2016 Energy Standards Overview

Heriberto Rosales

California Energy Commission

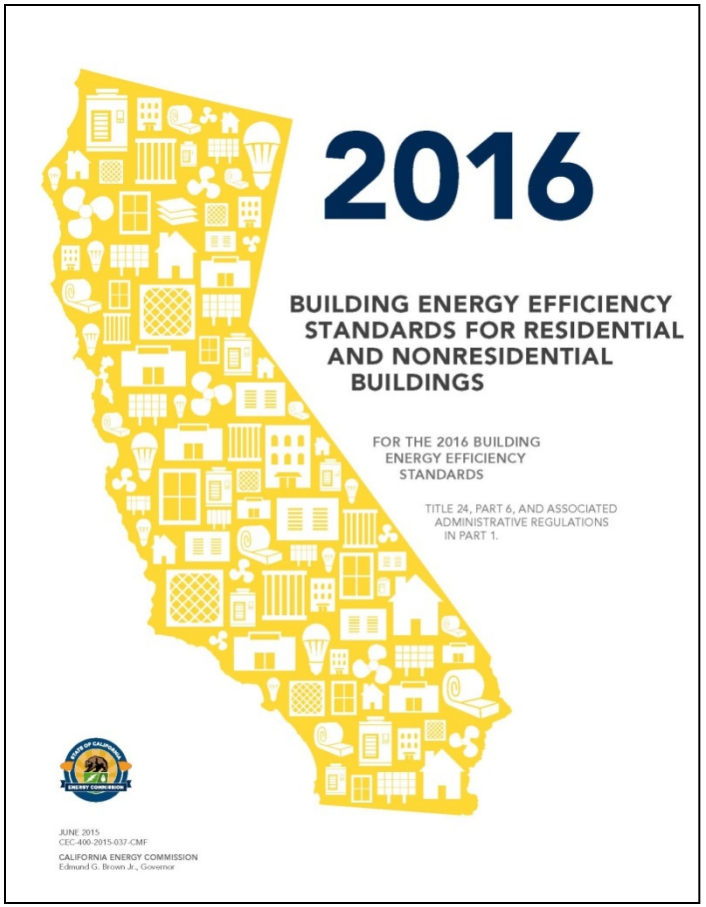
SEEC Forum

Riverside, CA

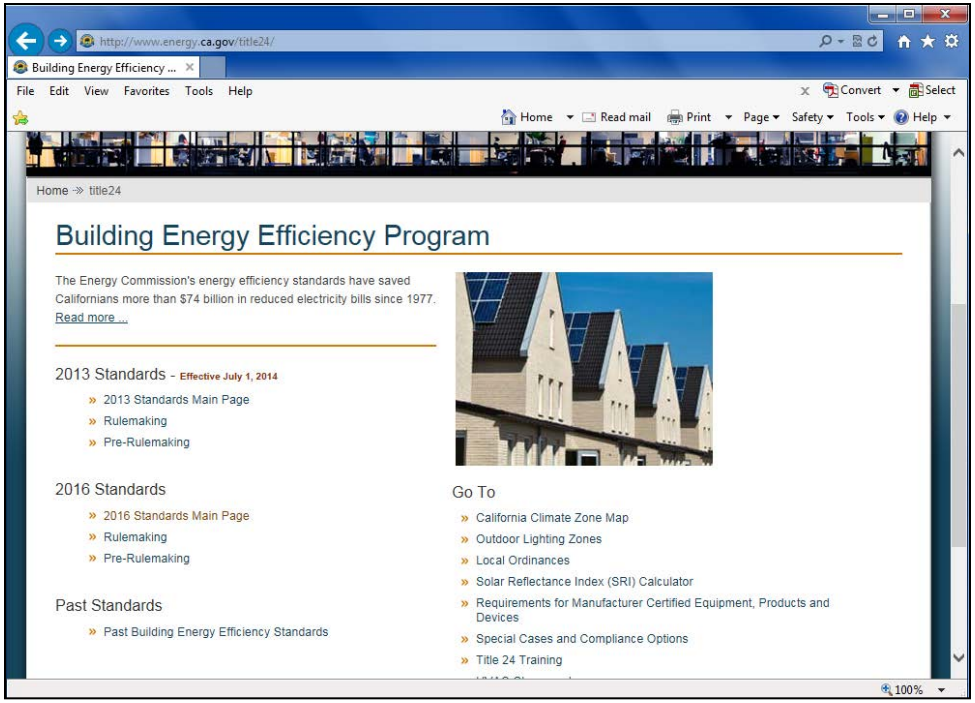
June 15, 2016

2016 Building Energy Efficiency Standards

- **Effective on Jan. 1, 2017**
  - Building permit applications submitted on or after this date
- **Master plans for tract homes affected:**
  - Need to resubmit if permits pulled on/after effective date



2016 Documents



- Building Energy Efficiency Standards
- Res. and Nonres. Compliance Manuals
- Reference Appendices
- All docs. available online at:

  www.energy.ca.gov/title24

2016 Residential Energy Savings

- **Overall, 28% more efficient than 2013 Standards**
  - Electric savings = 345 GWHs
  - Demand Reduction = 115 MW
  - Gas Savings = 31 Mtherms
- **Monthly life cycle cost of $11 with savings of $31 for "typical" home (statewide)**

