

SEEC

How Energy Code Ace Can Help *YOU*

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This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.



EnergyCodeAce.com

The screenshot shows the EnergyCodeAce.com website. At the top, there's a navigation bar with links for Home, Tools Ace, Training Ace, Resources Ace, and Outreach. Below this is a banner for the California Statewide Codes & Standards Program. The main content area is divided into several sections: 'Did you Know?' with energy-saving tips, 'Comply With Me' featuring a video of a marching band, 'Log In or Register' with a form, and 'It's time to comply - the 2013 Building Energy Code is now in effect!' with a countdown to July 1. Below these are three featured sections: 'Ace Tools™', 'Ace Training™', and 'Ace Resources™', each with a brief description of the services offered. At the bottom, there's a calendar for September 2013 and a footer with logos for various partners and a disclaimer.

- ♠ One-Stop Shop
 - ✦ Tools
 - ✦ Training
 - ✦ Resources
 - ✦ News & Information
 - ✦ Recognition Opportunities
- ♠ Personalized
 - ✦ Recommendations – *Coming Soon*
 - ✦ Engaging “Point Tracking”
- ♠ E-mail messaging to registered users
- ♠ Quick response to user questions



Step-by-step guide to the Title 24, Part 6 compliance process in easy-to-follow flowchart format



Aids in determining which compliance forms are applicable to your specific project



Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections



A “field guide” to assist you in identifying proper installation techniques and visual aides for some components commonly installed incorrectly



Workshop packages to help Building Departments facilitate trainings for local installation contractors



2013 Building Energy Efficiency Standards - Reference Ace

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- Residential Compliance Manual
- Nonresidential Compliance Manual

2013 Building Energy Efficiency Standards Reference Tool

TITLE 24, PART 6, AND ASSOCIATED ADMINISTRATIVE REGULATIONS IN PART 1





2013 Building Energy Efficiency Standards - Reference Ace

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MANUFACTURED OR KNOCKED DOWN

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SECTION 150.1 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR NEWLY CONSTRUCTED RESIDENTIAL BUILDINGS

(a) Basic Requirements.

New low-rise residential buildings shall meet all of the following:

1. The requirements of Sections 110.0 through 110.10 are applicable to new residential buildings.
2. The requirements of Section 150.0 (mandatory features).
3. Either the performance standards or the prescriptive standards set forth in this section for the Climate Zone in which the building will be located. Climate zones are shown in Reference Joint Appendix JA2 –Weather /Climate Data.
EXCEPTION to Section 150.1(a)3: If a single contiguous subdivision or tract falls in more than one Climate Zone, all buildings in the subdivision or tract may be designed to meet the performance or prescriptive standards for the Climate Zone that contains 50 percent or more of the dwelling units.
NOTE: The Commission periodically updates, publishes, and makes available to interested persons and local enforcement agencies precise descriptions of the Climate Zones, which is available in Reference Joint Appendix JA2 –Weather/Climate Data.
4. For other provisions applicable to new low-rise residential buildings, refer to Section 100.1.

(b) Performance Standards.

A building complies with the performance standard if the energy budget calculated for the Proposed Design Building under Subsection 2 is no greater than the energy budget calculated for the Standard Design Building under Subsection 1.

1. **Energy Budget for the Standard Design Building.**
The energy budget for a Standard Design Building is determined by applying the mandatory and prescriptive requirements to the Proposed Design Building. The energy budget is the sum of the TDV energy for space conditioning, mechanical ventilation and water heating.
2. **Energy Budget for the Proposed Design Building.**
The energy budget for a Proposed Design Building is determined by calculating the TDV energy for the Proposed Design Building. The energy budget is the sum of the TDV energy for space-conditioning, mechanical ventilation and water heating. The energy budget for the Proposed Design Building is reduced if on-site renewable energy generation is installed, according to methods established by the Commission in the Residential ACM Reference Manual.
3. **Calculation of Energy Budget.**
The TDV energy for both the Standard Design Building and the Proposed Design Building shall be computed by Compliance Software certified for this use by the Commission. The processes for Compliance Software approval are documented in the Residential ACM Approval Manual.
4. **Compliance Demonstration Requirements for Performance Standards.**
 - A. Certificate of Compliance and Application for a Building Permit. The application for a building permit shall include documentation pursuant to Sections 10-103(a)1 and 10-103(a)2 which demonstrates, using an approved calculation method, that the building has been designed so that its TDV energy use from depletable energy sources does not exceed the combined water-heating and space-conditioning energy budgets for the applicable Climate Zone.
EXCEPTION to Section 150.1(b)4A: Multiple Orientation: A permit applicant may demonstrate compliance with the energy budget requirements of Section 150.1(a) and (b) for any orientation of the same building model if the documentation demonstrates that the building model with its proposed designs and features would comply in each of the four cardinal orientations.
 - B. Field verification of installed features, materials, components, manufactured devices and system performance shall be documented on applicable Certificates of Installation pursuant to Section 10-103(a)3, and applicable Certificates of Verification pursuant to Section 10-103(a)5, in accordance with the following requirements when applicable:
 - i. **SEER Rating.** When performance compliance requires installation of a space conditioning system with a SEER rating that is greater than the minimum SEER rating required by TABLE 150.1-A, the installed system shall be field verified in accordance with the procedures specified in Reference Residential Appendix RA3.4.4.1.
 - ii. **EER Rating.** When performance compliance requires installation of a space conditioning system that meets or exceeds a specified EER rating, the installed system shall be field verified in accordance with the procedures specified in Reference Residential Appendix RA3.4.4.1.
 - iii. **Low Leakage Air Handler.** When performance compliance requires installation of a low leakage air-handling unit that meets the qualifications in Reference Joint Appendix JA9, the installed air handling unit shall be field verified in accordance with the



In-Person Class - Available via utility training centers or we'll bring the classes to your public facility at your convenience



Online, Real-time Class -
Delivered by an Ace instructor



Online, On-demand Training -
Take them whenever and
wherever you like, at your own
pace



Facilitated Online Discussion –
Experts lead peer-to-peer
conversations on key code
topics





 Ace Resources * Trigger Sheets	"Quick reference" component-by-component summaries of sections of 2013 Title 24, Part 6 "triggered" based on project scope.
 Ace Resources * Fact Sheets	"Quick reference" summaries of key requirements, forms, definitions and resources for implementing 2013 Title 24, Part 6
 Ace Resources * Checklists	Step-by-step guidance for plans checks and field inspections
 Ace Resources * Useful Links	A list of useful links, telephone numbers and handy documents
 Ace Resources * FAQ	FAQs on the program, the site and the code, and A place to submit your own questions





2016 CEC Documents

Beginning January 1, 2017

2016
NONRESIDENTIAL
ALTERNATIVE CALCULATION
METHOD REFERENCE
MANUAL

FOR THE 2016 BUILDING
ENERGY EFFICIENCY
STANDARDS

TITLE 24, PART 4, AND ASSOCIATED
ADMINISTRATIVE REGULATIONS
IN PART 1.

JUNE 2015
CEC-400-2015-007-CMF
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor

NOVEMBER 2015
CEC-400-2015-008-CMF
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor

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NOVEMBER 2015
CEC-400-2015-008-CMF
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor

<http://www.energy.ca.gov/title24/2016standards/index.html>



CEC: Software



CALIFORNIA ENERGY COMMISSION

- ✦ Current Approved Software for 2016
 - ✧ Residential
 - CBECC-Res
 - EnergyPro
 - Wrightsoft Right-Energy
 - ✧ Nonresidential
 - CBECC-Com
 - EnergyPro

http://www.energy.ca.gov/title24/2016standards/2016_computer_prog_list.html

CALIFORNIA'S 2016 — RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

CALIFORNIA ENERGY COMMISSION

The state's energy efficiency standards for new buildings and appliances have saved consumers billions in reduced electricity and natural gas bills. The building standards include better windows, insulation, lighting, air conditioning systems and other features that reduce energy consumption in homes and businesses. Since 1978 these standards have helped protect the environment by reducing more than 250 million metric tons of greenhouse gas emissions (or the equivalent of removing 37 million cars off California roads).

\$7,400 SAVINGS OVER A 30 YR. MORTGAGE | INITIAL COST \$2,700

28% more stringent



HIGH EFFICACY LIGHTING

All lighting in new homes must be efficient. Installation of high quality lighting with controls that nearly halve the energy required for lights in new homes.



HIGH PERFORMANCE WALLS

Increased wall insulation keeps the sun's heat out of your home during hot summer months and warm air in during winter months, improving comfort and reducing energy consumption.



