

COMPLIANCE FORMS SUMMARY
APPENDIX A

Appendix A Compliance Forms

Overview

This appendix includes blank copies of the Residential Compliance Forms. Compliance documentation is completed at the **Building Permit Phase**, the **Construction Phase**, and the **Field Verification and Diagnostic Testing Phase**. The forms and documents submitted at each of these phases are described below.

Building Permit Phase Documentation

The Standards Section 10-103(a) requires that a certificate of compliance be included on the plans when the performance approach is used. If the performance approach is utilized for compliance, the CF-1R forms are produced by the compliance software. Thermal Mass and Solar Heat Gain Coefficient calculations are performed internally by the software.

Certificate of Compliance - Residential New Construction (CF-1R)

The CF-1R summarizes the minimum energy performance specifications needed for new construction compliance, including HVAC capacity and the results of the heating and cooling load calculations need to be attached. The Standards require that a certificate of compliance be included on the plans. CEC approved Performance ACM software automatically generates CF-1R forms, which vary in some respects from the prescriptive CF-1R forms.

Certificate of Compliance - Residential Additions (CF-1R-ADD)

The CF-1R-ADD summarizes the minimum energy performance specifications needed to demonstrate compliance for an addition to a dwelling, including HVAC capacity and the results of the heating and cooling load calculations which are required to be attached. The Standards require that a certificate of compliance be included on the plans. CEC approved performance ACM software automatically generates CF-1R forms, which vary in some respects from the prescriptive CF-1R forms.

Certificate of Compliance - Residential Alterations (CF-1R-ALT)

The CF-1R-ALT summarizes the minimum energy performance specifications needed for an alteration to an existing dwelling, including HVAC capacity and the results of the heating and cooling load calculations need to be attached. The Standards require that a certificate of compliance be included on the plans. CEC approved performance ACM software automatically generates CF-1R forms, which vary in some respects from the prescriptive CF-1R forms.

Mandatory Measures List (MF-1R)

This document is applicable for both prescriptive and performance compliance. This reference list must be part of the building plans to help builders and inspectors reference applicable mandatory measures in the Standards.

Solar Water Heating Calculation (CF-SR)

This form is used to calculate the percent of domestic water heating that is supplied by solar water heating. The form is used to calculate the percent of solar contributed by tested solar system. All system or collector data must be based on the OG-300 test methods of the Solar Rating and Certification Corporation. This form is only available in electronic (Excel) format. Contact the Energy Commission Hotline for more information on how to access this calculation sheet.

Thermal Mass Worksheet (WS-1R)

This worksheet is completed by the documentation author when complying with the prescriptive requirements of Package C.

Area Weighted Average Calculation Worksheet (WS-2R)

This worksheet is used to calculate weight-averaged U-factors for prescriptive envelope compliance.

Appendix A Compliance Forms

Solar Heat Gain Coefficient (SHGC) Worksheet (WS-3R)

This worksheet is completed by the documentation author when complying with the prescriptive requirements.

Construction Phase Documentation

Installation Certificate (CF-6R)

The CF-6R is now broken into categories; ENV, LTG and MECH, and most compliance measures have a separate CF-6R form that is specific to a particular installation. A set of CF-6R documents applicable to the construction project is required to be assembled and posted at the building site. Different installing contractors are responsible for installing the water heating equipment, the windows (fenestration), the lighting system, the air distribution ducts and HVAC equipment, the measures that affect building envelope tightness, and the insulation.

Installation Certificate (CF-6R-HERS) Some installations are required to be Field verified by a third party HERS rater. These types of installations require that installers submit forms that certify certain performance or quality specifications have been met. These performance or quality specifications will be verified by a HERS rater.

Field Verification and/or Diagnostic Testing Documentation

Certificate of Field Verification and Diagnostic Testing (CF-4R)

The CF-4R is now broken into categories; ENV, and MECH, and most compliance measures have a separate CF-4R form that is specific to a particular installation. A set of CF-4R documents applicable to the construction project is required to be assembled and posted at the building site. These documents are completed by the HERS rater when field verification and/or diagnostic testing is required. These documents include information about the measurements and tests that were performed. The HERS rater verifies that the requirements for compliance credit have been met. Copies of the CF-4R are required to be provided to the Builder, HERS Provider and Enforcement Agency for every home that utilizes HER verification for compliance.

Appendix A Compliance Forms

2008 Residential Compliance Forms	# Pages
Certificate of Compliance	
CF-1R – Certificate of Compliance: Residential New Construction	5 Pages
CF-1R – ADD Certificate of Compliance: Residential Additions	5 Pages
CF-1R – ALT Certificate of Compliance: Residential Alterations	5 Pages
MF-1R – Mandatory Measures Summary: Residential	3 Pages
Worksheets	
WS-1R – Thermal Mass Worksheet	1 Page
WS-2R – Area Weighted Average Calculation Worksheet	1 Page
WS-3R – Solar Heat Gain Coefficient (SHGC) Worksheet	2 Pages
Installation Certificate	
CF-6R-ENV-01 – Envelope – Insulation; Roofing; Fenestration	3 Pages
CF-6R-ENV-20-HERS – Building Envelope Sealing	3 Pages
CF-6R-ENV-21-HERS – Quality Insulation Installation (QII) - Framing Stage Checklist	2 Pages
CF-6R-ENV-22-HERS – Quality Insulation Installation (QII) - Insulation Stage Checklist	3 Pages
CF-6R-LTG-01 – Residential Lighting	3 Pages
CF-6R-MECH-01 – Domestic Hot Water (DHW)	2 Pages
CF-6R-MECH-02 – Solar Domestic Hot Water Systems (SDHW)	1 Page
CF-6R-MECH-03 – Pool And Spa Heating Systems	2 Pages
CF-6R-MECH-04 – Space Conditioning Systems, Ducts and Fans	2 Pages
CF-6R-MECH-05 – Indoor Air Quality and Mechanical Ventilation	5 Pages
CF-6R-MECH-06 – Evaporatively Cooled Condensing Units	2 Pages
CF-6R-MECH-07 – Evaporative Coolers	2 Pages
CF-6R-MECH-08 – Ice Storage Air Conditioning (ISAC) Units	2 Pages
CF-6R-MECH-20-HERS – Duct Leakage Test – Completely New or Replacement Duct System	2 Pages
CF-6R-MECH-21-HERS – Duct Leakage Test – Existing Duct System	2 Pages
CF-6R-MECH-22-HERS – HSP/PSPP Installation; Cooling Coil Airflow & Fan Watt Draw Test	2 Pages
CF-6R-MECH-23-HERS – Verification of High EER Equipment	1 Page
CF-6R-MECH-24-HERS – Charge Indicator Display (CID)	1 Page
CF-6R-MECH-25-HERS – Refrigerant Charge Verification - Standard Measurement Procedure	5 Pages
CF-6R-MECH-26-HERS – Refrigerant Charge Verification - Alternate Measurement Procedure	2 Pages
CF-6R-MECH-27-HERS – Maximum Rated Total Cooling Capacity	2 Pages
CF-6R-MECH-28-HERS – Low Leakage Air Handler Verification	1 Page
CF-6R-MECH-29-HERS – Supply Duct Compliance Credits - Location; Surface Area; R-value	2 Pages
Certificate of Field Verification and Diagnostic Testing	
CF-4R-ENV-20 – Building Envelope Sealing	1 Page
CF-4R-ENV-21 – Quality Insulation Installation (QII) - Framing Stage Checklist	2 Pages
CF-4R-ENV-22 – Quality Insulation Installation (QII) - Insulation Stage Checklist	3 Pages
CF-4R-MECH-20 – Duct Leakage Test – Completely New or Replacement Duct System	2 Pages
CF-4R-MECH-21 – Duct Leakage Test – Existing Duct System	2 Pages
CF-4R-MECH-22 – HSP/PSPP Installation; Cooling Coil Airflow & Fan Watt Draw Test	2 Pages
CF-4R-MECH-23 – Verification of High EER Equipment	1 Page
CF-4R-MECH-24 – Charge Indicator Display (CID)	1 Page
CF-4R-MECH-25 – Refrigerant Charge Verification - Standard Measurement Procedure	5 Pages
CF-4R-MECH-26 – Not Used	N/A
CF-4R-MECH-27 – Maximum Rated Total Cooling Capacity	2 Pages
CF-4R-MECH-28 – Low Leakage Air Handler Verification	1 Page
CF-4R-MECH-29 – Supply Duct Compliance Credits - Location; Surface Area; R-value	2 Pages

*RESIDENTIAL
CERTIFICATE OF COMPLIANCE
CF-1R, CF-1R-ADD & CF-1R-ALT*

Prescriptive Certificate of Compliance: Residential		CF-1R
Newly Constructed Buildings and Additions Greater Than 1,000 ft²		(Page 1 of 5)
Project Name:	Climate Zone #	# of Stories

General Information		
Site Address:	Enforcement Agency:	Date:
Building Type <input type="checkbox"/> Single Family <input type="checkbox"/> Multi Family	Conditioned Floor Area ¹ (CFA):	
Circle the Front Orientation: N, E, S, W, or Degrees _____	Project Type: <input type="checkbox"/> New Building Construction <input type="checkbox"/> New Addition ¹ greater than 1,000 ft ² <i>1. Additions greater than 1,000 ft² must comply with Component Package D.</i>	
Component Package: (Check one) C _____ D _____ E (_____ E Alternative) in Climate zone 1 and 16 only. See footnotes to Table 151-D for alternative optional requirements.		

Opaque Surface Details For the furred portioned of Mass Walls see Furring Strips Construction Table below.

A	B	C	D	E	F	G	H	I	J
Proposed <small>See Note</small>				Standard	Values From JA4 Table				
Tag/ ID ¹	Assembly Name or Type ²	Framing Material and Size ²	Thickness, Spacing, or Other ³	U- factor ⁴	JA4 Table Number ⁵	Framed Cavity R-value ⁶	Continuous Insulation R-Value ⁷	JA4 Assembly Row/Col ⁸	Proposed Assembly U-factor ⁹

Note: For furred assemblies, accounting for Continuous Insulation R-value, see Page JA4-3 and Equation 4-1. For calculating furred walls use the Mass and Furring Construction table below.

1. For Tag/ID indicate the identification name that matches the building plans.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc...Indicate in column G the Frame material and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the thickness for mass in inches or Spacing between framing members enter; 16" or 24" OC; or Other for all other assembly description such as Concrete Sandwich Panel, Spandrel Panel, Logs, Straw Bale Panel and etc....
4. Based on the Climate Zone; enter the equivalent U-factor found in JA4 Table based on the R-Value from Table 151-B, C, or D
5. Enter the Table number that closely resembles the proposed assembly.
6. Enter the R-value that is being installed in the wall cavity or between the framing; otherwise, enter "0".
7. Enter the Continuous Insulation R-value for the proposed assembly; otherwise, enter "0".
8. Enter the row and column of the U-factor value based on Column F Table Number and enter the Assembly U-factor in Column J.
9. The **Proposed** Assembly U-factor, Column J, must be equal to or less than the **Standard** U-factor in Column E to comply.

Furring Strips Construction Table for Mass Walls Only

A	B	C	D	E	F	G	H	I	J	K	L	M
Proposed Properties of Masonry and Concrete Walls From Reference Joint Appendix Table 4.3.5, 4.3.6, 4.3.7					Added Interior or Exterior Insulation in Furring Space from Reference Joint Appendix Table 4.3.13							
Mass Thickness ¹	Assembly Name or Type ²	JA4 Table Number ³	JA4-Mass Cell Value ⁴	Mass U-Factor ⁵	Interior or Exterior of Insulation Layer	Frame Thickness	Frame Type Wood or Metal	Furring Cavity R-value ³	JA4-Mass Cell Value ⁴	Effective R-value ⁵	Final Assembly U-factor ^{6,7}	Comment

1. Indicate the Mass Thickness from Reference Joint Appendix JA.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc...Indicate the Frame type and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the Table number that closely resembles the proposed assembly.
4. Enter the row and column of the U-factor value.
5. Enter the Effective R-value listed in the JA4 Table Number.
6. The Final Assembly is calculated by using Equation 4-1 or Equation 4-4 of the Reference Joint Appendix JA4. Enter the value in Column L.
7. Insert the Final Assembly U-factor value back on to the Opaque Surface Details table in Column J.

Prescriptive Certificate of Compliance: Residential		CF-1R
Newly Constructed Buildings and Additions Greater Than 1,000 ft²		(Page 2 of 5)
Project Name:	Climate Zone #	# of Stories

FENESTRATION: PROPOSED AREAS					
Fenestration Type and Frame (Window, Glass Door or Skylight)	Orientation (North, East, South, West)	Proposed Area ¹ (ft ²)	Maximum Allowed U-factor ^{2,3}	Maximum Allowed SHGC ^{2,3,4}	NFRC or Default Values ⁵
<i>Total</i>					

1. Fenestration area is the area of total glazed product (i.e. glass plus frame). Exception: When a door is less than 50% glass, the fenestration area may be the glass area plus a 2" "frame" around the glass.

2. Enter value from Component Package Requirements from either Table 151-B, 151-C, or 151-D.

3. Actual fenestration efficiencies installed shall be indicated on the installation form, CF-6R-ENV. The efficiencies should be equivalent to or less than that listed on the CF-1R Form Page 1. Otherwise, revise the CF-1R and resubmit for plan check review.

4. Submit a completed WS-3R Form if a reduced SHGC is calculated with exterior shading or overhangs.

5. If applicable at this stage enter "NFRC" Certified windows or are CEC "Default" values found in Table 116-A or B.

FENESTRATION PROPOSED AREA CALCULATION				
	CFA ft ²	Allowed % of CFA ²	Allowed Area (CFA x Allowed %)	Total Proposed Area (From Table Above)
Total Fenestration Area ^{1,2}				
West Fenestration Area ³ (Required only in Climate Zones 2, 4 & 7 -15)		.05		
Total Area ³				
			≥	

1. For Component Package C, see Table 151-B for Climate Zone Maximum Total Area Allowance.

2. For all other packages enter 20% when no West orientation restriction or 15% when West fenestration is being installed in Climate Zones 2, 4, & 7-15.

3. The Proposed West Fenestration Area includes west-sloping skylight area and any other skylight area with a pitch less than 1:12.

4. To meet energy compliance the Total Proposed Area must be less than or equal to the Allowed Area.

Prescriptive Certificate of Compliance: Residential		CF-1R
<i>Newly Constructed Buildings and Additions Greater Than 1,000 ft²</i>		(Page 3 of 5)
Project Name:	Climate Zone #	# of Stories

ROOFING PRODUCTS (COOL ROOFS) §151(f)12

Check applicable box below if the newly installed roof is exempted from the roofing product "Cool Roof" requirements. Note: If any one of the boxes are checked below, the Aged Solar Reflectance and Thermal Emittance requirements for roofing products in §118(i) are not applicable. Do not fill table below.

- Cool Roofs Not Required in Climate Zones 1-12, 14, and 16 with a Low Sloped. Less or 2:12 pitch.
- Cool Roofs Not Required in Climate Zones 1 through 9 and 16 with a Steep-Sloped Roofs (pitch greater than 2:12) and product unit weight less than 5lb/ft².

Other Exceptions

- Roofing area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof criteria.
- Roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft² is exempt from the above Cool Roof criteria.

Note: If no CRRC-1 label is available, this compliance method cannot be used, use the Performance Approach to show compliance, otherwise, check the applicable box below if Exempt from the Roofing Products "Cool Roof" Requirement:

CRRC Product ID Number ¹	Roof Slope		Product Weight		Product Type ²	Aged Solar Reflectance ^{3,4}		Thermal Emittance	SRI ⁵
	≤ 2:12	> 2:12	< 5lb/ft ²	≥ 5lb/ft ²					
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			

1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council's Rated Product Directory at www.coolroofs.org/products/search.php
2. Indicate the type of product is being used for the roof top, i.e. single-ply roof, asphalt roof, metal roof, etc.
3. If the Aged Reflectance is not available in the Cool Roof Rating Council's Rated Product Directory then use the Initial Reflectance value from the same directory and use the equation $(0.2+0.7(\rho_{initial} - 0.2))$ to obtain a calculated aged value. Where ρ is the Initial Solar Reflectance.
4. Check box if the Aged Reflectance is a calculated value using the equation above.
5. Calculate the SRI value by using the SRI- Worksheet at <http://www.energy.ca.gov/title24/> and enter the resulting value in the SRI Column above and attach a copy of the SRI- Worksheet to the CF-1R.

To apply **Liquid Field Applied Coatings**, the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §118(i)4. Select the applicable coating:

<input type="checkbox"/> Aluminum-Pigmented Asphalt Roof Coating	<input type="checkbox"/> Cement-Based Roof Coating	<input type="checkbox"/> Other _____
--	--	--------------------------------------

HVAC SYSTEMS - HEATING

Heating Equipment Type and Capacity ^{1,2,3}	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location ⁴	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Heating Type (Central Furnace, Wall Furnace, Heat pump, Boiler, Electric Resistance, Hydronic, etc.)
2. Electric resistance heating is allowed only in Component Package C, or except where electric heating is supplemental (i.e., if total capacity ≤ 2 KW or 7,000 Btu/hr electric heating is controlled by a time-limiting device not exceeding 30 minutes). See §151(b) 3 exception.
3. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R Form for additional requirements and check applicable boxes.
4. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

Prescriptive Certificate of Compliance: Residential		CF-1R
<i>Newly Constructed Buildings and Additions Greater Than 1,000 ft²</i>		(Page 4 of 5)
Project Name:	Climate Zone #	# of Stories

HVAC SYSTEMS - COOLING

Cooling Equipment Type and Capacity ^{1,2}	Minimum Efficiency (SEER/EER or COP)	Distribution Type and Location ³	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Type (A/C, Heat pump, Evaporative Cooling, etc)
2. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R Form for additional requirements and check applicable boxes.
3. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

WATER HEATING

List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be gas or propane fired and may not use recirculation pumps. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.

Water Heater Type/Fuel Type ¹	Distribution Type (Standard, Recirculating) ²	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value ³

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The water heating tank and pipes shall be insulated to meet the requirements of §150(j)

SPECIAL FEATURES The enforcement agency should pay special attention to the Special Features specified in this checklist below. These items may require written justification and documentation and special verification.

Radiant Barrier (Roof) YES NO
 YES: Required in Climate Zones 2, 4, and 8-15 in Component Packages C, D and E.

Slab Edge (Perimeter) Insulation YES NO
 YES: In all Climate Zones using Component Package C, and in Climate Zone 16 under Component Packages D and E, R-7 insulation is required.

Heated Slab Insulation YES NO
 YES: Slab edge insulation required for heated slabs in all Component Packages in all Climate Zones. See details in Table 118-A of the standards.

Raised Slab Insulation YES NO
 YES: In Climate Zones 1, 2, 11, 13, 14 & 16 R-8 insulation is required, and in Climate Zones 12 & 15 R-4 insulation is required under Component Packages D and E. Raised slab insulation is not required in Component Package C.

Thermal Mass YES NO
 YES: In Component Package C for all Climate Zones, a Minimum Interior Mass Capacity (IMC) must be achieved per Table 151-A of the standards. If Yes, submit a completed WS-1R Form.

Prescriptive Certificate of Compliance: Residential		CF-1R
<i>Newly Constructed Buildings and Additions Greater Than 1,000 ft²</i>		(Page 5 of 5)
Project Name:	Climate Zone #	# of Stories

<p>HERS VERIFICATION SUMMARY <i>The enforcement agency should pay special attention to the HERS Measures specified in this checklist below. A completed and signed CF-4R Form for all the measures specified shall be submitted to the building inspector before final inspection.</i></p>		
<p>Duct Sealing & Testing <input type="checkbox"/> YES <input type="checkbox"/> NO YES: New ducted systems are to be sealed and duct leakage shall be less than 6% per §151(f)10 in all Component Packages in all Climate Zones. <i>HERS verification is required for this measure.</i></p>		
<p>Refrigerant Charge - Split System <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 8-15 in all Component Packages, when a newly ducted split A/C or heat pump is installed, a refrigerant charge measurement shall be verified per §151(f)7A. <i>HERS verification is required for this measure.</i></p>		
<p>Central Forced Air Handlers: Integrated Ventilation System Watt Draw <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In all Component Packages and in all Climate Zones, when a central fan integrated ventilation system is installed to meet the ventilation requirements of §150(o), the central forced air system fans must draw less than 0.58 watts per CFM per §151(f)11. <i>HERS verification is required for this measure.</i></p>		
<p>Ducted Split Central Air Conditioners and Heat Pumps: Airflow and Watt Draw <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In all Component Packages in Climate Zones 10 through 15, when a newly ducted split A/C or heat pump system is installed, the airflow and fan watt draw shall be verified per §151(f)7B. <i>HERS verification is required for this measure.</i></p>		

Documentation Author's Declaration Statement		
<ul style="list-style-type: none"> • I certify that this Certificate of Compliance documentation is accurate and complete. 		
Name:	Signature:	
Company:	Date:	
Address:	If Applicable <input type="checkbox"/> CEA or <input type="checkbox"/> CEPE (Certification #):	
City/State/Zip:	Phone:	

Responsible Building Designer's Declaration Statement		
<ul style="list-style-type: none"> • I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance. • I certify that the energy features and performance specifications for the building design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations. • The building design features identified on this Certificate of Compliance are consistent with the information provided to document this building design on the other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. 		
Name:	Signature:	
Company:	Date:	
Address:	License:	
City/State/Zip:	Phone:	

For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300.

Prescriptive Certificate of Compliance:		CF-1R ADD
Residential Additions		(Page 2 of 5)
Site Address:	Enforcement Agency:	Date:

1. For Tag/ID indicate the identification name that matches the building plans.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc... Indicate in column G the Frame material and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the thickness for mass in inches or Spacing between framing members enter; 16" or 24" OC; or Other for all other assembly description such as Concrete Sandwich Panel, Spandrel Panel, Logs, Straw Bale Panel, and etc....
4. Based on the Climate Zone; enter the equivalent U-factor found in JA4 Table based on the R-Value from Table 151-C
5. Enter the Table number that closely resembles the proposed assembly.
6. Enter the R-value that is being installed in the wall cavity or between the framing; otherwise, enter "0".
7. Enter the Continuous Insulation R-value for the proposed assembly; otherwise, enter "0".
8. Enter the row and column of the U-factor value based on Column F Table Number and enter the Assembly U-factor in Column J.
9. The **Proposed Assembly U-factor, Column J, must be equal to or less than the Standard U-factor in Column E to comply.**

FURRING STRIPS CONSTRUCTION TABLE FOR MASS WALLS ONLY

A	B	C	D	E	F	G	H	I	J	K	L	M
Proposed Properties of Masonry and Concrete Walls From Reference Joint Appendix Table 4.3.5, 4.3.6, 4.3.7					Added Interior or Exterior Insulation in Furring Space from Reference Joint Appendix Table 4.3.13							
Mass Thickness ¹	Assembly Name or Type ²	JA4 Table Number ³	JA4-Mass Cell Value ⁴	Mass U-Factor ⁵	Interior or Exterior of Insulation Layer	Frame Thickness	Frame Type Wood or Metal	Furring Cavity R-value ³	JA4-Mass Cell Value ⁴	Effective R-value ⁵	Final Assembly U-factor ^{6,7}	Comment

1. Indicate the Mass Thickness from Reference Joint Appendix JA.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc... Indicate the Frame type and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the Table number that closely resembles the proposed assembly.
4. Enter the row and column of the U-factor value.
5. Enter the Effective R-value listed in the JA4 Table Number.
6. The Final Assembly is calculated by using Equation 4-1 or Equation 4-4 of the Reference Joint Appendix JA4. Enter the value in Column L.
7. Insert the Final Assembly U-factor value back on to the Opaque Surface Details table in Column J.

FENESTRATION PROPOSED AREAS

Fenestration Type and Frame (Window, Glass Door or Skylight)	Orientation (North, East, South, West)	Proposed Area ¹ (ft ²)	Maximum U-factor ^{2, 3}	Maximum SHGC ^{2, 3, 4}	NFRC or Default Values ⁵
Total					

1. Fenestration area is the area of total glazed product (i.e. glass plus frame). Exception: When a door is less than 50% glass, the fenestration area may be the glass area plus a "2 inch frame" around the glass.
2. Enter value from Component Package D Requirements in Table 151-C.
3. Actual fenestration products installed and as indicated in CF-6R-ENV Form shall be equivalent to or have a lower U-factor and/or a lower SHGC value than that specified on the Fenestration Proposed Area table above.
4. Submit a completed WS-3R Form if a reduced SHGC is calculated with exterior shading.
5. If applicable at this stage enter "NFRC" for NFRC Certified windows or CEC "Default" values found in Table 116-A or B.

Prescriptive Certificate of Compliance:		CF-1R ADD
Residential Additions		(Page 3 of 5)
Site Address:	Enforcement Agency:	Date:

ADDITION ALLOWED FENESTRATION AREAS						
	A	B	C	D	E	F
	CFA of Addition ft ²	Allowed % of CFA	Allowed Area (A x B)	Area Removed ² ft ²	Maximum Allowed Area (C + D)	Proposed Area ⁵ (Table Above)
Total Fenestration Area ³		0.20				≥
West Fenestration Area ^{1,4} (Required In CZ's 2, 4 & 7 -15)		0.05				≥

1. West Fenestration Area includes west-sloping skylights and any skylights with a pitch less than 1:12.
2. Glass removed to make way for the addition.
3. For additions less than 1,000 ft² the standards allows glazing removed during the remodel to be added to the glazing area allowance. The maximum allowed glazing area for the addition is the CFA x 20% + glass removed to make way for the addition.
4. In climate zones 2, 4, 7-15, no more than 5% of the CFA is allowed for west-facing glazing plus west-facing glass area removed to make way for the addition. The maximum allowed west-facing glazing area is the CFA x 5% + west-facing glass removed to make way for the addition.
5. To meet compliance, the Proposed Area must be less than or equal to the Total Allowed Area for BOTH the Total and West Fenestration Areas.

ROOFING PRODUCTS (COOL ROOFS) §151(f)12								
Check applicable box below if the roof addition is exempt from the roofing product "Cool Roof" requirements. Note: If any one of the boxes are checked below, the Aged Solar Reflectance and Thermal Emittance requirements for roofing products in §118(i) are not applicable. Do not fill table below.								
<input type="checkbox"/> Roofing compliance <u>Not</u> Required in Climate Zones 1-12, 14, and 16 with a Low-Sloped. Less or 2:12 pitch.								
<input type="checkbox"/> Roofing compliance <u>Not</u> Required in Climate Zones 1 through 9 and 16 with a Steep-Sloped. Roofs pitch greater than 2:12 and product weight less than 5lb/ft ² .								
<input type="checkbox"/> Roofing area covered by building integrated; photovoltaic panels and solar thermal panels are exempt from the above Cool Roof criteria								
<input type="checkbox"/> Roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft ² is exempt from the above Cool Roof criteria.								
Note: If no CRRC-1 label is available, this compliance method cannot be used, use the Performance Approach to show compliance, otherwise, check the applicable box below if Exempt from the Roofing Products "Cool Roof" Requirement:								
CRRC Product ID Number ¹	Roof Slope		Product Weight		Product Type ²	Aged Solar Reflectance ^{3,4}	Thermal Emittance	SRI ⁵
	≤ 2:12	> 2:12	< 5lb/ft ²	≥ 5lb/ft ²				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council's Rated Product Directory at www.coolroofs.org/products/search.php .								
2. Indicate the type of product is being used for the roof top, i.e. single-ply roof, asphalt roof, metal roof, etc.								
3. If the Aged Reflectance is not available in the Cool Roof Rating Council's Rated Product Directory then use the Initial Reflectance value from the same directory and use the equation $(0.2+0.7(\rho_{initial} - 0.2))$ to obtain a calculated aged value. Where ρ is the Initial Solar Reflectance.								
4. Check box if the Aged Reflectance is a calculated value using the equation above.								
5. Calculate the SRI value by using the SRI- Worksheet at http://www.energy.ca.gov/title24/ and enter the resulting value in the SRI Column above and attach acopy of the SRI- Worksheet to the CF-1R.								
To apply Liquid Field Applied Coatings , the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §118(i)4. Select the applicable coating:								
<input type="checkbox"/> Aluminum-Pigmented Asphalt Roof Coating			<input type="checkbox"/> Cement-Based Roof Coating			<input type="checkbox"/> Other _____		

Prescriptive Certificate of Compliance:		CF-1R ADD
Residential Additions		(Page 4 of 5)
Site Address:	Enforcement Agency:	Date:

HVAC SYSTEMS - HEATING					
Heating Equipment Type and Capacity ^{1,2,3}	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location ⁴	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Heating Type (Central Furnace, Wall Furnace, Heat pump, Boiler, Electric Resistance, etc.)
2. Electric resistance heating is allowed only in Component Package C, or except where electric heating is supplemental (i.e., if total capacity ≤ 2 KW or 7,000 Btu/hr electric heating is controlled by a time-limiting device not exceeding 30 minutes). See §151(b)3 exception.
3. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R-ADD Form for additional requirements and check applicable boxes.
4. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

HVAC SYSTEMS - COOLING					
Cooling Equipment Type and Capacity ^{1,2}	Minimum Efficiency (SEER/EER or COP)	Distribution Type and Location ³	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Cooling Type (A/C, Heat pump, Evap. Cooling, etc.)
2. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R-ADD Form for additional requirements and check applicable boxes.
3. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

WATER HEATING					
List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be storage gas or propane fired, non-recirculating, and may not exceed 50 gallons. If no natural gas is connected to the building, an electric storage DHW heater less than 50 gallons with an energy factor greater than 0.90 may be used. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.					
Water Heater Type/Fuel Type ¹	Distribution Type (Standard, Recirculating) ²	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value ³

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc.)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The water heating tank and pipes shall be insulated to meet the requirements of §150(j).

