Residential Alterations and the 2013 Energy Standards

Christopher Olvera
California Energy Commission
Outreach and Education Unit

NorCal Permit Tech Committee
Auburn, CA
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Goals of this Training

- Clarify the Energy Standards Prescriptive requirements for residential alterations:
  - Water heater alterations
  - Reroofs
  - HVAC alterations
- Simplify compliance for permit technicians and clarify:
  - Which form is required at permit
  - What measures/efficiencies to verify
- Increase CEC staff knowledge about daily operations for permit technicians and their concerns/needs

QUESTIONS…

- **Please feel free to ask at anytime!**
  - During training
  - At break
  - Afterwards
- **Your questions will enhance this training**

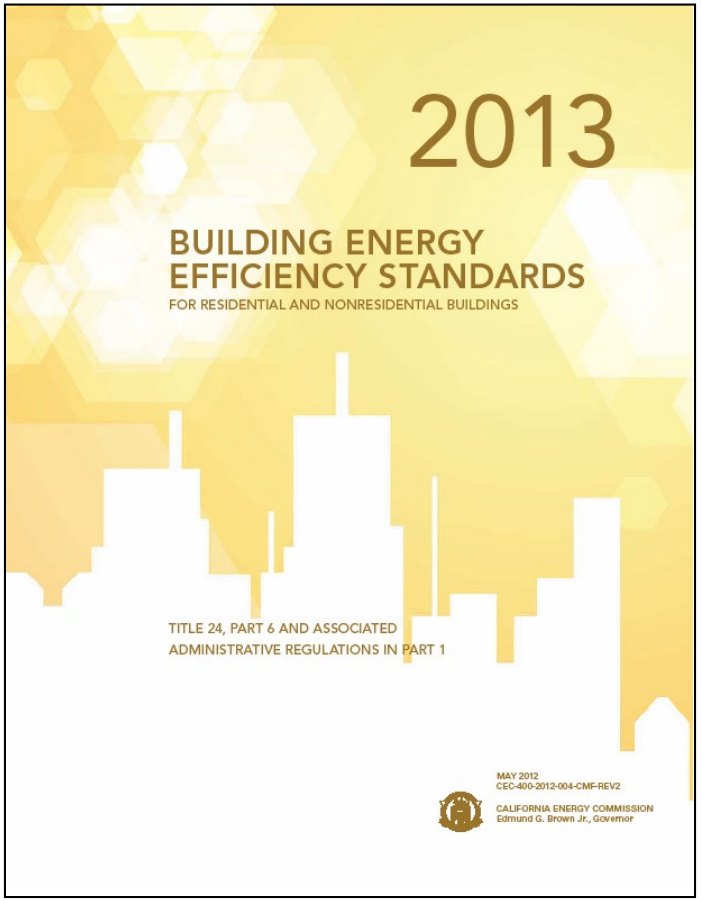
A Little CEC History

- Section 25402 of the Public Resources Code (known as the **Warren Alquist Act**)
- The act created the Energy Commission in 1974 and gave it authority to develop and maintain Building Energy Efficiency Standards
- Requires the Standards and new requirements to be cost effective over the economic life of the structure
- Requires the Energy Commission to update the Standards periodically (about every 3 years)