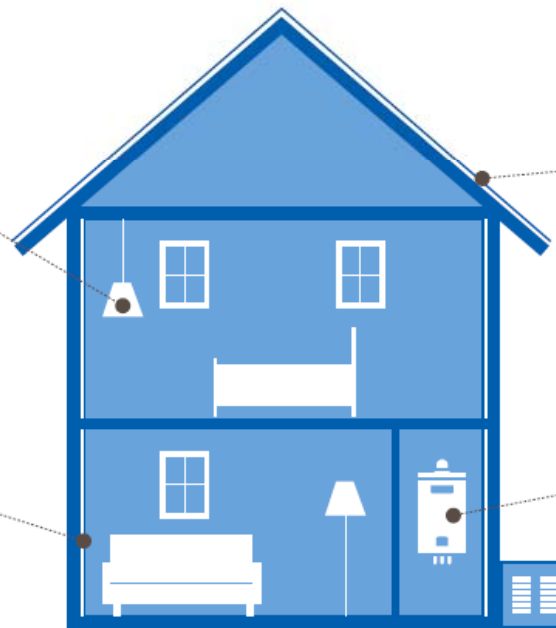
HIGH PERFORMANCE ATTICS

Attics with additional insulation at the roof deck keep attic temperatures closer to ambient, improving the home's heating and cooling performance. Extra insulation at the roof deck, in addition to the ceiling insulation, will reduce the attic temperature by 35 degrees or more during hot summer days.



IMPROVED WATER HEATING SYSTEM EFFICIENCY

Installing tankless water heating technology and better distribution systems reduces the energy needed to provide hot water to the home by about 35 percent.



These are cost effective measures that home builders may consider to achieve new levels of efficiency. They can be traded for other efficient technologies such as higher efficiency HVAC units, higher efficiency water heaters, etc.



Residential "What's New-2016" Sheet

www.energycodeace.com



Mechanical Highlights

Updates were made to both mandatory and prescriptive HVAC requirements under the 2016 Standards.

Mandatory Mechanical

- All ducts must be insulated.
- Ducts must be insulated to a maximum for...

Prescriptive Mechanical

1. Tank water heaters must have compact hot water distribution system or HERS verified DHW pipe insulation required.
2. Tank water heaters must have compact hot water distribution system or HERS verified DHW pipe insulation required.
3. Tank ≥ 55 gal (gas or propane); minimum energy factor of 0.76. Additional HERS verification: HERS verified compact hot water distribution system or HERS verified DHW pipe insulation required.

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Lighting Highlights

Mandatory High Efficacy Lighting \$150.0(k)

High efficacy lighting is essential to reducing energy load in homes and dwelling units, and the 2016 Standards makes it mandatory that all residential lighting be high efficacy. The Standards do not allow trade-offs

between lighting and other features when using the Performance Method. These mandatory requirements apply to permanently installed light fixtures, including screw-based which must contain JAB compliant lamps. Table 150.0-A summarized below, lists light source technologies qualified as high efficacy.

Table 150.0-A: High Efficacy Light Sources

Pin-based linear or compact fluorescent lamps light sources using electronic ballasts
Pulse-start metal halide lamps
High pressure sodium lamps
GU-24 sockets containing light sources other than LEDs
Inseparable SSL luminaires that are installed outdoors
Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting

Light sources not listed in Table 150.0-A above may be certified to the Energy Commission as high efficacy in accordance with Joint Appendix 8 (JA8). JAB compliant light sources must be marked as "JAB-2016" or "JAB-2016-E." "JAB-2016-E" designates light sources that have passed the Elevated Temperature Life Test and are deemed appropriate for use in enclosed luminaires.

Compliant light sources shown in the table below must be controlled by sensors or dimmers (exceptions for closets <70 SF and hallways,

Table 150.0-B: High Efficacy Light Sources

Light sources based on LED technology
LED light sources
Pin-based LED light sources (e.g., AR-111, etc.)
GU-24 based LED light sources

Screw Based Luminaires \$150.0(k)G

- Screw based luminaires must contain JAB compliant light sources.
- Recessed downlight luminaires in ceilings must not contain screw-based sockets.
- Incandescent sources are prohibited from having a GU-24 base (per Title 20 Section 1605.3(k)).

Blank Electrical Boxes \$150.0(k)B

- The number of blank electrical boxes more than 5 feet above the finished floor shall not be greater than the number of bedrooms.
- Additionally, these electrical boxes must be served by a dimmer, vacancy sensor, or fan speed control.

Bathrooms, Garages, Laundry Rooms, and Utility Rooms \$150.0(k)J

- At least one fixture must be controlled by a vacancy sensor.

Under Cabinet Lighting \$150.0(k)JL

- Any under cabinet lighting (including kitchen) must be switched separately from other lighting systems.

Outdoor Lighting \$150.0(k)J

- Must be high efficacy like indoor lighting.
- Must include manual on/off switch and one of the following:
 - Photocontrol and motion sensor
 - Photocontrol and automatic time switch control
 - Astronomical time switch control
 - Energy Management Control System



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Title 24, Part 6 - Residential What's New with 2016 Code

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CALIFORNIA'S 2016 — NONRESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

CALIFORNIA ENERGY COMMISSION

The state's energy efficiency standards for new buildings and appliances have saved consumers billions in reduced electricity and natural gas bills. The building standards include better windows, insulation, lighting, air conditioning systems and other features that reduce energy consumption in homes and businesses. Since 1978 these standards have helped protect the environment by reducing more than 250 million metric tons of greenhouse gas emissions (or the equivalent of removing 37 million cars off California roads).

5% more stringent

DOOR AND WINDOW INTERLOCKS

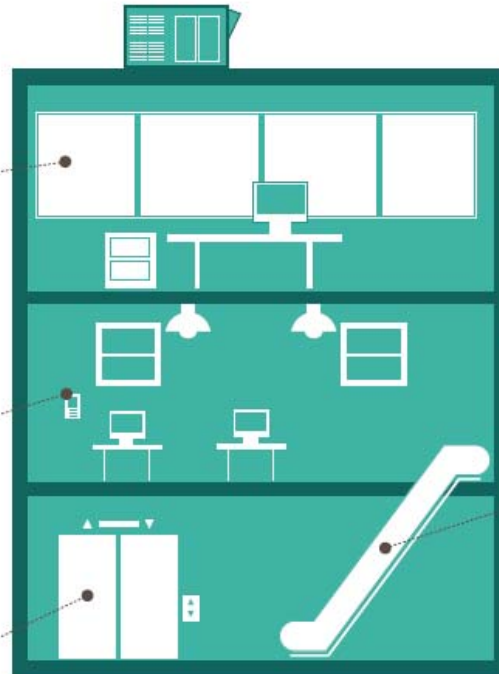
Sensors on doors and windows adjust the thermostat to turn off the heating or cooling if a door or window is left open for more than five minutes. This allows occupants to take advantage of outside temperatures and save on heating and cooling costs.

DIRECT DIGITAL CONTROLS

For larger heating, ventilation and air conditioning systems, installing digital controls enables communication with building energy management systems, allowing managers to tailor the building's heating and cooling demands and prevent waste.

ELEVATORS

Efficient ventilation fans and lighting sources installed within the elevator, along with controls that turn off the cab lighting and fans when the elevator is empty, save energy both when the elevator is in use and when empty.



OUTDOOR LIGHTING

The general power allowance for outdoor lighting has been lowered to include newer, more efficient luminaires which are widely available and commonly used for outdoor lighting applications.

ESCALATORS

Requires escalators and moving walkways in transit areas to run at a lower, less energy-consuming speed when not in use.

These are cost effective measures that builders may consider to achieve new levels of efficiency. They can be traded for other efficient technologies such as higher efficiency HVAC units, higher efficiency water heaters, etc.



Nonresidential "What's New-2016" Sheet

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2016 ENERGY CODE



Ace
Resources

Title 24, Part 6
Fact Sheet

Nonresidential What's New with 2016 Code?

Overview

Changes to the nonresidential requirements in the 2016 Building Energy Efficiency Standards (Energy Standards) largely follow ASHRAE 90.1 national standards and include energy conservation measures related to the building systems shown in Figure 1. The standards have been adopted, and once approved, will be implemented for projects permitted on or after January 1, 2017. For more detailed information, see the CEC FAQ Sheet.



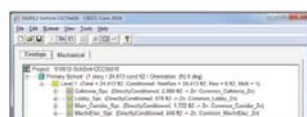
Figure 1: 2016 Energy Standards Update Infographic by CEC. In addition, the 2016 Energy Standards have set out to simplify and clarify several areas that were new in the 2013 Energy Standards, which were identified during the public comment period as needing clarification.

Compliance Tools

The Compliance Manuals and other related manuals are being updated to reflect the adopted 2016 Energy Standards and are planned to be available in early 2016 on the CEC's website.

In addition, Energy Code Ace is working with the California Energy Commission (CEC) to produce a suite of 2016 Energy Standards Application Guides, which will provide project examples and other information that may be helpful in applying the energy code requirements. Look for these and other new tools, training and resources on EnergyCodeAce.com during the summer of 2016.

CECC-Com, the state-funded nonresidential computer simulation tool, has been updated for the 2016 Energy Standards as well. A certified version is publicly available for free download now. This was developed early in order to give users time to utilize the software prior to the January 2017 implementation date.



Envelope Highlights

Prescriptive insulation requirements for roofs and ceilings have become more stringent under the 2016 Energy Standards. Additionally, prescriptive insulation requirements have become more stringent for metal and wood-framed walls in certain climate zones.