SPECIAL FEATURES The enforcement agency should pay special attention to the Special Features specified in this checklist below. These items may require written justification and documentation and special verification. Applicable special features shall be marked with a YES and be specified within the plans.	
Radiant Barrier (Roof)	
<input type="checkbox"/> YES	<input type="checkbox"/> NO Required in Climate Zones 2, 4, and 8-15 for additions larger than 100 ft ² .
Slab Edge (Perimeter) Insulation	
<input type="checkbox"/> YES	<input type="checkbox"/> NO In Climate Zone 16 under Component Package D, R-7 insulation is required.
Heated Slab Insulation	
<input type="checkbox"/> YES	<input type="checkbox"/> NO Slab edge insulation required for heated slabs in all Climate Zones. See details in Table 118-A of the standards.
Raised Slab Insulation	
<input type="checkbox"/> YES	<input type="checkbox"/> NO In Climate Zones 1, 2, 11, 13, 14 & 16 R-8 insulation is required, and in Climate Zones 12 & 15 R-4 insulation is required under Component Package D.
Thermal Mass - To obtain Compliance Credit for the installation of thermal mass, use the Performance Approach.	

Prescriptive Certificate of Compliance:		CF-1R ADD
Residential Additions		(Page 5 of 5)
Site Address:	Enforcement Agency:	Date:

HERS VERIFICATION SUMMARY - The enforcement agency should pay special attention to the HERS Measures specified in this checklist below. A completed and signed CF-4R Form for all the measures specified shall be submitted to the building inspector before final inspection.

Duct Sealing & Testing *HERS verification is required for this measure.*

<input type="checkbox"/> YES	<input type="checkbox"/> NO	In all Climate Zones, if a new space-conditioning system (HVAC equipment and ducting) is installed to serve the addition alone, the ducts are to be sealed and tested per §151(f)10.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 9-16, if more than 40 linear feet of new or replacement ducts are installed in unconditioned space to serve the addition, the ducts are to be sealed and tested per §152(b)1D. <input type="checkbox"/> EXCEPTION: Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 9-16, if the existing HVAC equipment is replaced (including replacement of the air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger) and will serve the addition, the ducts are to be sealed and tested per §152(b)1E. <input type="checkbox"/> EXCEPTION: Duct systems that are documented to have been previously sealed confirmed through HERS verification in accordance with procedures in the Reference Residential Appendix RA3. <input type="checkbox"/> EXCEPTION: Duct systems with less than 40 linear feet in unconditioned space. <input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.

Refrigerant Charge - Split System *HERS verification is required for this measure.*

<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 8-15, if a newly ducted split A/C or heat pump is installed to serve the addition alone, a refrigerant charge measurement shall be verified per §151(f)7A.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 8-15, if the existing HVAC equipment is replaced (including replacement of the air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger) and will serve the addition, a refrigerant charge measurement shall be verified per §152(b)1F.

Central Fan Integrated Ventilation System – Airflow and Fan Watt Draw - do not apply for additions 1,000 ft² or less.

Ducted Split Systems - Air Conditioners and Heat Pumps: Airflow and Fan Watt Draw *HERS verification is required.*

<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 10 through 15, if a new space-conditioning system (HVAC equipment and ducting) is installed to serve the addition alone, the airflow and fan watt draw shall be verified per §151(f)7B.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 10 through 15, if the existing space-conditioning system (HVAC equipment and ducting) is replaced and will serve the addition, the airflow and fan watt draw shall be verified per §152(b)1F.

Documentation Author's Declaration Statement

• I certify that this Certificate of Compliance documentation is accurate and complete.

Name:	Signature:
Company:	Date:
Address:	If Applicable <input type="checkbox"/> CEA or <input type="checkbox"/> CEPE (Certification #):
City/State/Zip:	Phone:

Responsible Building Designer's Declaration Statement

- I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance.
- I certify that the energy features and performance specifications for the building design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations.
- The building design features identified on this Certificate of Compliance are consistent with the information provided to document this building design on the other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.

Name:	Signature:
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300.

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 1 of 5)
Project Name:	Climate Zone #	# of Stories

General Information		
Site Address:	Enforcement Agency:	Date:
Building Type <input type="checkbox"/> Single Family <input type="checkbox"/> Multi Family	Circle the Front Orientation: N, E, S, W, or degrees _____	
Conditioned Floor Area (CFA): _____	Project Type: <input type="checkbox"/> Alterations <input type="checkbox"/> Envelope <input type="checkbox"/> Fenestration <input type="checkbox"/> Roof <input type="checkbox"/> HVAC Replacement or Change Out <input type="checkbox"/> Duct Replacement <input type="checkbox"/> Water Heater	

NOTE: This form is not to be used for Newly Constructed Buildings or Additions

Insulation Values For Opaque Surfaces (for Furring use the Mass and Furring Strips Construction table below)

Assembly Alteration
 Opening of framed cavity alone – Alterations that involve the opening of the framed cavity of a wall, ceiling, or floor must install the mandatory minimum insulation value per §150 for the altered assembly. Fill in Columns A – C and enter mandatory insulation value in Column H.
 Replacement of entire assembly – Replacement of an entire wall, ceiling, or floor assembly requires the installation of Component Package- D insulation values in Table 151-C. Fill in Columns A – J.

Opaque Surface Details For the furred portioned of Mass Walls see Furring Strips Construction Table below.

A	B	C	D	E	F	G	H	I	J
Proposed <small>See Note</small>				Standard	Values From JA4 Table				
Tag/ ID ¹	Assembly Name or Type ²	Framing Material and Size ²	Thickness, Spacing, or Other ³	U- factor ⁴	JA4 Table Number ⁵	Framed Cavity R-value ⁶	Continuous Insulation R-Value ⁷	JA4 Assembly Row/Col ⁸	Proposed Assembly U-factor ⁹

Note: For furred assemblies, accounting for Continuous Insulation R-value, see Page JA4-3 and Equation 4-1. For calculating furred walls use the Mass and Furring Construction table below.

1. For Tag/ID indicate the identification name that matches the building plans.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc... Indicate in column G the Frame material and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the thickness for mass in inches or Spacing between framing members enter; 16" or 24" OC; or Other for all other assembly description such as Concrete Sandwich Panel, Spandrel Panel, Logs, Straw Bale Panel and etc....
4. Based on the Climate Zone; enter the equivalent U-factor found in JA4 Table based on the R-Value from Table 151-B, C, or D
5. Enter the Table number that closely resembles the proposed assembly.
6. Enter the R-value that is being installed in the wall cavity or between the framing; otherwise, enter "0".
7. Enter the Continuous Insulation R-value for the proposed assembly; otherwise, enter "0".
8. Enter the row and column of the U-factor value based on Column F Table Number and enter the Assembly U-factor in Column J
9. The **Proposed** Assembly U-factor, Column J, must be equal to or less than the **Standard** U-factor in Column E to comply.

Furring Strips Construction Table for Mass Walls Only

A	B	C	D	E	F	G	H	I	J	K	L	M
Proposed Properties of Masonry and Concrete Walls From Reference Joint Appendix Table 4.3.5, 4.3.6, 4.3.7					Added Interior or Exterior Insulation in Furring Space from Reference Joint Appendix Table 4.3.13							
Mass Thickness ¹	Assembly Name or Type ²	JA4 Table Number ³	JA4-Mass Cell Value ⁴	Mass U-Factor ⁵	Interior or Exterior of Insulation Layer	Frame Thickness	Frame Type Wood or Metal	Furring Cavity R-value ³	JA4-Mass Cell Value ⁴	Effective R-value ⁵	Final Assembly U-factor ^{6,7}	Comment

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 2 of 5)
Project Name:	Climate Zone #	# of Stories

Mass and Furring Strips Construction (footnotes)

1. Indicate the type of assembly to include; Hollow Unit Masonry Walls, Solid Unit Masonry, Solid Concrete Walls, Etc. Additional assemblies can be found Reference Joint Appendix JA4.
2. This is the U-Factor based on the thickness of the assembly in inches.
3. The R-value of the insulation to be added on the interior or exterior of the assembly.
4. The Calculated R-Value is the R-value of the furred out section of the assembly.
- 5-6. The Final Assembly is calculated using Equation 4-2 or Equation 4-4 of the Reference Joint Appendix JA4. The equation is the inverse of Column D added to Column I. Column K is the inverse from column J.
7. Insert the calculated U-factor value on to the Opaque Surface Details in Column J

FENESTRATION PROPOSED AREAS					
<input type="checkbox"/> Replacing window alone – Replacement windows shall meet the U-Factor and SHGC Value requirements of Component Package D in Table 151-C. The Total Fenestration and West-facing Area requirements are not applicable.					
<input type="checkbox"/> Adding 50ft² or less of window area – Newly installed windows shall meet the U-Factor and SHGC Value requirements of Component Package D in Table 151-C.					
<input type="checkbox"/> Adding more than 50ft² of window area – Newly installed windows shall meet the U-Factor and SHGC Value and the Fenestration Area requirements of Component Package D in Table 151-C. Complete the Altered Fenestration Allowed Area Table on Page 2 of the CF-1R-ALT					
Fenestration Type and Frame (Window, Glass Door or Skylight)	Orientation (North, East, South, West)	Proposed Area ¹ (ft ²)	Maximum U-factor ^{2,3}	Maximum SHGC ^{2,3,4}	NFRC or Default Value ⁵
<ol style="list-style-type: none"> 1. Fenestration area is the area of total glazed product (i.e. glass plus frame). Exception: When a door is less than 50% glass, the fenestration area may be the glass area plus a “2 inch frame” around the glass. 2. Enter value from Component Package D Requirements in Table 151-C. 3. Actual fenestration products installed and as indicated in CF-6R-ENV Form shall be equivalent to or have a lower U-factor and/or a lower SHGC value than that specified on the CF-1R ALT Form. 4. Submit a completed WS-3R Form if a reduced SHGC is calculated with exterior shading. 5. If applicable at this stage enter “NFRC” for NFRC Certified windows or are CEC “Default” values found in Table 116-A or B. 					

ALTERED FENESTRATION ALLOWED AREAS (Complete if more than 50ft² of fenestration is added)							
	A	B	C	D	E	F	G
	CFA of Entire Dwelling	Allowed % of CFA ^{2,3}	Existing Fenestration Area ⁴	Area Removed ⁵	Fenestration Area Added ⁶	Allowed Area (A x B)	Proposed Area ^{1,4} (E-D) + C
Total Fenestration Area ² (ft ²)							≥
West Fenestration Area ^{1,3} (Required In CZ's 2, 4 & 7 -15)							≥
<ol style="list-style-type: none"> 1. The Proposed West Fenestration Area includes West-sloping skylight area and any other skylight area with a pitch less than 1:12. 2. Enter 20% when no West orientation restriction or 15% when West fenestration is being installed in Climate Zones 2, 4, & 7-15. Note that the maximum allowed fenestration can only be 5% of the CFA as indicated in Column F. Column G must be equal to or less than Column F. 3. In climate zones 2, 4, 7-15, no more than 5% of the CFA is allowed for west-facing glazing. 4. Existing Fenestration area must be counted toward the maximum allowed 15% or 20% of the whole building and calculated in Column G. The Proposed Area must be less than or equal to Column F. 5. Enter the fenestration removed as part of the alteration if any in column D. 6. Enter the Fenestration area that is being added as part of the alteration. 							

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 3 of 5)
Project Name:	Climate Zone #	# of Stories

ROOFING PRODUCTS (COOL ROOFS) §151(f)12

When the area of exterior roof surface to be replaced exceeds more than 50% of the existing roof area, or more than 1,000 ft², whichever is less, the new roofing area must meet the roofing product "Cool Roof" requirements of §152(b)1Hi, 152(b)1Hii, or 152(b)1Hiii.

Check applicable alternative or exception below if the roof alteration is exempt from the roofing product "Cool Roof" requirements. Note: If any one of the alternatives or exception below is checked, the Aged Solar Reflectance and Thermal Emittance requirements for roofing products in §118(i) are not applicable. Do not fill table below.

- Cool Roofs Not Required in Climate Zones 1-12, 14, and 16 with a Low Sloped. Less or 2:12 pitch.
- Cool Roofs Not Required in Climate Zones 1 through 9 and 16 with a Steep-Sloped Roofs (pitch greater than 2:12) and product unit weight less than 5lb/ft².

Alternatives to §152(b)1Hi and §152(b)Hii, Steep-slope roof (pitch > 2:12)

- Insulation with a thermal resistance of at least 0.85 hr-ft²-°F/Btu or at least a 3/4 inch air-space is added to the roof deck over an attic; or
- Existing ducts in the attic are insulated and sealed according to §151(f)10; or
- In climate zones 10, 12 and 13, with 1 ft² of free ventilation area of attic ventilation for every 150 ft² of attic floor area, and where at least 30 percent of the free ventilation area is within 2 feet vertical distance of the roof ridge; or
- Building has at least R-30 ceiling insulation; or
- Building has radiant barrier in the attic meeting the requirements of §151(f)2; or
- Building has no ducts in the attic; or
- In climate zones 10, 11, 13 and 14, R-3 or greater roof deck insulation above vented attic.

Exception to §152(b)1Hiii, Low-slope roof (pitch ≤ 2:12)

- Building has no ducts in the attic.

Other Exceptions

- Roofing area covered by building integrated; photovoltaic panels and solar thermal panels are exempt from the below Cool Roof criteria.
- Roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft² is exempt from the below Cool Roof criteria.

Note: If no CRRC-1 label is available, this compliance method cannot be used, use the Performance Approach to show compliance, otherwise, Check the applicable box below if Exempt from the Roofing Products "Cool Roof" Requirement:

CRRC Product ID Number ¹	Roof Slope		Product Weight		Product Type ²	Aged Solar Reflectance ^{3,4}		Thermal Emittance	SRI ⁵
	≤ 2:12	> 2:12	< 5lb/ft ²	≥ 5lb/ft ²					
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			

1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council's Rated Product Directory at www.coolroofs.org/products/search.php
2. Indicate the type of product is being used for the roof top, i.e. single-ply roof, asphalt roof, metal roof, etc.
3. If the Aged Reflectance is not available in the Cool Roof Rating Council's Rated Product Directory then use the Initial Reflectance value from the same directory and use the equation $(0.2+0.7(p_{initial} - 0.2))$ to obtain a calculated aged value. Where p is the Initial Solar Reflectance.
4. Check box if the Aged Reflectance is a calculated value using the equation above.
5. Calculate the SRI value by using the SRI- Worksheet at <http://www.energy.ca.gov/title24/> and enter the resulting value in the SRI Column above and attach a copy of the SRI- Worksheet to the CF-1R.

To apply **Liquid Field Applied Coatings**, the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §118(i)4. Select the applicable coating:

<input type="checkbox"/> Aluminum-Pigmented Asphalt Roof Coating	<input type="checkbox"/> Cement-Based Roof Coating	<input type="checkbox"/> Other _____
--	--	--------------------------------------

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 4 of 5)
Project Name:	Climate Zone #	# of Stories

HVAC SYSTEMS - HEATING

Heating Equipment Type and Capacity ^{1,2,3}	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location ⁴	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Heating Type (Central Furnace, Wall Furnace, Heat pump, Boiler, Electric Resistance, etc.)
2. Electric resistance heating is allowed only in Component Package C, or except where electric heating is supplemental (i.e., if total capacity ≤ 2 KW or 7,000 Btu/hr electric heating is controlled by a time-limiting device not exceeding 30 minutes). See §151(b)3 exception.
3. Refer to the HERS Verification section on Page 4 of the CF-1R-ALT Form for additional requirements and check applicable boxes.
4. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

HVAC SYSTEMS - COOLING

Cooling Equipment Type and Capacity ^{1,2}	Minimum Efficiency (SEER/EER or COP)	Distribution Type and Location ³	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Cooling Type (A/C, Heat pump, Evap. Cooling, etc)
2. Refer to the HERS Verification section on Page 4 of the CF-1R-ALT Form for additional requirements and check applicable boxes.
3. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

WATER HEATING

List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be gas or propane fired. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.

Water Heater Type/Fuel Type ¹	Distribution Type (Standard, Recirculating) ²	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value ³

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc.)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The external water heating tank and pipes shall be insulated to meet the requirements of §150(j).

SPECIAL FEATURES The enforcement agency should pay special attention to the Special Features specified in this checklist below. These items may require written justification and documentation and special verification.

NEW ROOF ASSEMBLY - Radiant Barrier

The radiant barrier requirement of §151(f)2 does not apply to roof alterations.

Slab Edge (Perimeter) Insulation YES NO

YES: In Climate Zone 16 in Component Packages D, R-7 insulation is required.

Heated Slab Insulation YES NO

YES: Slab edge insulation required for all heated slabs in all Climate Zones. See details in Table 118-A of the standards.

Raised Slab Insulation YES NO

YES: In Climate Zones 1, 2, 11, 13, 14 & 16, R-8 insulation is required; in Climate Zones 12 & 15, R-4 is required under component Package D.

Thermal Mass

To obtain Compliance Credit for the installation of thermal mass, use the Performance Approach.

*RESIDENTIAL
CERTIFICATE OF COMPLIANCE
CF-1R-ALT-HVAC*

2008 Building Energy Efficiency Standards Residential HVAC Alterations Climate Zones 1 and 3 through 7

BUSINESS AND PROFESSIONS CODE, SECTION 7110

Willful or deliberate disregard and violation of the building laws, including the California Building Code, and local permit requirements constitutes a cause for disciplinary action from the Contractors State License Board working in conjunction with the local building department. This action may consist of fines up to \$5,000 per violation or suspension/revocation of a contractor's license.

WHEN IS A PERMIT REQUIRED?

A written construction permit shall be obtained from the enforcement agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system, except as permitted in Appendix Chapter 1, Section 112.2 of the 2007 California Mechanical Code. Projects requiring permits include, but are not limited to:

- New HVAC installation
- HVAC Changeout
- Replacement of furnace, coil, FAU, or condenser
- Relocation of an existing HVAC unit
- Adding or replacing more than 40ft ducting in unconditioned space

2008 BUILDING ENERGY EFFICIENCY STANDARDS (Title 24, Part 6) REQUIREMENTS INCLUDE:

1. Heating equipment must have a minimum 78% AFUE (Exception: Wall & floor furnaces; room heaters).
2. Central air conditioners & heat pumps less than 65,000 Btu/hr must have a minimum 13 SEER.
3. Newly installed or replaced ducts must have a minimum insulation value of R-4.2.
4. A setback type thermostat (24 hr clock with four set points) is required for all alterations.
5. New or replacement ducts must meet the mandatory requirements of Section 150(m):
 - All joints and openings in the in the HVAC system must be sealed.
 - Only UL 181, UL 181A, or UL 181B approved tapes or mastic shall be used to seal duct openings.
 - Connections of metals ducts and the inner core of flex ducts shall be mechanically fastened. Flex ducts must be connected using a metal sleeve/coupling.
 - Flex ducts that are suspended must be supported every 4ft. max for horizontal runs with no more than 2" of sag between supports and 6 ft. max for vertical runs.
6. The **CF-6R-MECH-04** must be completed and signed by the installing contractor. The Inspector will collect this form and verify that the model numbers are the same as the installed equipment.

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 Type¹	List Minimum Efficiency²		Conditioned Floor Area	Duct insulation requirement	Thermostat
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other _____	<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____	<input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance	Served by system _____ sf	Over 40 ft of ducts added or replaced in unconditioned space <input type="checkbox"/> R 6 (CZ 1, 3-5)	<input type="checkbox"/> Setback <i>(If not already present, must be installed)</i>
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.					
Contractor (Documentation Author's /Responsible Designer's Declaration Statement) <ul style="list-style-type: none"> • I certify that this Certificate of Compliance documentation is accurate and complete. • 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. • 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. • 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. 					
Name:			Signature:		
Company:				Date:	
Address:				License:	
City/State/Zip:				Phone:	

2008 Building Energy Efficiency Standards Residential HVAC Alterations Climate Zones 2 and 9

BUSINESS AND PROFESSIONS CODE, SECTION 7110

Willful or deliberate disregard and violation of the building laws, including the California Building Code, and local permit requirements constitutes a cause for disciplinary action from the Contractors State License Board working in conjunction with the local building department. This action may consist of fines up to \$5,000 per violation or suspension/revocation of a contractor's license.

WHEN IS A PERMIT REQUIRED?

A written construction permit shall be obtained from the enforcement agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system, except as permitted in Appendix Chapter 1, Section 112.2 of the 2007 California Mechanical Code. Projects requiring permits include, but are not limited to:

- New HVAC installation
- HVAC Changeout
- Replacement of furnace, coil, FAU, or condenser
- Relocation of an existing HVAC unit
- Adding or replacing more than 40ft ducting in unconditioned space

2008 BUILDING ENERGY EFFICIENCY STANDARDS (Title 24, Part 6) REQUIREMENTS INCLUDE:

1. Heating equipment must have a minimum 78% AFUE (Exception: Wall & floor furnaces; room heaters).
2. Central air conditioners & heat pumps less than 65,000 Btu/hr must have a minimum 13 SEER.
3. Newly installed or replaced ducts must have a minimum insulation value of R-4.2.
4. A setback type thermostat (24 hr clock with four set points) is required for all alterations.
5. New or replacement ducts must meet the mandatory requirements of Section 150(m):
 - All joints and openings in the HVAC system must be sealed.
 - Only UL 181, UL 181A, or UL 181B approved tapes or mastic shall be used to seal duct openings.
 - Connections of metals ducts and the inner core of flex ducts shall be mechanically fastened. Flex ducts must be connected using a metal sleeve/coupling.
 - Flex ducts that are suspended must be supported every 4 ft. max for horizontal runs with no more than 2" of sag between supports and 6 ft. max for vertical runs.

WHEN IS HERS VERIFICATION REQUIRED AND WHAT FORMS ARE REQUIRED?

A HERS rater is a special inspector for the building department. The building inspector may also request to be on site to witness testing by the contractor and/or HERS rater. The installer picks one of the four options on the CF-1R-ALT-HVAC Form that describe the work being conducted. Each option lists the forms required to be at the job site for final inspection.

- CF-6R Forms shall be completed and submitted by the installing contractor for final inspection.*
- CF-4R Forms shall be completed, registered with an approved HERS Provider (cannot be completed by hand), and submitted by the HERS Rater for final inspection effective January 1, 2010.

DESCRIPTION OF HERS TESTS BELOW (Full descriptions found in Residential Appendix RA3 and Residential Manual)

Duct sealing – The installer is to insure leakage of the HVAC system is less than 6% for new air conditioning system (new equipment and all new ducts) or 15%, 60% reduction, etc. for alterations to existing HVAC systems. When the contractor uses the option to seal all accessible leaks, all easily movable objects must be moved to seal existing ducting. New ducting installed by the contractor is not allowed to have any leaks even if it is no longer accessible. In example 3 of the CF-1R "all new ducts" means that all the ducting was changed. The original boots, plenums, etc. do not need to be changed.

Cooling Coil Airflow (CCA) – When a refrigerant charge test is required, the system must first be tested to move a minimum 300 CFM per ton of cooling. An accurate charge cannot be conducted with air flows lower than 300 CFM per ton of cooling. Air flows can usually be increased by adding a larger return duct and grill or a second return duct and grill.

Refrigerant Charge (RC) – The installer is required to verify the charge is correct. If the outside temperature is below 55 degrees then the weigh in method must be used by the installer. When the weigh in method is used the HERS rater must retest when the temperature is 55 and above using the standard testing protocol in RA3. A charge indicator display (CID) can be used in place of conducting an RC. The purpose of the CID is to provide real-time information to the building occupant about the status of the system refrigerant charge, metering device, and cooling coil airflow. Manufacturers are currently developing this device.

Temperature Measurement Access Holes (TMAH) – Installer must drill and mark holes to measure temperature split.

NOTE: The CF-6R-MECH-04 is required for all HVAC alterations.

*** For final inspection ALL compliance forms (CF-1Rs, CF-6Rs, and CF-4Rs) shall be registered with an approved HERS Provider for building permit applications submitted on or after October 1, 2010.**

Simplified Prescriptive Certificate of Compliance: 2008 Residential HVAC CF-1R-ALT-HVAC

Climate Zones 2 and 9

Site Address:		Enforcement Agency:		Date:	Permit #:
Equipment Type ¹	List Minimum Efficiency ²	Conditioned Floor Area	Duct insulation requirement		Thermostat
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other _____	<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____ <input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance _____	Served by system _____ sf	Over 40 ft of ducts added or replaced in unconditioned space <input type="checkbox"/> R 6 (CZ 2 and 9)		<input type="checkbox"/> Setback <i>(If not already present, must be installed)</i>
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.					
HERS VERIFICATION SUMMARY Listed below are four HVAC alteration Options. The installer decides what work is being done and picks one of the appropriate Options. Each Option lists the HERS measures that must be conducted. A copy of the forms shall be left on site for final inspection and a copy given to the homeowner. At final, the inspector verifies that the work listed on this form was in fact the work completed by the installer. The inspector also verifies that each appropriate CF-6R and registered CF-4R forms (no hand filled CF-4Rs allowed) are filled out and signed. Beginning October 1, 2010, a registered copy of the CF-1R and CF-6R shall also be on site for final inspection.					
<input type="checkbox"/> 1. HVAC Changeout		Required Forms:			
<ul style="list-style-type: none"> • All HVAC Equipment replaced 		CF-6R forms: MECH-04, MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25			
<ul style="list-style-type: none"> • Condenser Coil and /or • Indoor Coil and /or • Furnace 		CF-6R forms: MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25			
For Split Systems: Duct leakage < 15 percent; RC, CCA ≥ 300 CFM/ton, TMAH For Packaged Units: Duct leakage < 15 percent Exempted from duct leakage testing if:					
<input type="checkbox"/> 1. Duct system was documented to have been previously sealed and confirmed through HERS verification, or <input type="checkbox"/> 2. Duct systems with less than 40 linear feet in unconditioned space, or <input type="checkbox"/> 3. Existing duct systems are constructed, insulated or sealed with asbestos					
<input type="checkbox"/> 2. New HVAC System		Required Forms:			
<ul style="list-style-type: none"> • Cut in or Changeout with new ducts: (all new ducting and all new equipment) 		CF-6R forms: MECH-04, MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25			
For Split Systems: Duct leakage < 6 percent; RC, CCA ≥ 300 CFM/ton, TMAH. For Packaged Units: Duct leakage < 6 percent					
<input type="checkbox"/> 3. New Ducts with Replacement		Required Forms:			
<ul style="list-style-type: none"> • Includes replacing or installing all new ducting and/or outdoor condensing unit and/or indoor coil and/or furnace. Not all equipment changed. 		CF-6R forms: MECH-04, MECH-20-HERS, and (for split systems) MECH-25-HERS CF-4R forms: MECH-20 and (for split systems) MECH-25			
For Split Systems: Duct leakage < 6 percent, RC, CCA ≥ 300 CFM/ton, TMAH For Packaged Units: Duct leakage < 6 percent					
<input type="checkbox"/> 4. New Ducting over 40 feet		Required Forms:			
<ul style="list-style-type: none"> • Includes adding or replacing more than 40 linear feet of duct in unconditioned space. 		CF-6R forms: MECH-04, MECH-21-HERS CF-4R forms: MECH-21			
For split system or packaged units: Duct leakage < 15 percent <input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.					
Contractor (Documentation Author's /Responsible Designer's Declaration Statement)					
<ul style="list-style-type: none"> • I certify that this Certificate of Compliance documentation is accurate and complete. • 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. • 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. • 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. 					
Name:			Signature:		
Company:				Date:	
Address:				License:	
City/State/Zip:				Phone:	

2008 Building Energy Efficiency Standards Residential HVAC Alterations Climate Zones 8

BUSINESS AND PROFESSIONS CODE, SECTION 7110

Willful or deliberate disregard and violation of the building laws, including the California Building Code, and local permit requirements constitutes a cause for disciplinary action from the Contractors State License Board working in conjunction with the local building department. This action may consist of fines up to \$5,000 per violation or suspension/revocation of a contractor's license.

WHEN IS A PERMIT REQUIRED?