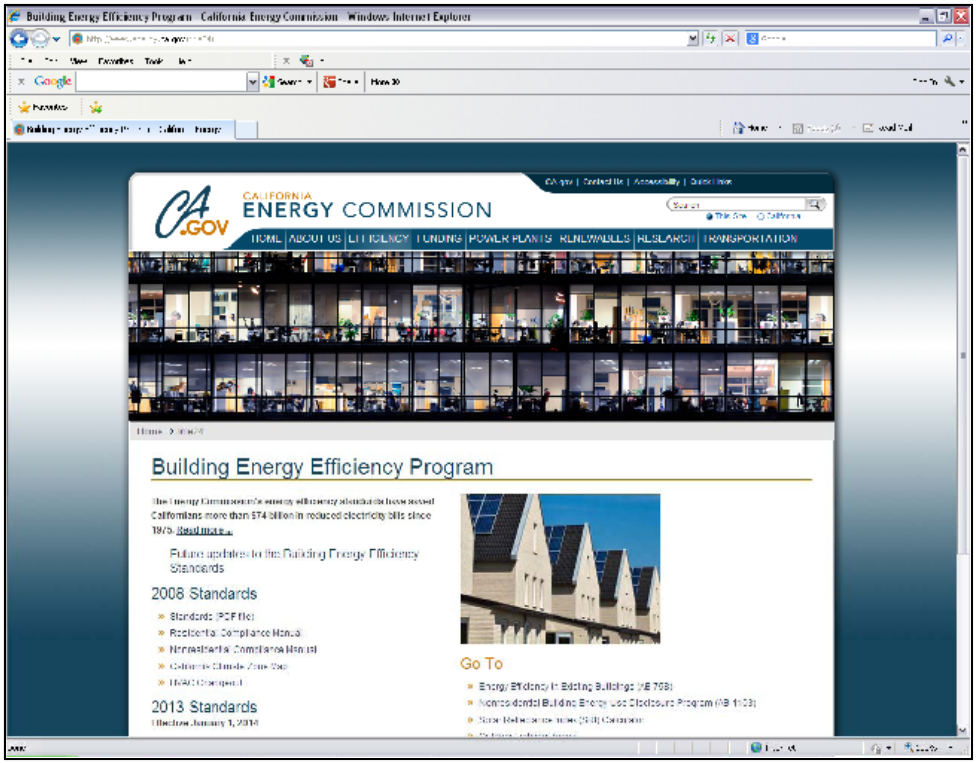
Let's discuss the 2013 Building Energy Efficiency Standards

2013 Building Energy Efficiency Standards

- **Effective on July 1, 2014**
  - Building permit applications submitted on or after this date
- **Master plans in plan review may be affected:**
  - Need to resubmit if permits pulled on/after effective date



2013 Documents



- Building Energy Efficiency Standards
- Residential Compliance Manual
- Reference Appendices
- All docs. available online at:

  www.energy.ca.gov/title24

Let's talk about water heater alterations

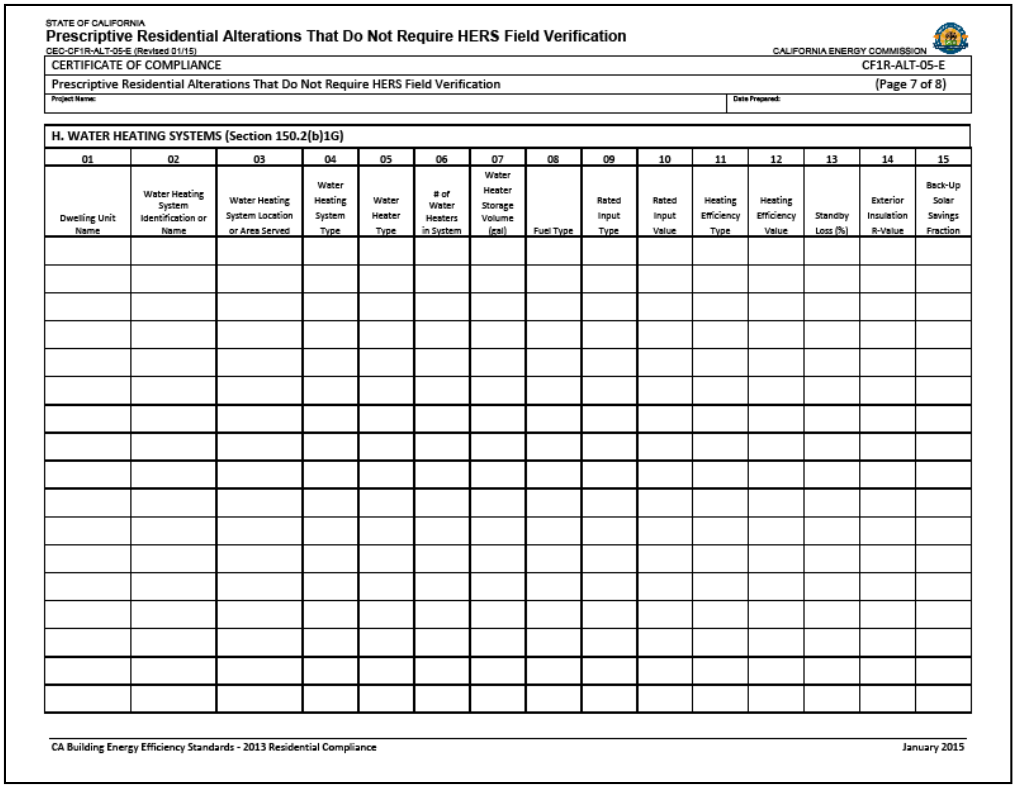
What triggers compliance?

