



# 2008 Energy Standards Requirements for Residential HVAC Changeouts in Climate Zones 1 and 3 through 7

**California Energy Commission  
Compliance and Enforcement Unit**

*Dated: September 23, 2011*



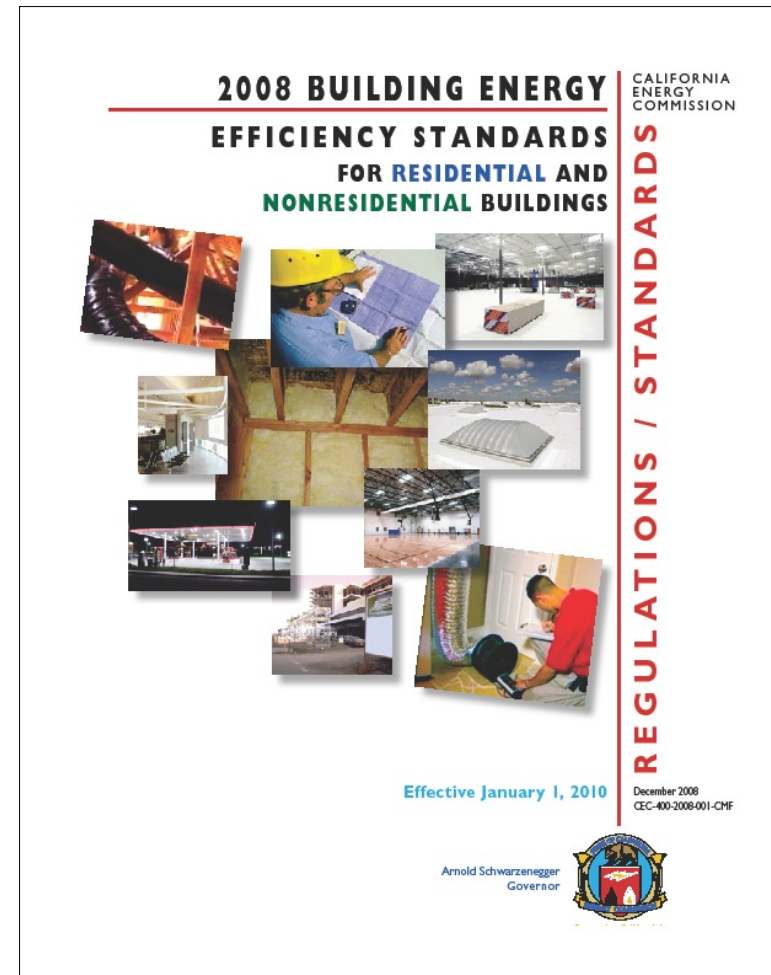
# Goals for this Presentation

- Simplify Energy Standards requirements for HVAC changeouts in Climate Zones 1 and 3 through 7
- Clarify roles and responsibilities for:
  - Building Department Professionals
  - HVAC Contractors
  - HERS Raters



# 2008 Energy Standards

- **Effective Date on January 1, 2010:**
  - Building Permit Applications submitted on or after this date
- **As of October 1, 2010:**
  - All Energy Compliance Forms required to be registered when HERS Verification/Testing is required





# When is Compliance Required?



- New HVAC installation
- HVAC Changeout
- New or replacement furnace, coil, FAU, or condenser
- HVAC unit relocation
- New or replacement space-conditioning system (equipment and ducting)
- New or replacement ducting



# Compliance Forms

- Compliance forms are **NOT** required to be registered in Climate Zones 1 and 3 through 7

- Why?
  - Registration is required only when HERS testing is required

- **ALL** compliance forms may be completed by hand or electronically (PDF) in these Cl. Zn.'s

**Simplified Prescriptive Certificate of Compliance: 2008 Residential HVAC Alterations CF-IR-ALT-HVAC**  
Climate Zones 1 and 3 - 7

Site Address:		Enforcement Agency:		Date:	Permit#:
Equipment Type <sup>1</sup>	List Minimum Efficiency <sup>2</sup>	Conditioned Floor Area	Duct Insulation requirement	Thermostat	
<input type="checkbox"/> Package Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input checked="" type="checkbox"/> Condensing Unit <input type="checkbox"/> Other	<input type="checkbox"/> AFUE <input checked="" type="checkbox"/> SEER <sub>13</sub> <input type="checkbox"/> EER <input type="checkbox"/> COP <input type="checkbox"/> HSPF <input type="checkbox"/> Resistance	Served by system 1,500 sq ft	Over 40 ft of ducts added or replaced in unconditioned space	<input checked="" type="checkbox"/> Setback <i>If not already present, must be installed</i>	