2016 Nonresidential Energy Savings

- **Overall, 5% more efficient than 2013 Standards**
  - Electric Savings = 192 GWHs
  - Demand Reduction = 80 MW
  - Gas Savings = 0.9 Mtherms

Let's begin with the Admin. Regulation changes for Residential Buildings

Administrative Regulations: Signatures and NSHP (§10-103)

- **Delegation of Signature Authority**
  - Applies to Certificate of Installation (CF2R) Forms only
  - Installing contractor/builder can designate someone as an authorized representative to sign form (likely a HERS Rater)
  - Agreement, signatures, etc. will be facilitated by HERS Providers
- **Exception to waive plan review and inspection for New Solar Homes Projects (NSHP) removed**

Now for the changes to the Residential Energy Measures

Summary of Major Changes

- **Solar ready zone exceptions revised**
- **Instantaneous water heaters**
  - Baseline for prescriptive and performance compliance
- **High efficacy lighting**
  - New JA8 requirements
- **High Performance Attics (HPA)**
  - Insulation required at ceiling and at the roof
- **High Performance Walls (HPW)**
  - Maximum allowed U-factor lowered

** See summary of changes handout*

Solar Ready – Mandatory
(§110.10)

- **For single-family residences and low-rise multi family buildings:**
  - Smart thermostats and high efficacy lighting exception for solar zone and interconnection/documentation reqs. replaced with:
    - Smart thermostat still required,

      and:

    - Energy Star dishwasher and fridge, or whole house fan with an ECM; or
    - Home automation controlling appliances and lighting that responds to demand response signals; or
    - Alternate plumbing that dischargers clothes washer and shower/tub water for an irrigation system that complies with CA Plumbing Code; or
    - Rainwater catchment system that complies with CA Plumbing Code and uses rainwater flowing from at least 65% of available roof area

Water Heating – Mandatory
(§110.3(c)7)

- Isolation valves required for instantaneous water heaters > 6.8 kBTU/hr (2 kW)
- Valves must be installed on cold line in, and hot water line leaving
- Valves simplify flushing the heat exchanger for maintenance

Water Heating – Prescriptive
(§150.1(c)8)

2013	2016
• Instantaneous gas/propane, or • A single gas/propane storage water heater ➢ Max input of 75,000 Btu/hr ➢ No QII or HERS verification requirements • Electric-resistance allowed if natural gas is unavailable	• Instantaneous gas/propane, or • If single gas/propane storage is designed: ➢ Max input of 105,000 Btu/hr ➢ Depending on tank size, QII or other HERS Verification measures required • Electric-resistance removed as prescriptive option for newly constructed buildings

Lighting – Luminaire Efficacy
(§150.0(k)1A)

- **Classification of efficacy has changed**
  - Screw base can now be considered high efficacy
- **Luminaires are either:**
  - High efficacy by source types listed, or
  - Must be certified & labeled per JA8 to be classified as high efficacy
  - **No low efficacy allowed!**

TABLE 150.0-A CLASSIFICATION OF HIGH EFFICACY LIGHT SOURCES

High Efficacy Light Sources Luminaires installed with only the lighting technologies in this table shall be classified as high efficacy	
Light sources in this column other than those installed in ceiling recessed downlight luminaires are classified as high efficacy and are **not** required to comply with Reference Joint Appendix JA8	Light sources in this column shall be certified to the Commission as High Efficacy Light Sources in accordance with Reference Joint Appendix JA8 and be marked as meeting JA8.
1. Pin-based linear or compact fluorescent light sources using electronic ballasts. 2. Pulse-start metal halide. 3. High pressure sodium. 4. GU-24 sockets containing light sources other than LEDs. [a,b] 5. Luminaires with hardwired high frequency generator and induction lamp. 6. Inseparable SSL luminaires that are installed outdoors. 7. Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting.	8. All light sources in ceiling recessed downlight luminaires. Note that ceiling recessed downlight luminaires shall not have screw bases regardless of lamp type as described in Section 150.0(k)1C. 9. GU-24 sockets containing LED light sources. 10. Any light source not otherwise listed in this table and certified to the Commission as complying with Joint Appendix 8.
Notes: a. GU-24 sockets containing light sources such as compact fluorescent lamps and induction lamps. b. California Title 20 Section 1605(k)3 does not allow incandescent sources to have a GU-24 base.	