- When a water heater is:
  - Replaced
  - Added (new)
- OR, when water heating piping is replaced or added
- Only the altered components need to comply

Water heater requirements

- **Meet minimum efficiency requirements**
  - Gas storage water heaters [0.62 – (.0019 x V)]
  - R-12 external insulation req. if equal to or less than min. eff.
- **Must be gas or propane (heat pumps OK)**
  - Electric water heater allowed ONLY if natural gas is not available
- **Meet pipe insulation requirements**
  - 1” for pipes with diameter 1” or less
  - 1.5” for pipes with diameter greater than 1”

How do I verify compliance?



STATE OF CALIFORNIA
Prescriptive Residential Alterations That Do Not Require HERS Field Verification
CEC-CF1R-ALT-05-E (Revised 01/15) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-ALT-05-E
Prescriptive Residential Alterations That Do Not Require HERS Field Verification	(Page 7 of 8)
Project Name:	Date Prepared:

H. WATER HEATING SYSTEMS (Section 150.2(b)1G)

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Dwelling Unit Name	Water Heating System Identification or Name	Water Heating System Location or Area Served	Water Heating System Type	Water Heater Type	# of Water Heaters in System	Water Heater Storage Volume (gal)	Fuel Type	Rated Input Type	Rated Input Value	Heating Efficiency Type	Heating Efficiency Value	Standby Loss (%)	Exterior Insulation R-Value	Back-Up Solar Savings Fraction

CA Building Energy Efficiency Standards - 2013 Residential Compliance January 2015

- Simplified CF1R form available online
  - Submit with permit application
- Instructions available
- Verify:
  - Fuel type
  - Efficiency
  - Insulation

Forms Exception Rule §10-103

- For alterations that do not require HERS testing:
  - Building Department may not require CF1R form
  - OR, can create simplified version of CF1R
- Does not exempt applicant from complying with code; only forms
- Recommend including requirements on permit application for simplification (i.e. water heater type, energy factor, tank insulation, etc.)

QUESTIONS…

About Water Heater Alterations?