*1. Equipment Type: Choose the equipment being installed, if 2. Minimum Equipment Efficiencies: 13 SEER, 78% AFUE.*

Contractor (Document to a Author's /Responsible De  
 • I certify that this Certificate of Compliance documentation  
 • I am eligible under Division 3 of the California Business Certificate of Compliance.  
 • I certify that the energy features and performance specified requirements of Title 24, Parts 1 and 6 of the California Code of Regulations are met.  
 • The design features identified on this Certificate of Compliance forms, worksheets, calculations, plans and specifications.

Name: Mr. Energy Efficient  
 Company: CEC Installers  
 Address: 1516 9th Street  
 City/State/Zip: Sacramento, CA 95814

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**INSTALLATION CERTIFICATE CF-6R-MECH-04**  
**Space Conditioning Systems, Ducts and Fans (Page 1 of 2)**

Site Address: 1516 9th Street, Sacramento, CA 95816 Enforcement Agency: Energy Commission Permit Number: 070111-11

**Space Conditioning Systems**

*Heating Equipment*

Equip Type (package heat pump)	CEC Certified Mfr. Name and Model Number	ARI Reference Number <sup>2</sup>	# of Identical Systems	Efficiency (AFUE, etc.) <sup>1,3</sup> (CF-IR value) <sup>4</sup>	Duct Location (attic, crawlspace, etc.)	Duct R-value	Heating Load (Btu/hr)	Heating Capacity (Btu/hr)
Furnace	CEC's Cool: RA-043511-0	5012-25465	1	85%	Attic	R-6	60 kBtu/hr	70 kBtu/hr

*Cooling Equipment*

Equip Type (package heat pump)	CEC Certified Mfr. Name and Model Number	ARI Reference Number <sup>2</sup>	# of Identical Systems	Efficiency (SEER and EER) <sup>1,3</sup> (CF-IR value) <sup>4</sup>	Duct Location (attic, crawlspace, etc.)	Duct R-value	Cooling Load (Btu/hr)	Cooling Capacity (Btu/hr)
Split	CEC's Heat: IC-01151106	13564-5411	1	14.0	Attic	R-6	34,500 Btu/hr	36,000 Btu/hr

*1. If project is new construction, see Footnotes to Standards Table 131-B and Table 131-C for duct ceiling alternative compliance.  
 2. ARI Reference Number can be found by entering the equipment model number at http://www.aridirectory.org/ari/ac.php#  
 3. Listed efficiency on this page must be greater than or equal (≥) to the value shown on the CF-IR form.  
 4. When CF-IR is reference it is also applicable to the CF-IR, CF-IR-AA or CF-IR-ALT*

**ALL BOXES MUST BE CHECKED TO BE A VALID FORM**  
 §110-§113: HVAC equipment is certified by the California Energy Commission.  
 §150(b): Heating and/or cooling loads calculated in accordance with ASHRAE, SMACNA, or ACCA.  
 §150(c): Setback Thermostat on all applicable heating and/or cooling systems meet the requirements of §112(c).  
 §150(j): Pipe insulation for cooling system refrigerant suction, chilled water and brine lines meets minimum requirements of Table 150-B and includes a vapor retardant or is enclosed entirely in conditioned space.

2008 Residential Compliance Forms August 2009



# CF-1R-HVAC-ALT form

- Which compliance form is required for a permit?