Lighting – Luminaire Efficacy

(§150.0(k)1A, cont'd)

Auto High Efficacy List (No JA8 Certification Required)	
2013 Standards	**2016 Standards**
Pin-based linear or Compact Fluorescent	No Change
GU-24 Sockets rated for CFLs/LEDs	Only GU24 sockets rated for use with other than LED light sources (CFL/Induction)
Pulse Start Metal Halide & High Pressure Sodium	No Change
Induction	Luminaires with high frequency generator and induction lamp
LEDs Certified to the CEC as High Efficacy	Inseparable Solid State Lighting (SSL, aka LED) installed outdoors, or decorative

Lighting – Luminaire Efficacy

(§150.0(k)1A, cont'd)

JA8 Certification & Labeling Required for High Efficacy Classification	
Light Source Type	**More Info**
Recessed Downlights in Ceilings – All Lighting Sources	1. Tested for elevated temperature 2. Cannot have screw base socket, regardless of lamp
LEDs – Indoor, Non-decorative	Including GU-24 base luminaires containing LEDs
Any lamp designed for use in screw base socket	
All others not listed on this or previous table	

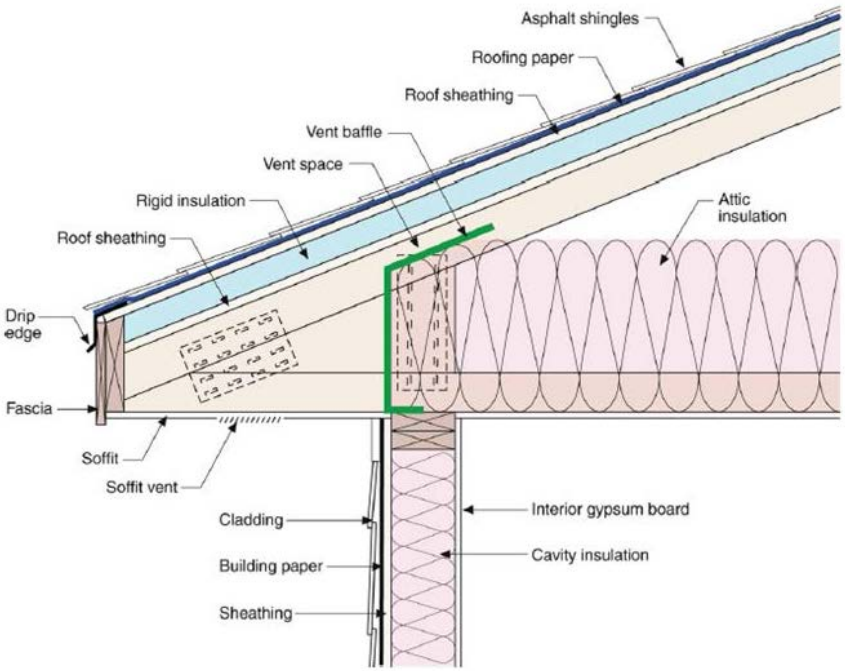
Ceiling/Wall Insulation: Mandatory (§150.0(a), (c))

2013	2016
• Insulation placement language in §110.8 • Roof/ceiling insulation required: ➢ 0.031 max U-factor/R-30 • Addresses only framed walls	• Moved to §150.0(a) • Roof/ceiling insulation reduced: ➢ 0.043 max U-factor/R-22 • Non-framed walls must meet max 0.102 U-factor

Ceiling/Roof Insulation: Prescriptive (§150.1(c)1A)

2013	2016
• Meet R-Value or U-Factor • Installed at ceiling **or** roof	• Introduction of "high performance attics" requirements • Insulation required at ceiling &roof depending on Option & CZ • Radiant barrier & duct location/ insulation requirements also depend on Option & CZ • 3 Options available • Photovoltaic system trade-off option proportional to HPA & HPW

Ceiling/Roof Insulation: Prescriptive (§150.1(c)1A, cont'd)



- **Option A**
  - Per TABLE 150.1-A
    - Continuous insulation required above roof rafters in some Climate Zones
    - Ceiling insulation required
    - Radiant barrier required in Climate Zones 2 through 15
    - Must meet §150.1(c)9A

Ceiling/Roof Insulation: Prescriptive (§150.1(c)1A, cont'd)

- **Option B**
  - ➢ Per TABLE 150.1-A
    - Insulation required below roof deck in some Climate Zones
    - Ceiling insulation required
    - Radiant barrier required in Climate Zones 2, 3 and 5 through 7
    - Must meet §150.1(c)9A

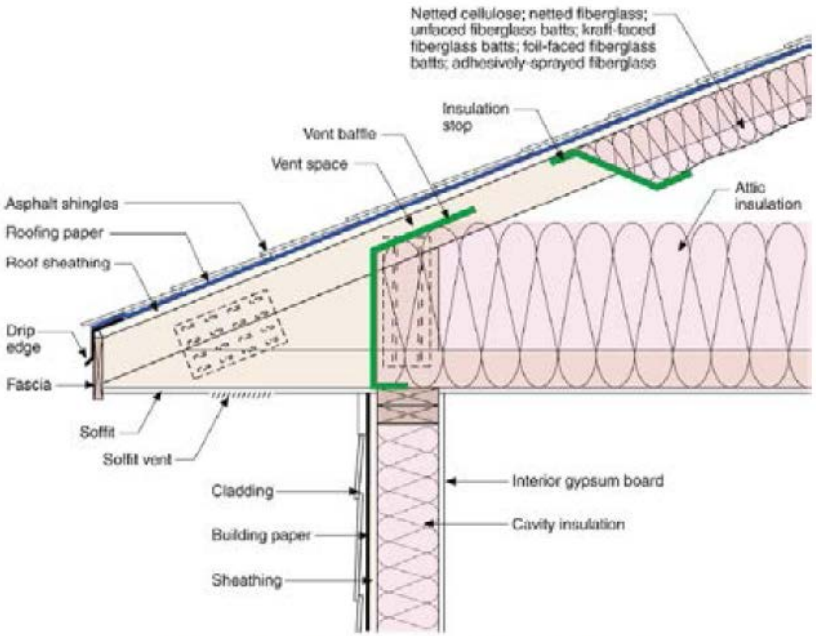


Figure 1: Venting Details for Modified Conventional Vented Attic

Ceiling/Roof Insulation: Prescriptive (§150.1(c)1A, cont'd)