A written construction permit shall be obtained from the enforcement agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system, except as permitted in Appendix Chapter 1, Section 112.2 of the 2007 California Mechanical Code. Projects requiring permits include, but are not limited to:

- New HVAC installation
- HVAC Changeout
- Replacement of furnace, coil, FAU, or condenser
- Relocation of an existing HVAC unit
- Adding or replacing more than 40ft ducting in unconditioned space

2008 BUILDING ENERGY EFFICIENCY STANDARDS (Title 24, Part 6) REQUIREMENTS INCLUDE:

1. Heating equipment must have a minimum 78% AFUE (Exception: Wall & floor furnaces; room heaters).
2. Central air conditioners & heat pumps less than 65,000 Btu/hr must have a minimum 13 SEER.
3. Newly installed or replaced ducts must have a minimum insulation value of R-4.2.
4. A setback type thermostat (24 hr clock with four set points) is required for all alterations and newly installed
5. New or replacement ducts must meet the mandatory requirements of Section 150(m):
 - All joints and openings in the in the HVAC system must be sealed.
 - Only UL 181, UL 181A, or UL 181B approved tapes or mastic shall be used to seal duct openings.
 - Connections of metals ducts and the inner core of flex ducts shall be mechanically fastened. Flex ducts must be connected using a metal sleeve/coupling.
 - Flex ducts that are suspended must be supported every 4ft. max for horizontal runs with no more than 2" of sag between supports and 6 ft. max for vertical runs

WHEN IS HERS VERIFICATION REQUIRED AND WHAT FORMS ARE REQUIRED?

A HERS rater is a special inspector for the building department. The building inspector may also request to be on site to witness testing by the contractor and/or HERS rater. The installer picks one of the three options on the CF-1R-ALT-HVAC Form that describe the work being conducted. Each option lists the forms required to be at the job site for final.

- CF-6R Forms shall be completed and submitted by the installing contractor for final inspection.*
- CF-4R Forms shall be completed, registered with an approved HERS Provider (cannot be completed by hand), and submitted by the HERS Rater for final inspection effective January 1, 2010.

DESTRUCTION OF HERS TESTS BELOW (Full descriptions found in Residential Appendix RA3 and Residential Manual)

Cooling Coil Airflow (CCA) – When a refrigerant charge test is required the system must first be tested to move a minimum 300 CFM per ton of cooling. An accrete charge cannot be conducted with air flows lower than 300 CFM per ton of cooling. Air flows can usually be increased by adding a larger return duct and grill or a second return duct and grill.

Refrigerant Charge (RC) – the installer is required to verify the charge is correct. If the outside temperature is below 55 degrees then the weigh in method must be used by the installer. When the weigh in method is used the HERS rater must retest when the temperature is 55 and above using the standard testing protocol in RA3. A charge indicator display or (CID) can be used in place of conducting an RC. The purpose of the CID is to provide real-time information to the building occupant about the status of the system refrigerant charge, metering device and cooling coil airflow. Manufacturers are currently developing this device.

Temperature Measurement Access Holes (TMAH) – Installer must drill and mark holes to measure temperature split.

NOTE: The CF-6R-MECH-04 is required for all HVAC alterations.

*** For final inspection ALL compliance forms (CF-1Rs, CF-6Rs, and CF-4Rs) shall be registered with an approved HERS Provider for building permit applications submitted on or after October 1, 2010.**

Simplified Prescriptive Certificate of Compliance: 2008 Residential HVAC Alterations CF-1R-ALT-HVAC
Climate Zones 8

Site Address:		Enforcement Agency:		Date:	Permit #:
Equipment Type ¹		List Minimum Efficiency ²		Conditioned Floor Area	Thermostat
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other		<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____		<input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance	Served by system _____ sf <input type="checkbox"/> Setback <i>(If not already present, must be installed)</i>
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.					
HERS VERIFICATION SUMMARY Listed below are three HVAC alteration Options. The installer decides what work is being done and picks one of the appropriate Options. Each Option lists the HERS measures that must be conducted. A copy of the forms shall be left on site for final inspection and a copy given to the homeowner. At final, the inspector verifies that the work listed on this form was in fact the work completed by the installer. The inspector also verifies that each appropriate CF-6R and registered CF-4R forms (no hand filled CF-4Rs allowed) are filled out and signed. Beginning October 1, 2010, a registered copy of the CF-1R and CF-6R shall also be on site for final inspection.					
<input type="checkbox"/> 1. HVAC Changeout		Required Forms:			
<ul style="list-style-type: none"> All HVAC Equipment replaced 		CF-6R forms: MECH-04, MECH- 25-HERS CF-4R forms: MECH-25			
<ul style="list-style-type: none"> Condenser Coil and /or Indoor Coil and /or Furnace 		CF-6R forms: MECH- 25-HERS CF-4R forms: MECH-25			
For Split Systems: RC, CCA ≥ 300 CFM/ton, TMAH For Packaged Units: No testing required					
<input type="checkbox"/> 2. New HVAC System		Required Forms:			
<ul style="list-style-type: none"> Cut in or Changeout with new ducts: (all new ducting and all new equipment) 		CF-6R forms: MECH-04, MECH- 25-HERS CF-4R forms: MECH-25			
For Split Systems: RC, CCA ≥ 300 CFM/ton, TMAH. For Packaged Units: No testing required					
<input type="checkbox"/> 3. New Ducts with Replacement		Required Forms:			
<ul style="list-style-type: none"> Includes replacing or installing all new ducting and/or outdoor condensing unit and/or indoor coil and/or furnace. Not all equipment changed. 		CF-6R forms: MECH-25-HERS CF-4R forms: MECH-25			
For Split Systems: RC, CCA ≥ 300 CFM/ton, TMAH For Packaged Units: No testing required					
Contractor (Documentation Author's /Responsible Designer's Declaration Statement) <ul style="list-style-type: none"> I certify that this Certificate of Compliance documentation is accurate and complete. 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. 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. 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. 					
Name:			Signature:		
Company:				Date:	
Address:				License:	
City/State/Zip:				Phone:	

2008 Building Energy Efficiency Standards Residential HVAC Alterations Climate Zones 10 to 15

BUSINESS AND PROFESSIONS CODE, SECTION 7110

Willful or deliberate disregard and violation of the building laws, including the California Building Code, and local permit requirements constitutes a cause for disciplinary action from the Contractors State License Board working in conjunction with the local building department. This action may consist of fines up to \$5,000 per violation or suspension/revocation of a contractor's license.

WHEN IS A PERMIT REQUIRED?

A written construction permit shall be obtained from the enforcement agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system, except as permitted in Appendix Chapter 1, Section 112.2 of the 2007 California Mechanical Code. Projects requiring permits include, but are not limited to:

- New HVAC installation
- HVAC Changeout
- Replacement of furnace, coil, FAU, or condenser
- Relocation of an existing HVAC unit
- Adding or replacing more than 40ft ducting in unconditioned space

2008 BUILDING ENERGY EFFICIENCY STANDARDS (Title 24, Part 6) REQUIREMENTS INCLUDE:

1. Heating equipment must have a minimum 78% AFUE (Exception: Wall & floor furnaces; room heaters).
2. Central air conditioners & heat pumps less than 65,000 Btu/hr must have a minimum 13 SEER.
3. Newly installed or replaced ducts must have a minimum insulation value of R-4.2. When more than 40 ft of ducting will be installed or replaced, the duct insulation value must be R-6 (CZ 10-13), or R-8 (CZ 14 and 15).
4. A setback type thermostat (24 hr clock with four set points) is required for all alterations.
5. New or replacement ducts must meet the mandatory requirements of Section 150(m):
 - All joints and openings in the in the HVAC system must be sealed.
 - Only UL 181, UL 181A, or UL 181B approved tapes or mastic shall be used to seal duct openings.
 - Connections of metals ducts and the inner core of flex ducts shall be mechanically fastened. Flex ducts must be connected using a metal sleeve/coupling.
 - Flex ducts that are suspended must be supported every 4ft. max for horizontal runs with no more than 2" of sag between supports and 6 ft. max for vertical runs.

WHEN IS HERS VERIFICATION REQUIRED AND WHAT FORMS ARE REQUIRED?

HERS verification is required for **all** HVAC alterations in Climate Zone 10-15. A HERS rater is a special inspector for the building department. The building inspector may also request to be on site to witness testing by the contractor and/or HERS rater. The installer picks one of the four options on the CF-1R-ALT-HVAC Form that describe the work being conducted. Each option lists the forms required to be at the job site for final inspection.

- CF-6R Forms shall be completed and submitted by the installing contractor for final inspection.*
- CF-4R Forms shall be completed, registered with an approved HERS Provider (cannot be completed by hand), and submitted by the HERS Rater for final inspection effective January 1, 2010.

DESCRIPTION OF HERS TESTS BELOW (Full descriptions found in Residential Appendix RA3 and Residential Manual)

Duct sealing – The installer is to insure leakage of the HVAC system is less than 6% for new air conditioning system (new equipment and all new ducts) or 15%, 60% reduction, seal all accessible leaks, etc. for alterations to existing HVAC systems. When the contractor uses the option to seal all accessible leaks, all easily movable objects must be moved to seal existing ducting. New ducting installed by the contractor is not allowed to have any leaks even if it is no longer accessible. In example 3 of the CF-1R "all new ducts" means that all the ducting was changed. The original boots, plenums, etc. do not need to be changed.

Cooling Coil Airflow (CCA) – There are two different minimum air flow requirements that must be met. These are 300 CFM and 350 CFM. The minimum 300 CFM per ton of cooling is required in order to conduct a refrigerant charge test. For new HVAC systems (new equipment and new ducts) the HVAC system must move a minimum 350 CFM of air for each ton of cooling.

Refrigerant Charge (RC) – The installer is required to verify the charge is correct. If the outside temperature is below 55 degrees then the weigh in method must be used by the installer. When the weigh in method is used the HERS rater must retest when the temperature is 55 and above. A charge indicator display (CID) can be used in place of conducting an RC, manufacturers are currently developing this device.

Temperature Measurement Access Holes (TMAH) – Installer must drill and mark holes to measure temperature split.

Hole for the placement of a Static Pressure Probe (HSPP) or Permanently installed Static Pressure Probe (PSPP) – Either the installer must drill and mark holes to measure static pressure or a permanently installed pressure probe must be installed and marked.

Saturation Temperature Measurement Sensors (STMS) – Permanently installed type K thermocouple are installed on the indoor and outdoor coil so that the HERS rater can verify charge without attaching gauges. Instructions are found in Ch 4 of the Res. Manual.

Fan Watt Draw (FWD) – Installer verifies that the furnace fan watt draw is less than 0.58 Watts/CFM.

NOTE: The CF-6R-MECH-04 is required for all HVAC alterations.

*** For Final inspection ALL compliance forms (CF-1Rs, CF-6Rs, and CF-4Rs) shall be registered with an approved HERS Provider for building permit applications submitted on or after October 1, 2010.**

Site Address:		Enforcement Agency:		Date:	Permit #:
Equipment Type ¹	List Minimum Efficiency ²		Duct insulation requirement	Conditioned Floor Area	Thermostat
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other	<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____	<input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance _____	Over 40 ft of ducts added or replaced in unconditioned space <input type="checkbox"/> R 6 (CZ 10-13) <input type="checkbox"/> R 8 (CZ 14-15)	Served by system _____ sf	<input type="checkbox"/> Setback <i>(If not already present, must be installed)</i>
<p>1. Equipment Type: Choose the equipment being installed; if more than one system, use another CF-1R-ALT-HVAC for each system.</p> <p>2. Minimum Equipment Efficiencies: 13 SEER, 78% AFUE, 7.7HSPF for typical residential systems.</p>					
<p>HERS VERIFICATION SUMMARY Listed below are four HVAC alteration Options. The installer decides what work is being done and picks one of the appropriate Options. Each Option lists the HERS measures that must be conducted. A copy of the forms shall be left on site for final inspection and a copy given to the homeowner. At final, the inspector verifies that the work listed on this form was in fact the work completed by the installer. The inspector also verifies that each appropriate CF-6R and registered CF-4R forms (no hand filled CF-4Rs allowed) are filled out and signed. Beginning October 1, 2010, a registered copy of the CF-1R and CF-6R shall also be on site for final inspection.</p>					
<input type="checkbox"/> 1. HVAC Changeout		Required Forms:			
<ul style="list-style-type: none"> All HVAC Equipment replaced 		CF-6R forms: MECH-04, MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25			
<ul style="list-style-type: none"> Condenser Coil and /or Indoor Coil and /or Furnace 		CF-6R forms: MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25			
<p>For Split Systems: Duct leakage < 15 percent; RC, CCA ≥ 300 CFM/ton (Minimum Air Flow Requirement), TMAH</p> <p>For Packaged Units: Duct leakage < 15 percent</p> <p>Exempted from duct leakage testing if:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1. Duct system was documented to have been previously sealed and confirmed through HERS verification, or <input type="checkbox"/> 2. Duct systems with less than 40 linear feet in unconditioned space, or <input type="checkbox"/> 3. Existing duct systems are constructed, insulated or sealed with asbestos 					
<input type="checkbox"/> 2. New HVAC System		Required Forms:			
<ul style="list-style-type: none"> Cut in or Changeout with new ducts: (all new ducting <u>and</u> all new equipment) 		CF-6R forms: MECH-04, MECH-20-HERS, and (for split systems) MECH-22-HERS, and MECH-25-HERS CF-4R forms: MECH 20-, and (for split systems) MECH-22, and MECH 25			
<p>For Split Systems: Duct leakage < 6 percent; RC, CCA ≥ 350 CFM/ton, FWD, TMAH, STMS, and either HSPP or PSPP.</p> <p>For Packaged Units: Duct leakage < 6 percent</p>					
<input type="checkbox"/> 3. New Ducts with/ or without Replacement		Required Forms:			
<ul style="list-style-type: none"> Includes replacing or installing all new ducting and/or outdoor condensing unit and/or indoor coil and/or furnace. No or some equipment changed. 		CF-6R forms: MECH-04, MECH-20-HERS, and (for split systems) MECH-25-HERS CF-4R forms: MECH-20 and (for split systems) MECH-25			
<p>For Split Systems: Duct leakage < 6 percent, RC, CCA ≥ 300 CFM/ton, TMAH</p> <p>For Packaged Units: Duct leakage < 6 percent</p>					
<input type="checkbox"/> 4. New Ducting over 40 feet		Required Forms:			
<ul style="list-style-type: none"> Includes adding or replacing more than 40 linear feet of duct in unconditioned space. 		CF-6R forms: MECH-04, MECH-21-HERS		CF-4R forms: MECH-21	
<p>For split system or packaged units: Duct leakage < 15 percent</p> <p><input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.</p>					
<p>Contractor (Documentation Author's /Responsible Designer's Declaration Statement)</p> <ul style="list-style-type: none"> I certify that this Certificate of Compliance documentation is accurate and complete. 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. 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. 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. 					
Name:			Signature:		
Company:			Date:		
Address:			License:		
City/State/Zip:			Phone:		

2008 Building Energy Efficiency Standards Residential HVAC Alterations Climate Zone 16

BUSINESS AND PROFESSIONS CODE, SECTION 7110

Willful or deliberate disregard and violation of the building laws, including the California Building Code, and local permit requirements constitutes a cause for disciplinary action from the Contractors State License Board working in conjunction with the local building department. This action may consist of fines up to \$5,000 per violation or suspension/revocation of a contractor's license.

WHEN IS A PERMIT REQUIRED?

A written construction permit shall be obtained from the enforcement agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system, except as permitted in Appendix Chapter 1, Section 112.2 of the 2007 California Mechanical Code. Projects requiring permits include, but are not limited to:

- New HVAC installation
- HVAC Changeout
- Replacement of furnace, coil, FAU, or condenser
- Relocation of an existing HVAC unit
- Adding or replacing more than 40ft ducting in unconditioned space

2008 BUILDING ENERGY EFFICIENCY STANDARDS (Title 24, Part 6) REQUIREMENTS INCLUDE:

1. Heating equipment must have a minimum 78% AFUE (Exception: Wall & floor furnaces; room heaters).
2. Central air conditioners & heat pumps less than 65,000 Btu/hr must have a minimum 13 SEER.
3. Newly installed or replaced ducts must have a minimum insulation value of R-4.2.
4. A setback type thermostat (24 hr clock with four set points) is required for all alterations.
5. New or replacement ducts must meet the mandatory requirements of Section 150(m):
 - All joints and openings in the HVAC system must be sealed.
 - Only UL 181, UL 181A, or UL 181B approved tapes or mastic shall be used to seal duct openings.
 - Connections of metals ducts and the inner core of flex ducts shall be mechanically fastened. Flex ducts must be connected using a metal sleeve/coupling.
 - Flex ducts that are suspended must be supported every 4 ft. max for horizontal runs with no more than 2" of sag between supports and 6 ft. max for vertical runs.

WHEN IS HERS VERIFICATION REQUIRED AND WHAT FORMS ARE REQUIRED?

A HERS rater is a special inspector for the building department. The building inspector may also request to be on site to witness testing by the contractor and/or HERS rater. The installer picks one of the four options on the CF-1R-ALT-HVAC Form that describe the work being conducted. Each option lists the forms required to be at the job site for final inspection.

- CF-6R Forms shall be completed and submitted by the installing contractor for final inspection.*
- CF-4R Forms shall be completed, registered with an approved HERS Provider (cannot be completed by hand), and submitted by the HERS Rater for final inspection effective January 1, 2010.

DESCRIPTION OF HERS TESTS BELOW (Full descriptions found in Residential Appendix RA3 and Residential Manual)

Duct sealing – The installer is to insure leakage of the HVAC system is less than 6% for new air conditioning system (new equipment and all new ducts) or 15%, 60% reduction, etc. for alterations to existing HVAC systems. When the contractor uses the option to seal all accessible leaks, all easily movable objects must be moved to seal existing ducting. New ducting installed by the contractor is not allowed to have any leaks even if it is no longer accessible. In example 3 of the CF-1R "all new ducts" means that all the ducting was changed. The original boots, plenums, etc. do not need to be changed.

Cooling Coil Airflow (CCA) – When a refrigerant charge test is required, the system must first be tested to move a minimum 300 CFM per ton of cooling. An accurate charge cannot be conducted with air flows lower than 300 CFM per ton of cooling. Air flows can usually be increased by adding a larger return duct and grill or a second return duct and grill.

Temperature Measurement Access Holes (TMAH) – Installer must drill and mark holes to measure temperature split.

NOTE: The CF-6R-MECH-04 is required for all HVAC alterations.

*** For final inspection ALL compliance forms (CF-1Rs, CF-6Rs, and CF-4Rs) shall be registered with an approved HERS Provider for building permit applications submitted on or after October 1, 2010.**

Simplified Prescriptive Certificate of Compliance: 2008 Residential HVAC CF-1R-ALT-HVAC

Climate Zones 16

Site Address:		Enforcement Agency:		Date:	Permit #:
Equipment Type ¹	List Minimum Efficiency ²	Conditioned Floor Area	Duct insulation requirement	Thermostat	
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other _____	<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____	<input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance _____	Served by system _____ sf Over 40 ft of ducts added or replaced in unconditioned space <input type="checkbox"/> R 8 (CZ 16)	<input type="checkbox"/> Setback (If not already present, must be installed)	
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.					
HERS VERIFICATION SUMMARY Listed below are four HVAC alteration Options. The installer decides what work is being done and picks one of the appropriate Options. Each Option lists the HERS measures that must be conducted. A copy of the forms shall be left on site for final inspection and a copy given to the homeowner. At final, the inspector verifies that the work listed on this form was in fact the work completed by the installer. The inspector also verifies that each appropriate CF-6R and registered CF-4R forms (no hand filled CF-4Rs allowed) are filled out and signed. Beginning October 1, 2010, a registered copy of the CF-1R and CF-6R shall also be on site for final inspection.					
<input type="checkbox"/> 1. HVAC Changeout		Required Forms:			
<ul style="list-style-type: none"> • All HVAC Equipment replaced 		CF-6R forms: MECH-04 and MECH-21-HERS CF-4R forms: MECH- 21			
<ul style="list-style-type: none"> • Condenser Coil and /or • Indoor Coil and /or • Furnace 		CF-6R forms: MECH-21-HERS CF-4R forms: MECH- 21			
For Split Systems: Duct leakage < 15 percent For Packaged Units: Duct leakage < 15 percent Exempted from duct leakage testing if: <ul style="list-style-type: none"> <input type="checkbox"/> 1. Duct system was documented to have been previously sealed and confirmed through HERS verification, or <input type="checkbox"/> 2. Duct systems with less than 40 linear feet in unconditioned space, or <input type="checkbox"/> 3. Existing duct systems are constructed, insulated or sealed with asbestos 					
<input type="checkbox"/> 2. New HVAC System		Required Forms:			
<ul style="list-style-type: none"> • Cut in or Changeout with new ducts: (all new ducting <u>and</u> all new equipment) 		CF-6R forms: MECH-04 and MECH-21-HERS CF-4R forms: MECH- 21			
For Split Systems: Duct leakage < 6 percent, For Packaged Units: Duct leakage < 6 percent					
<input type="checkbox"/> 3. New Ducts with Replacement		Required Forms:			
<ul style="list-style-type: none"> • Includes replacing or installing all new ducting and/or outdoor condensing unit and/or indoor coil and/or furnace. Not all equipment changed. 		CF-6R forms: MECH-04 and MECH-20-HERS CF-4R forms: MECH-20			
For Split Systems: Duct leakage < 6 percent For Packaged Units: Duct leakage < 6 percent					
<input type="checkbox"/> 4. New Ducting over 40 feet		Required Forms:			
<ul style="list-style-type: none"> • Includes adding or replacing more than 40 linear feet of duct in unconditioned space. 		CF-6R forms: MECH-04 and MECH-21-HERS CF-4R forms: MECH-21			
For split system or packaged units: Duct leakage < 15 percent <input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.					
Contractor (Documentation Author's /Responsible Designer's Declaration Statement) <ul style="list-style-type: none"> • I certify that this Certificate of Compliance documentation is accurate and complete. • 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. • 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. • 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. 					
Name:			Signature:		
Company:				Date:	
Address:				License:	
City/State/Zip:				Phone:	

*RESIDENTIAL
CERTIFICATE OF COMPLIANCE
MF-1R*

Mandatory Measures Summary

MF-1R

Residential

(Page 1 of 3)

Site Address:

Enforcement Agency:

Date:

NOTE: Low-rise residential buildings subject to the Standards must comply with all applicable mandatory measures listed, regardless of the compliance approach used. More stringent energy measures listed on the Certificate of Compliance (CF-1R, CF-1R-ADD, or CF-1R-ALT Form) shall supersede the items marked with an asterisk () below. This Mandatory Measures Summary shall be incorporated into the permit documents and the applicable features shall be considered by all parties as minimum component performance specifications whether they are shown elsewhere in the documents or in this summary. Submit all applicable sections of the MF-1R Form with plans.*

DESCRIPTION

Building Envelope Measures:

§116(a)1: Doors and windows between conditioned and unconditioned spaces are manufactured to limit air leakage.

§116(a)4: Fenestration products (except field-fabricated windows) have a label listing the certified U-Factor, certified Solar Heat Gain Coefficient (SHGC), and infiltration that meets the requirements of §10-111(a).

§117: Exterior doors and windows are weather-stripped; all joints and penetrations are caulked and sealed.

§118(a): Insulation specified or installed meets Standards for Insulating Material. Indicate type and include on CF-6R Form.

§118(i): The thermal emittance and solar reflectance values of the cool roofing material meets the requirements of §118(i) when the installation of a Cool Roof is specified on the CF-1R Form.

*§150(a): Minimum R-19 insulation in wood-frame ceiling or equivalent U-factor.

§150(b): Loose fill insulation shall conform with manufacturer's installed design labeled R-Value.

*§150(c): Minimum R-13 insulation in wood-frame wall or equivalent U-factor.

*§150(d): Minimum R-13 insulation in raised wood-frame floor or equivalent U-factor.

§150(f): Air retarding wrap is tested, labeled, and installed according to ASTM E1677-95(2000) when specified on the CF-1R Form.

§150(g): Mandatory Vapor barrier installed in Climate Zones 14 or 16.

§150(i): Water absorption rate for slab edge insulation material alone without facings is no greater than 0.3%; water vapor permeance rate is no greater than 2.0 perm/inch and shall be protected from physical damage and UV light deterioration.

Fireplaces, Decorative Gas Appliances and Gas Log Measures:

§150(e)1A: Masonry or factory-built fireplaces have a closable metal or glass door covering the entire opening of the firebox.

§150(e)1B: Masonry or factory-built fireplaces have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper and or a combustion-air control device.

§150(e)2: Continuous burning pilot lights and the use of indoor air for cooling a firebox jacket, when that indoor air is vented to the outside of the building, are prohibited.

Space Conditioning, Water Heating and Plumbing System Measures:

§110-§113: HVAC equipment, water heaters, showerheads, faucets and all other regulated appliances are certified by the Energy Commission.

§113(c)5: Water heating recirculation loops serving multiple dwelling units and High-Rise residential occupancies meet the air release valve, backflow prevention, pump isolation valve, and recirculation loop connection requirements of §113(c)5.

§115: Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces, household cooking appliances (appliances with an electrical supply voltage connection with pilot lights that consume less than 150 Btu/hr are exempt), and pool and spa heaters.

§150(h): Heating and/or cooling loads are calculated in accordance with ASHRAE, SMACNA or ACCA.

§150(i): Heating systems are equipped with thermostats that meet the setback requirements of Section 112(c).

§150(j)1A: Storage gas water heaters rated with an Energy Factor no greater than the federal minimal standard are externally wrapped with insulation having an installed thermal resistance of R-12 or greater.

§150(j)1B: Unfired storage tanks, such as storage tanks or backup tanks for solar water-heating system, or other indirect hot water tanks have R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.

§150(j)2: First 5 feet of hot and cold water pipes closest to water heater tank, non-recirculating systems, and entire length of recirculating sections of hot water pipes are insulated per Standards Table 150-B.

§150(j)2: Cooling system piping (suction, chilled water, or brine lines), and piping insulated between heating source and indirect hot water tank shall be insulated to Table 150-B and Equation 150-A.

§150(j)2: Pipe insulation for steam hydronic heating systems or hot water systems >15 psi, meets the requirements of Standards Table 123-A.

§150(j)3A: Insulation is protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind.

§150(j)3A: Insulation for chilled water piping and refrigerant suction lines includes a vapor retardant or is enclosed entirely in conditioned space.

Mandatory Measures Summary

MF-1R

Residential

(Page 2 of 3)

Site Address:

Enforcement Agency:

Date:

§150(j)4: Solar water-heating systems and/or collectors are certified by the Solar Rating and Certification Corporation.

Ducts and Fans Measures:

§150(m)1: All air-distribution system ducts and plenums installed, are sealed and insulated to meet the requirements of CMC Sections 601, 602, 603, 604, 605 and Standard 6-5; supply-air and return-air ducts and plenums are insulated to a minimum installed level of R-4.2 or enclosed entirely in conditioned space. Openings shall be sealed with mastic, tape or other duct-closure system that meets the applicable requirements of UL 181, UL 181A, or UL 181B or aerosol sealant that meets the requirements of UL 723. If mastic or tape is used to seal openings greater than 1/4 inch, the combination of mastic and either mesh or tape shall be used.

§150(m)1: Building cavities, support platforms for air handlers, and plenums defined or constructed with materials other than sealed sheet metal, duct board or flexible duct shall not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. Ducts installed in cavities and support platforms shall not be compressed to cause reductions in the cross-sectional area of the ducts.

§150(m)2D: Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.

§150(m)7: Exhaust fan systems have back draft or automatic dampers.

§150(m)8: Gravity ventilating systems serving conditioned space have either automatic or readily accessible, manually operated dampers.

§150(m)9: Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.

§150(m)10: Flexible ducts cannot have porous inner cores.

§150(o): All dwelling units shall meet the requirements of ANSI/ASHRAE Standard 62.2-2007 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings. Window operation is not a permissible method of providing the Whole Building Ventilation required in Section 4 of that Standard.

Pool and Spa Heating Systems and Equipment Measures:

§114(a): Any pool or spa heating system shall be certified to have: a thermal efficiency that complies with the Appliance Efficiency Regulations; an on-off switch mounted outside of the heater; a permanent weatherproof plate or card with operating instructions; and shall not use electric resistance heating or a pilot light.

§114(b)1: Any pool or spa heating equipment shall be installed with at least 36" of pipe between filter and heater, or dedicated suction and return lines, or built-up connections for future solar heating.

§114(b)2: Outdoor pools or spas that have a heat pump or gas heater shall have a cover.

§114(b)3: Pools shall have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.

§150(p): Residential pool systems or equipment meet the pump sizing, flow rate, piping, filters, and valve requirements of §150(p).

Residential Lighting Measures:

§150(k)1: High efficacy luminaires or LED Light Engine with Integral Heat Sink has an efficacy that is no lower than the efficacies contained in Table 150-C and is not a low efficacy luminaire as specified by §150(k)2.

§150(k)3: The wattage of permanently installed luminaires shall be determined as specified by §130(d).

§150(k)4: Ballasts for fluorescent lamps rated 13 Watts or greater shall be electronic and shall have an output frequency no less than 20 kHz.