- Installing contractor completes CF-1R-ALT-HVAC (by hand or electronically – PDF)

- Installing contractor identifies:

- Efficiency values of altered equipment
- Duct insulation values for altered ducting

Simplified Prescriptive Certificate of Compliance: 2008 Residential HVAC Alterations CF-1R-ALT-HVAC					
Climate Zones 1 and 3 - 7					
Site Address:		Enforcement Agency:		Date:	
Permit #:					
Equipment Type <sup>1</sup>	List Minimum Efficiency <sup>2</sup>	Conditioned Floor Area	Duct insulation requirement	Thermostat	
<input type="checkbox"/> Packaged Unit	<input type="checkbox"/> AFUE _____	Served by system 1,500 sq ft	Over 40 ft of ducts added or replaced in unconditioned space <input checked="" type="checkbox"/> R 6 (CZ 1, 3-5)	<input checked="" type="checkbox"/> Softback <i>(if not already present, must be installed)</i>	
<input type="checkbox"/> Furnace	<input checked="" type="checkbox"/> SEER 13				<input type="checkbox"/> COP _____
<input checked="" type="checkbox"/> Condensing Unit	<input type="checkbox"/> EER _____				<input type="checkbox"/> HSPF _____
<input type="checkbox"/> Other					<input type="checkbox"/> Resistance _____
<small>1. Equipment Type: Choose the equipment being installed; if more than one system, use another CF-1R-ALT-HVAC for each system. 2. Minimum Equipment Efficiencies: 13 SEER, 78% AFUE, 7.7HSPF for typical residential systems.</small>					
<b>Contractor (Documentation Author's /Responsible Designer's Declaration Statement)</b>					
<ul style="list-style-type: none"><li>• I certify that this Certificate of Compliance documentation is accurate and complete.</li><li>• I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the design identified on this Certificate of Compliance.</li><li>• I certify that the energy features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations.</li><li>• The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application.</li></ul>					
Name: Mr. Energy Efficient		Signature:			
Company: CEC Installers		Date: 8/26/11			
Address: 1516 9th Street		License#: CEC#: 46512-469845			
City/State/Zip: Sacramento, CA 95814		Phone: 1-800-772-3300			

2008 Residential Compliance Forms March 2010







# Final Inspection

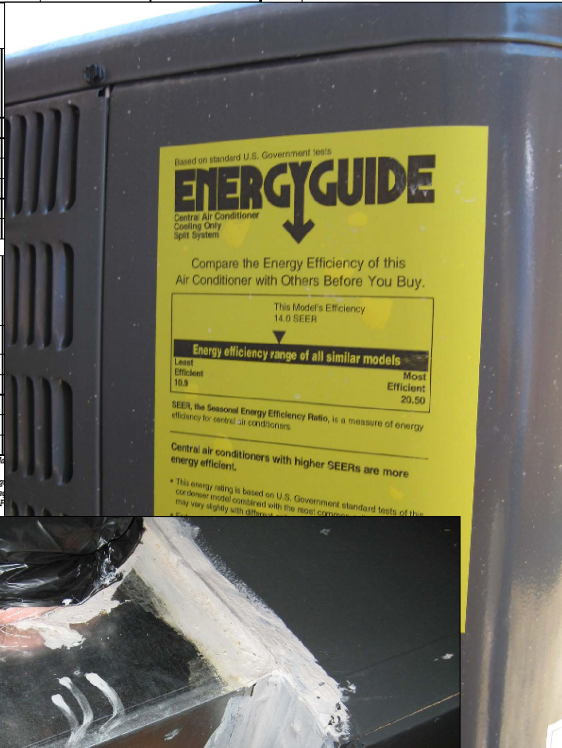
INSTALLATION CERTIFICATE		CF-6R-MECH-04
Space Conditioning Systems, Ducts and Fans		(Page 1 of 2)
Site Address: 1516 P Street, Sacramento, CA 95816	Enforcement Agency: Energy Commission	Permit Number: 070111-1

Space Conditioning Systems		
Heating Equipment		
Equip Type (package heat pump)	CEC Certified Mfg. Name and Model Number	ARI Reference Number *
Parace	CEC's Coal RA-081531-9	5812-2485

Cooling Equipment		
Equip Type (package heat pump)	CEC Certified Mfg. Name and Model Number	ARI Reference Number *
Spile	CEC's Mac IC-01153196	18964-5421

1. If project is new construction, see Footnotes to Standard compliance.  
2. ARI Reference Number can be found by entering the eq  
3. Listed efficiency on this page must be greater than or e  
4. When CF-1R is reference it is also applicable to the CF

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- **What does the Inspector verify?**

- Depends on the “type” of HVAC changeout:

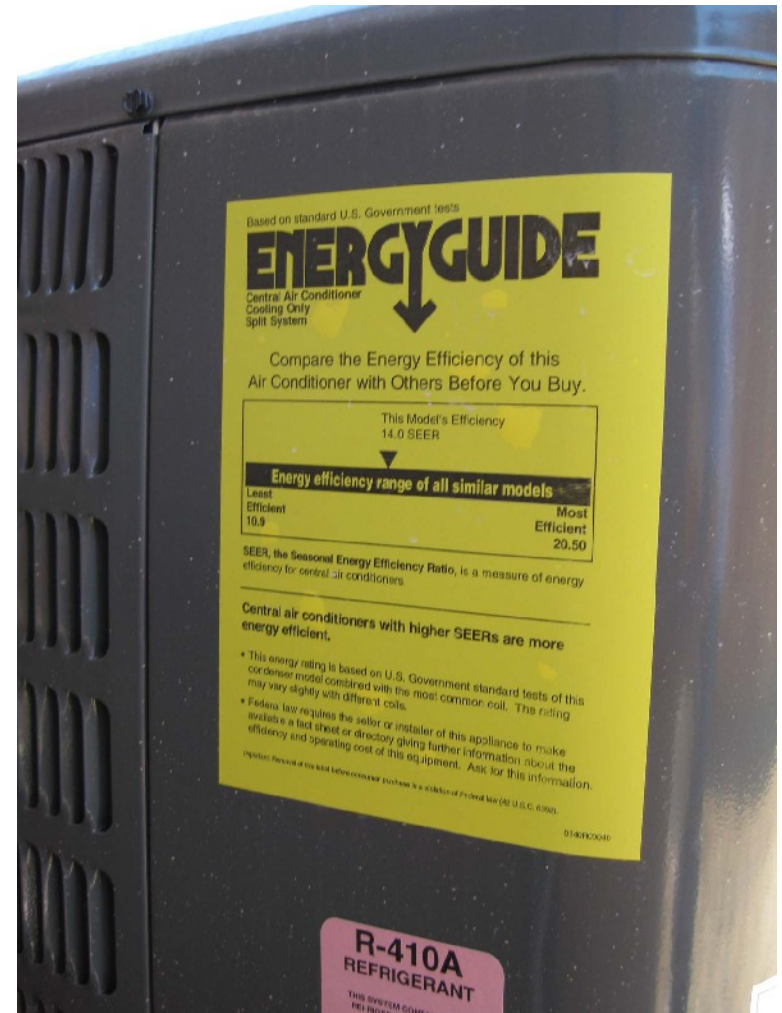
- HVAC Changeout
- New HVAC System
- New ducts with Replacement
- New/replaced ducts ONLY





# HVAC Changeout

- **Equipment is replaced**
  - Condenser Coil and/or
  - Indoor Coil and/or
  - Furnace
- **Installation Certificate**
  - CF-6R-MECH-04
    - Minimum efficiency values of altered equipment (13 SEER and/or 78% AFUE)
    - Heating/Cooling loads if equipment size was altered
    - NOTE: Model # on equipment should match model # on form





# Gas Wall/Floor Furnaces and Space Heaters

Table E-2  
Standards for Gas Wall Furnaces, Floor Furnaces, and Room Heaters

Appliance	Design Type	Capacity (Btu per hour)	Minimum AFUE (%)
Wall furnace	Fan	≤ 42,000	73
Wall furnace	Fan	> 42,000	74
Wall furnace	Gravity	≤ 10,000	59
Wall furnace	Gravity	> 10,000 ≤ 12,000	60
Wall furnace	Gravity	> 12,000 ≤ 15,000	61
Wall furnace	Gravity	> 15,000 ≤ 19,000	62
Wall furnace	Gravity	> 19,000 ≤ 27,000	63
Wall furnace	Gravity	> 27,000 ≤ 46,000	64
Wall furnace	Gravity	> 46,000	65
Floor furnace	All	≤ 37,000	56
Floor furnace	All	> 37,000	57
Room heater	All	≤ 18,000	57
Room heater	All	> 18,000 and ≤ 20,000	58
Room heater	All	> 20,000 and ≤ 27,000	63
Room heater	All	> 27,000 and ≤ 46,000	64
Room heater	All	> 46,000	65