- **Option C**
  - ➢ Per TABLE 150.1-A
    - Ceiling insulation required
    - Radiant barrier required in Climate Zones 2 through 15
    - Must meet §150.1(c)9B
    - Duct are located in conditioned space (HERS verified)

Wall Insulation – Prescriptive

(§150.1(c)1B)

2013	2016
• Cavity insulation R-value; and • Continuous insulation R-value OR • Meet U-Factor	• "High performance walls" requirements introduced • Per TABLE 150.1-A: ➢ Maximum U-Factor specified ➢ Req. U-Factor lowered (more stringent) ➢ Provides for greater design flexibility

QUESTIONS…

About the residential requirement changes?

Let's change course and talk about Nonresidential Buildings

Administrative Regulations: Signatures and ATTCP (§10-103)

- **Design Review Kickoff and Checklist NRCC**
  - Language revised to be more inclusive of eligible reviewers and signers
  - Can be a licensed professional engineer, architect, or contractor under the direct supervision of a P.E. or architect
- **Acceptance Test Technician Certification Providers**
  - Section numbers changed to 10-103.1 and 10-103.2
  - Updates to annual reporting and application amendment reqs.
  - These changes will be facilitated by the ATTCPs

Now let's talk about the changes to the Nonresidential Energy Measures

Summary of Major Changes

- **Equipment efficiencies**
  - Minimum reqs. increased
- **Direct digital controls**
- **Door & window interlocks**
  - New sensor reqs. to turn HVAC off
- **Covered Processes**
  - New reqs. for elevators and escalators
- **Envelope U-factors**
  - Maximum values lowered
- **Indoor and outdoor lighting**
  - Power allowances reduced
  - Indoor lighting alterations

** See summary of changes handout*

HVAC Efficiency – Mandatory
(§110.2)

- **Minimum efficiencies updated for mid-size/larger:**
  - A/Cs and condensing units
  - Unitary and applied heat pumps
  - Water chilling packages
  - Packaged terminal A/Cs and heat pumps
  - Warm air unit heaters (oil fired)
  - Gas and oil-fired boilers
- **Listed in TABLES 110.2-A through 110.2-K**

Direct Digital Controls – Mandatory (§120.2(j))

TABLE 120.2-A *DDC APPLICATIONS AND QUALIFICATIONS*

BUILDING STATUS	APPLICATIONS	QUALIFICATIONS
Newly Constructed Buildings	Air handling system and all zones served by the system	Individual systems supplying more than three zones and with design heating or cooling capacity of 300 kBtu/h and larger
Newly Constructed Buildings	Chilled water plant and all coils and terminal units served by the system	Individual plants supplying more than three zones and with design cooling capacity of 300 kBtu/h (87.9 kW) and larger
Newly Constructed Buildings	Hot water plant and all coils and terminal units served by the system	Individual plants supplying more than three zones and with design heating capacity of 300 kBtu/h (87.9 kW) and larger
Additions or Alterations	Zone terminal unit such as VAV box	Where existing zones served by the same air handling, chilled water, or hot water systems that have DDC
Additions or Alterations	Air handling system or fan coil	Where existing air handling system(s) and fan coil(s) served by the same chilled or hot water plant have DDC
Additions or Alterations	New air handling system and all new zones served by the system	Individual systems with design heating or cooling capacity of 300 kBtu/h and larger and supplying more than three zones and more than 75 percent of zones are new
Additions or Alterations	New or upgraded chilled water plant	Where all chillers are new and plant design cooling capacity is 300 kBtu/h (87.9 kW) and larger
Additions or Alterations	New or upgraded hot water plant	Where all boilers are new and plant design heating capacity is 300 kBtu/h (87.9 kW) and larger

- **DDC to the zone req. per TABLE 120.2**
- **Be capable of:**
  - Monitoring fan and pump pressure, heat/cool
  - Transferring zone and demand info.
  - Removing zones form reset algorithm
  - Displaying input/output points
  - Resetting heat/cool setpoints