§150(k)5: Permanently installed night lights and night lights integral to a permanently installed luminaire or exhaust fan shall contain only high efficacy lamps meeting the minimum efficacies contained in Table 150-C and shall not contain a line-voltage socket or line-voltage lamp holder; OR shall be rated to consume no more than five watts of power as determined by §130(d), and shall not contain a medium screw-base socket.

§150(k)6: Lighting integral to exhaust fans, in rooms other than kitchens, shall meet the applicable requirements of §150(k).

§150(k)7: All switching devices and controls shall meet the requirements of §150(k)7.

§150(k)8: A minimum of 50 percent of the total rated wattage of permanently installed lighting in kitchens shall be high efficacy.
EXCEPTION: Up to 50 watts for dwelling units less than or equal to 2,500 ft² or 100 watts for dwelling units larger than 2,500 ft² may be exempt from the 50% high efficacy requirement when: all low efficacy luminaires in the kitchen are controlled by a manual on occupant sensor, dimmer, energy management system (EMCS), or a multi-scene programmable control system; and all permanently installed luminaries in garages, laundry rooms, closets greater than 70 square feet, and utility rooms are high efficacy and controlled by a manual-on occupant sensor.

§150(k)9: Permanently installed lighting that is internal to cabinets shall use no more than 20 watts of power per linear foot of illuminated cabinet.

§150(k)10: Permanently installed luminaires in bathrooms, attached and detached garages, laundry rooms, closets and utility rooms shall be high efficacy.

Mandatory Measures Summary

MF-1R

Residential

(Page 3 of 3)

Site Address:

Enforcement Agency:

Date:

EXCEPTION 1: Permanently installed low efficacy luminaires shall be allowed provided that they are controlled by a manual-on occupant sensor certified to comply with the applicable requirements of §119.

EXCEPTION 2: Permanently installed low efficacy luminaires in closets less than 70 square feet are not required to be controlled by a manual-on occupant sensor.

§150(k)11: Permanently installed luminaires located in rooms or areas other than in kitchens, bathrooms, garages, laundry rooms, closets, and utility rooms shall be high efficacy luminaires.

EXCEPTION 1: Permanently installed low efficacy luminaires shall be allowed provided they are controlled by either a dimmer switch that complies with the applicable requirements of §119, or by a manual-on occupant sensor that complies with the applicable requirements of §119.

EXCEPTION 2: Lighting in detached storage building less than 1000 square feet located on a residential site is not required to comply with §150(k)11.

§150(k)12: Luminaires recessed into insulated ceilings shall be listed for zero clearance insulation contact (IC) by Underwriters Laboratories or other nationally recognized testing/rating laboratory; and have a label that certifies the luminaire is airtight with air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283; and be sealed with a gasket or caulk between the luminaire housing and ceiling.

§150(k)13: Luminaires providing outdoor lighting, including lighting for private patios in low-rise residential buildings with four or more dwelling units, entrances, balconies, and porches, which are permanently mounted to a residential building or to other buildings on the same lot shall be high efficacy.

EXCEPTION 1: Permanently installed outdoor low efficacy luminaires shall be allowed provided that they are controlled by a manual on/off switch, a motion sensor not having an override or bypass switch that disables the motion sensor, and one of the following controls: a photocontrol not having an override or bypass switch that disables the photocontrol; OR an astronomical time clock not having an override or bypass switch that disables the astronomical time clock; OR an energy management control system (EMCS) not having an override or bypass switch that allows the luminaire to be always on

EXCEPTION 2: Outdoor luminaires used to comply with Exception 1 to §150(k)13 may be controlled by a temporary override switch which bypasses the motion sensing function provided that the motion sensor is automatically reactivated within six hours.

EXCEPTION 3: Permanently installed luminaires in or around swimming pool, water features, or other location subject to Article 680 of the California Electric Code need not be high efficacy luminaires.

§150(k)14: Internally illuminated address signs shall comply with Section 148; OR not contain a screw-base socket, and consume no more than five watts of power as determined according to §130(d).

§150(k)15: Lighting for parking lots and carports with a total of for 8 or more vehicles per site shall comply with the applicable requirements in Sections 130, 132, 134, and 147. Lighting for parking garages for 8 or more vehicles shall comply with the applicable requirements of Sections 130, 131, 134, and 146

§150(k)16: Permanently installed lighting in the enclosed, non-dwelling spaces of low-rise residential buildings with four or more dwelling units shall be high efficacy luminaires.

EXCEPTION: Permanently installed low efficacy luminaires shall be allowed provided that they are controlled by an occupant sensor(s) certified to comply with the applicable requirements of §119.

RESIDENTIAL WORKSHEETS

Area Weighted Average Calculation Worksheet

WS-2R

Residential

(Page 1 of 1)

Site Address:

Enforcement Agency:

Date:

This worksheet should be used to calculate weight-averaged U-factors or averaged SHGC values for prescriptive envelope compliance. R-values can never be area weighted; only area-weighted U-factors.

Whenever two or more types of a building feature, material, or construction assembly occur in a building, a weighted average of the different types must be calculated. Weighted averaging is simply a mathematical technique for combining different amounts of various components into a single number. Weighted averaging is frequently done when there is more than one level of floor, wall, or ceiling insulation in a building, or more than one type of window (the SHGC values of skylights cannot be averaged per §151(f)4A).

- a. "Area" can be replaced throughout the formula by "Length" or any other unit of measure used for the value being averaged.
- b. "Value" can be replaced throughout the formula by "U-factor," "Solar Heat Gain Coefficient," or any other value that varies throughout a residence and is appropriate to weight average.

Item No.	Type 1 Value ^b	x	Type 1 Area ^a	+	Type 2 Value ^b	x	Type 2 Area ^a	+	Type 3 Value ^b	x	Type 3 Area ^a	÷	Total Area	=	Weighted Average Value
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	

Solar Heat Gain Coefficient Worksheet

WS-3R

Residential

(Page 1 of 2)

Site Address:

Enforcement Agency:

Date:

Items 1 through 4 must be completed for glazing/shading combinations by using the Default Table for Fenestration Products (Table 116-B of the Standards), NFRC certified data, or Solar Heat Gain Coefficients Used for Exterior Shading Attachments (Table S-1 below) for the specific conditions indicated (#1a or #1b or #3).

General Information

1a. For Fenestration Products w/NFRC testing and labels:
OR

SHGC_{fen} = _____

1b. For Fenestration Products without NFRC testing and labels (Table 116-B of the Standards):

SHGC_{fen} = _____

1c. Frame Type

1d. Product Type

1e. Glazing Type

1f. Single/Double Pane

metal, non-metal,
metal w/thermal break

operable/fixed

(visibly) tinted
clear (not visibly tinted)

single pane/double pane

2. Skylight (Y/N) _____

(A skylight is fenestration mounted on a roof surface at a slope less than 60° from the horizon.)

Combined Exterior Shade with Fenestration

3. SHGC_{Exterior Shade}: _____

Exterior Shade Type: _____

(If no exterior shade, assume standard bug screens, SHGC_{Exterior Shade} = 0.76 for ordinary windows. This requirement does not apply to skylights where SHGC_{Exterior Shade} is assumed to be 1.00. If another exterior shade is substituted for bug screens, use one of the values from Table S-1.

4.
$$\left[\left(\frac{\text{SHGC}_{\text{max}}}{\text{SHGC}_{\text{min}}} \times 0.2875 \right) + 0.75 \right] \times \frac{\text{Total SHGC}}{\text{SHGC}_{\text{min}}}$$

Where:

SHGC_{max} = Larger of (#1a or #1b) or #3

SHGC_{min} = Smaller of (#1a or #1b) or #3

Note: Calculated Solar Heat Gain Coefficient values for Total SHGC may be used directly for prescriptive packages.

- Package C Target Value for Total SHGC is 0.40 for Climate Zones 2 through 15
- Package D Target Value for Total SHGC is 0.40 for Climate Zones 2, 4 through 14 and 0.35 in Climate Zone 15
- Package E Target Value for Total SHGC is 0.40 for Climate Zones 2, 3, 5, 6, 8 through 10, and 0.25 in Climate Zones 4, 7, 11, 12, 14, and 15, and 0.30 in Climate Zone 13.

Table S-1: Solar Heat Gain Coefficients Used for Permanently Installed Exterior Shading Attachments for WS-3R^{1,2}

Exterior Shading Device³

With Single Pane
Clear Glass & Metal Framing⁴

1) Standard Bug Screens	0.76
2) Exterior Sunscreens with Weave 53 x 16/inch	0.30
3) Louvered Sunscreens w/Louvers as Wide as Openings	0.27
4) Low Sun Angle (LSA) Louvered Sunscreens	0.13
5) Vertical Roller or Shades or Retractable/Drop Arm/Marquisolette and Operable Awnings ²	0.13
6) Roll Down Blinds or Slats	0.13
7) None (for skylights only)	1.00

Notes:

1. These values may be used on line 3 of the Solar Heat Gain Coefficient (SHGC) Worksheet (WS-3R) to calculate exterior shading with other glazing types and combined interior and exterior shading with glazing.
2. Exterior operable awnings (canvas, plastic or metal), except those that roll vertically down and cover the entire window, should be treated as overhangs (use the SHGC equation) for the purposes of compliance with the Standards. See Fixed Shading Devices and Exterior Shading Devices in the Residential compliance Manual, Chapter 3.
3. Standard bug screens must be assumed for all fenestration unless replaced by other exterior shading attachments. The solar heat gain coefficient listed for bug screens is an area-weighted value that assumes that the screens are only on operable windows. The solar heat gain coefficient of any other exterior shade screens applied only to some window areas must be area-weighted with the solar heat gain coefficient of standard bug screens for all other glazing (see Form WS-2R). Different shading conditions may also be modeled explicitly in the computer performance method.
4. Reference glass for determining solar heat gain coefficients is 1/8 inch double strength (DSS) glass.

Solar Heat Gain Coefficient Worksheet		WS-3R
Residential		(Page 2 of 2)
Site Address:	Enforcement Agency:	Date:

Instructions for WS-3R

The following explains how to calculate solar heat gain coefficients on WS-3R. The number of each item below corresponds to the appropriate item on WS-3R.

Enter either:

1a. For products with NFRC testing and labels, enter the product’s labeled SHGC as #1a. $SHGC_{fen}$

OR

1b.	Enter the default $SHGC_{fen}$ from Table 116-B of the Standards corresponding to the fenestration characteristics described in entries 1c, 1d, 1e, and 1f. Entries for 1c, 1d, 1e, and 1f are only needed if 1b is entered for $SHGC_{fen}$.
-----	--

If 1b is entered, then:

1c	Describe the Frame Type [metal, metal w/thermal break, or non-metal (non-metal includes both vinyl and wood)].
1d	The Product Type (operable or fixed).
1e	The glazing type (tinted or uncoated). Note that tints or coatings that cannot be easily observed by the building official must be classified as “uncoated.” Tints must be easily visible to the naked eye.
1f	Single or double pane glazing.

2. For skylights mounted on a roof surface, enter “Y,” otherwise enter “N.” A skylight is fenestration mounted at a slope less than 60° from the horizon.
3. Describe the exterior shading device in the space provided (e.g., roll down awning). List $SHGC_{Exterior\ Shade}$, the SHGC of the exterior shade with 1/8” clear single pane glass and metal framing, from Table S-1. If a single window or skylight has multiple exterior shades (i.e., shade screens and awnings) use the one shading device with the lower SHGC.

If no exterior shade is proposed, assume standard bug screens with a SHGC of 0.76 (or a SHGC of 1.00 for horizontal glazing). This applies to the full area of fixed fenestration products as well as operable.
4. Calculate $SHGC_{Shade\ Open}$ using values from Items 3 and either 1a or 1b. The result is the combined SHGC of the fenestration product and exterior device with the interior *shade open*.

*CF-6R – ENVELOPE
INSTALLATION CERTIFICATES*

Envelope – Insulation; Roofing; Fenestration

Site Address: _____

Enforcement Agency: _____

Permit Number: _____

If more than one person has responsibility for installation of the items on this certificate, each person shall prepare and sign a certificate applicable to the portion of construction for which they are responsible; alternatively, the person with chief responsibility for construction shall prepare and sign this certificate for the entire construction. All applicable Mandatory Measures with check boxes require to be checked to ensure the mandatory measures have been met.

Description of Insulation

1. RAISED FLOOR

Material: _____

Brand Name: _____

Thickness (inches): _____

Thermal Resistance (R-Value): _____

§150(d): Minimum R-13 insulation in raised wood-frame floor or equivalent U-factor.

2. SLAB FLOOR/PERIMETER

Material: _____

Brand Name: _____

Thickness (inches): _____

Thermal Resistance (R-Value): _____

Perimeter Insulation Depth (inches): _____

§150(l): Water absorption rate for the insulation material alone without facings is no greater than 0.3%; water vapor permeance rate is no greater than 2.0 perm/inch and shall be protected from physical damage and UV light deterioration.

3. EXTERIOR WALL

a. Insulation Type (e.x. Batt, Loose Fill, Spray Foam)

a. Thermal Resistance (R-Value): _____

b. Insulation Type (e.x. Batt, Loose Fill, Spray Foam)

b. Thermal Resistance (R-Value): _____

Brand: _____

Spray/Loose fill) Installed Actual Thickness (inches): _____

Spray/Loose fill) Contractor's min installed weight/ft² _____ lb

Manufacturer's installed weight per square foot to achieve Thermal Resistance (R-Value)

§150(c): Minimum R-13 insulation in wood-frame wall or equivalent U-factor.

Exterior Foam Sheathing (rigid Insulation)

Material: _____

Brand Name: _____

Thickness (inches) : _____

Thermal Resistance (R-Value) : _____

4. FOUNDATION WALL

Material: _____

Brand Name: _____

Thickness (inches): _____

Thermal Resistance (R-Value): _____

5. CEILING

Batt or Blanket Type: _____

Brand Name: _____

Loose Fill Type: _____

Thermal Resistance (R-Value): _____

Spray Foam Type: _____

Brand Name: _____

Installed Actual Thickness (inches): _____

Contractor's min installed weight/ft² _____ lb

Manufacturer's installed weight per square foot to achieve Thermal Resistance (R-Value):

§150(a): Minimum R-19 insulation in wood-frame ceiling or equivalent U-factor.

6. ATTIC ROOF INSULATION AND/OR ATTIC RADIANT BARRIER

Material: _____

Brand Name: _____

Material: _____

Brand Name: _____

Thickness (inches): _____

Thermal Resistance (R-Value): _____

§118(a): Insulation installed meets Standards for Insulating Material.

§150(g): Mandatory Vapor barrier installed in Climate Zones 14 or 16.

INSTALLATION CERTIFICATE

CF-6R-ENV-01

Envelope – Insulation; Roofing; Fenestration

(Page 2 of 3)

Site Address:

Enforcement Agency:

Permit Number:

Description of Roofing Products

CRRC Product ID Number ¹	Manufacturer Information	Brand/Model	Product Type	Roof Area	Roof Slope	Product Weight ²	Initial Solar Reflectance	Aged Solar Reflectance ⁴	Thermal Emittance
								<input type="checkbox"/> ³	
								<input type="checkbox"/> ³	
								<input type="checkbox"/> ³	

1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council's Rated Product Directory at www.coolroofs.org/products/search.php

2. The weight in lbs per square feet of the roofing product being installed.

3. Check box if the Aged Reflectance is a calculated value using the equation below, footnote 4.

4. If the aged reflectance is not available in the Cool Roof Rating Council's Rated Product Directory then use the initial reflectance value from the directory and use the equation $(0.2 + 0.7(\rho_{initial} - 0.2))$ to obtain a calculated aged value.

CHECK APPLICABLE BOX BELOW IF EXEMPT FROM THE ROOFING PRODUCT "COOL ROOF" REQUIREMENT:

The roof area covered by building integrated photovoltaic panels and building integrated solar thermal panels are exempt from the above Cool Roof criteria.

Roof constructions that have thermal mass over the roof membrane with a weight of at least 25 lb/ft² is exempted from the above Cool Roof criteria.

To apply Liquid Field Applied Coatings, the coating must be applied with a minimum dry mil thickness of 20 mils across the entire roof surface and meet minimum performance requirements listed in §118(i)3 and Table 118-C. Select the applicable coating

Aluminum-Pigmented Asphalt Roof Coating

Cement-Based Roof Coating

Other _____

CRRC-1 Label Attached to CF-6R

(Note if no CRRC-1 label is available, this compliance method cannot be used and another method is required to meet compliance).

FENESTRATION/GLAZING

Item	Manufacturer/Brand Name (GROUP LIKE PRODUCTS)	Product U-factor ¹	Product SHGC ¹	# of Panes	NFRC Certified ^{1,2}	Total Quantity of Like Product (Optional)	Area ft ²	Add. Exterior Shading Dev. or Overhang	Comments/ Location/ Special Features
1									
2									
3									
4									
5									
6									
7									
8									

1. Use values from a fenestration product's NFRC Certified Label. For fenestration products without an NFRC label, use the default values from Section 116, Table 116-A and 116-B of the 2008 Energy Efficiency Standards.

2. NFRC Label Certificates shall not be removed until the building inspector has verified the efficiency. Enter Yes or No.

§116(a)1: Doors and windows between conditioned and unconditioned spaces designed to limit air leakage.

§116(a)2 and 3: Actual fenestration products installed are equivalent to or have a lower U-factor and/or a lower SHGC than that specified on the Certificate of Compliance (Form CF-1R).

§116(a)4: Fenestration products (except field-fabricated windows) have a label listing the certified U-Factor, certified Solar Heat Gain Coefficient (SHGC), and infiltration that meets the requirements of §10-111(a)

§117: Exterior doors and windows weather-stripped; all joints and penetrations caulked and sealed.

INSTALLATION CERTIFICATE**CF-6R-ENV-01****Envelope – Insulation; Roofing; Fenestration****(Page 3 of 3)****Site Address:****Enforcement Agency:****Permit Number:****DECLARATION STATEMENT**

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)

Responsible Person's Name:

Responsible Person's Signature:

CSLB License:

Date Signed:

Position With Company (Title):

CF-6R-ENVELOPE-HERS

INSTALLATION CERTIFICATE		CF-6R-ENV-20-HERS
Building Envelope Sealing		(Page 1 of 3)
Site Address:	Enforcement Agency:	Permit Number:

BUILDING ENVELOPE SEALING

Two methods are available to the installer for demonstrating compliance with the building envelope sealing requirement: 1) Rough Frame Inspection Checklist and Final Inspection Checklist, or 2) Building Envelope Leakage Diagnostic Test utilizing a blower door diagnostic test instrument. Note: HERS verification of the actual envelope leakage is required to be performed using the Building Envelope Leakage Test. In order to receive credit for the Building Envelope Sealing measure, the dwelling must comply with the HERS verification requirements. Completion of the Rough Frame Inspection Checklist and Final Inspection Checklist does not insure that the envelope will meet the requirements of the HERS verification procedure.

1a. Rough Frame Inspection Checklist

Sole Plate

- Entire sole plate of the home is either Rope caulk, foam gasket, or with caulking bead sealed.

Top Plate

- All electrical penetrations between conditioned and unconditioned spaces sealed with foam
- All piping penetrations between conditioned and unconditioned spaces sealed with foam

Ceiling

- Ceiling forms a continuous air barrier and any gaps or openings are filled with foam
- All recessed light fixtures in unconditioned space are IC (Insulation Contact) and AT (Air tight) rated and a gasket or sealing material is installed.
- All duct chases, fireplace chases, and double walls sealed air tight at the ceiling level. All gaps into shafts must be filled with foam or caulk.
- Openings around flue shafts fully sealed with solid blocking or flashing and any remaining gaps sealed with fire-rated caulk or sealant.
- Penetrations from wiring sealed with caulk or sealant

Floor Air Barrier

- All gaps in the raised floor between conditioned and unconditioned space (or to outside) filled with foam or caulk.
- All openings under a tub where the drain penetrates the floor sealed
- Garage band joist must be air tight at bays adjoining conditioned space

Walls

- All gaps around the windows caulked
- All gaps in exterior wall sheathing between conditioned and unconditioned space (or to outside) filled with foam or caulk
- All gaps in sheathing between conditioned space and the garage, attic, or covered patio filled with foam or caulk
- All other penetrations or cracks between conditioned and unconditioned space (the exterior of the home) sealed with foam or caulk

HVAC

Ensure that the following are sealed with an approved UL 181 mastic or tape:

Duct Work

- All register boot seams
- Return seams
- Return and supply collars
- Duct collars
- Duct board, T and Y seams

Furnace

- FAU seams
- FAU door
- Coil box is air tight including seams, condensate line, knockouts, and lineset.
- Supply and return plenums

INSTALLATION CERTIFICATE		CF-6R-ENV-20-HERS
Building Envelope Sealing		(Page 2 of 3)
Site Address:	Enforcement Agency:	Permit Number:

1b. Final Inspection Checklist

All gaps and penetrations in the drywall must be caulked or gasketed. All gaps and penetrations in the exterior sheathing must be caulked or gasketed. Some examples are:

Ceiling Penetrations

- All HVAC register boots are sealed to the drywall with caulking or tape
- All returns are sealed to the drywall
- All lighting fixtures are sealed to the drywall with a gasket, caulking or tape
- Any other penetrations to the drywall (for example fire sprinklers, whole house fans, surround sound speakers, ceiling outlet box etc.) are sealed with caulk or tape
- Attic access door is installed with weather stripping

Wall Penetrations

- All electrical outlets and switches are installed and sealed
- Any other penetrations to the drywall or exterior walls are sealed

General Inspections

- Flooring is installed
- Weather stripping is installed on doors and windows
- Exhaust fan dampers for kitchen and bath fans installed and working

HERS Provider: _____ Registration Number: _____ Registration Date: _____

INSTALLATION CERTIFICATE		CF-6R-ENV-20-HERS
Building Envelope Sealing		(Page 3 of 3)
Site Address:	Enforcement Agency:	Permit Number:

2. Building Envelope Leakage Test

Diagnostic Testing Results			
<i>CFM50_H = the measured airflow in cubic feet per minute (cfm) at 50 pascals for the dwelling with air distribution registers unsealed. SLA = 3.819 x (CFM50_H / Conditioned Floor Area in ft²) per Residential ACM Manual Equation R3-16</i>			
	Building Envelope Leakage <i>CFM50_H</i> as measured using a blower door diagnostic device	✓	✓
1.	Enter the blower door leakage target <i>CFM50_H</i> value for compliance from the CF-1R (cfm).		
2.	Enter the blower door leakage minimum <i>CFM50_H</i> value corresponding to 1.5 SLA from the CF-1R (cfm).		
3.	Enter the measured <i>CFM50_H</i> value from the blower door test (cfm)		
4.	The leakage test passes if the measured envelope leakage <i>CFM50_H</i> value from row is 3 less than or equal to the value required for compliance from row 1, otherwise the test fails. check/enter Pass or Fail	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
5.	If measured <i>CFM50_H</i> from row 3 is less than the minimum <i>CFM50_H</i> value corresponding to 1.5 SLA from row 2: check/enter < 1.5 SLA, otherwise check/enter ≥1.5 SLA	<input type="checkbox"/> < 1.5 SLA*	<input type="checkbox"/> ≥1.5 SLA
<p>*Advisory note to builder and enforcement agency: If row 5 indicates "< 1.5 SLA", it is critical to ensure that combustion and solid-fuel burning appliances in the dwelling are provided with adequate combustion and ventilation air and vented in accordance with manufacturers' installation instructions and all applicable codes as specified by ASHRAE Standard 62.2 Section 6.4. Additional information about compliance with this requirement is given in Section 4.6.5 of the Residential Compliance Manual under the topic of Combustion and Solid-Fuel Burning Appliances.</p>			

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

HERS Provider: _____ Registration Number: _____ Registration Date: _____
 2008 Residential Compliance Forms August 2009

INSTALLATION CERTIFICATE		CF-6R-ENV-21-HERS
Quality Insulation Installation (QII) - Framing Stage Checklist		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Quality Insulation Installation (QII) Framing Stage Checklist

*Air barrier and preparation for insulation verification inspection must be done at framing stage before insulation is installed. If there are any "No" answers rows not filled out or signatures missing then this is not valid form and cannot be accepted by the building department or HERS rater. If spray foam is used, then an air barrier is not required and NA would be checked. QII credit not allowed if any steel framing or structural framing that are in the walls of a **conditioned** space.*

✓ FLOOR AIR BARRIER			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps in the raised floor to unconditioned space or to outside larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All openings on a second floor including under a tub where the drain penetrates the floor are sealed
Yes	No	NA	
✓ WALLS AIR BARRIER			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps in wall exterior sheathing to unconditioned space or to outside larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No gaps in sheathing against the garage, attic, or covered patio. All gaps larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps in Rim-joists in interior and exterior walls to the outside including holes drilled for electrical and plumbing larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rope caulk, foam gasket, or caulking bead around the entire sole plate of the home
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps around the windows are caulked or foamed (stuffing with fiberglass not acceptable)
Yes	No	NA	
✓ ATTIC INSPECTION			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attic rulers appropriate to the material installed evenly throughout the attic to verify depth. (NA if SPF or batt)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attic area (sqft) _____ ÷ 250 = _____ minimum number of rulers installed. Must round up. Number of rulers actually installed _____ (NA if SPF or batt)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ALL rulers visible from attic access. (NA if SPF or batt)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Eave vents baffles installed at all eave vents to prevent air movement under or into insulation. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Area of eave vent baffle is the same or larger than the net free-ventilation area of the eave vent. (NA if SPF)
Yes	No	NA	
✓ CEILING AIR BARRIER			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All draft stops in place to form a continuous ceiling air barrier no gaps larger than 1/8". (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All drops covered with hard covers. Gaps around or in the hard cover larger than 1/8" filled with foam or caulk. (NA if SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>		All recessed light fixtures in non conditioned space are IC rated and air tight (AT)
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		All recessed light fixtures are sealed with a gasket or caulk between the housing and the ceiling
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		Openings around flue shafts fully sealed with solid blocking or flashing and any remaining gaps sealed with fire-rated caulk or sealant.
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		Piping shaft openings fully sealed and caulked
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		Penetrations from wiring in interior walls, electrical boxes, fire alarms etc. sealed with caulk or sealant
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		All duct chases, fireplace chases, and double walls sealed air tight at the ceiling level. All gaps into shafts larger than 1/8" filled with foam or caulk. Special attention paid to ducts entering shafts from ceiling.
Yes	No		

INSTALLATION CERTIFICATE		CF-6R-ENV-21-HERS
Quality Insulation Installation (QII) - Framing Stage Checklist		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

✓ GARAGE /CEILING AIR BARRIER FOR TWO STORIES (no conditioned space over garage)			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Air barrier installed at joists in garage to house transition (between floors). No gaps larger than 1/8" allowed. Use of SPF satisfies the requirement to seal the gaps.
✓ GARAGE /CEILING AIR BARRIER FOR TWO STORIES (conditioned space over garage)			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	If insulation is to be installed at subfloor then subfloor has no gaps over 1/8". Air barrier installed at joists in garage to house transition (between floors). Use of SPF satisfies the requirement to seal the gaps.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	If insulation is to be installed at ceiling of garage then ceiling and joists to the outside have no gaps over 1/8". (NA if SPF or no conditioned space over garage.)

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- All rows in this document have been checked and all answers are yes or NA
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-ENV-22-HERS
Quality Insulation Installation (QII) - Insulation Stage Checklist		(Page 1 of 3)
Site Address:	Enforcement Agency:	Permit Number:

Overview – In order for batt and blown in insulation to work correctly the insulation must **fill** the wall cavity and touch the air barrier with no gaps or voids. Ceiling and raised floor batt and blown in insulation must not be compressed and have no gaps or voids. QII credit not allowed if any steel framing or structural framing that are in the walls of a **conditioned** space.

Insulation Stage Checklist ✓ FLOOR INSULATION			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All floor joist cavity insulation installed to uniformly fit the cavity side-to-side and end-to-end. (NA if floors slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation in full contact with the subfloor, NO gaps. (NA if floors are slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation in contact with air barrier on all five sides. (ends, sides, back). NA if floors are slab on grade.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Batts cut to fit around wiring and plumbing, or split (delaminated). (NA if loose fill, SPF, or slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Batt insulation has continuous support. (NA if loose fill, SPF, or slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF (Spray Polyurethane Foam Medium Density) insulation the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than ½ inch less than the required thickness for the R-value. (NA for other forms of insulation).
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Insulation R-value same or greater than listed on the CF-1R.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation properly adhered to avoid gaps and provide an air seal (NA for other forms of insulation).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	For SPF list the required floor cavity R-value from CF-1R, R=____ List tested average depth of insulation (inches) ____ X 5.8 (R-value/inch for medium density SPF) = ____ (R-value). This is the installed R-value and must be equal to or greater than listed on CF-1R (NA for other forms of insulation).