Mandatory Measures – Section 120.7

Wall Insulation levels have been changed to the following:

- Metal framed: U-factor = 0.151 (R-13 w/R-Z)
 - Metal demising: U-factor = 0.151 (R-13 w/R-Z)
- All other mandatory insulation levels are unchanged. Additional exceptions apply for dedicated data centers.

Prescriptive Measures – Section 140.3

- Prescriptive envelope requirements in Table 140.3-B have been updated for Nonresidential buildings.
- Prescriptive envelope requirements in Table 140.3-C have been updated for High-Rise Residential and Hotel/Motels.
- The prescriptive Roof/Ceiling Insulation Tradeoff for Aged Solar Reflectance Table 140.3 has been updated as shown below. Requirements apply to roof replacements as well as new installations.

Table 140.3 Nonresidential Roof U-Factor

Aged Solar Reflectance	Metal Building	Wood Framed and Other
	All Zones	Zones 6 & 7
0.62-0.56	0.038	0.045
0.55-0.46	0.035	0.042
0.45-0.36	0.033	0.039
0.35-0.25	0.031	0.037

Table 140.3 Nonresidential Roof U-Factor

Process Equipment Highlights

New to the 2016 Energy Standards are mandatory energy saving requirements for escalators and elevators. Acceptance testing will be required for controls requirements.

Escalators and Moving Walkways – Section 120.6(g)

- Escalators and moving walkways will be required to run at lower speeds when unoccupied (and thus a lower energy consuming state) while not in use in high traffic areas like airports, hotels, and transportation function areas.

Elevators – Section 120.6(f)

- Energy efficient lighting: Lighting Power Density (LPD) of 0.6 w/ft² maximum
- Energy efficient fans: Ventilation fans for cabs without space conditioning shall not exceed 0.33 w/cfm
- Automatic shut-off controls on cab lighting and fans after 15 minutes of no service (stopped, unoccupied with doors closed)
- Lighting and ventilation must be operational during emergency stop situations while occupied with passengers.

Mechanical Highlights

Mandatory Equipment Efficiencies – Section 110.2

Mandatory equipment efficiencies for air conditioning units have increased as of 1/1/2016. Chiller and DX equipment efficiencies have become more stringent.

Economizers – Section 120.2(i)

New mandatory requirements for Fault Detection and Diagnostics (FDD) on all economizers installed on new air-cooled packaged DX units with cooling capacity of 54,000 Btu/hr or greater. Stand alone or integrated FDD accepted per Section 120.2(i) of the 2016 Energy Standards.

HVAC System Controls – Sections 120.2 & 140.4

- **Mandatory Direct Digital Controls (DDC):** DDC shall be applied per Section 120.2(j) of the 2016 Energy Standards, Table A for new construction, additions, and alterations. Control logic must be capable of monitoring several points including fan pressure, pump pressure, heating and cooling, have optimum start/stop controls, and perform automatic information transfer among other requirements.
- **Mandatory Optimum Start/Stop Controls:** The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint, the outdoor air temperature, and the amount of time prior to scheduled occupancy. Additional requirements for mass radiant floor slab systems. Requirements per Section 120.2 (k) of the 2016 Energy Standards.
- **Prescriptive HVAC Shut-off Sensors for Windows and Doors:** If windows or doors are left open for more than five minutes, sensors will adjust thermostats to disable the HVAC equipment by resetting the temperature setpoint to 55°F for mechanical heating and 90°F for mechanical cooling. Exemptions for doors with automatic closers or any space without thermostatic controls. Requirements per Section 140.4 (n) of the 2016 Energy Standards.

Commissioning Highlights

A few important clarifications were made to the commissioning requirements in Section 120.8 of the 2016 Energy Standards:

- Commissioning is required for all new buildings with nonresidential conditioned space, including nonresidential spaces in hotel/motel and high-rise residential buildings. The Owner's Project Requirements (OPR) must include building envelope performance expectations under the 2016 Energy Standards.
- Section 10-103 in Part 1 specifies that the Design Reviewer may be a licensed architect or licensed contractor in addition to a professional engineer.

Indoor Lighting Highlights

The interior lighting mandatory and prescriptive measures, as well as updates to the calculation methodologies are included below.

Prescriptive Calculation Methodology – Section 140.6

- **Complete Building Method:** Allowed Lighting Power Densities are reduced by 0.1 or less for half of building types listed in Table 140.6-B.
- **Area Category Method:** Allowed Lighting Power Densities are reduced by 0.2 or less for a third of functional areas in Table 140.6-C.
- **Tailored Method:** Lighting Power Density Values updated per Table 140.6-G. Allowances in Table 140.6-D remain unchanged.

Indoor Lighting Controls – Sections 130.1 & 140.6

- **Mandatory Shut-Off Controls:** Additional exception of 0.1 w/ft² for egress in any building.
- **Mandatory Multi-level Controls:** Enclosed areas 100 ft² or greater with a general lighting load greater than 0.5 w/ft² must have multi-level controls as shown in Table 130.1-A. Some exceptions apply for classrooms, public restrooms, and areas with one luminaire.
- **Mandatory Partial-ON Occupancy Sensor:** For areas requiring occupant sensing controls per Section 130.1(c) of the Standards (offices ≤ 250 ft², multipurpose rooms < 1,000 ft², classrooms, and conference rooms), and multilevel controls per Section 130.1(b) of the 2016 Energy Standards, the occupant sensing controls shall function as partial-ON (for 50-70% of controlled power) OR vacancy sensor (only manual ON). Where no multi-level controls are required per Section 130.1(b) of the 2016 Energy Standards, an automatic full-on occupancy sensor is acceptable.
- **Control Credits:** Power Adjustment Factors (PAF) listed in Table 140.6-A have been updated and the following options have been added:
- **Institutional Tuning:** Limits maximum output or power draw of controlled lighting to 85% or less of full light output/draw.
- **Daylight dimming plus OFF control:** Turns lighting completely OFF when daylight in the day/night zone is greater than 150% of general lighting system at full power.





CEC: What's New



California Energy Commission 2016 Building Energy Efficiency Standards What's New for Residential

The most significant changes in the 2016 Building Energy Efficiency Standards affecting residential buildings include the new requirements for high-performance insulation within walls and attics. Other changes include:

Mandatory Measures:

1. Insulation in roof/ceiling construction must be at least R-22 (maximum U-factor of 0.043) (§ 150.0(a)1).
2. New duct total leakage reduced to 5 percent or less (§ 150.0(m)11B1).
3. All installed air-conditioner and heat pump systems shall be equipped with liquid line filter driers as specified by manufacturer's instructions (§ 150.0(h)3B).
4. Storage hot water heaters no longer need to be externally wrapped (§ 150.0(j)1).
5. All luminaires must be "high-efficacy" (§ 150.0(k)1A).
6. Isolation valves must be installed on instantaneous water heaters that have a minimum input of 6.8 kBTU/hr (§ 110.3(c)7).

Prescriptive Compliance:

1. Increased flexibility for envelope compliance (§ 150.1(c)).
2. Increased roof assembly requirements to include insulation installed either above or below roof deck (§ 150.1(c)1A).
3. Requirements for water-heating systems in single-family and multifamily buildings have been updated and more options have been added (§ 150.1(c)8).
4. High-performance attics and ducts in conditioned spaces have been added as an option for a space-conditioning distribution system (§ 150.1(c)9).
5. If a whole house fan (WHF) is required, it must comply with a total air flow of at least 1.5 CFM/ft² and have 1 square foot of attic vent free area for each 750 CFM (§ 150.1(c)12).

Performance Compliance:

All compliance software programs that are approved by the Energy Commission must use a single interpretation of the performance compliance rules that the Energy Commission has integrated into the public domain software. More information is available in the 2016 Residential ACM Approval Manual and the 2016 Residential ACM Reference Manual.

Additions and Alterations:

1. Changes to the prescriptive requirements for the building envelope (specifically wall insulation) for additions (§ 150.2(a)1).
2. With alterations, the prescriptive requirements for mechanical cooling, water heating, and lighting have been revised (§ 150.2(b)).
3. More detailed information on additions and alterations in Chapter 9 of the 2016 Residential Compliance Manual.