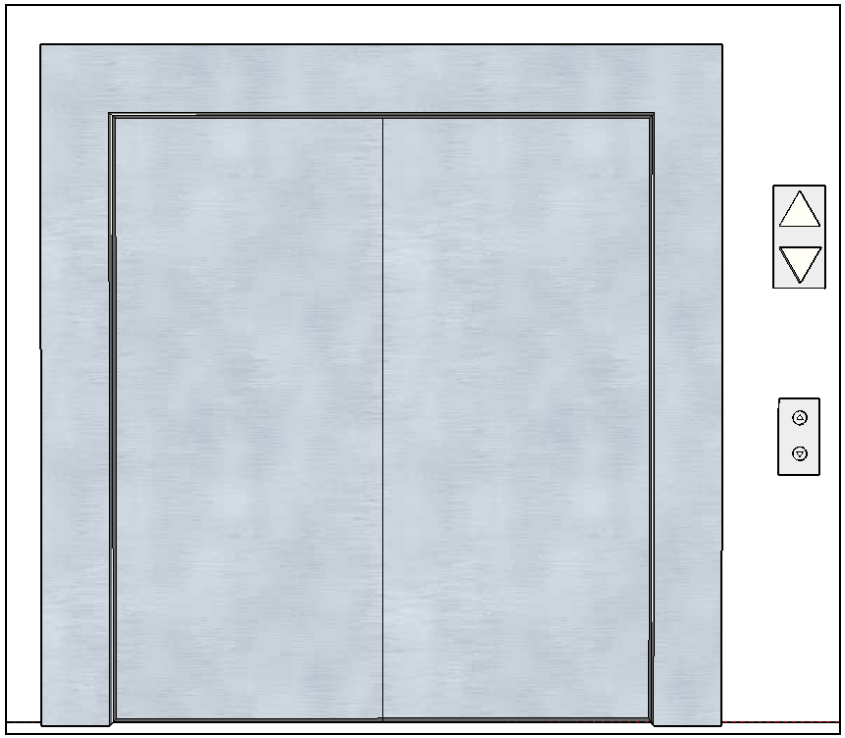
HVAC Shut-Off – Prescriptive

(§140.4(n))

- **Directly conditioned spaces with operable wall or roof openings shall have interlock controls that:**
  - Disable or reset the temperature setpoint to 55°F for heating; and
  - Disable or reset the temperature setpoint to 90°F for cooling
- **Controls must initiate when window/skylight is open for more than 5 minutes**
- **Exceptions:**
  - Doors with automatic closing devices
  - Spaces without a thermostatic control (thermostat or temperature sensor) for heating or cooling

Covered Processes: Elevators
(§120.6 (f))

- **New mandatory requirements for elevators**
  - LPD shall be ≤ 0.6 watts/ft^2
  - Ventilation for cabs without A/C shall be ≤ 0.33 watts/cfm
  - Lights and ventilation shut-off when unused for over 15 minutes
    - Lighting & ventilation shall remain operational in event cab is stuck and occupied
  - Acceptance testing required



Covered Processes: Escalators & Moving Walkways (§120.6 (g))

Source: wwwtelcosensors.com/solutions/industries/elevators

- **New mandatory requirements for escalators and moving walkways:**
  - Located in airports, hotels, and transportation areas
  - Shall reduce to minimum permitted speed (ASME A17.1/ CSA B44) when not conveying passengers
  - Acceptance testing required

Envelope – Prescriptive

(§140.3(a), (c))

- **Roof/ceiling insulation tradeoff for aged solar reflectance revised**
  - ➢ Max. U-Factors reqs. lower in TABLE 140.3
- **Max. U-Factors for ceiling/roofs and walls lowered**
  - ➢ TABLES 140.3-B through D
- **Min. daylighting requirements updated**

TABLE 140.3 ROOF/CEILING INSULATION TRADEOFF FOR AGED SOLAR REFLECTANCE

Nonresidential			
Aged Solar Reflectance	Metal Building Climate Zone 1-16 U-factor	Wood framed and Other Climate Zone 6 & 7 U-factor	Wood Framed and Other All Other Climate Zones U-factor
0.62-0.56	0.038	0.045	0.032
0.55-0.46	0.035	0.042	0.030
0.45-0.36	0.033	0.039	0.029
0.35-0.25	0.031	0.037	0.028

				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	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
			Wood Framed and Other	0.034	0.034	0.034	0.034	0.034	0.049	0.049	0.049	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034
		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	0.069	0.062	0.082	0.062	0.062	0.069	0.069	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	0.095	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.045	0.059	0.059	0.059	0.042	0.059
		Floors/ Soffits	Raised 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
	Roofing Products	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
	Air Barrier			NR	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ
	Exterior Doors, Maximum U-factor		Non-Swinging	0.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.50
			Swinging	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70

Indoor Lighting – Prescriptive
(§140.6(a))

New for 2016:

- LPDs have been reduced for Complete Building, Area Category, and Tailored Method
- Two new PAFs added
  - Daylight dimming plus Off
  - Institutionalized tuning
- Three PAFs removed since the control strategies are now mandatory
  - Partial-ON occupancy sensors
  - Manual Dimming/Multiscene programmable controls
  - Combined manual dimming plus partial-ON occupancy sensor

Power Adjustment Factors - Prescriptive (§140.6(a)2)

- Power Adjustment Factor (PAF): Allows a reduction of calculated actual indoor lighting power by the factors below

TABLE 140.6-A LIGHTING POWER ADJUSTMENT FACTORS (PAF)