✓ WALL INSULATION			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Standard depth cavities insulation fills cavity and touches air barrier on all six sides. (NA if SPF used and meets the required R-value).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All double walls and bump-outs, the insulation fills the cavity or additional air barrier installed so that the insulation fills the cavity. Insulation touches all six sides. (NA if SPF used and meets the required R-value).
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Behind tub/shower, walls under stairs, and fireplace, insulation touches air barrier on five sides. Not required to fill the space. Cavity required to be air tight.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	BATTS , not a single void/depression deeper than ¾" in ANY stud bay. (NA if loose fill or SPF)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	BATTS , voids/depressions less than 3/4" allowed as long as the area is not greater than 10% of the surface area for each stud bay. (NA if loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Loose Fill no gaps or voids of any depth allowed. (NA if batts or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation properly adhered to avoid gaps and provide an air seal (NA for other forms of insulation).
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Any gaps between studs or insulation larger than 1/8" must be filled with insulation or foam.
<input type="checkbox"/> Yes	<input type="checkbox"/> No		All Rim-joists to the outside insulated.
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Special attention must be paid to corner channels, wall intersections, and behind tub/shower enclosures insulated to proper R-Value.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All skylight shafts and attic kneewalls insulated with minimum R-19.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation in full contact with drywall or wall finishes of skylight shafts and attic kneewalls.

INSTALLATION CERTIFICATE		CF-6R-ENV-22-HERS
Quality Insulation Installation (QII) - Insulation Stage Checklist		(Page 2 of 3)
Site Address:	Enforcement Agency:	Permit Number:

<input type="checkbox"/> Yes	<input type="checkbox"/> No		Wall insulation same or better than what is listed on the CF-1R.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF list the required wall cavity R-value from CF-1R, R-____. List tested average depth of insulation (inch) ____ X 5.8 (R-value/inch for medium density SPF) = ____ (R-value) This is the installed R-value and must be equal to or greater than listed on CF-1R (NA for other forms of insulation)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF (Spray Polyurethane Foam Medium Density) insulation the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than ½ inch less than the required thickness for the R-value. (NA for other forms of insulation)

✓ CEILING INSULATION			
<input type="checkbox"/> Yes	<input type="checkbox"/> No		BATTS there must not be a single gap/void/depression deeper than ¾". (NA if loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No		BATTS voids/depressions less than ¾" allowed as long as the area is not greater than 10% of the surface area for each stud bay. (NA if loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	NO gaps or voids allowed for loose fill and SPF. (NA if batts).
<input type="checkbox"/> Yes	<input type="checkbox"/> No		All ceiling insulation installed to uniformly fit the cavity side-to-side and end-to-end.
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Insulation in full contact with the ceiling, NO gaps.
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Insulation in contact with air barrier on all five sides.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Batts cut to fit around wiring and plumbing, or split (delaminated). (NA for loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Batts taller than the trusses must expand so that they touch each other over the trusses. (NA for loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation properly adhered to avoid gaps and provide an air seal (NA for other forms of insulation)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation fully fills cavity below any plywood platform or cat-walk. If SPF used then minimum 3 inches. (NA if no platforms or cat-walks)
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Attic access gasketed
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Attic access insulated with rigid foam or batt insulation using adhesive or mechanical fastener. R-value same as ceiling R-value listed on CF-1R
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Recessed light fixtures covered full depth with insulation. If SPF used then other forms of insulation used to cover or enclosed in a box fabricated from ½-inch plywood, 18 ga. sheet metal, 1/4-inch hard board or drywall
<input type="checkbox"/> Yes	<input type="checkbox"/> No		Roof insulation same or better than what is listed on the CF-1R
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Loose Fill Insulation at proper depth – insulation rulers visible and indicating proper depth and R-value for blown in insulation. (NA for batts or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Loose Fill Insulation uniformly covers the entire ceiling (or roof) area from outside of all exterior walls. (NA for batts or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Loose-fill insulation meets or exceeds manufacturer's minimum weight and thickness requirements for the target R-value. Target R-value. Manufacturer's minimum required weight for the target R-value (pounds-per-square-foot). Manufacturer's minimum required thickness at time of installation. Manufacturer's minimum required settled thickness. Note: To receive compliance credit the HERS rater shall verify that the manufacturer's minimum weight and thickness has been achieved for the target R-value. (NA for batts or SPF).

INSTALLATION CERTIFICATE	CF-6R-ENV-22-HERS
Quality Insulation Installation (QII) - Insulation Stage Checklist	
(Page 3 of 3)	
Site Address:	Enforcement Agency:
	Permit Number:

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF list the required ceiling cavity R-value from CF-1R, R-_____. List tested average depth of insulation____ in X 5.8R = _____ R this is the installed R-value and must be equal to or greater than listed on CF-1R (NA for other forms of insulation)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation must be covered with other forms of insulation or enclosed in a box fabricated from ½ inch plywood, 18 gauge metal, ¼ inch hard board or drywall. The exterior of the box may then be insulated with SPF.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than ½ inch less than the required thickness for the R-value. (NA for other forms of insulation)
✓ GARAGE ROOF/CEILING INSULATION FOR TWO STORIES (no conditioned space over garage)			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation installed at joists against the air barrier in the garage to house transition. All wall insulation requirements above must be met. (NA if conditioned space over garage).
✓ GARAGE ROOF/CEILING INSULATION FOR TWO STORIES(conditioned space over garage)			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	If insulation is to be installed at subfloor then the insulation must also be installed at joists against the air barrier in the garage to house transition. All ceiling and wall insulation requirements above must be met. (NA if no conditioned space over garage).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	If insulation is to be installed at ceiling of garage then the joists to the outside must be insulated and all the insulation requirements listed above must be met. (NA if no conditioned space over garage).

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I have read the High Quality Insulation Installation Procedures (Residential Appendix, RA3.5), understand these procedures, and understand that there are additional requirements than must be met than those listed on this CF-6R.
- All rows in this document have been checked and all answers are yes or NA
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will be checking the installation and that if such checking identifies defects, I am required to take corrective action at my expense. If the installation is part of a sample group for HERS verification, and the installation fails to meet the requirements of such quality assurance checking, additional checking/testing and repair of other installations in the HERS sample group will be required at my expense. I understand that the HERS provider, and Energy Commission representatives will also be performing checks of the installation on jobs not tested by the HERS rater.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives and on October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License	Date Signed:	Position With Company (Title):

*CF-6R – LIGHTING
INSTALLATION CERTIFICATES*

Residential Lighting

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

1. Kitchen Lighting

Does project include kitchen lighting?

<input type="checkbox"/> Yes, complete section 1 <input type="checkbox"/> No, go on to section 2	
<input type="checkbox"/> Yes §150(k)3: The wattage of permanently installed luminaires (lighting fixtures) has been determined as specified by §130(d).	
<input type="checkbox"/> Yes <input type="checkbox"/> No §150(k)3: In the kitchen, are there electrical boxes finished with a blank cover or where no electrical equipment has been installed, and where the electrical box can be used for a luminaire or a surface mounted ceiling fan? If yes, the following row must also be yes:	
<input type="checkbox"/> Yes <input type="checkbox"/> NA Wattage has been calculated as 180 watts of low efficacy lighting per blank electrical box.	

§150(k)8 Kitchen Lighting must comply with either method (a), (b), or (c) below:

(a) All high efficacy luminaires

<input type="checkbox"/> Yes, complies because only high efficacy luminaires have been installed in the kitchen.
<input type="checkbox"/> No, complies with method (b) or (c).

(b) ≥ 50% watts used by high efficacy luminaires

<input type="checkbox"/> Yes, complies because at least 50% of the installed watts are from permanently installed high efficacy luminaires as demonstrated in the table below: Total A ≥ Total B.
<input type="checkbox"/> No, complies with method (a) or (c).

Fill out the following table if complying with either method (b) or (c).

Table (b)

Luminaire Type	Efficacy		Watts	x	Quantity	=	High Efficacy Watts	or	Low Efficacy Watts
	High	Low							
	<input type="checkbox"/>	<input type="checkbox"/>		x		=		or	
	<input type="checkbox"/>	<input type="checkbox"/>		x		=		or	
	<input type="checkbox"/>	<input type="checkbox"/>		x		=		or	
	<input type="checkbox"/>	<input type="checkbox"/>		x		=		or	
	<input type="checkbox"/>	<input type="checkbox"/>		x		=		or	
Complies with method (b) if $A \geq B$							Total: A:	\geq	B:

(c) Additional Kitchen Low Efficacy Lighting

<input type="checkbox"/> Yes, complies because the kitchen lighting qualifies for additional low efficacy lighting and as demonstrated in table in (b) (above) and the table in (c) (below) that $(A + C) \geq B$
<input type="checkbox"/> No, complies with method (a) or (b).

Additional kitchen low efficacy lighting is available only if all of the following are true:

<input type="checkbox"/> Yes. All low efficacy luminaires in the kitchen are controlled by a vacancy sensor Dimmer energy management control system (EMCS) or a multi-scene programmable control system.
<input type="checkbox"/> Yes. Permanently installed luminaires in garages laundry rooms closets greater than 70 square feet and utility rooms are high efficacy luminaires AND are controlled by a vacancy sensor.

Table (c)

From the Table in (b)		Use 50 W for dwelling units $\leq 2,500 \text{ ft}^2$ Use 100 W for dwelling units $> 2,500 \text{ ft}^2$	Add	Yes/No ?
A	B	C	A + C	Is $(A+C) \geq B$?

2. Lighting Internal to Cabinets

Does project includes lighting internal to cabinets?

<input type="checkbox"/> Yes, complete section 2 <input type="checkbox"/> No, go on to section 3
<input type="checkbox"/> Yes, §150(k)9: Permanently installed lighting internal to cabinets uses ≤ 20 watts of power per linear foot of illuminated cabinet.

Residential Lighting

Site Address:

Enforcement Agency:

Permit Number:

3. Installed Devices and Components Have Been Certified to the Energy Commission

Does the project include any of the devices or components listed below? Yes, complete section 3 No, go on to section 4

Yes
 §119 and §150(k)7(F): Any of the following devices and components which have been installed have been certified to the Energy Commission according to the applicable provisions of §119: All LED lighting systems that are classified as high efficacy, ballasts used in recessed luminaires, vacancy sensors (automatic off/manual on occupant sensors), dimmers, track lighting integral current limiters, and outdoor motion sensors.

4. Lighting Controls Complete section 4

- Yes NA §150(k)7A: Permanently installed low efficacy luminaires are controlled by switches separate from those controlling high efficacy luminaires.
- Yes NA §150(k)7B: Exhaust fans with integral lighting systems are switched separately from lighting systems, OR have a lighting system that can be manually turned on and off while allowing the fan to continue to operate for an extended period of time.
- Yes NA §150(k)7C: All permanently installed luminaires are switched with readily accessible controls that permit the luminaires to be manually switched on and off.
- Yes NA §150(k)7D: All lighting controls have been installed in accordance with the manufacturer’s instructions.
- Yes NA §150(k)7E: All lighting circuits that are controlled by more than one switch, where a dimmer or vacancy sensor has been installed to comply with §150(k), no controls bypass the dimmer or vacancy sensor functions.

5. Luminaires (Lighting Fixtures)

Does the project include the installation of any luminaires (indoor or outdoor)?

- Yes, complete section 5 No, go on to section 6
- Yes, high efficacy luminaire classification has been determined according to §150(k)1, and low efficacy luminaire classification has been determined according to §150(k)2.
- Yes NA §150(k)4: Fluorescent lamps rated 13 watts or greater have an electronic ballasts having an output frequency no less than 20 kHz.
- Yes NA §150(k)5: Permanently installed night lights, and night lights integral to permanently installed luminaires or exhaust fans, contain only high efficacy lamps meeting the minimum efficacies contained in Table 150-C and do not contain a line-voltage socket or line voltage lamp holder, OR the night light is rated to consume no more than 5 watts of power and does not contain a medium screw-base socket.
- Yes NA §150(k)6: Lighting integral to exhaust fans, in rooms other than kitchens, meet the applicable requirements of §150(k).
- Yes NA Any electrical box finished with a blank cover or where no electrical equipment has been installed, and where the electrical box can be used for a luminaire or a surface mounted ceiling fan, has been treated as low efficacy luminaires for compliance with §150(k).

Does the project include any luminaires that are recessed into insulated ceilings?

- Yes, complete the rest of section 5 No, go on to section 6
- Yes, §150(k)12: Luminaires that are recessed into insulated ceilings meet all of the following conditions:
 - Yes, are listed, as defined in §101, for zero clearance insulation contact (IC) by UL or other nationally recognized testing/rating laboratory, and
 - Yes, have labels that certify the luminaires are airtight with air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283 (Exhaust fan housings are not required to be certified airtight), and
 - Yes, are sealed with a gasket or caulk between luminaire housings and the ceiling, and all air leak paths between conditioned and unconditioned spaces have been sealed with a gasket or caulk. (including all exhaust fan housings), and
 - Yes, allows ballast maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling.

6. Indoor Lighting (any indoor room that is not a kitchen)

Does the project include permanently installed luminaires in any room that is not a kitchen?

- Yes, complete section 6 No, go on to section 7
- Yes NA §150(k)10: Permanently installed luminaires in bathrooms, garages, laundry rooms, closets > 70 ft², and utility rooms are high efficacy luminaires OR are controlled by a vacancy sensor.
- Yes NA §150(k)11: Permanently installed luminaires located in rooms or areas other than in kitchens, bathrooms, garages, laundry rooms, closets, and utility rooms are high efficacy luminaires, OR are controlled by a dimmer switch OR are controlled by a vacancy sensor.

Residential Lighting

Site Address:

Enforcement Agency:

Permit Number:

7. Outdoor Lighting

Does the project include any permanently installed outdoor lighting?

Yes, complete section 7 No, go on to section 8

Yes NA §150(k)13: Luminaires providing outdoor lighting, including outdoor lighting for private patios on low-rise residential buildings with four or more dwelling units, entrances, balconies, and porches, and which are permanently mounted to a residential building or to other buildings on the same lot are high efficacy luminaires OR are controlled by a manual on/off switch, plus a motion sensor not having an override or bypass switch that disables the motion sensor, plus one of the following three additional control methods:

- a. A photocontrol that does not have an override or bypass switch that disables the photocontrol; or
- b. An astronomical time clock not having an override or bypass switch that disables the astronomical time clock; or
- c. Energy management controls systems (EMCS) not having an override or bypass switch that allows the luminaire to be always on.

Yes NA **Exception 2:** Low efficacy outdoor luminaires used to comply with Exception 1 to §150(k)13 are controlled by an override switch which temporarily bypasses the motion sensing function, and the motion sensor is automatically reactivated within six hours. The luminaire is controlled by a photocontrol, astronomical time clock, or EMCS as required by Exception 1 to §150(k)13.

Yes NA **Exception 3:** There are permanently installed luminaires in or around swimming pools, water features, or other locations subject to Article 680 of the California Electric Code which do not need to be high efficacy luminaires.

Yes NA §150(k)14: Internally illuminated address signs comply with §148, OR do not contain a screw-base socket and consume no more than 5 watts of power as determined according to §130(d).

Yes NA §150(k)15 Lighting for parking lots and carports with a total of 8 or more vehicles per site have lighting that complies with §130, 132, 134, and 147. Lighting for parking garages for 8 or more vehicles comply with §130, 131, 134, and 146. If yes, the Nonresidential compliance forms must be submitted

8. Common areas of low-rise residential buildings

Does the project include the installation of any luminaires in common areas of low-rise residential buildings?

Yes, complete section 8 No, go on to section 9

Yes, §150(k)16: Permanently installed lighting in the enclosed, non-dwelling spaces of low-rise residential buildings with four or more dwelling units shall be high efficacy luminaires OR are controlled by occupant sensor(s) certified to comply with §119(d).

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)

Responsible Person's Name:

Responsible Person's Signature:

CSLB License:

Date Signed:

Position With Company (Title):

*CF-6R – MECHANICAL
INSTALLATION CERTIFICATES*

INSTALLATION CERTIFICATE		CF-6R-MECH-01
Domestic Hot Water (DHW)		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

1. WATER HEATING SYSTEMS:

Heater Type	CEC Certified Mfr Name & Model Number	Distribution Type (Std, Point-of-Use, etc)	If Recirculation, Control Type	# of Identical Systems	Rated Input (kW or Btu/hr) ¹	Tank Volume (gallons)	Efficiency (EF, RE) ¹	Standby Loss (%) ¹

*Note 1: For **small gas storage** (rated input less than or equal to 75,000 Btu/hr), **electric resistance** and **heat pump water heaters**, list Energy Factor (EF). For **large gas storage water heaters** (rated input of greater than 75,000 Btu/hr), list Recovery Efficiency (RE), Thermal Efficiency, Standby Loss and Rated Input. For **instantaneous gas water heaters**, list the Thermal Efficiency and Rated Input.*

2. Mandatory Measures

TO COMPLY - ALL BOXES MUST BE CHECKED

§110-§113: Water heaters, showerhead and faucets are certified by the California Energy Commission.

§150(j): Water System Pipe and Tank Insulation. And Cooling Line Insulation

1. Storage tank insulation

- A. Storage gas water heaters rated with an Energy Factor no greater than the federal minimal standard are externally wrapped with insulation having an installed thermal resistance of R-12 or greater; and
- B. Unfired storage tanks or other indirect hot water tanks have R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.

2. Water piping and cooling system line insulation thickness and conductivity

- First 5 feet of hot and cold water pipes closest to water heater tank, non-recirculating systems, and entire length of recirculating sections of hot water pipes are insulated per Standards Table 150-B; and
- Pipe insulation for steam hydronic heating systems or hot water systems >15 psi, meets the requirements of Standards Table 123-A.
- Insulation is protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind.

§151(f)8D: If indicated on the CF-1R, all hot water piping that runs from the hot water source to the kitchen fixtures is insulated per Standards Table 150-B.

INSTALLATION CERTIFICATE		CF-6R-MECH-01
Domestic Hot Water (DHW)		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

3. Central Water Heating in Buildings with Multiple Dwelling Units (required for prescriptive)

TO COMPLY - ALL BOXES MUST BE CHECKED

- All hot water piping in main circulating loop is insulated to requirements of §150(j)
- Central hot water systems serving six or fewer dwelling units which have (1) less than 25' of distribution piping outdoors; (2) zero distribution piping underground; (3) no recirculation pump; and (4) insulation on distribution piping that meets the requirements of Section 150(j)
- Central hot water systems serving more than 6 dwelling units - presence of either a time control or a time/temperature control

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-02
Solar Domestic Hot Water Systems (SDHW)		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

SOLAR HOT WATER HEATING SYSTEMS:

SRCC Certified Mfr Name & Model Number	Net Solar Fraction (from attached CEC F-Chart)	# of Collectors in System	Collector Size	Solar Tank Volume (gallons)

- §150(j)1B: Backup storage tanks for solar water-heating systems have R-12 external insulation or R-16 internal insulation where the internal insulation R-value indicated on the exterior of the tank.
- §150(j)2A: All solar piping shall be insulated.
- §150(j)4: Solar water-heating system and/or/collectors are certified by the Solar Rating and Certification Corporation.
- Solar water-heating systems storage is no less than the value used in the attached solar calculation sheet,
- Solar water-heating systems shall be installed at a slope equal to a pitch between 2-12 to 6-12.
- A solar water-heating system is installed at an orientation equal to value used in the attached solar calculation sheet, or within 45 degrees of true south.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-03
Pool And Spa Heating Systems		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Pool and Spa Heating Systems requirements

§114(a): Systems and Equipment.

- 1. Heater has a thermal efficiency that complies with the Appliance Efficiency Regulations.
- 2. Has a readily accessible on-off switch mounted outside of the heater.
- 3. Weatherproof plate or card containing operating instructions for the pool or spa heater.
- 4. No electric resistance heating except for listed package units that has fully insulated enclosures and tight fitting covers that are insulated to at least R-6. Or if documentation is provided that at least 60 % of the annual heating energy is from site solar energy or recovered energy.
- 5. Heating system has no pilot light.

§114(b): Installation.

- 1. System is installed with at least 36" of pipe between the filter and heater, or dedicated suction and return lines, or built-in or built-up connections for future solar heating.
- 2. A cover for outdoor pools or spas that have a heat pump or gas heater.
- 3. Pool system has directional inlets to adequately mix the pool water
- 4. Time switch which will allow the pump to be set or programmed to run during off-peak periods only

§150(p) Pump Sizing and flow rate specification

- 1. The pump specified is listed in the CEC database of certified pool pumps.
- 2. The pump flow rate shall be calculated based on pool sizing table below.
- 3. The pump is capable of operating at 2 or more speeds (not applicable if pump is less than 1 horsepower).
- 4. Each auxiliary pool load is served by either a separate pump, or the system is served by a multi-speed pump.

Pool sizing (Values are based on a maximum allowable turnover rate of 6- hours)

Max Pool Volume (gallons)	Min Pipe D or Greater (inches)		Min Filter Area or more (square feet)			Max Pump Flow (gpm)
	Return	Suction	Cartridge	Sand	DE	
13,000	1.5	1.5	100	2.4	20	36
17,000	1.5	2	130	3.1	25	47
21,000	2	2	160	3.9	30	58
28,000	2	2.5	210	5.2	40	78
42,000	2.5	3	320	7.8	60	117
48,000	3	3	360	8.9	70	133

Note: For pumps greater than 1 hp. The maximum Pump Flow is the lowest speed default filtration

- 5. Calculated volume of pool _____ (gallons).
- 6. Return Pipe Diameter _____ (inches).
- 7. Suction Pipe Diameter _____ (inches).
- 8. Filter Type _____ (Cartridge, Sand, DE).
- 9. Filter Surface Area _____ (sf).
- 10. Max Pump Flow _____ (gpm).

INSTALLATION CERTIFICATE		CF-6R-MECH-03
Pool And Spa Heating Systems		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

System Piping

- 1. The suction side pipe is straight for at least 4 pipe diameters before entering the pump (See table below for the required straight run lengths for various pipe sizes).
- 2. The design uses low pressure drop fittings (sweep90's)

Pipe Diameter (inch)	Required Pipe Length leading into pump (inch)
1.5	6
2	8
2.5	10
3	12

Filtration Equipment

- 1. If a backwash valve is used: The diameter of the backwash multi-port valve is 2 inches or as large as the circulation pipe, whichever is greater

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

Site Address:	Enforcement Agency:	Permit Number:
---------------	---------------------	----------------

Space Conditioning Systems

Heating Equipment

Equip Type (package-heat pump)	CEC Certified Mfr. Name and Model Number	ARI Reference Number ²	# of Identical Systems	Efficiency (AFUE, etc.) ^{1,3} (≥CF-1R value) ⁴	Duct Location (attic, crawl-space, etc.)	Duct R-value	Heating Load (Btu/hr)	Heating Capacity (Btu/hr)

Cooling Equipment

Equip Type (package heat pump)	CEC Certified Mfr. Name and Model Number	ARI Reference Number ²	# of Identical Systems	Efficiency (SEER and EER) ^{1,3} (≥CF-1R value) ⁴	Duct Location (attic, crawl-space, etc.)	Duct R-value	Cooling Load (Btu/hr)	Cooling Capacity (Btu/hr)

1. If project is new construction, see Footnotes to Standards Table 151-B and Table 151-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-1R form.
4. When CF-1R is reference it is also applicable to the CF-1R, CF-1R-AA or CF-1R-ALT

ALL BOXES MUST BE CHECKED TO BE A VALID FORM

- §110-§113: HVAC equipment is certified by the California Energy Commission.
- §150(h): Heating and/or cooling loads calculated in accordance with ASHRAE, SMACNA, or ACCA.
- §150(i): Setback Thermostat on all applicable heating and/or cooling systems meet the requirements of §112(c).
- §150(j)2: 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.

INSTALLATION CERTIFICATE		CF-6R-MECH-04
Space Conditioning Systems, Ducts and Fans		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Ducts and Fans

§150(m): Duct and Fans

- 1. All air-distribution system ducts and plenums installed, sealed and insulated to meet the requirements of CMC Sections 601, 602, 603, 604, 605 and Standard 6-5; supply-air and return-air ducts and plenums are insulated to a minimum installed level of R-4.2 or enclosed entirely in conditioned space. Openings shall be sealed with mastic, tape or other duct-closure system that meets the applicable requirements of UL 181, UL 181A, or UL 181B or aerosol sealant that meets the requirements of UL 723. If mastic or tape is used to seal openings greater than 1/4 inch, the combination of mastic and either mesh or tape shall be used; and
- 1. Building cavities, support platforms for air handlers, and plenums defined or constructed with materials other than sealed sheet metal, duct board or flexible duct shall not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. Ducts installed in cavities and support platforms shall not be compressed to cause reductions in the cross-sectional area of the ducts.
- 2D. Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.
- 7. Exhaust fan systems have back draft or automatic dampers.
- 8. Gravity ventilating systems serving conditioned space have either automatic or readily accessible, manually operated dampers.
- 9. Protection of Insulation. Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.
- 10. Flexible ducts cannot have porous inner cores.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Ventilation for Indoor Air Quality (IAQ): All dwelling units shall meet the requirements of ANSI/ASHRAE standard 62.2. Ref: Title 24 Part 6 Section 150(o). Equation and table numbering on this CF-6R corresponds to the numbering for that information in the published ASHRAE Standard 62.2.

WHOLE-BUILDING VENTILATION

Ventilation Rate: A mechanical supply system, exhaust system, or combination thereof shall provide whole-building ventilation with outdoor air each hour at no less than the rate in equation 4.1a. For dwelling occupant densities known to be greater than ($N_{br} + 1$), the rate shall be increased by 7.5 cfm for each additional person.

(Eq. 4.1a) $Q_{fan} = 0.01A_{floor} + 7.5(N_{br} + 1)$

Where:
 A_{floor} = conditioned floor area, ft²
 N_{br} = number of bedrooms; not to be less than one
 Q_{fan} = ventilation air requirement = fan flow rate, (cfm)

Enter Eq 4.1a Calculation:
 A_{floor} =
 N_{br} =
 Q_{fan} =

Delivered Ventilation: The effective ventilation rate of an **intermittent** system is the combination of its delivered capacity, its fractional on-time, cycle time, and the ventilation effectiveness from Table 4.2. This calculation only applies to intermittent systems.

(Eq. 4.2) $Q_f = Q_r / (\epsilon f)$

Where:
 Q_r = ventilation air requirement from Eq. 4.1a (above)
 f = daily fractional on-time, (%)
 ϵ = ventilation effectiveness (from Table 4.2)
 Q_f = fan flow rate during the on-cycle (cfm)

Enter Eq 4.2 Calculation (if applicable).
 Q_r =
 f =
 ϵ =
 Q_f =

Daily Fractional On-Time, f	Ventilation effectiveness, ϵ
$f \leq 35\%$	0.33
$35\% \leq f < 60\%$	0.50
$60\% \leq f < 80\%$	0.75
$80\% \leq f$	1.0
Fan runs at least once every three hours	1.0

Whole-Building Ventilation Rate Summary

Select the method used to provide Whole-Building Ventilation and enter the required fan flow rate (cfm). Select one:

Continuous fan flow (cfm) = _____

Intermittent fan flow (cfm) = _____

Use the fan flow rate from this summary for selection of the whole-building ventilation fan and for the duct design for the whole-building ventilation system. Provide the system design information in applicable sections below.

LOCAL VENTILATION EXHAUST

Local mechanical exhaust fans shall be installed in each kitchen and bathroom. The minimum airflow rates shall be at least the amount indicated in tables 5.1 and 5.2.

Table 5.1 Intermittent Local Ventilation Exhaust Airflow Rates			Table 5.2 Continuous Local Ventilation Exhaust Airflow Rates		
Application	Airflow	Notes	Application	Airflow	Notes
Kitchen	100 cfm	Vented range hood required if exhaust fan flow is less than 5 ACH	Kitchen	5 ACH	Based on Kitchen Volume
Bathroom	50 cfm		Bathroom	20 cfm	

INSTALLATION CERTIFICATE		CF-6R-MECH-05
Indoor Air Quality and Mechanical Ventilation		(Page 2 of 5)
Site Address:	Enforcement Agency:	Permit Number:

VENTILATION SYSTEM DESIGN – Fan selection and duct design criteria for compliance

The airflow rates required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measuring device. Alternatively, the airflow rating at a pressure of 0.25 in. w.c. of a certified fan may be used to demonstrate compliance without testing of the airflow of the installed system, provided the system duct sizing meets the prescriptive requirements of Table 7.1, or manufacturer's design criteria. Other methods may be used to provide the required ventilation rates when approved by a licensed design professional, subject to confirmation of delivered ventilation airflow of the installed system. Central Fan Integrated (CFI) ventilation systems shall demonstrate compliance by field testing of the delivered ventilation airflow of the installed system.