Revised 04/28/2016

- ★ Brief summary of what's new for both residential and nonresidential.

http://www.energy.ca.gov/title24/2016standards/documents/whatsnew_2016residential.pdf



Nonresidential Commissioning

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2016 ENERGY CODE



Title 24 Part 6

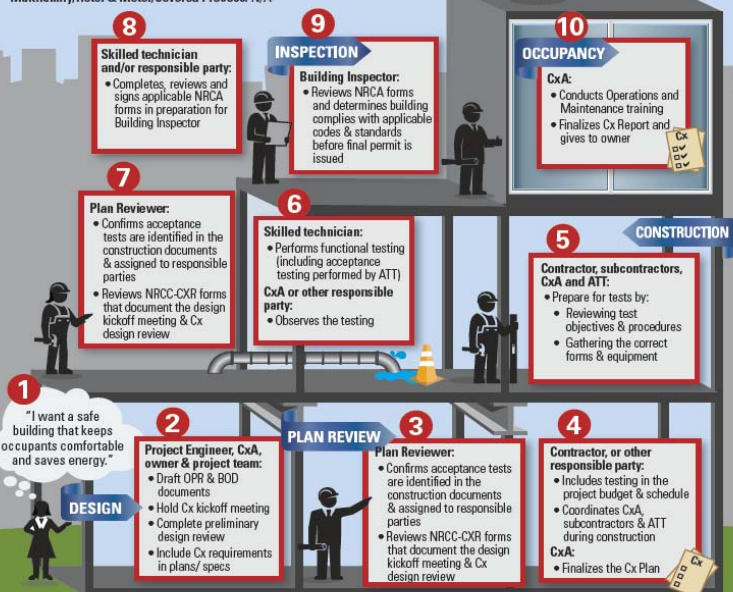
Nonresidential Commissioning



Requirements

- New Nonresidential Buildings CFA <10,000 ft²:** Cx Specifications, NRCC-CXR and NRCA (ATT) requirements only
- New Nonresidential Buildings CFA >10,000 ft²:** All aspects of Cx required
- New Mixed Use Buildings:** Required for the CFA associated with NR occupancy. See above for commissioning requirements based on CFA (not including multifamily, hotel/motel, covered process CFA)
- Multifamily/Hotel & Motel/Covered Process:** N/A

LEGEND
ATT: Acceptance Test Technician
CFA: Conditioned Floor Area
Cx: Commissioning
CxA: Commissioning Authority
NR: Nonresidential
NRCC/NRCC: Title 24 Part 6 Compliance forms



For more information see the
Energy Code Ace Nonresidential Building Commissioning Fact Sheet: EnergyCodeAce.com/resources
and Title 24, Part 6 2016 Nonresidential Manual Chapter 12:
energy.ca.gov/2015publications/CEC-400-2015-033/chapters/chapter_12_building_commissioning_guide.pdf



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Ace Resources * Title 24 Part 6 Fact Sheet

Commissioning in the Energy Code

Commissioning requirements for all newly constructed nonresidential buildings are included in the 2013 update to Title 24, Part 6- California's Building Energy Efficiency Standards (Standards). Many of these requirements were moved from CalGreen (Title 24, Part 11), where commissioning was originally incorporated into state building code in 2008.

Commissioning requirements apply to all newly constructed nonresidential buildings, though the extent of the requirements depends on whether the conditioned floor area is less than 10,000 square feet or 10,000 square feet and greater.

The Standards define "newly constructed" as "a building that has never been used or occupied for any purpose" in Section 100.1.

The commissioning requirements in Part 6 do not apply to residential projects (including high-rise residential) do not apply to additions or alterations and do not apply to newly constructed nonresidential buildings that are unconditioned.

Commissioning is critical to realizing the energy savings during building operation that were intended by the building design. Closely related to acceptance testing, commissioning involves functional testing during construction, but also includes activities during design that will ensure the building systems and associated controls will meet the owner's energy and operating efficiency goals.

Title 24, Part 6 defines commissioning as, "a systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements."

Commissioning Requirements

Commissioning requirements are included in Section 120.8 of the Standards, and the table below illustrates which requirements apply based on conditioned floor area. Additional resources are listed that may provide valuable detail on how to properly implement these requirements.

Commissioning Requirements in Part 6	Conditioned Space <10k ft ²	≥ 10k ft ²
OPR (§120.8(b))	X	X
BOD (§120.8(c))	X	X
Design Review (§120.8(d))	X	X
Commissioning in Construction Docs (§120.8(e))	X	X
Commissioning Plan (§120.8(f))	X	X
Functional Performance Tests (§120.8(g))	X	X
O&M Training (§120.8(h))	X	X
Commissioning Report (§120.8(i))	X	X

Table 1. Commissioning Requirements in Title 24, Part 6

Additional Resources

The following resources may be helpful in addition to the Standards language to understand the commissioning requirements:

- Building Commissioning Guide in Nonresidential Compliance Manual:** This guide outlines both an intent and compliance method for each requirement in Section 120.8.



This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

DOCUMENT 2015-03-06

Building Commissioning

Roles and Responsibilities

Because commissioning spans the entire building delivery process from pre-design through occupancy, many parties are involved, making communication and coordination paramount. Below is a list of who may need to participate in the commissioning process, at one time or another during the project.

- + Owner, owner's representative or facility operator
- + Designers (architect and MEP)
- + Design Reviewer (see table below)
- + Plans Examiner
- + General Contractor
- + Key Subcontractors (HVAC, controls, TAB, etc.)
- + Acceptance Test Technician*
- + Commissioning Agent*
- + Building Inspector*

* These parties are generally only involved for buildings with conditioned floor area 10,000 square feet or greater when §120.8(f) - §120.8(i) are required.

Who is most appropriate to fill each of these roles is dependent upon the experience and expertise of the project team. There are no requirements in the Standards that designate who the Commissioning Authority must be. However, for both the Design Reviewer and Acceptance Test Technician, there are restrictions on who can fill these roles.

Building Size	<10,000 ft ²	10,000 - 50,000 ft ²	>50,000 ft ²	Complex systems in Bldgs >10,000 ft ²
Allowed Design Reviewer	Any licensed professional engineer, including the engineer of record	A licensed professional engineer in-house to the design firm but not associated with the building project, or a third party licensed professional engineer	A third party licensed professional engineer	A third party licensed professional engineer

Table 2. Who can act as the Design Reviewer, per §120.8(d)

Information on becoming a certified Acceptance Test Technician can be found on the California Energy Commission's Acceptance Test Technician Certification Provider webpage.

Additional Resources

The following resources may be helpful to understand roles related to the commissioning and acceptance testing process:

- + **Building Commissioning Guide in Nonresidential Compliance Manual:** Section 12.1 of this guide outlines roles and information on how to find a qualified Commissioning Authority.
- + **California Commissioning Collaborative:** This organization includes a Provider List that may be valuable when searching for a Commissioning Authority.
- + **Section 10-103(a):** This section in the Standards indicates that the Design Reviewer must be a licensed professional engineer.

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CEC Blueprint

Issue 113

March – April 2016

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

- » New Mechanical Acceptance Test Technician Certification Provider
- » Small Duct High Velocity Space Conditioning Systems
- » Demand Responsive Controls for Additions and Alterations
- » Residential Water Heating Options
- » EnergyPro Version 7.0
- » Alternative Path for Complying with Lighting Alteration Requirements
- » Lighting Standards to Save Californians More Than \$4 Billion in Electricity Costs
- » Q&A
 - Illuminated Areas
 - Track Lighting Alterations
 - Compliance Documents
 - Townhouses and Duplexes
 - Commissioning
- » Energy Code Ace Training Schedule

New Mechanical Acceptance Test Technician Certification Provider

On January 13, 2016, the California Energy Commission (Energy Commission) approved the National Environmental Balancing Bureau (NEBB), as a mechanical Acceptance Test Technician Certification Provider (ATTCP).

This gives NEBB the authority to train, certify, and oversee acceptance test technicians (ATTs) and their employers. NEBB will train and certify ATTs to perform all 17 mechanical acceptance tests required in the *2013 Building Energy Efficiency Standards* (Energy Standards).

The Conditions of Approval are available for review in the **Executive Director's recommendation**.

For more information, please visit: <http://energy.ca.gov/title24/attcp/>.

Small Duct High Velocity Space Conditioning Systems

Small duct high velocity (SDHV) systems may be used to comply with the Energy Standards. The following is a list of requirements with direction on how SDHV systems can comply with the low-rise residential requirements of the Energy Standards.

Mandatory Requirements

United States Department of Energy Standards:

SDHV systems manufactured on or after January 23, 2006, and before January 1, 2015, must have a minimum Seasonal Energy Efficiency Ratio (SEER) of 11, and a minimum Heating Seasonal Performance Factor (HSPF) of 6.8.

SDHV systems manufactured on or after January 1, 2015, must have a minimum SEER of 12, and a minimum HSPF of 7.2.

Energy Standards:

Section 150.0(m)13B - Single zone systems that use forced air ducts to supply cooled air to an occupiable space must either meet minimum airflow and fan efficacy requirements, or meet the return duct and grille sizing requirements of **TABLES 150.0-C or 150.0-D**.

Section 150.0(m)15 - Specific to systems with multiple thermostatically controlled zones, this section requires the same mandatory airflow and fan efficacy requirements as **Section 150.0(m)13B**. However, it does not have the same duct and grille sizing alternative. If such systems cannot satisfy the airflow and fan efficacy requirements of this section, compliance must be demonstrated via the performance approach.

NOTE: The return duct and grille sizing alternative will likely be the method chosen for compliance when installing a SDHV system.

Section 150.0(m)15 - Specific to systems with multiple thermostatically controlled zones, this section requires the same mandatory airflow and fan efficacy requirements as **Section 150.0(m)13B**. However, it does not have the same duct and grille sizing alternative. If such systems cannot satisfy the airflow and fan efficacy requirements of this section, compliance must be demonstrated via the performance approach.

