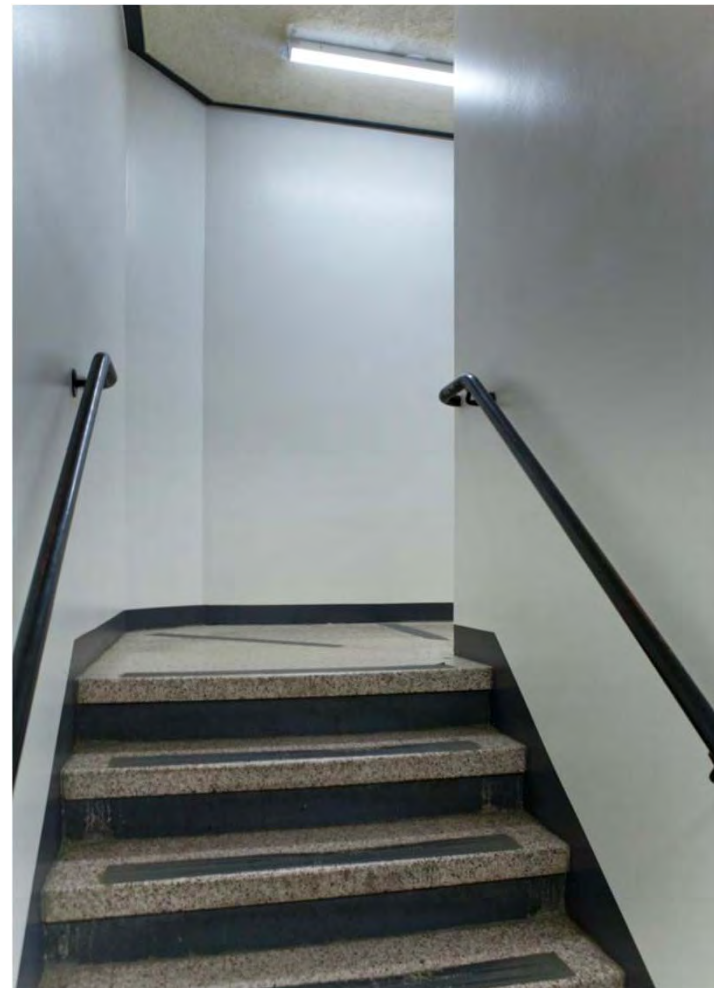


Lighting: Mandatory Occupant-Sensing

SECONDARY SPACES

Under the 2013 code, occupant-sensing controls must automatically reduce lighting power by 50% in these areas when they are unoccupied:

- Corridors and stairwells
- Warehouse aisles and open areas
- Library book stack aisles ≥ 10 ft in length and accessible from only one end and those ≥ 20 ft in length and accessible from both ends





Lighting: Mandatory Demand Responsive

The 2008 code only required DR capability in retail buildings with sales floor areas $\geq 50,000$ ft². The 2013 code expands this considerably, requiring that all non-residential buildings $\geq 10,000$ ft² be capable of automatically responding to a DR signal, so that:

Total energy use for lighting can automatically drop to a level at least 15% below the building's maximum total lighting power

Lighting is reduced in a manner consistent with requirements for uniform illumination levels (listed in Table 130.1-A)

Non-habitable spaces must not be used to comply with this requirement, and spaces with a lighting power density ≤ 0.5 W / ft² are not counted toward the building's total lighting power. Designers are still responsible for specifying automated controls that are compatible with the local utility's DR protocol.



Lighting "Alterations": <10%

TABLE 141.0-E Requirements for Luminaire Alterations

Quantity of existing affected luminaires per Enclosed Space ¹	Resulting Lighting Power for Each Enclosed Space	Applicable Mandatory Control Provisions for Each Enclosed Space	Multi-level Lighting Control Requirements for Each Altered Luminaire
Alterations that do not change the area of the enclosed space or the space type			
Sum total < 10% of existing luminaires	Existing lighting power is permitted	Existing provisions are permitted	Existing controls are permitted
Sum total ≥ 10% of existing luminaires	≤ 85% of allowed lighting power per Section 140.6 Area Category Method	§130.1(a), (c)	Two level lighting control ² or §130.1(b)
	> 85% of allowed lighting power per Section 140.6 Area Category Method	§130.1(a), (c), (d) ³	§130.1(b)
Alterations that change the area of the enclosed space or the space type or increase the lighting power in the enclosed space			
Any number	Comply with Section 140.6	§130.0(d) ³ §130.1(a), (c), (d) ³ , (e)	§130.1(b)

1. Affected luminaires include any luminaire that is changed, replaced, removed, relocated; or, connected to, altered or revised wiring, except as permitted by EXCEPTIONS 1 and 2 to Section 141.0(b)2iii:
 2. Two level lighting control shall have at least one control step between 30 and 70% of design lighting power in a manner providing reasonably uniform illuminations
 3. Daylight controls in accordance with Section 130.0(d) are required only for luminaires that are altered.