WHOLE-BUILDING VENTILATION SYSTEM DESIGN - Identify the ventilation system design criteria		
(select one criteria from this column)	Requirements for installer to demonstrate compliance with code	Airflow Test Required?
<input type="checkbox"/> Prescriptive design (Table 7.1)	Enter the installed ventilation air-moving equipment information and the installed ventilation duct system information in the tables below, and certify on the CF-6R that the installed system conforms to the Table 7.1 prescriptive design criteria.	no
<input type="checkbox"/> Central Fan Integrated (CFI)	Central forced air system fans used in Central Fan Integrated ventilation systems shall demonstrate, in air distribution mode, a watt draw less than 0.58 W/CFM per Standards §151(f)11. Submit a CF-6R-MECH-22-HERS form for each forced air unit used for a CFI system. HERS verification is required.	yes
<input type="checkbox"/> Engineered Design	Enter the installed ventilation air-moving equipment information and the installed ventilation duct system information in the tables below, and certify on the CF-6R that the installed system conforms to the engineered ventilation system design approved by the enforcement agency.	yes
<input type="checkbox"/> Manufacturer's design criteria	Enter the installed ventilation air-moving equipment information and the installed ventilation duct system information in the tables below, and certify on the CF-6R that the installed system conforms to the manufacturer's ventilation system duct design criteria.	no

LOCAL VENTILATION SYSTEM DESIGN - Identify the ventilation system design criteria		
(select one criteria from this column)	Requirements for installer to demonstrate compliance with code	Airflow Test Required?
<input type="checkbox"/> Prescriptive design (Table 7.1)	Enter the installed ventilation air-moving equipment information and the installed ventilation duct system information in the tables below, and certify on the CF-6R that the installed system conforms to the Table 7.1 prescriptive design criteria.	no
<input type="checkbox"/> Engineered Design	Enter the installed ventilation air-moving equipment information and the installed ventilation duct system information in the tables below, and certify on the CF-6R that the installed system conforms to the engineered ventilation system design approved by the enforcement agency.	yes
<input type="checkbox"/> Manufacturer's design criteria	Enter the installed ventilation air-moving equipment information and the installed ventilation duct system information in the tables below, and certify on the CF-6R that the installed system conforms to the manufacturer's ventilation system duct design criteria.	no

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Table 7.1 Prescriptive Duct Sizing Requirements

Diameter, (in)	Flex Duct				Smooth Duct			
Fan Rating cfm @ 0.25 in. w.g.	50	80	100	125	50	80	100	125
Maximum Allowable Duct Length (ft)								
Diameter, (in)	Flex Duct				Smooth Duct			
3	X	X	X	X	5	X	X	X
4	70	3	X	X	105	35	5	X
5	NL	70	35	20	NL	135	85	55
6	NL	NL	125	95	NL	NL	NL	145
7 and above	NL	NL	NL	NL	NL	NL	NL	NL

This table assumes no elbows. Deduct 15 ft of allowable duct length for each turn, elbow, or fitting. Interpolation and extrapolation in Table 7.1 is not allowed. For airflow values not listed, use the next higher value. This table is not applicable for airflow > 125 cfm. NL = no limit on duct length of this size. X = not allowed, any length of duct of this size with assumed turns, elbows, fittings will exceed the rated pressure drop.

INSTALLED VENTILATION AIR-MOVING EQUIPMENT INFORMATION

Ventilation devices and equipment shall be tested and rated by HVI procedures for airflow and sound. Sound rating maximum is 1.0 sone for all continuous duty fans; 1.0 sone for intermittent duty whole-building fans; and 3.0 sone for intermittent duty local exhaust fans. Refer to the Residential Compliance Manual section 4.6 for information about exclusions to these sound rating requirements. In the table below, list the fan equipment installed that meets the requirement for whole-building ventilation and local ventilation exhaust.

Fan or System Name or Location ¹	System Type ² (WBV or LVE)	Required Airflow ³ (CFM)	Fan Manufacturer Name ⁴	Fan Model Number ⁵	Certified Airflow ⁶ (CFM)	Sound Rating ⁷ (Sone)	Fan Watts ⁸	Fan Power Ratio (Watt per CFM) ⁹

1) Enter the Fan or System Identification Name or Location Name or System Identifier (e.g. "Bath02" "MastBath", "Kitchen01").
 2) What type of ventilation requirement is the fan specified to meet? WBV (whole-building ventilation) or LVE (local ventilation exhaust).
 3) Enter the required ventilation airflow values determined by the calculations or tables in the WHOLE-BUILDING VENTILATION and/or LOCAL VENTILATION EXHAUST sections at the beginning of this Installation Certificate (CFM). At least one fan must be designated for use for compliance with the "Whole-Building Ventilation" requirement.
 4) Enter the fan manufacture's name.
 5) Enter the fan model number or series number.
 6) Enter the fan's Certified Airflow rating at 0.25 inch w.c. (CFM). Fans rated at less than 0.25 inch w.c. (e.g. 0.1 inch w.c.) cannot be used to comply with the ventilation requirements using the prescriptive design criteria in Table 7.1. This certified airflow rating value must be equal to or greater than the required airflow from column 3 of this table when demonstrating compliance using Table 7.1.
 7) Enter the fan's certified sound rating (Sone)
 8) Enter the fan watt draw
 9) Divide the Watt value from column 8 by the Certified Airflow value (CFM) from column 6. For dwellings utilizing the performance energy compliance method, for standalone whole-building ventilation systems (does not apply to local ventilation exhaust fans), the fan power ratio must be less than or equal to the fan power ratio value reported on the Performance CF-IR.

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

INSTALLED VENTILATION DUCT SYSTEM INFORMATION

Airflows required by the standard refer to delivered airflow of the installed system as determined by testing with a flow hood, flow grid, or other measuring device. Alternatively, the installed equipment's HVI airflow rating at a pressure of 0.25 inch w.c. may be used, provided the system can be inspected to confirm the duct sizing meets the prescriptive requirements of Table 7.1, or manufacturer's duct design criteria.

Fan or System Name or Location ¹	Compliance Method ² (T; P; or M)	Required Airflow ³ (CFM)	Airflow Test ⁴ (CFM)	Duct Type ⁵	Number of Elbows and Fittings ⁶	Actual Duct Length ⁷ (ft)	Allowable Duct Length ⁸ (ft)	Pass or Fail ⁹

1. Enter the Fan or System Identification Name, or Location Name, or System Identifier. These should be the same identifiers as shown in the INSTALLED VENTILATION AIR-MOVING EQUIPMENT INFORMATION table column 1 above.
2. Enter the method for demonstrating compliance with the ventilation airflow requirements. Enter "T" for Tested; "P" for Prescriptive Table 7.1 design criteria (inspection); "M" for Manufacturer's duct design criteria (inspection). Note: the building official may require submittal of manufacturer's published design criteria documentation if compliance is to be demonstrated by inspection of the installation for conformance to manufacturer's design criteria.
3. Enter the required ventilation airflow values determined by the calculations or tables in the WHOLE-BUILDING VENTILATION and/or LOCAL VENTILATION EXHAUST sections at the beginning of this Installation Certificate (CFM). These should be the same airflow values that were entered for each corresponding fan in column 3 of the INSTALLED VENTILATION AIR-MOVING EQUIPMENT INFORMATION table above.
4. If complying by a method that requires an Airflow Test of the installed system, enter the result from the Airflow Test for the installed system (CFM).
5. Enter duct type for the installed system. Choices are "Flex" or "Smooth" if using Table 7.1 for compliance.
6. Enter total number of elbows or fittings or abrupt turns in the ventilation duct for the installed system.
7. Enter the installed system's actual total duct length (ft).
8. If complying by use of the prescriptive design criteria or manufacturer's design criteria, enter the Maximum Allowable Duct Length (ft) for the system as determined by Table 7.1 or manufacturer's duct design criteria.
9. If complying by airflow test, the system passes if the Tested Airflow⁴ equals or exceeds the Required Airflow³. If complying by demonstrating conformance to prescriptive design criteria or manufacturer's design criteria, the system passes if actual total duct length from column 7 is less than the maximum allowed length from column 8. Enter: Pass or Fail

INSTALLATION CERTIFICATE		CF-6R-MECH-05
Indoor Air Quality and Mechanical Ventilation		(Page 5 of 5)
Site Address:	Enforcement Agency:	Permit Number:

OTHER REQUIREMENTS

The items listed below (6.1 through 6.8) correspond to the information given in ASHRAE 62.2 Section 6 "Other Requirements". Refer also to Chapter 4.6 of the Residential Compliance Manual (Section 4.6.5) for information describing these "Other Requirements". The signature of the Responsible Person in the declaration statement below certifies that the building complies with these requirements specified in ASHRAE 62.2 Section 6.1 through 6.8 if applicable.

- 6.1 Transfer Air
- 6.2 Instructions and Labeling
- 6.3 Cloths Dryers
- 6.4 Combustion and solid-fuel burning appliances
- 6.5 Garages
- 6.6 Ventilation Opening Area
- 6.7 Minimum filtration
- 6.8 Air Inlets

- Prescriptive Designs: For ventilation systems that utilize *prescriptive design* criteria, the signature of the Responsible Person in the declaration statement below certifies that the installed system conforms to the prescriptive ventilation system design criteria from Table 7.1 of Standard 62.2 and manufacturer's installation specifications.
- Engineered Designs: For ventilation systems that utilize *engineered design* criteria, the signature of the Responsible Person in the declaration statement below certifies that the installed system conforms to the engineered ventilation system design documentation approved by the enforcement agency.
- Manufacturer's design criteria: For ventilation systems that utilize *manufacturer's design criteria*, the signature of the Responsible Person in the declaration statement below certifies that the installed system conforms to the manufacturer's published duct system design criteria and installation specifications.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

HVAC SYSTEMS: *Evaporatively Cooled Condensing Units*

CEC Certified Mfr. Name and Model Number	# of Identical Systems	EER _a	EER _b	Duct Location (attic, etc.)	Duct R- value	Cooling Load (Btu/hr)	Cooling Capacity (Btu/hr)

EER_a = EER at 75° F wetbulb and 95° F dry bulb;

EER_b = EER at 65° F wetbulb and 82° F dry bulb

The system complies with all eligibility criteria:		YES	NO
1	EER at 95° F dry bulb and 75° F wet bulb temperature is listed with ARI	<input type="checkbox"/>	<input type="checkbox"/>
2	EER at 82° F dry bulb and 65° F wet bulb temperature is submitted to ARI and published in accordance with ARI guidelines.	<input type="checkbox"/>	<input type="checkbox"/>
Pass if: Yes in lines 1-5		<input type="checkbox"/>	<input type="checkbox"/>

The system complies with all eligibility criteria:		YES	NO
1	Water stays in the water casing.	<input type="checkbox"/>	<input type="checkbox"/>
2	Water pump starts running when the system is turned on.	<input type="checkbox"/>	<input type="checkbox"/>
3	When the water pump is running, verify that all the condenser coils are wet.	<input type="checkbox"/>	<input type="checkbox"/>
4	High pressure trip for the compressor is set (per manufacturer's documents) at or below 300 psig for R22 Refrigerant and at or below the saturation pressure corresponding to a temperature of 131 ⁰ F for all other refrigerants.	<input type="checkbox"/>	<input type="checkbox"/>
5	When the water supply to the water casing is turned off and the casing is drained, the water pump (if the pump is water cooled) and the compressor trip off.	<input type="checkbox"/>	<input type="checkbox"/>
6	Condenser coils have a corrosion-resistant coating.	<input type="checkbox"/>	<input type="checkbox"/>
7	Electrolytic protection is installed, and the wiring of the protection circuit is intact.	<input type="checkbox"/>	<input type="checkbox"/>
8	Water casing is made up of corrosion-resistant material.	<input type="checkbox"/>	<input type="checkbox"/>
9	A blow-down pump is installed for periodic blow-down in order to remove solids from the water casing. Operation of this pump is automatic and is linked to compressor run time or conductivity of the water in the casing.	<input type="checkbox"/>	<input type="checkbox"/>
10	Water casing is sloped downward toward the blow-down pump location.	<input type="checkbox"/>	<input type="checkbox"/>
11	Drift elimination is in place, there is not a mist of water exiting with the exhaust air.	<input type="checkbox"/>	<input type="checkbox"/>
12	Verify that condensate from the cooling coils is routed to water casing unless a document is submitted to the Building Department showing that doing so is not practical due to availability of space, health, or safety concerns.	<input type="checkbox"/>	<input type="checkbox"/>

INSTALLATION CERTIFICATE		CF-6R-MECH-06
Evaporatively Cooled Condensing Units		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

13	Condenser has manufacturer's certification that water consumption is less than or equal to 5.0 gallons per ton-hour of capacity at ARI Rating conditions.	<input type="checkbox"/>	<input type="checkbox"/>
14	Water connection is made with tubing not more than 1/4" ID at the unit. Larger line may come up to the connection.	<input type="checkbox"/>	<input type="checkbox"/>
15	Overflow from the unit is not connected directly to the sewer drain (so that in the event of a water float failure, an overflow condition can be more easily detected) or another means of determining an overflow condition is provided.	<input type="checkbox"/>	<input type="checkbox"/>
Pass if: Yes in lines 1-15		<input type="checkbox"/>	<input type="checkbox"/>

- EER for evaporatively cooled condensers must be verified by a HERS rater.
- Ducts are required to be tested and sealed in all evaporatively cooled condenser installations, and the duct sealing must be verified by a HERS rater.
- Proper refrigerant charge or a Charge Indicator Light (certified by the Energy Commission) must be verified by a HERS rater for all evaporatively cooled condenser installations.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-07
Evaporative Coolers		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Evaporative Cooler Units

CEC Certified Mfr. Name and Model Number	# of Identical Systems	EER	Duct Location (attic, etc.)	Duct R-value	Total Power (watts)
		13			
		13			
		13			
		13			

The system complies with all eligibility criteria:		<input type="checkbox"/> System Qualifies	
1	The equipment manufacturer shall certify to the Commission that water use does not exceed 7.5 gallons per ton hour based on the Title 20 Appliance Standards testing criteria.	✓	✓
		<input type="checkbox"/> Yes	<input type="checkbox"/> No
2	Equipment shall be permanently installed (no window or portable units).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3	Installation shall provide for automatic relief of supply air from the house with maximum air velocity through the relief dampers not exceeding 800 fpm (at the Title 20 rated airflow). Pressure relief dampers and ductwork shall be distributed to provide adequate airflow through all habitable rooms. For installations with an attic, ceiling dampers shall be installed to relieve air into the attic, and then to outside through attic vents. For installations without an attic, sidewall relief dampers are acceptable.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4	To minimize water consumption, bleed systems are not allowed.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5	A water quality management system (either “pump down” or conductivity sensor) is required. “Pump down” systems can either be integral to the evaporative cooler or they can be accessories that operate on a timed interval. The time interval between dumps shall be set to a minimum of six hours of cooler operation. Longer intervals are encouraged if local water quality allows	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6	Automatic thermostats are required. On/off control is not allowed.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7	If the evaporative cooler duct system is shared with a heating and/or cooling system, the installed duct system shall employ backdraft dampers at the evaporative cooler supply.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8	The installing contractor must provide a winter closure device that substantially blocks outdoor air from entering the indoor space.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9	The size of the water inlet connection at the evaporative cooler shall not exceed 3/8”.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10	Unless prohibited by local code, the sump overflow line shall not be directly connected to a drain and shall be terminated in a location that is normally visible to the building occupants.	<input type="checkbox"/> Yes	<input type="checkbox"/> No

INSTALLATION CERTIFICATE		CF-6R-MECH-07
Evaporative Coolers		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

11	System type is either indirect or direct/indirect Note: direct evaporative coolers cannot be used as part of the evaporative cooling compliance option. (Circle witch type)	indirect	direct/ indirect
	Pass if: Yes in lines 1-	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail

DECLARATION STATEMENT

- **I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.**
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Ice Storage Air Conditioning (ISAC) Units

Enter the specification information from the CEC database for the installed condensing unit and for the installed system components in the table below.

Name and Model Number ¹	# of Identical Systems	SEER ¹	Duct Location (attic, etc.)	Duct R-value	Cooling Load (Btu/hr)	Cooling Capacity (Btu/hr)

The system complies with all eligibility criteria:	<input type="checkbox"/> System Qualifies	
The model number of the installed unit matches the model number used for compliance credit.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/> Yes	<input type="checkbox"/> No

The system complies with all eligibility criteria:		<input type="checkbox"/> System Qualifies	
1	Verify that building cooling is controlled by a standard indoor HVAC thermostat and not by factory installed controls.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		<input type="checkbox"/> Yes	<input type="checkbox"/> No
2	Verify that ice Making is not controlled by the thermostat.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3	Verify that the water tank is filled to the proper level as specified by the manufacturer.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4	Verify that the correct model number (as indicated in compliance documents including) time is installed. Certify the installed model number on the CF-1R.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5	Force the controls to indicate no demand for cooling, set the time to be within the nighttime time period and simulate that the tank is not full with ice. Verify that the system operates properly in the Ice-Making mode (i.e., it starts charging the tank and does not provide cooling to the building).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6	Force the controls to indicate no demand for cooling, set the time to be within the nighttime time period, and simulate the tank being full of ice. Verify that the system is operates properly in the Idle mode (i.e., the compressor is off, and no cooling via the system is provided).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7	Force the controls to indicate a demand for cooling and set the time to be within the daytime time period. Verify that the system operates properly in the Ice Melt mode (i.e., it starts discharging and that the compressor is off).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8	Force the controls to indicate a demand for cooling and set the time to be within the morning shoulder time period. Verify that the system operates properly in the Direct Cooling mode (i.e., the system is providing cooling with the compressor).	<input type="checkbox"/> Yes	<input type="checkbox"/> No

INSTALLATION CERTIFICATE		CF-6R-MECH-08
Ice Storage Air Conditioning (ISAC) Units		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

9	Force the controls to indicate no cooling load, and set the time to be within the daytime time period. Verify that the system operates properly in the Idle mode (i.e., it does not provide cooling to the building, and the compressor is off).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10	Force the controls to indicate a demand for cooling and set the time to be within the night time period. Verify that the cooling is provided by the compressor.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Pass if: Yes in lines 1 - 10		<input type="checkbox"/> Pass	<input type="checkbox"/> Fail

Ducts are required to be tested and sealed in all Ice Storage Air Conditioner installations, and the duct sealing must be verified by a HERS rater.

DECLARATION STATEMENT

- **I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.**
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.**

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

CF-6R – MECHANICAL – HERS

Site Address:	Enforcement Agency:	Permit Number:
---------------	---------------------	----------------

Enter the Duct System Name or Identification/Tag:

Enter the Duct System Location or Area Served:

Note: Submit one Installation Certificate for each duct system that must demonstrate compliance in the dwelling.

This certificate is required for compliance for completely new duct systems installed in new dwelling construction, and also for completely new or replacement duct systems in existing dwellings. For existing dwellings, a completely new or replacement duct system can also include existing parts of the original duct system (e.g., register boots, air handler, coil, plenums, etc.) if those parts are accessible and they can be sealed.

Duct Leakage Diagnostic Test – completely new or replacement duct system

Enter a value for the Allowed Leakage (CFM) for the duct system leakage verification. The value entered must be the Verified Low Leakage Ducts in Conditioned Space criteria or one of the three calculated leakage rates described below.

Verified Low Leakage Ducts in Conditioned Space (VLLDCS) Compliance Credit. If compliance credit for verified low leakage ducts in conditioned space is shown in the special features section of the CF-1R, the leakage to outside test method must be used to verify duct leakage (refer to RA3.1.4.3.4), and 25 CFM must be entered for Allowed Leakage.	Allowed Leakage (CFM)
---	-----------------------

<p>Allowed leakage calculation – (select one calculation method from this section). Use 6% (<i>leakage factor</i> = 0.06) for calculations if tested at “final” or 4% (<i>leakage factor</i> = 0.04) if tested at “rough.” When utilizing Low Leakage Air Handler (LLAH) credit, the allowed duct leakage may be specified by the CF-1R to be less than 6%, in which case the user-specified leakage rate must be used in the calculations below. For example, if the user-specified leakage (specified as a percentage of fan airflow) is reported on the CF-1R as 3%, then use a <i>leakage factor</i> of 0.03 in the calculations below.</p> <p><input type="checkbox"/> Cooling system method: Nominal capacity of condenser in Tons _____ x 400 x <i>leakage factor</i> = _____(CFM)</p> <p><input type="checkbox"/> Heating system method: 21.7 x _____ Output Capacity in Thousands of Btu/hr x <i>leakage factor</i> = _____(CFM)</p> <p><input type="checkbox"/> Measured airflow method (RA3.3): Enter measured fan flow in CFM here _____ x <i>leakage factor</i> = _____(CFM)</p>	
--	--

Enter value for Actual leakage (CFM) in the right column, from measurement using applicable duct leakage pressurization test procedure from Reference Residential Appendix RA3.1(CFM @ 25 Pa).	Actual Leakage (CFM)
List Actual Leakage from duct leakage test (CFM)	

Pass if Actual Leakage is less than Allowed Leakage Pass Fail

For complete replacement of duct systems only, if the 6 percent leakage rate criteria cannot be met, a smoke test should be performed to verify that the excess leakage is coming only from a pre-existing furnace cabinet (air handler cabinet), and not from other <i>accessible</i> portions of the duct system. A HERS rater must verify the installation (No sampling allowed).	
List Actual Leakage from smoke test(CFM)	

Pass if all accessible leaks (except for existing air handler) are sealed using smoke Pass Fail

INSTALLATION CERTIFICATE		CF-6R-MECH-20-HERS
Duct Leakage Test – Completely New or Replacement Duct System		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Compliance Method

This dwelling was: (select one of the following two choices):

- Tested at Final
- Tested at Rough-in (requires installer to complete the *visual inspection at final construction stage* described below)

Visual Inspection at Final Construction Stage (if applicable)

After installing the interior finishing wall and verifying that the above rough-in tests was completed, the following procedure must be performed:

- For all supply and return registers, verify that the spaces between the register boot and the interior finishing wall are properly sealed.
- If the house rough-in duct leakage test was conducted without an air handler installed, inspect the connection points between the air handler and the supply and return plenums to verify that the connection points are properly sealed.
- Inspect all joints to ensure that no cloth backed rubber adhesive duct tape is used.

Outside air (OA) ducts for Central Fan Integrated (CFI) ventilation systems, shall not be sealed/taped off during duct leakage testing. CFI OA ducts that utilize controlled motorized dampers, that open only when OA ventilation is required to meet ASHRAE Standard 62.2, and close when OA ventilation is not required, may be configured to the closed position during duct leakage testing.

- All supply and return register boots must be sealed to the drywall
- New duct installations cannot utilize building cavities as plenums or platform returns in lieu of ducts.
- Mastic and draw bands must be used in combination with Cloth backed, rubber adhesive duct tape to seal leaks at duct connections.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):
Is this installation monitored by a Third Party Quality Control Program (TPQCP)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Name of TPQCP (if applicable):

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Enter the Duct System Name or Identification/Tag:

Enter the Duct System Location or Area Served:

Note: Submit one Installation Certificate for each duct system that must demonstrate compliance in the dwelling.

This installation certificate is required for compliance for alterations and additions in existing dwellings to space conditioning systems and duct systems.

Note: For existing dwellings, a completely new or replacement duct system can also include existing parts of the original duct system (e.g., register boots, air handler, coil, plenums, etc.) if those parts are accessible and they can be sealed. For a completely new or replacement duct system installed in an existing dwelling, use the Installation Certificate titled "Duct Leakage Test – Completely New or Replacement Duct System."

Duct Leakage Diagnostic Test – Existing Duct System

Select one compliance method from the following four choices.

Option 1. Measured leakage less than 15% of Fan Airflow.

Option 2. Measured leakage to outside less than 10% of Fan Airflow.

Option 3. Reduce leakage by 60% or more, and conduct smoke test to seal all accessible leaks.

Option 4. Fix all accessible leaks using smoke test, and HERS rater must verify.

Note: (One of Options 1, 2 or 3 must be attempted before utilizing Option 4.)

Determine nominal **Fan Airflow** using one of the following three calculation methods.

Cooling system method: Size of condenser in Tons _____ x 400 = _____ CFM

Heating system method: 21.7 x _____ Heating Output Capacity (kBtuh) = _____ CFM

Measured system airflow using RA3.3 airflow test procedures: _____ CFM

1	<p>Option 1 used then:</p> <p>Allowed leakage = Fan Airflow _____ x 0.15 = _____ CFM</p> <p>Actual leakage = _____ CFM</p> <p style="text-align: right;">Pass if Actual leakage is less than Allowed leakage</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
2	<p>Option 2 used then:</p> <p>Allowed leakage = Fan Airflow _____ x 0.10 = _____ CFM</p> <p>Actual leakage to outside = _____ CFM</p> <p style="text-align: right;">Pass if Actual leakage to outside is less than Allowed leakage</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
3	<p>Option 3 used then:</p> <p>Initial leakage prior to start of work = _____ CFM</p> <p>Final leakage after sealing all accessible leaks using smoke test = _____ CFM</p> <p>Initial leakage _____ - Final leakage _____ = Leakage reduction _____ CFM</p> <p>(Leakage reduction _____ / Initial leakage _____) x 100% = % Reduction</p> <p style="text-align: right;">Pass if % Reduction ≥ 60%</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
4	<p>Option 4 used then:</p> <p>All accessible leaks repaired using smoke test. HERS rater must verify (No sampling).</p> <p style="text-align: right;">Pass if all accessible leaks have been sealed using Smoke Test</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail

INSTALLATION CERTIFICATE		CF-6R-MECH-21-HERS
Duct Leakage Test – Existing Duct System		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

- Outside air (OA) ducts for Central Fan Integrated (CFI) ventilation systems, shall not be sealed/taped off during duct leakage testing. CFI OA ducts that utilize controlled motorized dampers, that open only when OA ventilation is required to meet ASHRAE Standard 62.2, and close when OA ventilation is not required, may be configured to the closed position during duct leakage testing.
- All supply and return register boots must be sealed to the drywall if smoke test is utilized for compliance – applies to duct leakage compliance option 3 (leakage reduction by 60%) and option 4 (fix all accessible leaks) described above.
- New duct installations cannot utilize building cavities as plenums or platform returns in lieu of ducts.
- Mastic and draw bands must be used in combination with cloth backed rubber adhesive duct tape to seal leaks at all new duct connections.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):
Is this installation monitored by a Third Party Quality Control Program (TPQCP)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Name of TPQCP (if applicable):

INSTALLATION CERTIFICATE		CF-6R-MECH-22-HERS
HSPP/PSPP Installation; Cooling Coil Airflow & Fan Watt Draw Test		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

Hole for the placement of a Static Pressure Probe (HSPP), and Permanently installed Static Pressure Probe (PSPP) in the supply plenum

When the Certificate of Compliance (CFIR) indicates Cooling Coil Airflow or Fan Watt Draw verification are required, HSPP or PSPP are required to be installed in each air handler in the dwelling. Procedures for installing HSPP and PSPP are described in Reference Residential Appendix RA3.3. This measure requires verification by a HERS rater.

Select one method from the two choices below for compliance with the HSPP/PSPP requirement for this dwelling.				
<input type="checkbox"/>	HSPP	1/4 inch (6 mm) hole labeled and located downstream of the evaporator coil in the supply plenum as shown in the figure in Section RA3.3.1.1.		
<input type="checkbox"/>	PSPP	1/4 inch (6 mm) hole equipped with a permanently installed pressure probe, labeled and located downstream of the evaporator coil in the supply plenum as shown in the figure in Section RA3.3.1.1.		
System Name or Identification/Tag				
System Location or Area Served				
Confirm that a HSPP or PSPP has been installed on the air handler per the requirements of RA3.3.1.1. Enter Pass or Fail				

Cooling Coil Airflow Verification

When the Certificate of Compliance indicates Cooling Coil Airflow verification is required, the procedures for measuring the cooling coil airflow must be performed as specified in Reference Residential Appendix RA3.3. Results of the cooling coil airflow diagnostic test must be entered in the table below. This measure requires verification by a HERS rater.

Select one method from the three choices below for compliance with the Cooling Coil Airflow test requirement for this dwelling.				
<input type="checkbox"/>	Diagnostic Fan Flow Using Plenum Pressure Matching according to the procedures in RA3.3.3.1.1			
<input type="checkbox"/>	Diagnostic Fan Flow Using Flow Grid Measurement according to the procedures in RA3.3.3.1.2			
<input type="checkbox"/>	Diagnostic Fan Flow Using Flow Capture Hood according to the procedures in RA3.3.3.1.3			
System Name or Identification/Tag				
System Location or Area Served				
Nominal Cooling Capacity (ton) of the outdoor unit.				
Enter the minimum airflow requirement from the CF-1R (CFM/ton).				
Calculate the target minimum airflow for the test by multiplying the CFM/ton criteria specified on the CF-1R by the nominal cooling capacity of the outdoor unit (ton). Target (CFM)				
Enter the diagnostically tested airflow (CFM). Tested (CFM)				
The system complies if Tested (CFM) is equal or greater than Target (CFM). Enter Pass or Fail				

INSTALLATION CERTIFICATE		CF-6R-MECH-22-HERS
HSPP/PSPP Installation; Cooling Coil Airflow & Fan Watt Draw Test		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Fan Watt Draw Verification

When the Certificate of Compliance indicates Fan Watt Draw verification is required, the procedures for measuring the Fan Watt Draw must be performed as specified in Reference Residential Appendix RA3.3. Results of the Fan Watt Draw diagnostic test must be entered in the table below. This measure requires verification by a HERS rater. Note: Fan watt draw must be measured simultaneously with cooling coil airflow. The fan watt draw measurement and cooling coil airflow measurement must simultaneously meet or exceed their target criteria specified by the CF-1R for the dwelling.