Let's talk about reroofs

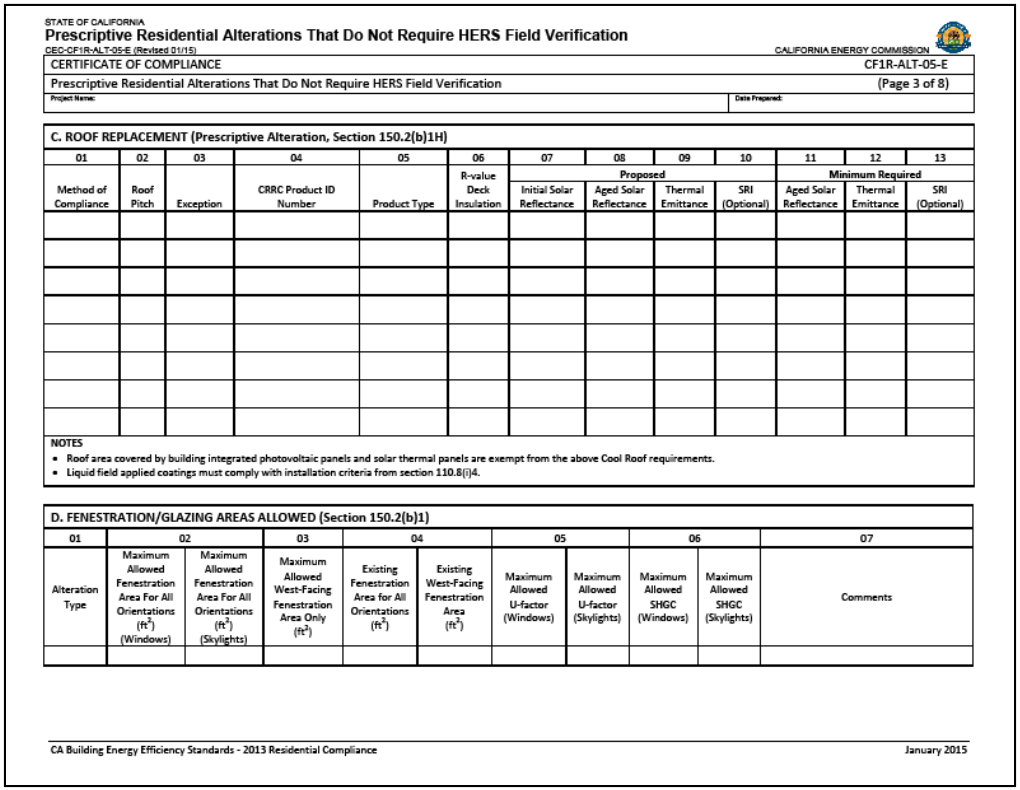
What triggers compliance?

- When more than 50% of the roof is being replaced
- Only the altered roofing area need comply (cool roof)

Cool Roof requirements

- **Steeped-sloped roofs, Climate Zones 10 – 15:**
  - Minimum aged solar reflectance of 0.20; and
  - Thermal emittance of 0.75
  - OR, SRI of 16
- **Numerous exceptions may be installed (or already existing) as equivalent**
- **Must be certified to the Cool Roof Rating Council (CRRC)**
- **Blueprint Issue 107 outlines requirements**

How do I verify compliance?



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CERTIFICATE OF COMPLIANCE CF1R-ALT-05-E

Prescriptive Residential Alterations That Do Not Require HERS Field Verification (Page 3 of 8)

Project Name: Date Prepared:

C. ROOF REPLACEMENT (Prescriptive Alteration, Section 150.2(b)1H)

01	02	03	04	05	06	07	08	09	10	11	12	13
						Proposed				Minimum Required		
Method of Compliance	Roof Pitch	Exception	CRRC Product ID Number	Product Type	R-value Deck Insulation	Initial Solar Reflectance	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)

NOTES
- Roof area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof requirements.
- Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.

D. FENESTRATION/GLAZING AREAS ALLOWED (Section 150.2(b)1)

01	02		03	04		05		06		07
Alteration Type	Maximum Allowed Fenestration Area For All Orientations (ft^2) (Windows)	Maximum Allowed Fenestration Area For All Orientations (ft^2) (Skylights)	Maximum Allowed West-Facing Fenestration Area Only (ft^2)	Existing Fenestration Area for All Orientations (ft^2)	Existing West-Facing Fenestration Area (ft^2)	Maximum Allowed U-factor (Windows)	Maximum Allowed U-factor (Skylights)	Maximum Allowed SHGC (Windows)	Maximum Allowed SHGC (Skylights)	Comments

CA Building Energy Efficiency Standards - 2013 Residential Compliance January 2015

- Simplified CF1R form available online
  - Submit with permit application
- Instructions available
- Verify:
  - Solar reflectance
  - Thermal emittance
  - CRRC cert. number

Forms Exception Rule §10-103

- For alterations that do not require HERS testing:
  - Building Department may not require CF1R form
  - OR, can create simplified version of CF1R
- Does not exempt applicant from complying with code; only forms
- Recommend including requirements on permit application for simplification (i.e. solar reflectance, thermal emittance, exception/alternative, etc.)