Prescriptive Requirements

The refrigerant charge and duct insulation requirements apply as with any other system.

Sign up!

- ✦ <http://www.energy.ca.gov/efficiency/listservers.html>
- ✦ Building Standards and Blueprint listserv (automatic email list)
- ✦ Best way to stay up with latest information from CEC
 - ✧ Software update approvals
 - ✧ ATT status updates
 - ✧ Code interpretations
 - ✧ And so much MORE!



Infographic and Fact Sheet

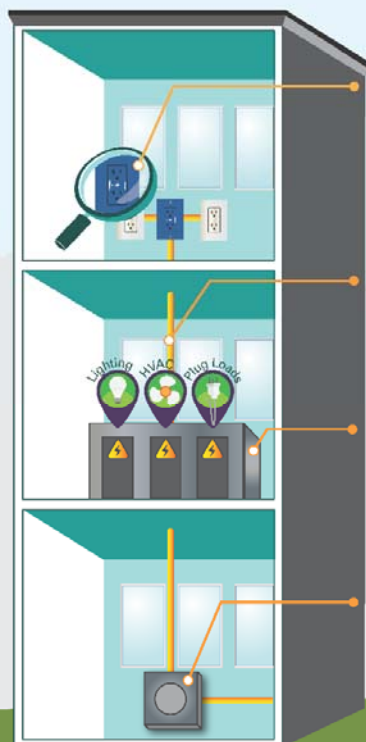
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2013 ENERGY CODE



Title 24 Part 6
Infographics

**Nonresidential
Electrical Power Distribution**



WATT'S HAPPENING HERE?

Electricity's Trip From the Ground Up

4 When the electricity arrives at its final destination, it may need to be controlled.

Circuit Controls

§130.5(d) In private offices, open office areas, reception lobbies, conference rooms, kitchenettes in office spaces, and copy rooms one controlled outlet must be within a 6-foot radius of any number of uncontrolled outlets.

3 As electricity flows through the building's wires, voltage drops.

Voltage Drop

§130.5(c) Design load calculated so that voltage drop is maximized at 2% for feeders and 3% for branch circuits (5% combined.)

2 Once in the building, it must make a choice on where to go (e.g., HVAC, lighting, plug loads.)

Disaggregation of Load

§130.5(b) Separate electric load so Building Owner can meter specific uses.

1 The trip begins... electricity arrives at a building and knocks to get in.

Service Metering

§130.5(a) Meter to allow Building Owner to monitor building electricity usage.

For more information see the Nonresidential
EnergyCodeAce.com/content/resou



A Sempra Energy utility



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For example calculations and additional guidance on performing calculations, see [Section 8.4](#) of the 2013 Nonresidential Compliance

+ DR controls and equipment shall be capable of receiving and automatically responding to at least one standards-based



Resources
Title 24 Part 6
Fact Sheet

What is Electrical Power Distribution?

Electrical power distribution systems encompass electrical systems and equipment not specific to lighting. All measures in this code section are mandatory per [Section 130.5](#) of the 2013 Building Energy Efficiency Standards (Energy Standards). For additional guidance and example calculations and applications, see [Sections 8.2-8.6](#) of the 2013 [Nonresidential Compliance Manual](#).

These requirements, which were new in the 2013 Standards, apply to all new construction, additions, and alterations for nonresidential, high rise residential and hotel/motel buildings.

Mandatory Measures

Electrical Service Metering [Section 130.5 \(a\)](#)

Electrical power distribution systems (where electrical power from utility company or on-site generation enters a building) shall have a permanently installed user-accessible meter. The intent of the measure is that the service to every building be metered so that energy can be monitored by the user.

Requirements:

- + The meter must be able to:
 - + Show the instantaneous power in kilowatts being used by the building
 - + Reset and measure energy use in kilowatt-hours over a period set by the user
 - + Be read by the building owner or occupant

Additional requirements must be met for larger services (see [Table 130.5-A](#) on [NRCC-ELC-01-E](#), page 2)

- + For electrical services > 250 kVA: the meter must also record the historical peak demand in kilowatts.
- + For electrical services > 1000 kVA: the meter must also be able to report the kWh for a fixed rate period.

If utility company's revenue service meter can meet the above requirements, then an additional meter does not need to be provided. In general, smart meters will meet the measure requirements if they allow building owners to access the meter data.

If a new customer-owned meter needs to be installed, it can be less accurate than a typical utility company revenue-grade meter, since it is being used to determine building energy use for management purposes.

If a building is not connected to the grid, a customer-owned meter must be in place to monitor energy use. If a building has multiple services, only the service that provides regular electric power needs to meet the measure requirements, however it is recommended that back up power be metered as well.

Compliance Documentation: Complete project information on page 2 of [NRCC-ELC-01-E](#).

Disaggregation of Electrical Circuits [Section 130.5 \(b\)](#)

EPD systems should be designed for disaggregated measurement of electrical load energy uses downstream from the service meter according to load type and service power (kVA). "Disaggregation"

Nonresidential Electrical Power Distribution (EPD)

The measure is triggered when a new switchboard, panelboard or subpanel are connected, or when new feeders are pulled, typically in a new building, major renovation or addition. In existing buildings, if existing switchboard, feeders, and panelboards remain "as-is," the project does not need to meet the measure requirements. The measure does not require installation of metering devices.

Requirements:

Disaggregation is progressive and not required until the service is greater than 50 kVA (unless it pertains to renewable power sources or electric vehicle charging stations). See [Table 130.5-B](#) of the Standards or page 4 of the [NRCC-ELC-01-E](#) for specific separation requirements. For most small buildings, this requirement will not apply.

- + For services > 50 kVA - 250 kVA, the requirements are applied to some load groups regardless of actual load, and to other load groups when the group reaches a threshold value of 25 kVA
- + For services ≥ 250 kVA, lighting and plug loads are required to be disaggregated "by floor, type or area". All HVAC, DHW, elevators, and charging stations loads can be measured in aggregate, by load type

Options for compliance:

- + Separate switchboards, motor control centers, or panelboards to which are connected only the required load or group of loads; or
- + 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
- + Branch circuits, taps or disconnects requiring overcurrent protection devices rated 60 amperes or greater

Exceptions:

If a complete metering and measurement system is installed and meets the disaggregation requirements in [Table 130.5-B](#) of the Energy Standards.

Compliance Documentation: Complete project information on pages 3-4 of [NRCC-ELC-01-E](#).

Voltage Drop [Section 130.5 \(c\)](#)

Following the limits in CA Electrical Code ([Title 24, Part 3](#)), the recommended voltage drop becomes mandatory. Voltage drop is the energy loss as heat in the electrical conductors.

Requirements:

- + The maximum voltage drop is 2% of the design load for feeders. Feeders are conductors carrying current from one switchboard or panelboard to another.
- + The maximum voltage drop is 3% of the design load for branch circuits. Branch circuits are conductors carrying current from a switchboard/panelboard to one or more connected loads.
- + The cumulative voltage loss adds up to 5% loss relative to the load at the end of the branch circuit



Decoding * Electrical Distribution™



Multi-Family Fact Sheet

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Title 24 Part 6
Fact Sheet

Know Your Project – Key Terms

Multifamily (MF) buildings will have to comply with either residential requirements or a mix of nonresidential and residential requirements depending on the number of habitable stories in your building:

- Multifamily Building:** contains multiple dwelling units that share common walls (townhomes) and may also share common floors or ceilings (apartments). Hotel or motel buildings are not considered multifamily.
- High-Rise Residential:** all multifamily buildings with four or more habitable stories.
- Low-Rise Residential:** all multifamily buildings with three or fewer habitable stories.

High-Rise vs Low-Rise Multifamily

While low-rise multifamily buildings need to comply with residential requirements, several project aspects for high-rise buildings fall under the scope of either nonresidential requirements or specific high-rise residential (HRR) requirements for some prescriptive measures

Mandatory Measures All MF Buildings §110	
Low-Rise §150.0, 150.1, 150.2	High-Rise §120.141
Envelope: Residential HVAC: Residential - including HERS measures Water Heating: Residential - including solar hot water and dual loop recirculation Indoor Lighting Dwelling Units: Residential - Common areas: different options dependent on % of total conditioned floor area Outdoor Lighting and Parking Garages: Residential - Different options dependent upon # of parking spots	Envelope: Nonresidential* - HVAC: Nonresidential - including ventilation Water Heating: Residential - including solar hot water and dual loop recirculation Indoor Lighting Dwelling Units: Residential - Common areas: Nonresidential Outdoor Lighting: Nonresidential *Section 140.3 includes specific requirements for high-rise residential

Mandatory, Prescriptive, Performance

Mandatory requirements that apply to both low and high-rise multifamily buildings can be found in [Section 110.0 through 110.10](#) of the Standards.

In addition to meeting these "mandatory measures," projects can choose between a prescriptive or performance compliance path. Most multifamily projects pursue the performance compliance path, which allows flexibility to trade-off performance between building systems. In order to verify compliance using the performance path, compliance software must be used to show overall project compliance.