Alterations include:

Existing lighting system is:

1. Modified
2. Replaced
3. Moved

Per Table 141.0-E.

Exception: Qualify as Luminaire Modification-in-Place

TABLE 141.0-F Requirements for Luminaire Modifications-in-Place

For compliance with this Table, building space is defined as any of the following: 1. A complete single story building 2. A complete floor of a multi floor building 3. The entire space in a building of a single tenant under a single lease 4. All of the common, not leasable space in single building			
Quantity of affected luminaires per Building Space per annum	Resulting Lighting Power per Each Enclosed Space Where ≥ 10% of Existing Luminaires are Luminaire Modifications-in-Place	Applicable mandatory control provisions for each enclosed space ¹	Applicable multi-level lighting control requirements for each modified luminaire ²
Sum total < 40 Luminaire Modifications-in-Place	Existing lighting power is permitted	Existing provisions are permitted	Existing controls are permitted
Sum total ≥ 40 Luminaire Modifications-in-Place	≤ 85% of allowed lighting power per Section 140.6 Area Category Method	§130.1(a), (c)	Two level lighting control ³ Or §130.1(b)
	> 85% of allowed lighting power per Section 140.6 Area Category Method	§130.0(d) ⁴ §130.1(a), (c), (d) ⁴	§130.1(b)

1. Control requirements only apply to enclosed spaces for which there are Luminaire Modifications-in-Place.
 2. Multi-level controls are required only for luminaires for which there are Luminaire Modifications-in-Place.
 3. Two level lighting control shall have at least one control step between 30% and 70% of design lighting power in a manner providing reasonably uniform illuminations
 4. Daylight controls in accordance with Section 130.0(d) are required only for luminaires that are modified-in-place.

Luminaire Modification-in-place:

1. Replacing lamps and ballasts with like type that preserves original luminaire listing.
2. Changing # or type of light source including: socket renewal, removal or relocation of sockets, wiring.
3. Changing the optical system of the luminaire.
4. Replacement of whole luminaire.

Cannot be part or result of any general remodeling of the enclosed space in which they are located; or changes to panelboard or branch circuit wiring.



Electrical





Electrical: Mandatory Disaggregation

B. Disaggregation of Electrical Circuits (continued)

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

Table 130.5 – 8 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

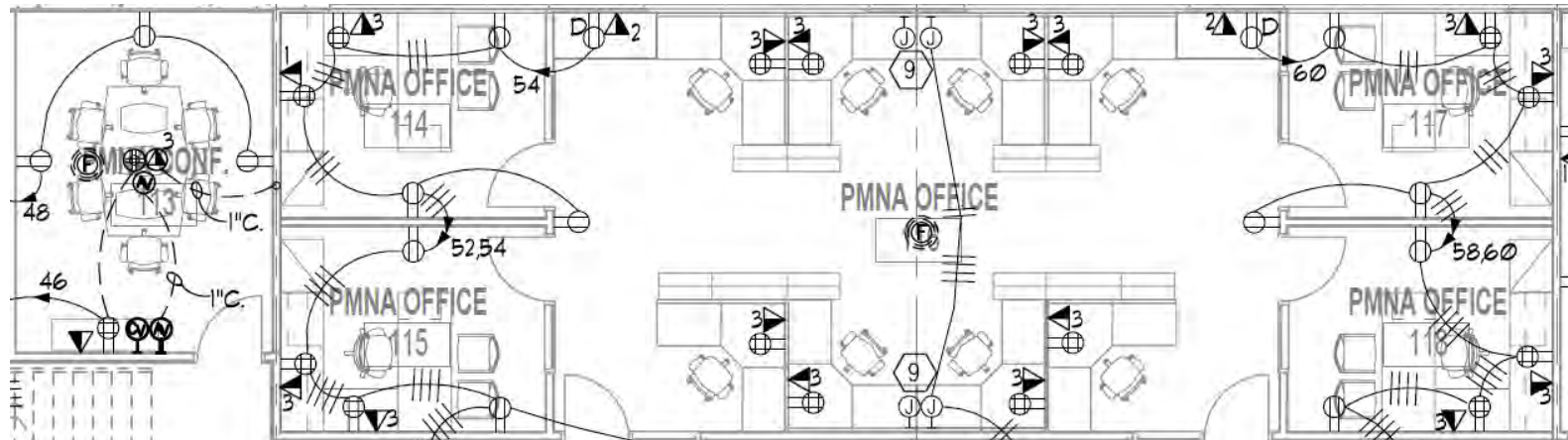


☐ Controlled 120 volt receptacles shall be provided in each private office, open office area, reception lobby, conference room, kitchenette in office spaces, and copy room. Controlled receptacles shall meet the following requirements.

☐ 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.





Contact Information



If you need any further information, please feel free to contact me directly. I wish I could be there in person today, and I thank Francesca Wahl for presenting this material today.

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