- Minimum efficiency (AFUE) requirements are different for non-ducted, non-central gas fired heating equipment
- Shall meet minimum efficiencies listed in Table E-2 of the 2010 Appliance Regulations



# New HVAC System

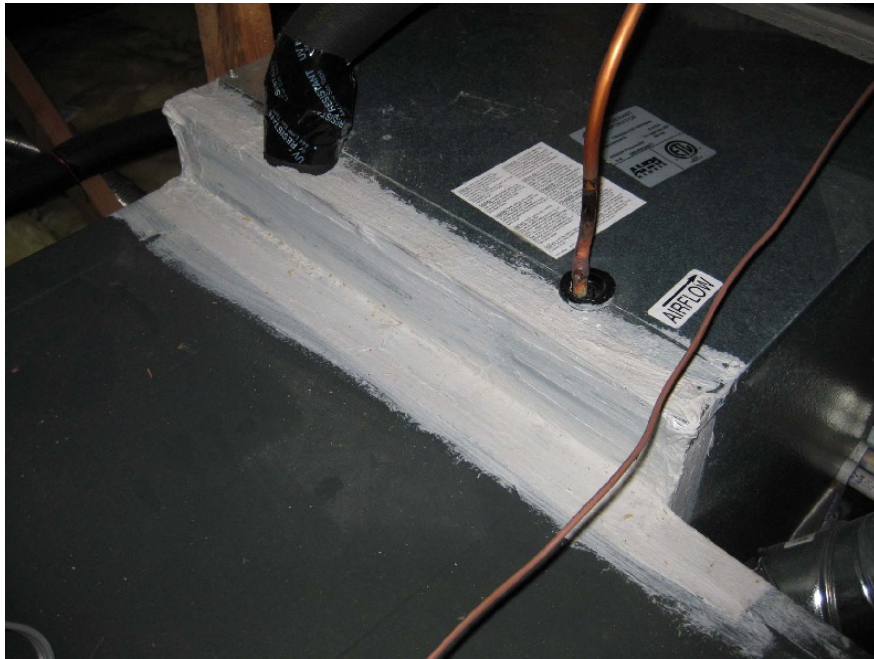
- **New or replacement space-conditioning system**
  - All new HVAC equipment, and
  - All new ducting
- **Installation Certificate**
  - CF-6R-MECH-04
    - Minimum efficiency values of new equipment (13 SEER and/or 78% AFUE)
    - Duct insulation R-value (R-4.2)
    - Heating/Cooling loads if equipment size was altered
    - NOTE: Model # on equipment should match model # on form







## New HVAC System *cont.*



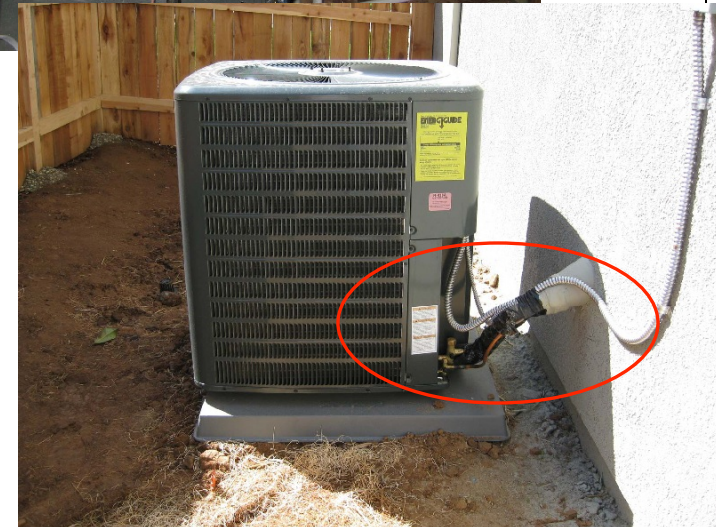
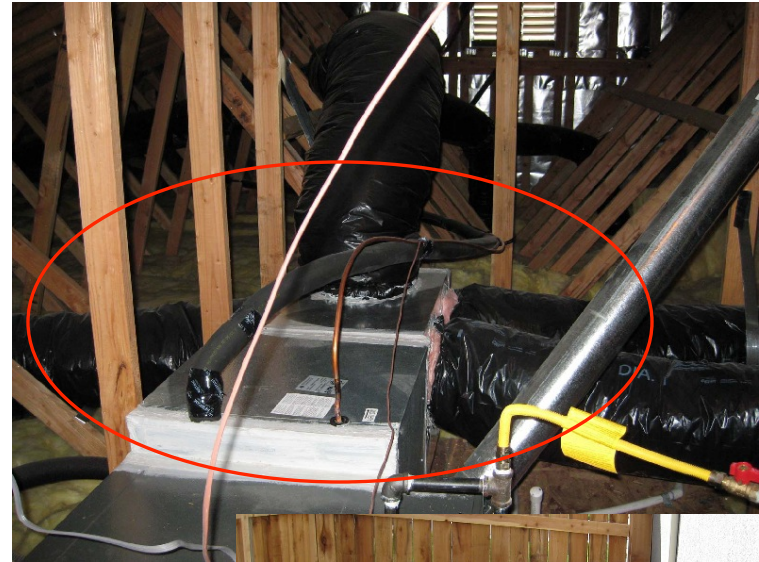
- Are ducts and plenums connected and sealed per Section 150(m)?
  - UL181, UL181A, UL181B tape required
  - Cloth-backed rubber adhesive tape must be used in combination with mastic and/or drawbands
    - Tape may be used by itself ONLY when backing says “CEC Approved”