The compliance software compares the building design to a similar building that meets the prescriptive requirements of the Standards. Mandatory measures must be met, and cannot be traded off.

- More information can be found about the Performance and Prescriptive Compliance Approaches in the [Navigator Ace Tool](#).

High-Rise and Low-Rise Multifamily

Solar Ready Areas

Projects are required to either include an allocated solar ready area or show compliance with the appropriate exceptions found in [Section 110.10\(b\)\(1\)\(B\)](#). A solar ready area or "solar zone" is a section of the roof designated and reserved for the future installation of a solar electric or solar thermal system.

- Sizing:** The solar area shall comprise no less than 15% of the total roof area of the building (less any skylight area) and may consist of multiple sub areas provided that each subarea is at least 80 square feet with no dimension less than 5 feet.

- Location:** The solar area shall be located on the roof or overhang of the building or on the roof or overhang of another structure located within 250 feet of the building, or on covered parking installed with the building project.

[Section 110.10](#) also includes requirements for orientation, shading, structural design loads, and interconnection pathways for electrical service.

Envelope

Mandatory requirements for roofs, walls, floors and windows vary depending on construction type, and whether the project is high-rise or low-rise.

Mandatory Envelope Requirements for Multifamily

	Low-Rise	High-Rise
Roof		
Maximum U-factor	0.031 (wood R-30)	0.088 (metal R-19) 0.075 (wood R-13)
Wall		
Maximum U-factor	0.102 (2x4 R-13) 0.074 (2x6 R-19)	0.105 (metal R-13 w/ R-4) 0.110 (2x4 R-11)
Floor		
Maximum U-factor	0.037 (wood R-19)	0.269 (raised mass) 0.071 (other R-11)
 fenestration		
Maximum U-factor	0.58	NA

Detail on assemblies can be found in [Joint Appendix 4](#).

HVAC & Domestic Hot Water

There are two Energy Code Ace Trigger Sheets that go into more detail on HVAC requirements. They include requirements for new construction (new systems) as well as alterations. Low-rise projects should reference the residential sheet, and high-rise the nonresidential sheet.

- Residential HVAC Change-outs:** This trigger sheet covers entirely new and complete replacement HVAC systems, alterations to equipment and alterations to ductwork.

- Nonresidential Small Commercial HVAC Alterations:** This trigger sheet covers packaged units and split systems.

Domestic Hot Water requirements also differ based on whether the building is low-rise or high-rise.

- New Low-Rise MF buildings:** and additions which add water heating must meet the mandatory requirements of [Sections 150.0\(a\)](#) and [150.0\(a\)](#) regarding system design & insulation.

- Mandatory pipe insulation requirements for High-Rise MF** are found in [Section 120.3](#). Water heating systems shall have an insulation thickness corresponding to the system's fluid temperature as listed in [Table 120.3-A](#).

- Both Low-Rise and High-Rise MF complying prescriptively** must meet requirements in [Section 150.1\(c\)\(8\)](#):

- Systems serving individual dwelling units shall be gas or propane and either a storage type water heater with an input of 75,000 Btu/hr or less or an instantaneous type water heater with an input of 200,000 Btu/hr or less. An electric resistance storage or instantaneous water heater may only be installed if natural gas is unavailable—additionally the water heater must be located within the building envelope and a solar water heating system with a solar savings fraction of 0.5 must be installed.

- Systems serving multiple dwelling units must meet the minimum efficiency requirements of [Sections 110.1](#) and [110.3](#) and have a recirculation loop equipped with an automatic control system which controls pump operation based on hot water demand and return temperature.

- A solar water heating system** with a minimum solar savings fraction of 0.20 in climate zones 1-9 or 0.35 in climate zones 10-16 is prescriptively required for systems serving multiple dwelling units.

Dwelling Unit Lighting (§130.0, §150.0)

Lighting requirements inside dwelling units are mandatory (rather than prescriptive) and are the same for low-rise and high-rise multifamily buildings. For a list of which spaces in high-rise residential buildings are subject to the residential lighting requirements, refer to [Section 130.0\(b\)](#). For a complete description of the residential lighting requirements, see [Section 150.0\(k\)](#) and [Tables 150.0-A and 150.0-B](#).

Application	Fixture and Control Requirements
Bathrooms	One High Efficacy (HE) fixture AND either manual-on vacancy sensor or HE for all other fixtures
Closets ≥ 70 ft ²	High Efficacy or manual-on vacancy sensor or dimmer
Kitchens	High Efficacy for at least 50% of total rated wattage
Garages, Laundry, and Utility Rooms	High Efficacy and vacancy sensor
All other interior rooms	High Efficacy or Manual-on vacancy sensor or Dimmer

For more complete information regarding lighting requirements for dwelling units, please see our [Residential Fact Sheet on Indoor and Outdoor Lighting](#).

- High Efficacy Luminaires** are designed and built to operate only energy efficient light sources, such as fluorescent T8 lamps, compact fluorescent lamps (CFLs), LEDs and high intensity discharge (HID) lamps.

- Note that high efficacy lamps installed in low efficacy luminaires (e.g., screw-based CFL and LED lamps) do NOT count as high efficacy lighting.

- Occupancy/Vacancy sensors and daylight sensors** are all devices that automatically control lights and/or light levels in response to conditions that they "sense" or "see."

Indoor Common Area Lighting (§130.0, §140.6, §150.0(k)(12))

For high-rise multifamily buildings, common areas must comply with the applicable nonresidential lighting standards.

For low-rise multifamily residential buildings, the requirements for indoor lighting of common areas are based on the percentage of conditioned floor area made up by these common areas. Indoor common areas with a combined floor area of:

- 20% or less of Conditioned Floor Area** require that permanently installed lighting for these areas consist of high efficacy luminaires or be controlled by an occupant sensor.
- Greater than 20% of Conditioned Floor Area** will need to comply with the applicable requirements of nonresidential indoor lighting. In addition, lighting installed in corridors and stairwells shall be controlled by occupant sensors that reduce the lighting power in each space by at least 50% when unoccupied.

Lighting for Parking Lots and Carports

Requirements for outdoor lighting of parking areas are based on the vehicle capacity. Parking lots, carports, or parking garages designed for:

- Fewer than eight vehicles** must adhere to the basic requirements for outdoor residential lighting:
 - High efficacy lighting OR
 - Low efficacy lighting with controls.
- Eight or more vehicles** are required to meet the nonresidential lighting requirements, including lighting power density limits. See [Sections 130.2](#) and [140.7](#) for an exhaustive list of requirements.

Additional Resources for Lighting

The following resources may be helpful in addition to the Standards language to understand the residential requirements:

- California Lighting Technology Center Lighting Guides:** The CLTC has produced 2013 Title 24, Part 6 Lighting Guides for Residential Lighting and Outdoor Lighting.

Electrical Distribution (§130.5)

The 2013 Standards introduced requirements for electrical distribution in Part 6 that are relevant to nonresidential portions of a multifamily project. They can be found in [Section 130.5](#) and include requirements for:

- Service Metering
- Electrical Disaggregation
- Voltage Drop
- Receptacle Controls

Commissioning (§120.8)

Multifamily projects that have nonresidential portions have commissioning requirements in [Section 120.8](#), which apply to systems serving the nonresidential portions of the building.



This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

DOCUMENT 2019-08-14



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"What's Changed-2016"

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2016 Title 24, Part 6

Nonresidential, High-Rise Residential, Hotel/Motel What's Changed in 2016

MECHANICAL: Mandatory Measures

Color background indicates code language: ☐ no change ☐ revised ☐ NEW for 2016

Measure	T-24 Section	Notes
Systems & Equipment <i>§110.0 has added new language regarding conformance to Title 20</i>	110.0(b)	Altered language regarding certification of manufactured systems, equipment, appliances and building components needing to meet Title 20 requirements (appliances), or certification requirements per Title 24, Part 6 (not considered an appliance) and that it is the responsibility of the manufacturer.
Heating Equipment Efficiency	110.2(a)	Table 110.2-B: Heating mode water and groundwater source heat pumps COP minimum values (1/1/2017). Table 110.2-E: SPVHP and PTHP COP minimum values (1/1/2017). Table 110.2-J: Oil-fired unit heater minimum efficiency increased to 81% E _c (1/1/2017). Table 110.2-K: Boiler minimum efficiencies to change 3/2/2020.
Cooling Equipment Efficiency	110.2(a)	Table 110.2-A: Air conditioners: air cooled and water cooled IEER minimum values (1/1/2016). Table 110.2-B: Air and water cooled heat pumps IEER and EER minimum values (1/1/2016). Table 110.2-D: Air and water cooled chillers Path A and B minimum efficiencies (1/1/2017). Table 110.2-E: Cooling mode PTAC, PTHP and SPVAC EER minimum values (1/1/2017). Table 110.2-G: Evaporative cooling towers added.
Space Conditioning Equipment	110.2(b-f)	No Change
Service Water Heating Systems & Equipment: Installation	110.3(a)(b) 110.3(c)7	No Change. NOTE: Temperature control listed in ASHRAE Handbook HVAC Applications Guide volume 2011 is Table 3 (as is stated within Standards); in volume 2015 it can be found in Chapter 50, Table 19. Isolation valves. Instantaneous water heaters with an input rating greater than 6.8 kBtu/hr (2 kW) shall have isolation valves on both the cold water supply and the hot water pipe leaving the water heater, and hose bibbs or other fittings on each valve for flushing the water heater when the valves are closed.
Pool & Spas	110.4(a)(b)	No Change
Pilot Lights	110.5(a-d)	No Change
Ventilation	120.1(a-e)	No Change

Residential

What's Changed in 2016

Language: ☐ NO CHANGE ☐ REVISED ☐ NEW FOR 2016

ent, appliances and building components that need to meet Title 20
le 24, Part 6 (not a regulated appliance under Title 20). Certification

COP minimum values (1/1/2017).