TYPE OF CONTROL	TYPE OF AREA		FACTOR
a. To qualify for any of the Power Adjustment Factors in this table, the installation shall comply with the applicable requirements in Section 140.6(a)2 b. Only one PAF may be used for each qualifying luminaire unless combined below. c. Lighting controls that are required for compliance with Part 6 shall not be eligible for a PAF			
1. Daylight Dimming plus OFF Control	Luminaires in skylit daylit zone or primary sidelit daylit zone		0.10
2. Occupant Sensing Controls in Large Open Plan Offices	In open plan offices > 250 square feet: One sensor controlling an area that is:	No larger than 125 square feet	0.40
		From 126 to 250 square feet	0.30
		From 251 to 500 square feet	0.20
3. Institutional Tuning	Luminaires in non-daylit areas: Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.		0.10
	Luminaires in daylit areas: Luminaires that qualify for other PAFs in this table may also qualify for this tuning PAF.		0.05
4. Demand Responsive Control	All building types less than 10,000 square feet. Luminaires that qualify for other PAFs in this table may also qualify for this demand responsive control PAF		0.05

Indoor Lighting Alterations
(§141.0(b)2I, J)

- **Simplification of lighting alterations in existing buildings**
  - Simplified language, tailored requirements to project size
  - New option to reduce control requirements in exchange for more power reduction for replaced or modified luminaires
  - Acceptance testing no longer required for projects where controls are added to control 20 or fewer luminaires
    - Applies to indoor and outdoor lighting alterations

§140.1(b)2I, J: Indoor Lighting Alterations *cont.*

2013	2016
• **Lighting System Alterations**	• **Entire Luminaire Alterations** ➢ Removing and reinstalling same luminaires (≥ 10% of existing) ➢ Replacing/adding luminaires ➢ Adding, removing, replacing walls along with redesign of lighting system
• **Luminaire Modification in Place**	• **Luminaire Component Modification** ➢ Replacing ballast/driver and lamps ➢ Changing the light source ➢ Changing the optical system

§140.1(b)2I, J: Indoor Lighting Alterations *cont.*

Two options for meeting power and control req.

1. **Meet LPD requirements and controls per TABLE 141.0-E**
   - Area control
   - Multilevel lighting control
   - Shutoff control
   - Automatic daylight control
   - Demand responsive control

Similar to 2013

2. **Reduce existing lighting power by 50% or 35% and controls**
   - Area control
   - Shutoff control

New for 2016

Indoor Lighting Alterations

(Table 5-4 of 2016 Nonresidential Compliance Manual)

Table 5-4 of 2016 Nonresidential Compliance Manual			
Applicable Section 130.1 Control requirements:	Lighting power is reduced by 35/50% compared to existing	Resulting lighting power, compared to the lighting power allowance specified in Section 140.6(c)2, Area Category Method	
		Lighting power is ≤85% of allowance	Lighting power is > 85% to 100% of allowance
Section 130.1(a)1, 2, and 3 Area Controls	Yes	Yes	Yes
Section 130.1(b) Multi-Level Lighting Controls – only for alterations to general lighting of enclosed spaces 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot	Not Required	Bi-level control for each enclosed space, minimum one step between 30-70 percent of lighting power regardless of luminaire type, or meet Section 130.1(b)	Yes
Section 130.1(c) Shut-Off Controls	Yes	Yes	Yes
Section 130.1(d) Automatic Daylight Controls	Not Required	Not Required	Yes
Section 130.1(e) Demand Responsive Controls – only for alterations > 10,000 ft^2 in a single building, where the alteration also changes the area of the space, or changes the occupancy type of the space, or increases the lighting power	Not Required	Not Required	Yes

QUESTIONS…

About the nonresidential requirement changes?

Let's finish with some Resources

Approved 2016 Compliance Software

Used to demonstrate compliance with the Energy Standards when using the Performance Approach

- **Residential**
  - CBECC-Res
  - Energy Pro
  - Wrightsoft Right-Energy
- **Nonresidential**
  - CBECC-Com
  - Energy Pro

More information at:

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

2013 Approved HERS Providers

- **New construction and HVAC alterations**
  - CalCERTS
- **New construction ONLY**
  - CHEERS
- **HVAC alterations ONLY**
  - U.S. Energy Raters Association (USERA)

More information at:
http://www.energy.ca.gov/HERS/providers.html

2013 Approved ATTCPs

- **Mechanical ATTCPs**
  - NEMIC (replaced TABB)
  - NEBB
- **Lighting ATTCPs**
  - CALCTP
  - NLCAA

More information at:

http://www.energy.ca.gov/title24/attcp/

Blueprint

- Published every other month
- Clarifications on frequently asked questions
- Receive by e-mail
- http://www.energy.ca.gov/efficiency/blueprint/

Issue 113 | March – April 2016

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

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**.