QUESTIONS…

About reroofs??

Let's talk about HVAC alterations

What triggers compliance?

- When a new space conditioning system is replaced or installed
  - Equipment and ducting
- When ducting is replaced or installed
- HVAC changeouts
  - Equipment only
- HVAC Trigger Sheet developed by Energy Code Ace

HVAC requirements

- **Depending on what is altered:**
  - Minimum efficiency requirements for A/C and furnace
  - Duct insulation
  - HERS Testing (Duct leakage; Airflow and Fan Watt Draw; Refrigerant Charge)
  - CF1R must be registered with approved HERS Provider
  - Per §10-103, Building Department may except hand written CF1R at permit; all registered forms submitted at Final inspection

New space cond. system

2008 – *§152(b)1C*	**2013** – *§150.2(b)1C*
• Min. R-4.2 duct insulation	• Min. R-6.0 duct insulation
• Duct leakage req. in Cl. Zns. 2 and 9 – 16	• Duct leakage req. in ALL Cl. Zns.
• Airflow/FWD req. in Cl. Zns. 10 – 15	• Airflow/FWD req. in ALL Cl. Zns.
• RC req. in Cl. Zns. 2 and 8 – 15 for split systems	• RC req. in same Cl. Zns for split and packaged A/Cs and heat pumps, and mini-split systems
• Forms must be registered	

Replace/New System and the Permit Process

- **CF1R-ALT-02 form**
  - Can req. at Final
  - HERS tests/forms specified
- **Verify at Final:**
  - Duct insulation ≥ R-6.0 (MCH-1)
  - Duct leakage (MCH-20)
  - AF/FWD (MCH 22 and 23)
  - RC (MCH-25)

Duct alterations

2008 – *§152(b)1D*

- When more than 40 linear feet added/replaced in uncond. space:
  - Min. R-4.2 duct insulation
  - Duct leakage req. in Cl. Zns. 2 and 9 – 16
    - 6% for new duct systems
    - Less than 15%
    - Less than 10% to outside
    - Reduce leakage by 60%
    - Smoke test

2013 – *§150.2(b)1D*

- When more than 40 linear feet added/replaced in uncond. or indirectly conditioned space:
  - Min. R-6.0 duct insulation
  - Duct leakage req. in ALL Cl. Zns.
    - 6% leakage req. when more than 75% of ducting replaced
    - Reduce leakage by 60% option removed

Duct Alterations and the Permit Process

- **CF1R-ALT-02 form**
  - Can req. at Final
  - Duct leakage specified
- **Verify at Final**
  - Duct insulation ≥ R-6.0
    - Uncond. and indirectly cond. space
  - Duct Leakage (MCH-20)
    - ALL Climate Zones

HVAC Changeouts

2008 – §152(b)1E, F

- Duct leakage req. in Cl. Zns. 2 and 9 – 16
  - Less than 15%
  - Less than 10% to outside
  - Reduce leakage by 60%
  - Smoke test
- RC req. in Cl. Zns. 2 and 8 – 15 for split systems

2013 – *§150.2(b)1E, F*

- Duct leakage req. in ALL Cl. Zns.
  - Reduce leakage by 60% option removed
- RC req. in same Cl. Zns. for:
  - Split A/Cs and heat pumps
  - Packaged A/C and heat pumps
  - Mini-split systems

Changeouts and the Permit Process

- **CF1R-ALT-02 form**
  - Can req. at Final
  - HERS tests/forms specified
- **Verify at Final:**
  - Duct leakage (MCH-20)
  - RC (MCH-25)
  - AF (MCH-23)

HERS Providers

Currently, 3 HERS Providers are approved for residential alterations (2013 Standards):

- **CalCERTS:**
  https://www.calcerts.com/
- **U.S. Energy Raters Association (USERA)**
  http://www.usenergyraters.com/
- **Energy Analysis & Comfort Solutions, Inc. (EACS)**
  http://www.eacsinc.com/

QUESTIONS…

About HVAC alterations?