<i>Select one method from the two choices below for compliance with the Fan Watt Draw test requirement for this dwelling.</i>				
<input type="checkbox"/>	Portable Watt Meter Measurement according to the procedures in RA3.3.3.3.1			
<input type="checkbox"/>	Utility Revenue Meter Measurement according to the procedures in RA3.3.3.3.2			
System Name or Identification/Tag				
System Location or Area Served				
Enter the air handler Tested (CFM) from the cooling coil airflow test table above.				
Enter the fan watt draw requirement from the CF-1R (Watt/CFM).				
Calculate the target maximum Watt draw for the test by multiplying the Watt/CFM criteria specified on the CF-1R by the air handler Tested (CFM). Target (Watt)				
Enter the diagnostically tested Watt draw (Watt). Tested (Watt)				
The system complies if Tested (Watt) is less than or equal to Target (Watt) Enter pass or Fail				

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):
Is this installation monitored by a Third Party Quality Control Program (TPQCP)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Name of TPQCP (if applicable):

INSTALLATION CERTIFICATE		CF-6R-MECH-23-HERS
Verification of High EER Equipment		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

Verification of High EER Equipment

Procedures for verification of High EER Equipment are described in Reference Residential Appendix RA3.4. For dwelling units with multiple systems, the procedures must be applied to each system separately. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

1	System Name or Identification/Tag				
2	System Location or Area Served				
3	Certified EER Rating of the installed equipment (Btu/Watt-hr)				
4	Make and Model Number of the installed Outdoor Unit				
5	Make and Model Number of the installed Inside Coil				
6	Make and Model Number of the installed Furnace or Air Handler.				
7	Minimum Equipment EER required for compliance as reported on the CF-1R				
<input type="checkbox"/> When a high EER system specification includes a time delay relay, the installation of the time delay relay must be verified for compliance credit. Refer to Reference Residential Appendix RA3.4.3 for the Time Delay Relay Verification Procedure. <input type="checkbox"/> When installation of specific matched equipment is necessary to achieve a high EER, installation of the specific equipment must be verified for compliance credit. Refer to Reference Residential Appendix RA3.4.3 for the Matched Equipment Verification Procedure.					
8	If the Certified EER Rating in row 3 is equal to or greater than the required minimum EER in row 7, the unit complies. If the unit complies enter Pass				

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-24-HERS
Charge Indicator Display (CID)		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

CHARGE INDICATOR DISPLAY (CID)

Charge Indicator Display (CID) specifications are available in Reference Joint Appendix JA6; HERS verification procedure for the CID is in Reference Residential Appendix RA3.4.2. If refrigerant charge verification is required for compliance, and a CID has been installed on the system, a pass for this CID verification for an installed system is sufficient for demonstrating compliance with the refrigerant charge verification requirement for that system, thus submittal of a standard refrigerant charge verification compliance form (MECH 25) is not required for a system that has a passing CID verification shown in the table below.

CID - Verification of the Presence and Proper Function of a Charge Indicator Display

System Name or Identification/Tag						
System Location or Area Served						
CID Manufacturer Name and Model Number						
1	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The display module is mounted adjacent to the system thermostat			
2	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The manufacturer has certified to the Energy Commission that the CID model meets the requirements of Reference Joint Appendix JA6			
3	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The CID was installed by the manufacturer			
4	<input type="checkbox"/> Yes	<input type="checkbox"/> No	or if 3 is No, the CID was installed according to the manufacturer's specifications			
Yes to 1 and 2 and yes to either 3 or 4 is a pass			enter Pass or Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):
Is this installation monitored by a Third Party Quality Control Program (TPQCP)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Name of TPQCP (if applicable):

INSTALLATION CERTIFICATE		CF-6R-MECH-25-HERS
Refrigerant Charge Verification - Standard Measurement Procedure		(Page 1 of 5)
Site Address:	Enforcement Agency:	Permit Number:

Note: If installation of a Charge Indicator Display (CID) is utilized as an alternative to refrigerant charge verification for compliance, a MECH-24 Certificate (instead of this MECH-25 Certificate) should be used to demonstrate compliance with the refrigerant charge verification requirement. TMAH and STMS are not required for compliance, when a CID is utilized for compliance.

As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

Temperature Measurement Access Holes (TMAH) and Saturation Temperature Measurement Sensors (STMS)
Procedures for installing TMAH are specified in Reference Residential Appendix RA3.2. If refrigerant charge verification is required for compliance, TMAH are also required for compliance. STMS are only required for completely new or replacement space-conditioning systems that utilize prescriptive compliance method.

TMAH - Access Holes in Supply and Return Plenums of Air Handler

System Name or Identification/Tag							
System Location or Area Served							
1	<input type="checkbox"/> Yes	<input type="checkbox"/> No	5/16 inch (8 mm) access hole upstream of evaporative coil in the return plenum and labeled according to Figure in Section RA3.2.2.2.2.				
2	<input type="checkbox"/> Yes	<input type="checkbox"/> No	5/16 inch (8 mm) access hole downstream of evaporative coil in the supply plenum and labeled according to Figure in Section RA3.2.2.2.2.				
Yes to 1 and 2 is a pass.				Enter Pass or Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Fail

STMS - Sensor on the Evaporator Coil

System Name or Identification/Tag							
3	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
4	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor wire is terminated with a standard mini plug suitable for connection to a digital thermometer. The sensor mini plug is accessible to the installing technician and the HERS rater without changing the airflow through the condenser coil				
5	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor measures the saturation temperature of the coil within 1.3 degrees F				
Yes to 3, 4, and 5 is a pass. N/A if STMS are not applicable. Otherwise enter Pass or Fail				Enter	<input checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

STMS - Sensor on the Condenser Coil

System Name or Identification/Tag							
6	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
7	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor wire is terminated with a standard mini plug suitable for connection to a digital thermometer. The sensor mini plug is accessible to the installing technician and the HERS rater without changing the airflow through the condenser coil				
8	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor measures the saturation temperature of the coil within 1.3 degrees F				
Yes to 6, 7, and 8 is a pass. N/A if STMS are not applicable. Otherwise enter Pass or Fail				Enter	<input checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Standard Charge Measurement Procedure (for use if outdoor air dry-bulb is above 55 °F)

Procedures for determining Refrigerant Charge using the Standard Charge Measurement Procedure are available in Reference Residential Appendix RA3.2. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

- *The system should be installed and charged in accordance with the manufacturer’s specifications before starting this procedure.*
- *The system must meet minimum airflow requirements as prerequisite for a valid refrigerant charge test.*
- *If outdoor air dry-bulb is 55 °F or below, the installer must use the RA3.2.3 Alternate Charge Measurement Procedure (Weigh-In Charging Method). If the Weigh-In Method is used, the dwelling cannot be included in a sample group for HERS verification compliance.*

Space Conditioning Systems

System Name or Identification/Tag				
System Location or Area Served				
Outdoor Unit Serial #				
Outdoor Unit Make				
Outdoor Unit Model				
Nominal Cooling Capacity (ton)				
Date of Verification				

Calibration of Diagnostic Instruments

Date of Refrigerant Gauge Calibration		(must be re-calibrated monthly)
Date of Thermocouple Calibration		(must be re-calibrated monthly)

Measured Temperatures (°F)

System Name or Identification/Tag				
Supply (evaporator leaving) air dry-bulb temperature ($T_{supply, db}$)				
Return (evaporator entering) air dry-bulb temperature ($T_{return, db}$)				
Return (evaporator entering) air wet-bulb temperature ($T_{return, wb}$)				
Evaporator saturation temperature ($T_{evaporator, sat}$)				
Condenser saturation temperature ($T_{condensor, sat}$)				
Suction line temperature ($T_{suction}$)				
Liquid Line Temperature (T_{liquid})				
Condenser (entering) air dry-bulb temperature ($T_{condenser, db}$)				

Site Address:	Enforcement Agency:	Permit Number:
---------------	---------------------	----------------

Minimum Airflow Requirement

Temperature Split Method Calculations for determining Minimum Airflow Requirement for Refrigerant Charge Verification. The temperature split method is specified in Reference Residential Appendix RA3.2.

System Name or Identification/Tag				
Calculate: Actual Temperature Split = $T_{\text{return, db}} - T_{\text{supply, db}}$				
Target Temperature Split from Table RA3.2-3 using $T_{\text{return, wb}}$ and $T_{\text{return, db}}$				
Calculate difference: Actual Temperature Split – Target Temperature Split =				
Passes if difference is between -3°F and +3°F or, upon remeasurement, if between -3°F and -100°F Enter Pass or Fail				

Note: Temperature Split Method Calculation is not necessary if actual Cooling Coil Airflow is verified using one of the airflow measurement procedures specified in Reference Residential Appendix RA3.3. If actual cooling coil airflow is measured, the value must be equal to or greater than the Calculated Minimum Airflow Requirement in the table below.

Calculated Minimum Airflow Requirement (CFM) = Nominal Cooling Capacity (ton) X 300 (cfm/ton)

System Name or Identification/Tag				
Calculated Minimum Airflow Requirement (CFM)				
Measured Airflow using RA3.3 procedures (CFM)				
Passes if measured airflow is greater than or equal to the calculated minimum airflow requirement. Enter Pass or Fail				

Superheat Charge Method Calculations for Refrigerant Charge Verification. This procedure is required to be used for fixed orifice metering device systems

System Name or Identification/Tag				
Calculate: Actual Superheat = $T_{\text{suction}} - T_{\text{evaporator, sat}}$				
Target Superheat from Table RA3.2-2 using $T_{\text{return, wb}}$ and $T_{\text{condenser, db}}$				
Calculate difference: Actual Superheat – Target Superheat =				
System passes if difference is between -5°F and +5°F Enter Pass or Fail				

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Subcooling Charge Method Calculations for Refrigerant Charge Verification. This procedure is required to be used for thermostatic expansion valve (TXV) and electronic expansion valve (EXV) systems.

System Name or Identification/Tag				
Calculate: Actual Subcooling = $T_{\text{condenser, sat}} - T_{\text{liquid}}$				
Target Subcooling specified by manufacturer				
Calculate difference: Actual Subcooling – Target Subcooling =				
System passes if difference is between -3°F and +3°F Enter Pass or Fail				

Metering Device Calculations for Refrigerant Charge Verification. This procedure is required to be used for thermostatic expansion valve (TXV) and electronic expansion valve (EXV) systems.

System Name or Identification/Tag				
Calculate: Actual Superheat = $T_{\text{suction}} - T_{\text{evaporator, sat}}$				
Enter allowable superheat range from manufacturer's specifications (or use range between 4°F and 25°F if manufacturer's specification is not available)				
System passes if actual superheat is within the allowable superheat range Enter Pass or Fail				

INSTALLATION CERTIFICATE		CF-6R-MECH-25-HERS
Refrigerant Charge Verification - Standard Measurement Procedure		(Page 5 of 5)
Site Address:	Enforcement Agency:	Permit Number:

Standard Charge Measurement Summary: System shall pass both refrigerant charge criteria, metering device criteria (if applicable), and minimum cooling coil airflow criteria based on measurements taken concurrently during system operation. If corrective actions were taken, all applicable verification criteria must be re-measured and/or recalculated.				
System Name or Identification/Tag				
System meets all refrigerant charge and airflow requirements. Enter Pass or Fail				

Residential Appendix RA3.2.2 requires that if the outdoor temperature is between 55°F and 65°F the return air dry bulb temperature shall be maintained above 70°F during the Standard Charge Measurement Procedure. The signature of the Responsible Person in the declaration statement below certifies this requirement has been met for all applicable system verifications reported on this certificate.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position With Company (Title):
Is this installation monitored by a Third Party Quality Control Program (TPQCP)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Name of TPQCP (if applicable):

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

Temperature Measurement Access Holes (TMAH) and Saturation Temperature Measurement Sensors (STMS)
Procedures for installing TMAH are specified in Reference Residential Appendix RA3.2. If refrigerant charge verification is required for compliance, TMAH are also required for compliance. STMS are only required for completely new or replacement space-conditioning systems that utilize prescriptive compliance method.

TMAH - Access Holes in Supply and Return Plenums of Air Handler

System Name or Identification/Tag							
System Location or Area Served							
1	<input type="checkbox"/> Yes	<input type="checkbox"/> No	5/16 inch (8 mm) access hole upstream of evaporative coil in the return plenum and labeled according to Figure in Section RA3.2.2.2.2.				
2	<input type="checkbox"/> Yes	<input type="checkbox"/> No	5/16 inch (8 mm) access hole downstream of evaporative coil in the supply plenum and labeled according to Figure in Section RA3.2.2.2.2.				
Yes to 1 and 2 is a pass.				Enter Pass or Fail	<input checked="" type="checkbox"/> Pass	<input checked="" type="checkbox"/> Fail	

STMS - Sensor on the Evaporator Coil

System Name or Identification/Tag							
3	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
4	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor wire is terminated with a standard mini plug suitable for connection to a digital thermometer. The sensor mini plug is accessible to the installing technician and the HERS rater without changing the airflow through the condenser coil				
5	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor measures the saturation temperature of the coil within 1.3 degrees F				
Yes to 3, 4, and 5 is a pass. N/A if STMS are not applicable. Otherwise enter Pass or Fail				Enter	<input checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass	<input checked="" type="checkbox"/> Fail

STMS - Sensor on the Condenser Coil

System Name or Identification/Tag							
6	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
7	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor wire is terminated with a standard mini plug suitable for connection to a digital thermometer. The sensor mini plug is accessible to the installing technician and the HERS rater without changing the airflow through the condenser coil				
8	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor measures the saturation temperature of the coil within 1.3 degrees F				
Yes to 6, 7, and 8 is a pass. N/A if STMS are not applicable. Otherwise enter Pass or Fail				Enter	<input checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass	<input checked="" type="checkbox"/> Fail

INSTALLATION CERTIFICATE		CF-6R-MECH-26-HERS
Refrigerant Charge Verification - Alternate Measurement Procedure		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Alternate Charge Measurement Procedure (for use if outdoor air dry-bulb is below 55 °F)

Procedures for Determining Refrigerant Charge using the Alternate Method are available in Reference Residential Appendix RA3.2. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

- *The alternative charge measurement procedure requires that the system shall be installed and charged in accordance with the manufacturer's specifications for refrigerant charge using the weigh-in charging method.*
- *Installer verification of line lengths and charge adjustment calculation must be documented on CF-6R before starting this procedure.*
- *If outdoor air dry-bulb is 55 °F or above, installer must use the Standard Charge Measure Procedure.*

Weigh-In Charging Method for Refrigerant Charge Verification				
System Name or Identification/Tag				
System Location or Area Served				
Actual liquid line length (ft)				
Manufacturer's Standard liquid line length (ft)				
Calculate: difference in length (ft) = Actual length – Standard length				
Manufacturer's correction factor (ounces per foot)				
Calculate: charge adjustment = correction factor X difference in length				
Alternate Charge Measurement Summary: System refrigerant charge has been adjusted to meet the manufacturer's specifications based on actual line length Enter Pass or Fail				

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-27-HERS
Maximum Rated Total Cooling Capacity		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Maximum Rated Total Cooling Capacity (MRTCC) Compliance Credit

Procedures for calculating the Maximum Rated Total Cooling Capacity (MRTCC) compliance credit and Electrical Input exception are given in Reference Residential Appendix RA1. The value is calculated by the compliance software and given on the Certificate of Compliance (CF-1R). Compliance with this credit requires that the installed space conditioning system must have a cooling capacity rating at ARI conditions that is equal or less than the MRTCC compliance credit value. The system must also meet the HERS verification requirements for duct leakage, and prescriptive cooling coil airflow compliance credits, and if the Electrical Input Exception is utilized, the EER must be verified. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

1	System Name or Identification/Tag				
2	System Location or Area Served				
3a	ARI Rated Total Cooling Capacity of the installed system (Btu/hr)				
3b	Sum of the ARI Rated Total Cooling Capacities of multiple systems installed in the dwelling (Btu/hr), if applicable.				
Note: MRTCC credit may be calculated for the whole dwelling, or for individual cooling systems in the dwelling. If the MRTCC target value from the CF-1R is for the entire dwelling, and there are multiple cooling systems installed in the dwelling, then the sum of ARI Rated Cooling Capacities of the installed cooling systems must be calculated and entered in row 3b.					
4a	MRTCC target value from the CF-1R (Btu/hr) – if for individual systems				
4b	MRTCC target value from the CF-1R (Btu/hr) – if total for entire dwelling				
5	If the applicable row 3 value is less than or equal to the applicable row 4 value, the unit complies. If the unit complies enter Pass				

Electrical Input Exception for MRTCC compliance credit

Electrical Input Exception for MRTCC compliance credit allows the installed rated total cooling capacity to exceed the MRTCC target value for compliance credit if the electrical input of the oversized cooling system is less than or equal to the electrical input of a standard cooling system. For buildings with more than one cooling system, the proposed electrical input is the sum of the values for each system.

1	System Name or Identification/Tag				
2	System Location or Area Served				
6	ARI Rated EER of the installed unit (Btu/Watt-hr)				
7a	Calculate Proposed Electrical Input ⁷				
7b	Sum of the Proposed Electrical Input values for entire multiple systems installed in the dwelling (Watt), if applicable.				
8a	Calculate Standard Total Electric Input ⁸ (Watt) – if for individual systems				
8b	Calculate Standard Total Electric Input ⁸ (Watt) – if total for entire dwelling				
9	If the applicable row 7 value is less than or equal to the applicable row 8 value, the unit complies. If the unit complies enter Pass				

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Notes:

7) Proposed Electrical Input (Watt) = ARI Rated Total Cooling Capacity (Btu/hr) / ARI Rated EER (Btu/Watt-hr) if the proposed Air Conditioner is listed in the ARI database with a specified furnace or air handler and that furnace or air handler is to be installed. Otherwise, if the proposed Air Conditioner is listed in the ARI database without a furnace or air handler, the proposed electrical input is either:

Proposed Electrical Input (Watt) = [(ARI Rated Total Cooling Capacity (Btu/hr) / ARI Rated EER (Btu/Watt-hr))] + [(ARI Rated Total Cooling Capacity (Btu/hr) x .0048 (Watt-hr/Btu));

or

Proposed Electrical Input (Watt) = [(ARI Rated Total Cooling Capacity (Btu/hr) / ARI Rated EER (Btu/Watt-hr)] – [(ARI Rated Total Cooling Capacity (Btu/hr) x .0122 (Watt-hr/Btu)] + The measured fan power (Watt); where the measured fan power is determined at an airflow equal to or greater than 350 CFM per ton using the procedure described in RA3.3 of the Residential Appendices

8) Standard Total Electric Input (Watt) = MRTCC target from the CF-1R (Btu/hr) / 10 (Btu/Watt-hr)

- Systems must meet the Cooling Coil Airflow HERS verification requirement in order to receive credit for MRTCC.
- Systems must meet the Duct Sealing HERS verification requirements in order to receive credit for MRTCC.
- Systems must meet the HERS verification requirement for EER if the Electrical Input Exception is utilized to comply with the MTRCC compliance credit

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-28-HERS
Low Leakage Air Handler Verification		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

Verified Low Leakage Air Handler (LLAH) with Sealed and Tested Duct System *An additional compliance credit is available for verified low leakage ducts if a Low Leakage Air Handler is installed. The air handler must be connected to a Sealed and Tested New Duct System to receive the credit. Refer to Residential Appendix RA3.1.4.3.10. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.*

System Name or Identification/Tag				
System Location or Area Served				
LLAH Unit Make				
LLAH Unit Model				
<input type="checkbox"/> The LLAH must be connected to a New Duct System that meets the HERS verification requirement for Sealed and Tested Ducts in order to receive compliance credit. <input type="checkbox"/> The LLAH cabinet (furnace or heat pump fan and inside coil) must be certified to the Commission to leak 2 percent or less of its nominal air conditioning cfm delivered when pressurized to 1-inch water gauge with all present air inlets, air outlets, and condensate drain port(s) sealed.				
If the installed LLAH documentation confirms the unit meets the certification requirement and Duct Testing is specified on the CF-1R, the unit complies. If the unit complies enter Pass				

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

INSTALLATION CERTIFICATE		CF-6R-MECH-29-HERS
Supply Duct Compliance Credits - Location; Surface Area; R-value		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Enter the Duct System Name or Identification/Tag:
Enter the Duct System Location or Area Served:
Note: Submit one Installation Certificate for each duct system that must demonstrate compliance in the dwelling.

SUPPLY DUCT LOCATION COMPLIANCE CREDITS

Credit is available for supply duct systems entirely in conditioned space or with reduced surface area in unconditioned spaces.

LESS THAN 12 LINEAR FEET OF SUPPLY DUCT OUTSIDE OF CONDITIONED SPACE COMPLIANCE CREDIT. *A detailed duct design is not required for compliance with this measure. HERS verification is required for compliance with this measure.*

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Less than 12 linear feet of supply duct outside of conditioned space.
Yes to this compliance credit is a pass		
✓ <input type="checkbox"/> Pass ✓ <input type="checkbox"/> Fail		

SUPPLY DUCTS LOCATED IN CONDITIONED SPACE COMPLIANCE CREDIT. *A detailed duct design is not required for compliance with this measure. HERS verification is required for compliance with this measure.*

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Ducts are located within the conditioned volume of building.
Yes to this compliance credit is a pass		
✓ <input type="checkbox"/> Pass ✓ <input type="checkbox"/> Fail		

SUPPLY DUCT SURFACE AREA REDUCTION AND R-VALUE COMPLIANCE CREDITS

Credit is available for supply duct systems with reduced surface area in unconditioned space with varying combinations of higher performance insulation. In order to claim these credits a detailed duct system design is required to be documented on the plans approved by the enforcement agency, and the installation must be certified to be consistent with the approved plans by the installer, and the installation must be verified by a HERS rater. The size, R-value, and location of each duct segment in an unconditioned space including details describing if ducts are buried in attic insulation must be shown in the design drawings approved by the enforcement agency, entered into the compliance software, and shown on the CF-1R for the building. Procedures for field verification and diagnostic testing for this group of compliance credits are described in Reference Residential Appendix RA3.1

SUPPLY DUCT SURFACE AREA REDUCTION COMPLIANCE CREDIT

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Prescriptive Cooling Coil Airflow compliance has been verified.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	The building's duct system design was approved by the enforcement agency, and the duct system design is detailed in the special features section of the CF-1R approved by the enforcement agency.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	The installed duct system does not have severely twisted or compressed sections that would restrict required operating airflow.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	The installed duct system layout, including duct sizes and locations of supply & return registers match the duct system design plans approved by the enforcement agency, and the installed duct system meets the requirements for Verified Duct Design specified in Reference Residential Appendix RA3.1.4.1.1.1
Yes to all is a pass		
✓ <input type="checkbox"/> Pass ✓ <input type="checkbox"/> Fail		

INSTALLATION CERTIFICATE		CF-6R-MECH-29-HERS
Supply Duct Compliance Credits - Location; Surface Area; R-value		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

BURIED DUCTS ON THE CEILING R-VALUE COMPLIANCE CREDIT

In order to claim credit for buried ducts on the ceiling, the conditions for the Supply Duct Surface Area Reduction (above) must be met, the approved duct design must identify which portions of the duct system are "Buried", and the installed duct system must conform to the approved duct design. Also, the duct system must meet prescriptive Duct Leakage test requirements and the building must meet Quality Insulation Installation requirements.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	The duct design passes the Supply Duct Surface Area Reduction compliance credit, buried ducts are shown on the approved duct design and on the approved CF-1R, and the installed duct system is consistent with the approved duct design drawings.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Duct Leakage requirements
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Quality Insulation Installation requirements
Yes to all is a pass		<input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail

DEEPLY BURIED DUCTS R-VALUE COMPLIANCE CREDIT

In order to claim credit for buried ducts on the ceiling, the conditions for the Supply Duct Surface Area Reduction (above) must be met, the approved duct design must identify which portions of the duct system are "Deeply Buried", and the installed duct system must conform to the approved duct design. Also, the duct system must meet prescriptive Duct Leakage test requirements and the building must meet Quality Insulation Installation requirements.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	The duct design passes the Supply Duct Surface Area Reduction compliance credit, buried ducts are shown on the approved duct design and on the approved CF-1R, and the installed duct system is consistent with the approved duct design drawings.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Duct Leakage requirements
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Quality Insulation Installation requirements
Yes to all is a pass		<input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for construction, or an authorized representative of the person responsible for construction (responsible person).
- I certify that the installed features, materials, components, or manufactured devices identified on this certificate (the installation) conforms to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that that if such checking identifies defects, I am required to take corrective action at my expense. I understand that Energy Commission and HERS provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance (CF-1R) form approved by the enforcement agency that identifies the specific requirements for the installation. I certify that the requirements detailed on the CF-1R that apply to the installation have been met.
- **I will ensure that a completed, signed copy of this Installation Certificate shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a signed copy of this Installation Certificate is required to be included with the documentation the builder provides to the building owner at occupancy.** I will ensure that all Installation Certificates will come from a HERS provider data registry for multiple orientation alternatives, and beginning October 1, 2010, for all low-rise residential buildings.

Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	Responsible Person's Signature:	
CSLB License:	Date Signed:	Position With Company (Title):

*CF-4R – ENVELOPE
CERTIFICATE OF FIELD VERIFICATION AND
DIAGNOSTIC TESTING*

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-ENV-20
Building Envelope Sealing		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

BUILDING ENVELOPE SEALING

Diagnostic Testing Results			
<i>CFM50_H = the measured airflow in cubic feet per minute (cfm) at 50 pascals for the dwelling with air distribution registers unsealed. SLA = 3.819 x (CFM50_H / Conditioned Floor Area in ft²) per Residential ACM Manual Equation R3-16</i>			
	Building Envelope Leakage CFM50 _H as measured using a blower door diagnostic device	✓	✓
1.	Enter the blower door leakage target CFM50_H value for compliance from the CF-1R (cfm).		
2.	Enter the blower door leakage minimum CFM50_H value corresponding to 1.5 SLA from the CF-1R (cfm).		
3.	Enter the measured CFM50_H value from the blower door test (cfm)		
4.	The leakage test passes if the measured envelope leakage CFM50 _H value from row 3 is less than or equal to the value required for compliance from row 1, otherwise the test fails. check/enter Pass or Fail	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
5.	If measured CFM50 _H from row 3 is less than the minimum CFM50 _H value corresponding to 1.5 SLA from row 2: check/enter < 1.5 SLA, otherwise check/enter ≥1.5 SLA	<input type="checkbox"/> < 1.5 SLA*	<input type="checkbox"/> ≥1.5 SLA
*Advisory note to builder and enforcement agency: If row 5 indicates "< 1.5 SLA", it is critical to ensure that combustion and solid-fuel burning appliances in the dwelling are provided with adequate combustion and ventilation air and vented in accordance with manufacturers' installation instructions and all applicable codes as specified by ASHRAE Standard 62.2 Section 6.4. Additional information about compliance with this requirement is given in Section 4.6.5 of the Residential Compliance Manual under the topic of Combustion and Solid-Fuel Burning Appliances.			

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-ENV-21
Quality Insulation Installation (QII) - Framing Stage Checklist		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

1. Quality Insulation Installation (QII) - Framing Stage Checklist

Air barrier and preparation for insulation verification inspection must be done at framing stage before insulation is installed. If there are any "No" answers rows not filled out or signatures missing then this is not valid form and cannot be accepted by the building department or HERS rater. If spray foam is used an air barrier is not required NA would be checked. QII credit not allowed if any steel framing or structural framing in the walls of a conditioned space.