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

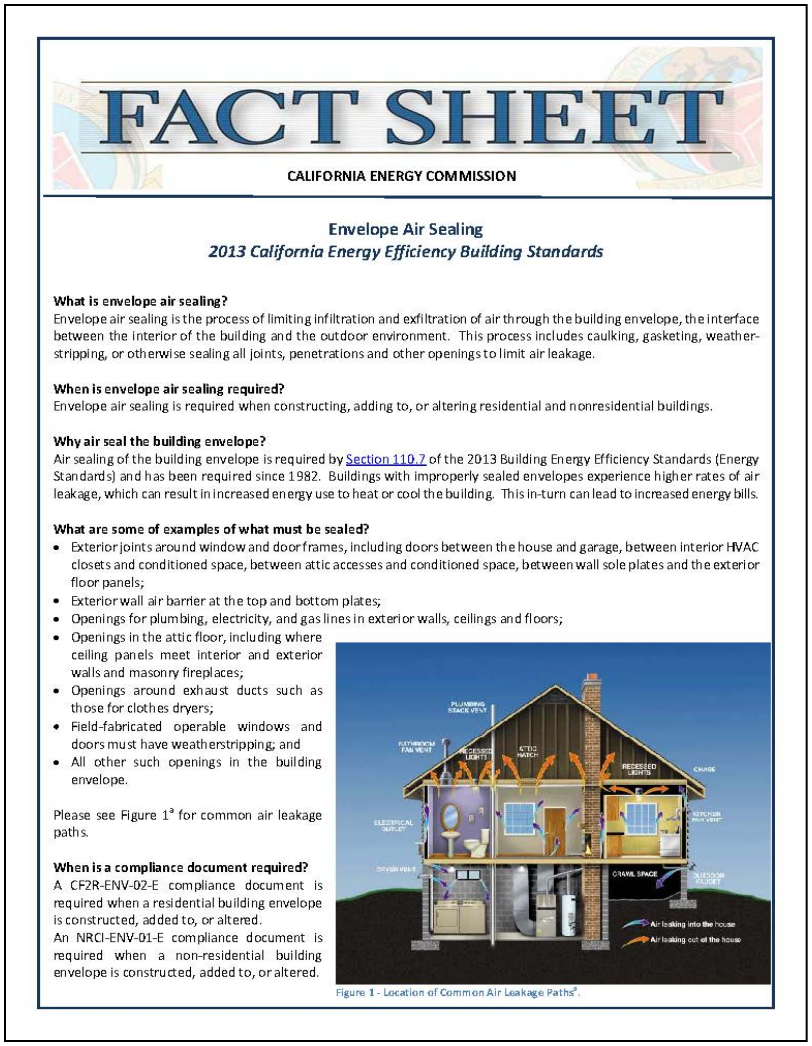
Section 150.0(m)15 - Specific to systems with multiple thermostatically controlled zones, this section requires the same mandatory airflow and fan efficacy requirements as **Section 150.0(m)13B**. However, it does not have the same duct and grille sizing alternative. If such systems cannot satisfy the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

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

Prescriptive Requirements

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

2013 Fact Sheets



FACT SHEET

CALIFORNIA ENERGY COMMISSION

Envelope Air Sealing

2013 California Energy Efficiency Building Standards

What is envelope air sealing?
Envelope air sealing is the process of limiting infiltration and exfiltration of air through the building envelope, the interface between the interior of the building and the outdoor environment. This process includes caulking, gasketing, weather-stripping, or otherwise sealing all joints, penetrations and other openings to limit air leakage.

When is envelope air sealing required?
Envelope air sealing is required when constructing, adding to, or altering residential and nonresidential buildings.

Why air seal the building envelope?
Air sealing of the building envelope is required by Section 110.7 of the 2013 Building Energy Efficiency Standards (Energy Standards) and has been required since 1982. Buildings with improperly sealed envelopes experience higher rates of air leakage, which can result in increased energy use to heat or cool the building. This in-turn can lead to increased energy bills.

What are some of examples of what must be sealed?

- Exterior joints around window and door frames, including doors between the house and garage, between interior HVAC closets and conditioned space, between attic accesses and conditioned space, between wall sole plates and the exterior floor panels;
- Exterior wall air barrier at the top and bottom plates;
- Openings for plumbing, electricity, and gas lines in exterior walls, ceilings and floors;
- Openings in the attic floor, including where ceiling panels meet interior and exterior walls and masonry fireplaces;
- Openings around exhaust ducts such as those for clothes dryers;
- Field-fabricated operable windows and doors must have weatherstripping; and
- All other such openings in the building envelope.

Please see Figure 1[a] for common air leakage paths.