In Summary

- The Energy Standards have requirements for water heater alterations, re-roofs, and HVAC alterations
- Compliance can be verified on CF1R form
- Building Departments may exempt projects from having to submit the CF1R form for alterations that do not require HERS Testing
  - Can include requirements on permit application
- The CF1R form must be registered at either permit or Final inspection when HERS testing is required (HVAC alterations)

Resources - Blueprint

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

BLUEPRINT CALIFORNIA ENERGY COMMISSION • PAGE 1

CALIFORNIA ENERGY COMMISSION

BLUEPRINT

EFFICIENCY DIVISION

Issue 107 January - February 2015

In This Issue

- Cool Roofs & Condensation
- QII Compliance Credit for Insulated Headers
- Approved Acceptance Test Technician Certification Providers for Lighting Controls
- Free Training Opportunities
- Q&A
  - Commissioning
  - Nonresidential Economizers
  - Residential Reroof Projects
  - Luminaire Modifications-in-Place

Cool Roofs & Condensation

A cool roof is a roofing material with high thermal emittance and high solar reflectance, or low thermal emittance and exceptionally high solar reflectance that reduces heat gain through the roof. Because cool roofs gain and retain less heat than traditional roofs, less heat is transferred through the envelope into the building's interior. By lowering internal temperatures, cool roofs reduce occupant demand for air conditioning, allowing for building cooling cost savings.

The temperature of the cool roof is reduced to such an extent that moisture no longer evaporates as it would with a traditional roof. When cool roofs are not installed properly, moisture condenses and becomes trapped within the roofing materials. The trapped moisture can lead to mold growth and damage to the roofing materials or supporting elements.

To prevent the trapping of moist air, it is essential to follow proper air sealing procedures as outlined in Section 110.7 of the 2013 Building Energy Efficiency Standards (Energy Standards). Proper installation may require the installation of: air barriers, vapor barriers, insulation above the roof deck, and additional ventilation.

For more information on cool roofs, please review the U.S. Department of Energy's *Energy Saver* article "Cool Roofs" at: http://www.energy.gov/energysaver/articles/cool-roofs.