## New HVAC System *cont.*

- **Is new refrigerant suction line insulated per Table 150-B?**
  - Pipe diameter  $\leq 2$  inches shall have min. insulation thickness of 0.75 inches
  - Pipe diameter  $> 2$  inches shall have min. insulation thickness of 1.0 inch
- **And protected per Section 150(j)?**
  - Insulation shall be protected by aluminum, sheet metal, painted canvas, or plastic cover







# New Ducts with Replacement



- **All new or replacement ducting, and:**
  - Condenser Coil and/or
  - Indoor Coil and/or
  - Furnace
- **Installation Certificate**
  - CF-6R-MECH-04
    - Duct insulation R-value (R-4.2)
    - Minimum efficiency values of new equipment (13 SEER and/or 78% AFUE)
    - Heating/Cooling loads if equipment size was altered
    - NOTE: Model # on equipment should match model # on form





## New Ducts with Replacement *cont.*

- **Are ducts and plenums connected and sealed per Section 150(m)?**
  - UL181, UL181A, UL181B tape required
  - Cloth-backed rubber adhesive tape must be used in combination with mastic and/or drawbands
    - Tape may be used by itself ONLY when backing says “CEC Approved”





# New/Replaced Ducts **ONLY**

- **New or replacement ducting only**
  - No HVAC equipment is altered
- **Installation Certificate**
  - CF-6R-MECH-04
    - Duct insulation R-value (R-4.2)
- **Are ducts and plenums connected and sealed per Section 150(m)?**
  - UL181, UL181A, UL181B tape required
  - Cloth-backed rubber adhesive tape must be used in combination with mastic and/or drawbands
    - Tape may be used by itself **ONLY** when backing says “CEC Approved”



# Correction Notice

**CORRECTION NOTICE**  
*(California Energy Commission)*

THE ENERGY COMMISSION HAS INSPECTED YOUR ALTERATION PROJECT AND HAVE NOTED THE FOLLOWING CORRECTIONS:

Install refrigerant lineset insulation with thickness of at least 1.0 inch for piping greater than 2 inches per 2008 Energy Standards Table 150-B and §150(j)2.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

REINSPECTION REQUIRED. CALL THE ENERGY COMMISSION FOR ANOTHER INSPECTION AFTER THE CORRECTIONS ABOVE ARE COMPLETE.

REINSPECTION IS NOT REQUIRED.

INSPECTOR

DATE

ENERGY COMMISSION INSPECTOR

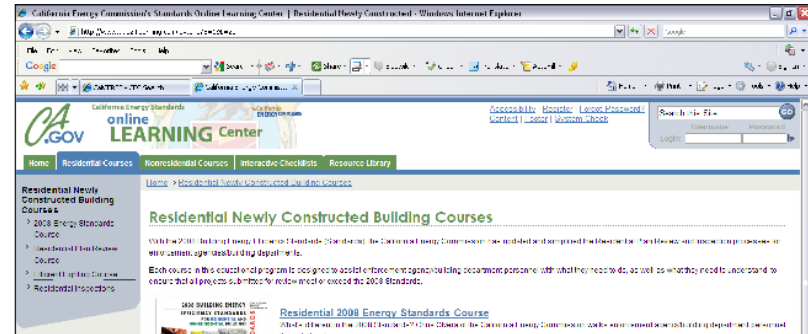
8/26/11

- A correction notice shall be issued when Inspector finds noncompliance with 2008 Energy Standards.
  - i.e. “Altered ducts shall be properly installed and sealed per §150(m)”
- Sample correction notice statements for each Standard Section may be found in the [2008 Residential Energy Inspection Guide for Alterations](#)