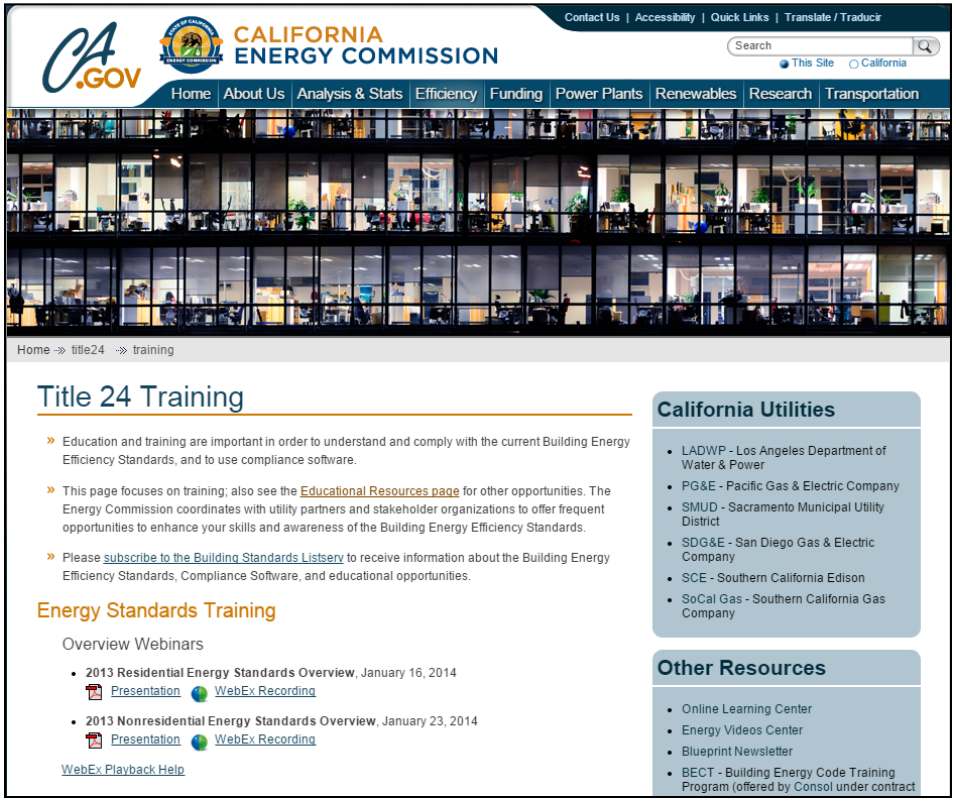
When is a compliance document required?
A CF2R-ENV-02-E compliance document is required when a residential building envelope is constructed, added to, or altered.
An NRCI-ENV-01-E compliance document is required when a non-residential building envelope is constructed, added to, or altered.

Figure 1 - Location of Common Air Leakage Paths[a].

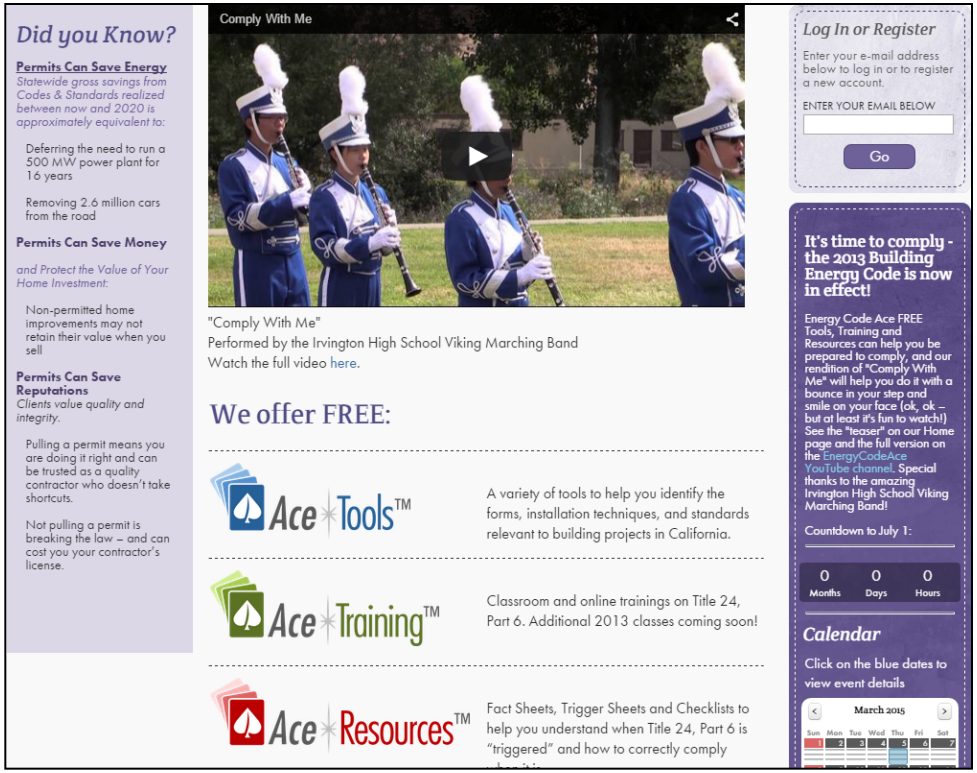
- 5 published to date
- Detailed clarifications on specific topic/requirements
- Receive by e-mail (listserver)
- http://www.energy.ca.gov/efficiency/factsheets/

2016 Training

- Provided by Utilities
- Free of charge
- Can request for training in your region/area
- CEC training
- http://www.energy.ca.gov/title24/training/



Energy Code Ace



- Forms tools
- Free training (in person and online)
- Checklists, Trigger Sheets for building dept.
- http://www.energycodeace.com/content/home/

Hotline

- Toll-free in California
- Open Monday through Friday
  - 8:00 a.m. to noon, and
    1:00 p.m. to 4:30 p.m.
- Call at:
  - 1-800-772-3300 (In CA)
  - (916) 654-5106 (Outside CA)
- Or, e-mail at: Title24@energy.ca.gov

Listservers

- Main conduit for communicating with stakeholders
- Sign up at:
  - http://www.energy.ca.gov/listservers/
- Subscribe to the following Efficiency Lists:
  - Building Standards
  - Blueprint
- Respond to confirmation e-mail within 24 hours