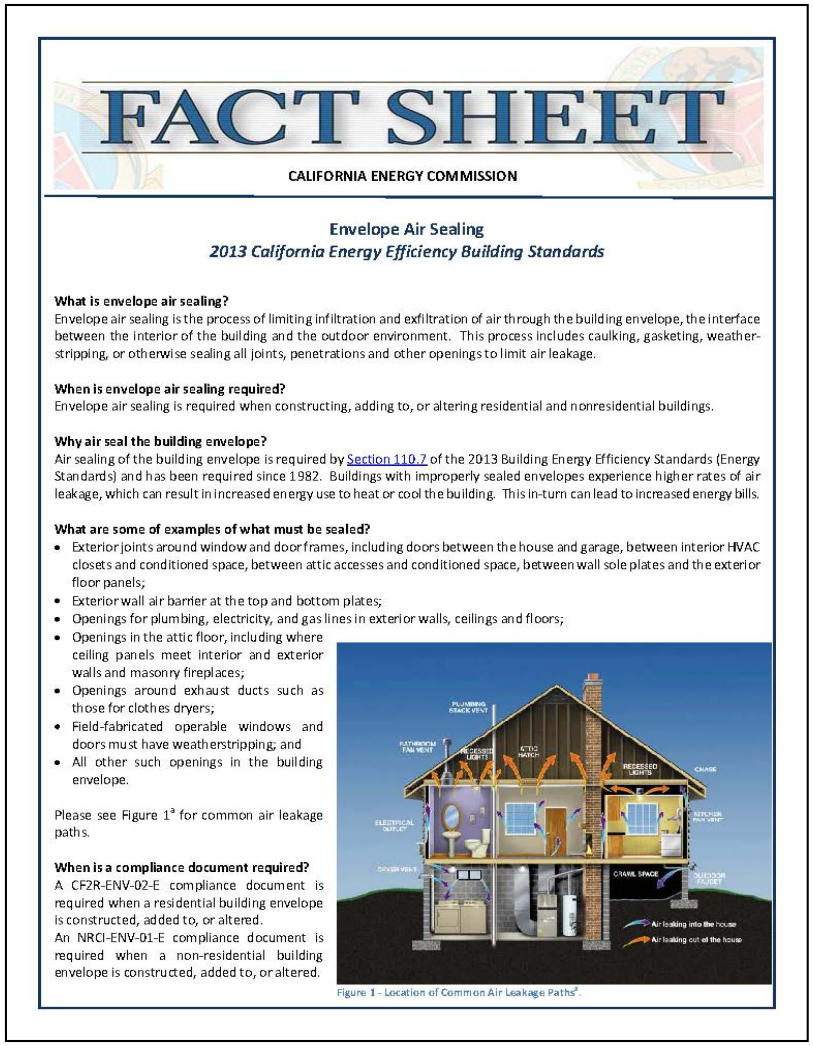
Quality Insulation Installation (QII) Compliance Credit for Insulated Headers

The 2013 Energy Standards provide Quality Insulation Installation (QII) compliance credit for R-2 insulated headers as indicated in Section RA3.5.6.2.9 of the 2013 Reference Residential Appendices (RA). Insulation or wood must fill the cavities, leaving no air gaps in or around the header. To obtain QII credit, use compliance document CF2R-ENV-21-H. Compliance with the R-2 insulated header requirement is verified in Section C, number 13 of this compliance document.

Three options meet the R-2 insulated header requirement:

1. Two-member header with insulation in between. The header and insulation must fill the wall cavity. Example: a 2x4 wall with two 2x nominal headers, or a 2x6 wall with a 4x nominal header and a 2x nominal header. Insulation is required to fill the wall cavity and must be installed between the headers.

Resources - 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.

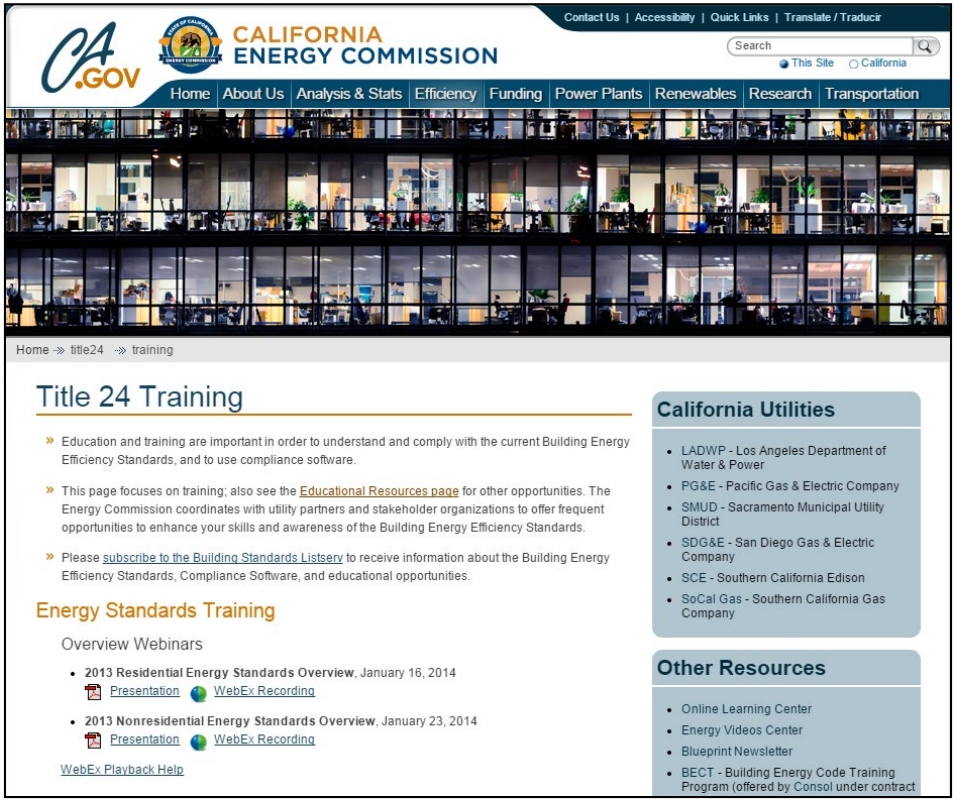
When is a compliance document required?
A CF2R-ENV-02-E compliance document is required when a residential building envelope is constructed, added to, or altered.
An NRCI-ENV-01-E compliance document is required when a non-residential building envelope is constructed, added to, or altered.