# For More Information

- **Online Learning Center**  
[www.energyvideos.com](http://www.energyvideos.com)
  - Download Energy Checklist and Guides
  - View Energy Videos and Energy Courses
- **Energy Standards Hotline**
  - 1 (800) 772-3300 (Free in CA)
  - (916) 654-5106 (Public)
  - [title24@energy.state.ca.us](mailto:title24@energy.state.ca.us)



**2008 Residential Energy Inspection Checklist for Alterations**  
(Prescriptive Approach)

\* The Inspector only needs to verify compliance for altered building components \*

ENVELOPE ALTERATIONS					
<b>Assembly Situation (Wall, ceiling, or floor replacement)</b>					
Do the following features match the CF-1R-ALT (Insulation) Form?	Yes	No	N/A	10-10303B	§
Wall, ceiling (or roof), floor insulation values				1520(1)	
Is the insulation properly installed? (Mandatory Measure)				118	
Are all infiltration areas (joints and openings) sealed? (Mandatory Measure)				117	
Is the CF-6R-ENV-01 (Insulation) Form completed, signed, and posted on site?				10-10303A	§
<b>Fenestration Alteration (Replacing or adding windows/skylights)</b>					
Do the following features match the CF-1R-ALT (Fenestration) Form?	Yes	No	N/A	10-10303B	§
U-factor and SHGC values				1520(1)A, B	
Exterior shading				1520(1)A, B	
Window area and orientation (ONLY when more than 50 ft <sup>2</sup> is added)				1520(1)A	
Is the CF-6R-ENV-01 (Fenestration) Form completed, signed, and posted on site?				10-10303A	§
<b>Re-Roof</b>					
Do the following features match the CF-1R-ALT (Re-roof) Form?	Yes	No	N/A	10-10303B	§
Cool Roof values (solar reflectance and thermal emittance)				1520(1)H	
Is the CF-6R-ENV-01 (Re-roof) Form completed, signed, and posted on site?				10-10303A	§
<b>HVAC ALTERATIONS</b>					
Do the following features match the CF-1R-ALT-HVAC Form?	Yes	No	N/A	10-10303B	§
HVAC equipment efficiency				112	
Duct insulation values				1520(1)D	
Are ducts and plenums properly installed and sealed? (Mandatory Measure)				1520(1)	
Is the refrigerant suction line insulated and protected? (Mandatory Measure)				1520(2), 3	
Is the CF-6R-MECH-04 (HVAC) Form completed, signed, and posted on site?				10-10303A	§
Are the following HERS measures identified on the CF-1R-ALT-HVAC Form?	Yes	No	N/A	10-10303B	§
Duct sealing and testing – If Yes:				1520(1)D, E	
Is the CF-6R-MECH-20-HERS or CF-6R-MECH-21-HERS Form completed, signed, registered (October 1, 2010) and posted on site?				10-10303A	
Is the CF-4R-MECH-20 or CF-4R-MECH-21 Form completed, signed, registered and posted on site?				10-103035	
Refrigerant charge measurement – If Yes:				1520(1)F	
Is the CF-6R-MECH-23-HERS or CF-6R-MECH-26-HERS Form completed, signed, registered (October 1, 2010) and posted on site?				10-10303A	
Is the CF-4R-MECH-23 Form completed, signed, registered and posted on site?				10-103035	
Airflow (fan flow) and fan watt draw – If Yes:				1520(1)C	
Is the CF-6R-MECH-22-HERS Form completed, signed, registered (October 1, 2010) and posted on site?				10-10303A	
Is the CF-4R-MECH-22 Form completed, signed, registered and posted on site?				10-103035	

August 30, 2010