E_c (1/1/2017).

im values (1/1/2016).

values (1/1/2016).

encies (1/1/2017).

es (1/1/2017).

C Applications Guide volume 2011 is Table 3 (as is stated within

er than 6.8 kBtu/hr (2 kW) shall have isolation valves on both the
ose bibbs or other fittings on each valve for flushing the water

ed heat pump systems.

2(c).

er heaters, an R-12 external blanket is no longer required since
minimum federal efficiency). Minor changes in language regarding

ve conditioned space, must be insulated with a minimum of R-4.2.

es and townhouses. All others: No Change

am for the airflow fan watt draw minimum requirements.

iously delivering, in every zonal control mode, airflow from the
CFM per ton of nominal cooling capacity, and operating at an
fication and diagnostic testing in accordance with the applicable
v exceptions apply for small duct high velocity systems and

Page 1 of 4



CEC: 15 Day Language

SUBCHAPTER 2

ALL OCCUPANCIES—MANDATORY REQUIREMENTS FOR THE MANUFACTURE, CONSTRUCTION AND INSTALLATION OF SYSTEMS, EQUIPMENT AND BUILDING COMPONENTS

SECTION 110.0 – SYSTEMS AND EQUIPMENT—GENERAL

Sections 110.1 through 110.40-11 establish specific requirements for manufacturing, construction, and installation of certain systems, equipment, appliances and building components that are installed in buildings regulated by Part 6 within the scope of Section 100.0(a).

NOTE: The requirements of Sections 110.0 through 110.40-11 apply to newly constructed buildings. Sections 141.0 and 150.2 specify which requirements of Sections 110.1 through 110.40-11 also apply to additions and alterations to existing buildings.

(a) General Requirements. Systems, equipment, appliances and building components ~~may~~ shall only be installed in a building within the scope of Section 100.0(a) regulated by Part 6 only if:

1. (a)—The manufacturer has certified that the system, equipment, appliances or building component complies with the applicable manufacturing provisions of Sections 110.1 through 110.40-11, and
2. (b)—The system, equipment, appliance or building component complies with all applicable installation provisions of Sections 110.1 through 110.40-11.

(b) Certification Requirements for Manufactured Systems, Equipment, Appliances and Building Components.

1. Appliances that are within the scope of Section 1601 of the Appliance Efficiency Regulations shall only be installed if they have been certified to the Energy Commission by the manufacturer, pursuant to the provisions of Title 20 California Code of Regulations, Section 1606; or
2. Systems, equipment, appliances and building components that are required by Part 6 or the Reference Appendices to be certified to the Energy Commission, which are not appliances that are within the scope of Section 1601 of the Appliance Efficiency Regulations, shall only be installed if they are certified by the manufacturer in a declaration, executed under penalty of perjury under the laws of the State of California, that:
 - A. all the information provided pursuant to the certification is true, complete, accurate and in compliance with all applicable requirements of Part 6; and
 - B. the equipment, product, or device was tested using the test procedure specified in Part 6 if applicable;
3. The certification status of any system, equipment, appliance or building component shall be confirmed only by reference to:
 - A. A directory published or approved by the Commission; or
 - B. A copy of the application for certification from the manufacturer and the letter of acceptance from the Commission staff; or
 - C. Written confirmation from the publisher of a Commission-approved directory that a device has been certified; or
 - D. A Commission-approved label on the device.

[http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/15-day language/revised express terms/2016 T24 Standards Part 6 15-Day Language.pdf](http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/15-day%20language/revised%20express%20terms/2016%20T24%20Standards%20Part%206%2015-Day%20Language.pdf)



ECA Nonresidential PE Checklist-2016



Review Date: _____
Updated: _____

Dynamic or Static

✦ Dynamic:

- ✦ Computer is required
- ✦ Adobe Reader is required
- ✦ Organized to help organize plan check for all the Title 24 Part 6 certificate of Compliance forms (NRCC)
- ✦ You can choose to have predetermined "Plan Check Responses" populated for items *not* meeting code.

✦ Static:

- ✦ No computer required ☺

Are the following items confirmed on the plans?
* If "NO", items to be corrected per plan check comments

		YES	NO*
Has only one Certificate of Compliance (NRCC) been submitted as part of this permit FOR THE SAME FEATURE?	§10-103	☐	☒
Are all NRCC documents filed on the plans?	§10-103	☐	☒
Are all NRCC documents signed and dated by the: Responsible building designers or owner? <i>Must be wet signed</i> Documentation author? <i>Can be electronic or wet signature</i>	§10-103	☒	☐
Have commissioning design review forms been provided?	NEW NR building or any NR occupancy within NEW mixed-use building will require NRCC-CXR forms. If NR conditioned space is $\geq 10,000$ ft ² , OPR/BOD/Cx Specs are also required.	☐	☒
Is the climate zone correct?	Based on zip code	☒	☐
Is the site orientation correct?	Azimuth (not plan north)	☒	☐
Total conditioned floor area (ft ²)		☒	☐
Total unconditioned area (ft ²)		☒	☐
Number of dwelling units	Multifamily & hotel/motel	☒	☐
Number of stories above grade	Not including mezzanine or lofts	☒	☐



Example Part 6 Plan Check Correction Comments

Multiple NRCC (Certificate of Compliance) forms have been submitted for the same building feature. Please clarify whether the feature is showing compliance via prescriptive or performance path, and only documented on one NRCC form per procedures in §10-103.

One or more NRCC (Certificate of Compliance) form is not included within the plan set. Please resubmit plans with required NRCC forms filled within the set per procedures in §10-103.

This project is either a newly constructed nonresidential building, or has nonresidential spaces within a newly constructed mixed-use building. The NRCC-CXR forms are required to show compliance with commissioning design review requirements per §120.8. Please resubmit including required NRCC-CXR forms.

Have commissioning design review forms been provided?	NEW NR building or any NR occupancy within NEW mixed-use building will require NRCC-CXR forms. If NR conditioned space is $\geq 10,000$ ft ² , OPR/BOD/Cx Specs are also required.	§120.8	☐	☐
Is the climate zone correct?	Based on zip code	§100.1(b)	☐	☐
Is the site orientation correct?	Azimuth (not plan north)	NR ACM 2.1	☐	☐
Total conditioned floor area (ft ²)		§100.1(b)	☐	☐
Total unconditioned area (ft ²)		§100.1(b)	☐	☐
Number of dwelling units	Multifamily & hotel/motel	§100.1(b)	☐	☐
Number of stories above grade	Not including mezzanine or lofts	§100(c)	☐	☐
Does the NRCC-PRF show "Building Complies"? Prescriptive compliance verified using tables on the following pages.			☐	☐

Coming soon!



ECA Residential BI Checklist-2016

Ace Resources 2016 Residential - Title 24, Part 6 **Building Inspector** Energy Inspection Checklist **EnergyCode Ace** Helping you play your cards right

Permit Number: _____

Project Address: _____

Contacts: _____

OVERALL REQUIREMENT	YES	NO
All compliance documents completed, signed and registered, if required. (HERS verification triggers registration.)	☐	☐
CFIR (Certificate of Compliance - most current, if revised from plan review)	☐	☐
CFIR (Certificates of Installation)	☐	☐
CFIR (Certificates of Verification- HERS)	☐	☐
Define Fuel Type ☐ natural gas ☐ propane ☐ electricity	☐	☐

Does installed measure and/or HERS-verified data match CFIR and meet all mandatory requirements?