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

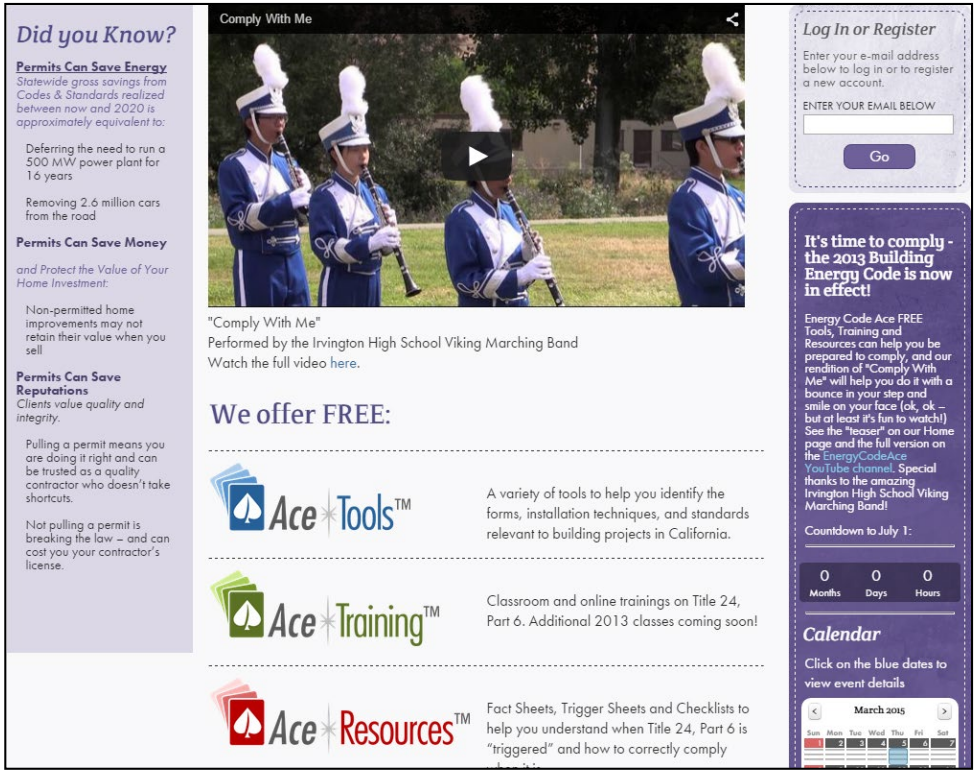
- 5 published to date
- Detailed clarifications on specific topic/requirements
- Receive by e-mail (listserver)
- http://www.energy.ca.gov/efficiency/factsheets/

Resources - Training

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



Resources - Energy Code Ace



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

Resources - Hotline

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

Resources - 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
  - Efficiency
- Respond to confirmation e-mail within 48 hours