Measure	Required Forms			Notes	YES	NO
	Form Name	CFIR	CFIR			
ENVELOPE						
Fenestration	ENV-01				☐	☐
Insulation	ENV-03				☐	☐
Roofing (cool roof, radiant barrier)	ENV-04				☐	☐
HERS Measures (if required)	ENV-20 & MCH-24				☐	☐
Envelope Air Leakage	ENV-21, 22, 23, 24				☐	☐
Quality Insulation Installation (QII)					☐	☐
HVAC						
Equipment	MCH-01				☐	☐
Whole House Fan (ventilation cooling)	MCH-02, MCH-30				☐	☐
Evaporative Coolers	MCH-04				☐	☐
HERS Measures						
Duct leakage	MCH-20				☐	☐
Duct location	MCH-21				☐	☐
Fan Efficacy	MCH-22				☐	☐
Airflow Rate	MCH-23				☐	☐
Refrigerant Charge	MCH-25				☐	☐
High SEER or EER	MCH-26				☐	☐
IAQ Ventilation	MCH-27				☐	☐
Return Duct and filter Grille	MCH-28				☐	☐
Buried Ducts	MCH-29				☐	☐
PLUMBING						
Distribution					☐	☐
Non-HERS: Centralized system (multifamily)	PLB-01				☐	☐
Individual system	PLB-02				☐	☐
HERS: Centralized system (multifamily)	PLB-21				☐	☐
Individual system	PLB-22				☐	☐
Pools and Spas	PLB-03				☐	☐
Solar Hot Water	STH-01				☐	☐
ELECTRICAL						
PV Systems	SPV-01				☐	☐
Lighting: Single Family	LTG-01				☐	☐
Multifamily	LTG-02				☐	☐



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Static

- ✦ No computer required ☺
- ✦ Provides guidance on which building features must be documented with which forms
- ✦ These forms are designed to be a verification tool in the field.

Coming soon!



<http://cltc.ucdavis.edu/>

CLTC/UC Davis



WHAT'S NEW IN THE 2016 CALIFORNIA RESIDENTIAL LIGHTING

Changes to mandatory lighting requirements in California's 2016 Building Energy Efficiency Standards

California's new residential Building Energy Efficiency Standards focus on several key areas to improve the energy efficiency of existing buildings. The most significant efficiency improvement is the California Energy Commission estimates that the 2016 standards will save electricity savings annually and reduce statewide greenhouse electricity to power 500,000 California homes each year. These standards represent a major step towards meeting California's goal of reducing greenhouse gas emissions by 40 percent by the year 2020. Updates enhance and simplify previous requirements and improvements slated for 2019 code. This publication offers updates to the 2016 residential lighting energy efficiency code.

MAJOR CHANGES



ALL HIGH EFFICACY LIGHTING
Indoor and outdoor lighting to



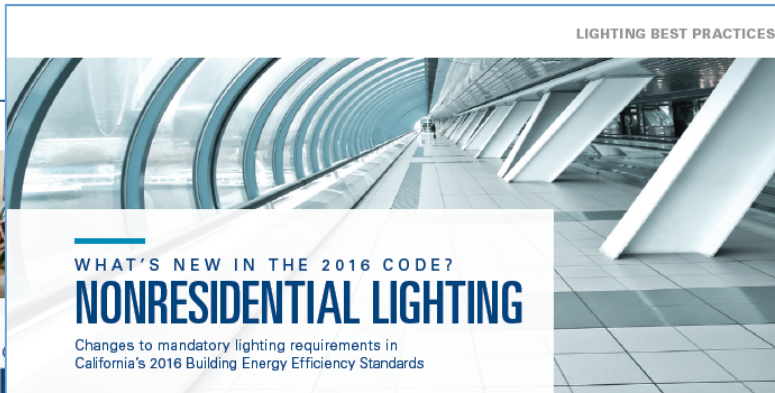
JAS UPDATED
Joint Appendix JA8 regulations of residential high efficacy lamp. JA8 regulations only applied to



SIMPLIFIED CONTROL REQUIREMENTS
Lighting control requirements for control requirements are based on lamp or luminaire installed, not

This guide is not intended to be used in lieu of California's Building Energy Efficiency Standards, and it is not a substitute for the code itself. Please visit energy.ca.gov/title24/2016 to download the official 2016 Title 24 Building Energy Efficiency Standards, Errata, Reference Appendices, and the Nonresidential Compliance Manual.

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



LIGHTING BEST PRACTICES

WHAT'S NEW IN THE 2016 CODE? NONRESIDENTIAL LIGHTING

Changes to mandatory lighting requirements in California's 2016 Building Energy Efficiency Standards

California's new nonresidential Building Energy Efficiency Standards take effect on January 1, 2017. The 2016 Standards focus on several key areas to improve the energy efficiency of newly constructed buildings, additions and alterations to existing buildings. California's Standards now align with ASHRAE 90.1 2013 standards and include more stringent lighting power density limits for many indoor and outdoor spaces. Updates enhance and simplify many aspects of the 2013 requirements including indoor lighting control requirements for new construction and alterations. This publication offers an overview of important updates contained in the 2016 nonresidential lighting energy efficiency standards.

MAJOR CHANGES



REDUCTION TO LIGHTING POWER DENSITY VALUES

Lighting power density allotments have been reduced for many indoor and outdoor spaces including spaces in auditoriums, libraries, and schools. Reductions affect building, area and tailored methods of compliance.



UPDATED POWER ADJUSTMENT FACTORS

The 2016 Standards contain two new power adjustment factors (PAF) that address institutional tuning and daylight harvesting. Three other PAF have been eliminated.



MULTILEVEL LIGHTING & OCCUPANCY CONTROLS

Multilevel lighting control requirements have been simplified. In addition, spaces that utilize certain types of occupancy controls are no longer required to also include multilevel control. Other occupancy control requirements are now to apply in practice.



ALTERATIONS

The line between maintenance and retrofit has been redrawn. More projects are now exempt from alteration requirements. Those that are required to comply now have more options including some with reduced control requirements.

This guide is not intended to be used in lieu of California's Building Energy Efficiency Standards, and it is not a substitute for the code itself. Please visit energy.ca.gov/title24/2016 to download the official 2016 Title 24 Building Energy Efficiency Standards, Errata, Reference Appendices, and the Nonresidential Compliance Manual.

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LIGHTING BEST PRACTICES

WHAT'S NEW IN THE TITLE 20 CODE? LIGHTING APPLIANCE EFFICIENCY REGULATIONS

Changes to California's lighting appliance requirements

The California Energy Commission adopted new standards updating the 2015 Appliance Efficiency Regulations (Title 20) for lighting appliances. Updates will roll out in two tiers with Tier 1 effective January 1, 2018 and Tier 2 effective July 1, 2019. Notably, this update adds standards for small-diameter directional lamps. The updated regulations incorporate elements of lighting product quality for both general service LED lamps and small-diameter directional lamps in addition to the traditional lighting appliance efficiency standards previously included in the regulations. The addition of these new standards will require revisions to the California Appliance Efficiency Database product certification process, as well as updates to product labeling requirements for lamp marking, marketing material, and product packaging.

MAJOR CHANGES

UPDATES TO LAMP REGULATIONS AND CATEGORIES

General service LED lamps are now regulated as a separate category from other light sources in the general service lamp category. New requirements include specific performance metrics and corresponding test methods to quantify product performance in an industry-recognized manner.

Small diameter directional lamps with a diameter of 2.25 inches or less that are equipped with ANSI compliant base-types or the E26 base type are now regulated. New requirements apply to both low- and line-voltage lamps.

Portable luminaires that are equipped with a socket requiring a general service lamp must be packaged with a compact fluorescent lamp or LED lamp that adheres to the updated lamp requirements.

CALIFORNIA APPLIANCE EFFICIENCY DATABASE

The appliance database filing structure that manufacturers use to submit products for listing with the California Energy Commission will include new product categories and performance metrics starting January 1, 2018.

PRODUCT LABELING

Manufacturers must test and certify their products with the updated regulations before including claims of dimmability, incandescent lamp equivalency, wattage equivalence, decorative lamp lumen output, or compliance with the Voluntary California Quality LED Lamp Specification in their lamp marking, marketing material, and package labeling.

This guide is not intended to be used in lieu of California's Appliance Efficiency Regulations, and it is not a substitute for the code itself. Please visit energy.ca.gov/appliances to download the official 2015 Appliance Efficiency Regulations and the rulemaking specific to General Service LED Lamps and Small-Diameter Directional Lamps.

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CEC Hot Line

The screenshot shows the California Energy Commission (CEC) website. The header includes the CEC logo, the text "CALIFORNIA ENERGY COMMISSION", and a navigation menu with links: Home, About Us, Analysis & Stats, Efficiency, Funding, Power Plants, Renewables, Research, and Transportation. A search bar is also present. The main content area features a large image of a light bulb. Below this, the breadcrumb "Home -> efficiency" is shown. The section title "Contacts for Energy Efficiency Programs" is underlined. Under the subheading "Energy Standards Hotline", there are three categories of contact information: Phone Numbers, Emails, and Fax Numbers. The phone numbers are 800-772-3300 (Toll-Free in California) and 916-654-5106 (Outside California). The email addresses are Appliances@energy.ca.gov and Title24@energy.ca.gov. The fax numbers are 916-654-4304 for both Appliance Efficiency and Building Energy Efficiency.

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Contacts for Energy Efficiency Programs

Energy Standards Hotline

Phone Numbers

- » Toll-Free in California: 800-772-3300
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Emails

- » Appliances@energy.ca.gov
- » Title24@energy.ca.gov

Fax Numbers

- » Appliance Efficiency: 916-654-4304
- » Building Energy Efficiency: 916-654-4304

Special Number for Building Departments only
(see Gina Rodda for business card at ECA booth 😊)