✓ FLOOR AIR BARRIER			
<input type="checkbox"/>		<input type="checkbox"/>	All gaps in the raised floor to unconditioned space or to outside larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All openings on a second floor including under a tub where the drain penetrates the floor is sealed
Yes	No	NA	
✓ WALLS AIR BARRIER			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps in wall exterior sheathing to unconditioned space or to outside larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No gaps in sheathing against the garage, attic, or covered patio. All gaps larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps in Rim-joists in interior and exterior walls to the outside including holes drilled for electrical and plumbing larger than 1/8" filled with foam or caulk. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rope caulk, foam gasket, or caulking bead around the entire sole plate of the home
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All gaps around the windows are caulked or foamed (stuffing with fiberglass not acceptable)
Yes	No	NA	
✓ ATTIC INSPECTION			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attic rulers appropriate to the material installed evenly throughout the attic to verify depth. (NA if SPF or batt)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Square foot of attic ____ / 250 = ____ minimum number of rulers installed. Must round up. Number of rulers actually installed ____ (NA if SPF or batt)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ALL rulers visible from attic access. (NA if SPF or batt)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Eave vents baffles installed at all eave vents to prevent air movement under or into insulation. (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Area of eave vent baffle is the same or larger than the net free-ventilation area of the eave vent. (NA if SPF)
Yes	No	NA	
✓ CEILING AIR BARRIER			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All draft stops in place to form a continuous ceiling air barrier no gaps larger than 1/8". (NA if SPF)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All drops covered with hard covers. Gaps around or in the hard cover larger than 1/8" filled with foam or caulk. (NA if SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>		All recessed light fixtures in non conditioned space IC and air tight (AT)
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		All recessed light fixtures are sealed with a gasket or caulk between the housing and the ceiling
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		Openings around flue shafts fully sealed with solid blocking or flashing and any remaining gaps sealed with fire-rated caulk or sealant.
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		Piping shafts openings fully sealed and caulked
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		Penetrations from wiring in interior walls, electrical boxes, fire alarms etc. sealed with caulk or sealant
Yes	No		
<input type="checkbox"/>	<input type="checkbox"/>		All duct chases, fireplace chases, and double walls sealed air tight at the ceiling level. All gaps into shafts larger than 1/8" filled with foam or caulk. Special attention paid to ducts entering shafts from ceiling.
Yes	No		

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-ENV-21
Quality Insulation Installation (QII) - Framing Stage Checklist		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

✓ GARAGE ROOF/CEILING AIR BARRIER FOR TWO STORIES (no conditioned space over garage)			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Air barrier installed at joists in garage to house transition (between floors). No gaps larger than 1/8". If SPF used then air barrier installed gaps not required to be filled. (NA if SPF or conditioned space over garage)
✓ GARAGE ROOF/CEILING AIR BARRIER FOR TWO STORIES (conditioned space over garage)			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	If insulation is to be installed at subfloor then subfloor has no gaps over 1/8". Air barrier installed at joists in garage to house transition (between floors). (NA if SPF or no conditioned space over garage)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	If insulation is to be installed at ceiling of garage then ceiling and joists to the outside have no gaps over 1/8". (NA if SPF or no conditioned space over garage.)

SAMPLE FORM
 INFORMATION ONLY
 NOT FOR SUBMITTAL

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

*QII credit not allowed if any steel framing or structural framing in the walls of a **conditioned** space.*

Insulation Stage Checklist

FLOOR INSULATION			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All floor joist cavity insulation installed to uniformly fit the cavity side-to-side and end-to-end. (NA if floors slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation in full contact with the subfloor, NO gaps. (NA if floors are slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation in contact with air barrier on all five sides. (ends, sides, back). NA if floors are slab on grade.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Batts cut to fit around wiring and plumbing, or split (delaminated). (NA if loose fill, SPF, or slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Batt insulation has continuous support. (NA if loose fill, SPF, or slab on grade).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation R-value same or greater that listed on CF-1R.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation properly adhered to avoid gaps and provide an air seal
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF (Spray Polyurethane Foam Medium Density) insulation the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than 1/2 inch less than the required thickness for the R-value. (NA for other forms of insulation).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF list the required floor cavity R-value from CF-1R, R-____. List tested average depth of insulation____ in X 5.8R = ____ R this is the installed R-value and must be equal to or greater than listed on CF-1R (NA for other forms of insulation)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Measure thickness of insulation in 6 random measurements. Must be within 1/2 inch of the required depth.

✓ WALL INSULATION

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Standard depth cavities insulation fills cavity and touches air barrier on all six sides. (NA if SPF used and meets the required R-value).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All double walls and bump-outs, the insulation fills the cavity or additional air barrier installed so that the insulation fills the cavity. Insulation touches all six sides. (NA if SPF used and meets the required R-value).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Behind tub/shower, walls under stairs, and fireplace, insulation touches air barrier on five sides. Not required to fill the space. Cavity required to be air tight.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	BATTS , not a single void/depression deeper than 3/4" in ANY stud bay. (NA if loose fill or SPF)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	BATTS , voids/depressions less than 3/4" allowed as long as the area is not greater than 10% of the surface area for each stud bay. (NA if loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Loose Fill no gaps or voids of any depth allowed. (NA if batts or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Any gaps between studs or insulation larger than 1/8" must be filled with insulation or foam.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All Rim-joists to the outside insulated.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Special attention must be paid to corner channels, wall intersections, and behind tub/shower enclosures insulated to proper R-Value.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	All skylight shafts and attic kneewalls insulated with minimum R-19.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Insulation in full contact with drywall or wall finish of skylight shafts and attic kneewalls.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	Wall insulation same or better than what is listed on the CF-1R.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	SPF insulation properly adhered to avoid gaps and provide an air seal

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF (Spray Polyurethane Foam Medium Density) insulation the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than 1/2 inch less than the required thickness for the R-value. (NA for other forms of insulation).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF list the required floor cavity R-value from CF-1R, R-____. List tested average depth of insulation ____ in X 5.8R = ____ R this is the installed R-value and must be equal to or greater than listed on CF-1R (NA for other forms of insulation)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Measure thickness of insulation in 6 random measurements. Must be within 1/2 inch of the required depth
Yes	No	NA	
✓ CEILING INSULATION			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BATTS there must not be a single gap/void/depression deeper than 3/4". (NA if loose fill or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BATTS voids/depressions less than 3/4" allowed as long as the area is not greater than 10% of the surface area for each stud bay. (NA if loose fill or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NO gaps or voids allowed for loose fill and SPF. (NA if batts).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All ceiling insulation installed to uniformly fit the cavity side-to-side and end-to-end.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation in full contact with the ceiling, NO gaps.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation in contact with air barrier on all five sides.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Batts cut to fit around wiring and plumbing, or split (delaminated). (NA for loose fill or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Batts taller than the trusses must expand so that they touch each other over the trusses. (NA for loose fill or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than 1/2 inch less than the required thickness for the R-value. (NA if loose fill or batts).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation fully fills cavity below any plywood platform or cat-walk. If SPF used then minimum 3 inches. (NA if no platforms or cat-walks)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attic access gasketed
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attic access insulated with rigid foam or batt insulation using adhesive or mechanical fastener. R-value same as ceiling R-value listed on CF-1R
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Recessed light fixtures covered full depth with insulation. If SPF used then other forms of insulation used to cover or enclosed in a box fabricated from 1/2-inch plywood, 18 ga. sheet metal, 1/4-inch hard board or drywall
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wall insulation same or better than what is listed on the CF-1R
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Loose Fill Insulation at proper depth – insulation rulers visible and indicating proper depth and R-value for blown in insulation. (NA for batts or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Loose Fill Insulation uniformly covers the entire ceiling (or roof) area from outside of all exterior walls. (NA for batts or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Loose-fill mineral fiber insulation meets or exceeds manufacturer's minimum weight and thickness requirement for the target R-value. Target R-value _____ Manufacturer's minimum required weight for the target R-value _____ (pounds-per-square foot). Sample weight _____ (pounds per square foot).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Manufacturer's minimum required thickness at time of installation _____ (inches) Manufacturer's minimum required settled thickness _____ (inches). Number of days since loose-fill insulation was installed _____ (days). At the time of installation, the insulation shall be greater than or equal to the manufacturer's minimum initial insulation thickness. If the HERS rater does not verify the insulation at the time of installation, and if the loose-fill insulation has been in place less than seven days the thickness shall be greater than the manufacturer's minimum required thickness at the time of installation less 1/2 inch to account for settling. If the insulation has been in place for seven days or longer the insulation thickness shall be greater than
Yes	No	NA	

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

			or equal to the manufacturer's minimum required settled thickness. Minimum thickness measured (inches).
✓ GARAGE ROOF/CEILING INSULATION FOR TWO STORIES(no conditioned space over garage)			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation installed at joists against the air barrier in the garage to house transition (between floors). All wall insulation requirements above must be met. (NA if conditioned space over garage).
Yes	No	NA	
✓ GARAGE ROOF/CEILING INSULATION FOR TWO STORIES(conditioned space over garage)			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If insulation is to be installed at subfloor then the insulation must also be installed at joists against the air barrier in the garage to house transition (between floors). All ceiling and wall insulation requirements above must be met. (NA if no conditioned space over garage).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If insulation is to be installed at ceiling of garage then the joists to the outside must be insulated and all the insulation requirements listed above must be met. (NA if no conditioned space over garage).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF insulation properly adhered to avoid gaps and provide an air seal
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF (Spray Polyurethane Foam Medium Density) insulation the average thickness is equal to or greater than that listed on the CF-1R and the minimum thickness shall be no more than 1/2 inch less than the required thickness for the R-value. (NA for other forms of insulation).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF list the required floor cavity R-value from CF-1R, R-____. List tested average depth of insulation ____ in X 5.8R = ____ R this is the installed R-value and must be equal to or greater than listed on CF-1R (NA for other forms of insulation)
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Measure thickness of insulation in 6 random measurements. Must be within 1/2 inch of the required depth
Yes	No	NA	

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

*CF-4R – MECHANICAL
CERTIFICATE OF FIELD VERIFICATION AND
DIAGNOSTIC TESTING*

Duct Leakage Test – Completely New or Replacement Duct System **(Page 1 of 2)**

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Enter the Duct System Name or Identification/Tag: _____

Enter the Duct System Location or Area Served: _____

Note: Submit one Installation Certificate for each duct system that must demonstrate compliance in the dwelling.

This certificate is required for compliance for completely new duct systems installed in new dwelling construction, and also for completely new or replacement duct systems in existing dwellings. For existing dwellings, a completely new or replacement duct system can also include existing parts of the original duct system (e.g., register boots, air handler, coil, plenums, etc.) if those parts are accessible and they can be sealed.

Duct Leakage Diagnostic Test – completely new or replacement duct system

Enter a value for the Allowed Leakage (CFM) for the duct system leakage verification. The value entered must be the Verified Low Leakage Ducts in Conditioned Space criteria or one of the three calculated leakage rates described below.

Verified Low Leakage Ducts in Conditioned Space (VLLDCS) Compliance Credit. If compliance credit for verified low leakage ducts in conditioned space is shown in the special features section of the CF-1R, the leakage to outside test method must be used to verify duct leakage (refer to RA3.1.4.3.4), and 25 CFM must be entered for Allowed Leakage.	Allowed Leakage (CFM)
<p>Allowed leakage calculation – (select one calculation method from this section). Use 6% (<i>leakage factor</i> = 0.06) for calculations. When utilizing Low Leakage Air Handler (LLAH) credit, the allowed duct leakage may be specified by the CF-1R to be less than 6%, in which case the user-specified leakage rate must be used in the calculations below. For example, if the user-specified leakage (specified as a percentage of fan airflow) is reported on the CF-1R as 3%, then use a <i>leakage factor</i> of 0.03 in the calculations below.</p> <p><input type="checkbox"/> Cooling system method: Nominal capacity of condenser in Tons _____ x 400 x <i>leakage factor</i> = _____ (CFM)</p> <p><input type="checkbox"/> Heating system method: 21.7 x _____ Output Capacity in Thousands of Btu/hr x <i>leakage factor</i> = _____ (CFM)</p> <p><input type="checkbox"/> Measured airflow method (RA3.3): Enter measured fan flow in CFM here _____ x <i>leakage factor</i> = _____ (CFM)</p>	Actual Leakage (CFM)
Enter value for Actual leakage (CFM) in the right column, from measurement using applicable duct leakage pressurization test procedure from Reference Residential Appendix RA3.1(CFM @ 25 Pa).	Actual Leakage (CFM)
List Actual Leakage from duct leakage test (CFM)	Actual Leakage (CFM)
<p>Pass if Actual Leakage is less than Allowed Leakage <input type="checkbox"/> Pass <input type="checkbox"/> Fail</p>	
For complete replacement of duct systems only, if the 6 percent leakage rate criteria cannot be met, a smoke test should be performed to verify that the excess leakage is coming only from a pre-existing furnace cabinet (air handler cabinet), and not from other <i>accessible</i> portions of the duct system. A HERS rater must verify the installation (No sampling allowed).	Actual Leakage from smoke test(CFM)
<p>Pass if all accessible leaks (except for existing air handler) are sealed using smoke <input type="checkbox"/> Pass <input type="checkbox"/> Fail</p>	

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-20
Duct Leakage Test – Completely New or Replacement Duct System		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

- Outside air (OA) ducts for Central Fan Integrated (CFI) ventilation systems, shall not be sealed/taped off during duct leakage testing. CFI OA ducts that utilize controlled motorized dampers, that open only when OA ventilation is required to meet ASHRAE Standard 62.2, and close when OA ventilation is not required, may be configured to the closed position during duct leakage testing.
- All supply and return register boots must be sealed to the drywall
- New duct installations cannot utilize building cavities as plenums or platform returns in lieu of ducts.
- Mastic and draw bands must be used in combination with Cloth backed, rubber adhesive duct tape to seal leaks at duct connections.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Duct Leakage Test – Existing Duct System **(Page 1 of 2)**

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Enter the Duct System Name or Identification/Tag:
Enter the Duct System Location or Area Served:
<i>Note: Submit one Installation Certificate for each duct system that must demonstrate compliance in the dwelling.</i>

This installation certificate is required for compliance for alterations and additions in existing dwellings to space conditioning systems and duct systems.

Note: For existing dwellings, a completely new or replacement duct system can also include existing parts of the original duct system (e.g., register boots, air handler, coil, plenums, etc.) if those parts are accessible and they can be sealed. For a completely new or replacement duct system installed in an existing dwelling, use the Installation Certificate titled "Duct Leakage Test – Completely New or Replacement Duct System."

Duct Leakage Diagnostic Test – existing duct system

Select one compliance method from the following four choices.

Option 1. Measured leakage less than 15% of Fan Airflow.

Option 2. Measured leakage to outside less than 10% of Fan Airflow.

Option 3. Reduce leakage by 60% or more, and conduct smoke test to seal all accessible leaks.

Option 4. Fix all accessible leaks using smoke test, and HERS rater must verify.

Note: (One of Options 1, 2, or 3 must be attempted before utilizing Option 4.)

Determine nominal **Fan Airflow** using one of the following three calculation methods.

Cooling system method: Size of condenser in Tons _____ x 400 = _____ CFM

Heating system method: 21.7 x _____ Heating Output Capacity (kBtuh) = _____ CFM

Measured system airflow using RA3.3 airflow test procedures: _____ CFM

1	<p>Option 1 used then:</p> <p>Allowed leakage = Fan Airflow _____ x 0.15 = _____ CFM</p> <p>Actual leakage = _____ CFM</p> <p style="text-align: right;">Pass if Actual leakage is less than Allowed leakage</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
2	<p>Option 2 used then:</p> <p>Allowed leakage = Fan Airflow _____ x 0.10 = _____ CFM</p> <p>Actual leakage to outside = _____ CFM</p> <p style="text-align: right;">Pass if Actual leakage to outside is less than Allowed leakage</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
3	<p>Option 3 used then:</p> <p>Initial leakage prior to start of work = _____ CFM</p> <p>Final leakage after sealing all accessible leaks using smoke test = _____ CFM</p> <p>Initial leakage _____ - Final leakage _____ = Leakage reduction _____ CFM</p> <p>(Leakage reduction _____ / Initial leakage _____) x 100% = % Reduction</p> <p style="text-align: right;">Pass if % Reduction ≥ 60%</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
4	<p>Option 4 used then:</p> <p>All accessible leaks repaired using smoke test. HERS rater must verify (No sampling).</p> <p style="text-align: right;">Pass if all accessible leaks have been sealed using Smoke Test</p>	<input type="checkbox"/> Pass <input type="checkbox"/> Fail

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-21
Duct Leakage Test – Existing Duct System		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

- Outside air (OA) ducts for Central Fan Integrated (CFI) ventilation systems, shall not be sealed/taped off during duct leakage testing. CFI OA ducts that utilize controlled motorized dampers, that open only when OA ventilation is required to meet ASHRAE Standard 62.2, and close when OA ventilation is not required, may be configured to the closed position during duct leakage testing.
- All supply and return register boots must be sealed to the drywall if smoke test is utilized for compliance – applies to duct leakage compliance option 3 (leakage reduction by 60%) and option 4 (fix all accessible leaks) described above.
- New duct installations cannot utilize building cavities as plenums or platform returns in lieu of ducts.
- Mastic and draw bands must be used in combination with cloth backed rubber adhesive duct tape to seal leaks at all new duct connections.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-22
HSPP/PSPP Installation; Cooling Coil Airflow & Fan Watt Draw Test		(Page 1 of 2)
Site Address:	Enforcement Agency:	Permit Number:

As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

Hole for the placement of a Static Pressure Probe (HSPP), and Permanently installed Static Pressure Probe (PSPP) in the supply plenum

When the Certificate of Compliance (CFIR) indicates Cooling Coil Airflow or Fan Watt Draw verification are required, HSPP or PSPP are required to be installed in each air handler in the dwelling. Procedures for installing HSPP and PSPP are described in Reference Residential Appendix RA3.3. This measure requires verification by a HERS rater.

Select one method from the two choices below for compliance with the HSPP/PSPP requirement for this dwelling.			
<input type="checkbox"/>	HSPP	1/4 inch (6 mm) hole labeled and located downstream of the evaporator coil in the supply plenum as shown in the figure in Section RA3.3.1.1.	
<input type="checkbox"/>	PSPP	1/4 inch (6 mm) hole equipped with a permanently installed pressure probe, labeled and located downstream of the evaporator coil in the supply plenum as shown in the figure in Section RA3.3.1.1.	
System Name or Identification/Tag			
System Location or Area Served			
Confirm that a HSPP or PSPP has been installed on the air handler per the requirements of RA3.3.1.1. Enter Pass or Fail			

Cooling Coil Airflow Verification

When the Certificate of Compliance indicates Cooling Coil Airflow verification is required, the procedures for measuring the cooling coil airflow must be performed as specified in Reference Residential Appendix RA3.3. Results of the cooling coil airflow diagnostic test must be entered in the table below. This measure requires verification by a HERS rater.

Select one method from the three choices below for compliance with the Cooling Coil Airflow test requirement for this dwelling.			
<input type="checkbox"/>	Diagnostic Fan Flow Using Plenum Pressure Matching according to the procedures in RA3.3.3.1.1		
<input type="checkbox"/>	Diagnostic Fan Flow Using Flow Grid Measurement according to the procedures in RA3.3.3.1.2		
<input type="checkbox"/>	Diagnostic Fan Flow Using Flow Capture Hood according to the procedures in RA3.3.3.1.3		
System Name or Identification/Tag			
System Location or Area Served			
Nominal Cooling Capacity (ton) of the outdoor unit.			
Enter the minimum airflow requirement from the CF-1R (CFM/ton).			
Calculate the target minimum airflow for the test by multiplying the CFM/ton criteria specified on the CF-1R by the nominal cooling capacity of the outdoor unit (ton). Target (CFM)			
Enter the diagnostically tested airflow (CFM). Tested (CFM)			
The system complies if Tested (CFM) is equal or greater than Target (CFM). Enter Pass or Fail			

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-22
HSPP/PSPP Installation; Cooling Coil Airflow & Fan Watt Draw Test		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

Fan Watt Draw Verification

When the Certificate of Compliance indicates Fan Watt Draw verification is required, the procedures for measuring the Fan Watt Draw must be performed as specified in Reference Residential Appendix RA3.3. Results of the Fan Watt Draw diagnostic test must be entered in the table below. This measure requires verification by a HERS rater. Note: Fan watt draw must be measured simultaneously with cooling coil airflow. The fan watt draw measurement and cooling coil airflow measurement must simultaneously meet or exceed their target criteria specified by the CF-1R for the dwelling.

Select one method from the two choices below for compliance with the Fan Watt Draw test requirement for this dwelling.				
<input type="checkbox"/>	Portable Watt Meter Measurement according to the procedures in RA3.3.3.3.1			
<input type="checkbox"/>	Utility Revenue Meter Measurement according to the procedures in RA3.3.3.3.2			
System Name or Identification/Tag				
System Location or Area Served				
Enter the air handler Tested (CFM) from the cooling coil airflow test table above.				
Enter the fan watt draw requirement from the CF-1R (Watt/CFM).				
Calculate the target maximum Watt draw for the test by multiplying the Watt/CFM criteria specified on the CF-1R by the air handler Tested (CFM). Target (Watt)				
Enter the diagnostically tested Watt draw (Watt). Tested (Watt)				
The system complies if Tested (Watt) is less than or equal to Target (Watt) Enter pass or Fail				

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Verification of High EER Equipment

Procedures for verification of High EER Equipment are described in Reference Residential Appendix RA3.4. For dwelling units with multiple systems, the procedures must be applied to each system separately. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

1	System Name or Identification/Tag				
2	System Location or Area Served				
3	Certified EER Rating of the installed equipment (Btu/Watt-hr)				
4	Make and Model Number of the installed Outdoor Unit				
5	Make and Model Number of the installed Inside Coil				
6	Make and Model Number of the installed Furnace or Air Handler.				
7	Minimum Equipment EER required for compliance as reported on the CF-1R				
<input type="checkbox"/> When a high EER system specification includes a time delay relay, the installation of the time delay relay must be verified for compliance credit. Refer to Reference Residential Appendix RA3.4.3 for the Time Delay Relay Verification Procedure. <input type="checkbox"/> When installation of specific matched equipment is necessary to achieve a high EER, installation of the specific equipment must be verified for compliance credit. Refer to Reference Residential Appendix RA3.4.3 for the Matched Equipment Verification Procedure.					
8	If the Certified EER Rating in row 3 is equal or greater than the required minimum EER in row 7, the unit complies. If the unit complies enter Pass				

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-24
Charge Indicator Display (CID)		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

CHARGE INDICATOR DISPLAY (CID)

Charge Indicator Display (CID) specifications are available in Reference Joint Appendix JA6; HERS verification procedure for the CID is in Reference Residential Appendix RA3.4.2. If refrigerant charge verification is required for compliance, and a CID has been installed on the system, a pass for this CID verification for an installed system is sufficient for demonstrating compliance with the refrigerant charge verification requirement for that system, thus submittal of a standard refrigerant charge verification compliance form (MECH 25) is not required for a system that has a passing CID verification shown in the table below.

CID - Verification of the Presence and Proper Function of a Charge Indicator Display

System Name or Identification/Tag						
System Location or Area Served						
CID Manufacturer Name and Model Number						
1	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The display is mounted adjacent to the system thermostat			
2	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The manufacturer has certified to the Energy Commission that the CID model meets the requirements of Reference Joint Appendix JA6.			
3	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Visual verification by the HERS rater confirms that the CID is installed on the system as specified in RA3.4.2.			
Yes to 1 and 2 and yes to either 3 or 4 is a pass			enter Pass or Fail	<input checked="" type="checkbox"/> Pass	<input checked="" type="checkbox"/> Fail	

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Note: If installation of a Charge Indicator Display (CID) is utilized as an alternative to refrigerant charge verification for compliance, a MECH-24 Certificate (instead of this MECH-25 Certificate) should be used to demonstrate compliance with the refrigerant charge verification requirement. TMAH and STMS are not required for compliance, when a CID is utilized for compliance.

As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

Temperature Measurement Access Holes (TMAH) and Saturation Temperature Measurement Sensors (STMS)
Procedures for installing TMAH are specified in Reference Residential Appendix RA3.2. If refrigerant charge verification is required for compliance, TMAH are also required for compliance. STMS are only required for completely new or replacement space-conditioning systems that utilize prescriptive compliance method.

TMAH - Access Holes in Supply and Return Plenums of Air Handler

System Name or Identification/Tag							
System Location or Area Served							
1	<input type="checkbox"/> Yes	<input type="checkbox"/> No	5/16 inch (8 mm) access hole upstream of evaporative coil in the return plenum and labeled according to Figure in Section RA3.2.2.2.2.				
2	<input type="checkbox"/> Yes	<input type="checkbox"/> No	5/16 inch (8 mm) access hole downstream of evaporative coil in the supply plenum and labeled according to Figure in Section RA3.2.2.2.2.				
Yes to 1 and 2 is a pass.				Enter Pass or Fail	✓ <input type="checkbox"/> Pass	✓ <input type="checkbox"/> Fail	

STMS - Sensor on the Evaporator Coil

System Name or Identification/Tag							
3	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
4	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor wire is terminated with a standard mini plug suitable for connection to a digital thermometer. The sensor mini plug is accessible to the installing technician and the HERS rater without changing the airflow through the condenser coil				
5	<input type="checkbox"/> Yes	<input type="checkbox"/> No	When attached to a digital thermometer, the sensor provides an indication of the saturation temperature of the coil.				
Yes to 3, 4, and 5 is a pass. N/A if STMS are not applicable. Otherwise enter Pass or Fail				Enter	✓ <input type="checkbox"/> N/A	✓ <input type="checkbox"/> Pass	✓ <input type="checkbox"/> Fail

STMS - Sensor on the Condenser Coil

System Name or Identification/Tag							
6	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
7	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor wire is terminated with a standard mini plug suitable for connection to a digital thermometer. The sensor mini plug is accessible to the installing technician and the HERS rater without changing the airflow through the condenser coil				
8	<input type="checkbox"/> Yes	<input type="checkbox"/> No	When attached to a digital thermometer, the sensor provides an indication of the saturation temperature of the coil.				
Yes to 6, 7, and 8 is a pass. N/A if STMS are not applicable. Otherwise enter Pass or Fail				Enter	✓ <input type="checkbox"/> N/A	✓ <input type="checkbox"/> Pass	✓ <input type="checkbox"/> Fail

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Standard Charge Measurement Procedure (for use if outdoor air dry-bulb is above 55 °F)

Procedures for determining Refrigerant Charge using the Standard Charge Measurement Procedure are available in Reference Residential Appendix RA3.2. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

- *The system should be installed and charged in accordance with the manufacturer’s specifications before starting this procedure.*
- *The system must meet minimum airflow requirements as prerequisite for a valid refrigerant charge test.*
- *If outdoor air dry-bulb is 55 °F or below, the installer must use the RA3.2.3 Alternate Charge Measurement Procedure (Weigh-In Charging Method). If the Weigh-In Method is used, the dwelling cannot be included in a sample group for HERS verification compliance.*

Space Conditioning Systems

System Name or Identification/Tag				
System Location or Area Served				
Outdoor Unit Serial #				
Outdoor Unit Make				
Outdoor Unit Model				
Nominal Cooling Capacity (ton)				
Date of Verification				

Calibration of Diagnostic Instruments

Date of Refrigerant Gauge Calibration	(must be re-calibrated monthly)
Date of Thermocouple Calibration	(must be re-calibrated monthly)

Measured Temperatures (°F)

System Name or Identification/Tag				
Supply (evaporator leaving) air dry-bulb temperature (T _{supply, db})				
Return (evaporator entering) air dry-bulb temperature (T _{return, db})				
Return (evaporator entering) air wet-bulb temperature (T _{return, wb})				
Evaporator saturation temperature (T _{evaporator, sat})				
Condensor saturation temperature (T _{condensor, sat})				
Suction line temperature (T _{suction})				
Liquid Line Temperature (T _{liquid})				
Condenser (entering) air dry-bulb temperature (T _{condenser, db})				

Site Address:	Enforcement Agency:	Permit Number:
---------------	---------------------	----------------

Minimum Airflow Requirement

Temperature Split Method Calculations for determining Minimum Airflow Requirement for Refrigerant Charge Verification. The temperature split method is specified in Reference Residential Appendix RA3.2.

System Name or Identification/Tag				
Calculate: Actual Temperature Split = $T_{\text{return, db}} - T_{\text{supply, db}}$				
Target Temperature Split from Table RA3.2-3 using $T_{\text{return, wb}}$ and $T_{\text{return, db}}$				
Calculate difference: Actual Temperature Split – Target Temperature Split =				
Passes if difference is between -4°F and +4°F or upon remeasurement, if between -4°F and -100°F Enter Pass or Fail				

Note: Temperature Split Method Calculation is not necessary if actual Cooling Coil Airflow is verified using one of the airflow measurement procedures specified in Reference Residential Appendix RA3.3. If actual cooling coil airflow is measured, the value must be equal to or greater than the Calculated Minimum Airflow Requirement in the table below.

Calculated Minimum Airflow Requirement (CFM) = Nominal Cooling Capacity (ton) X 300 (cfm/ton)

System Name or Identification/Tag				
Calculated Minimum Airflow Requirement (CFM)				
Measured Airflow using RA3.3 procedures (CFM)				
Passes if measured airflow is greater than or equal to the calculated minimum airflow requirement. Enter Pass or Fail				

Superheat Charge Method Calculations for Refrigerant Charge Verification. This procedure is required to be used for fixed orifice metering device systems

System Name or Identification/Tag				
Calculate: Actual Superheat = $T_{\text{suction}} - T_{\text{evaporator, sat}}$				
Target Superheat from Table RA3.2-2 using $T_{\text{return, wb}}$ and $T_{\text{condenser, db}}$				
Calculate difference: Actual Superheat – Target Superheat =				
System passes if difference is between -6°F and +6°F Enter Pass or Fail				

Site Address:	Enforcement Agency:	Permit Number:
---------------	---------------------	----------------

Subcooling Charge Method Calculations for Refrigerant Charge Verification. This procedure is required to be used for thermostatic expansion valve (TXV) and electronic expansion valve (EXV) systems.

System Name or Identification/Tag				
Calculate: Actual Subcooling = $T_{\text{condenser, sat}} - T_{\text{liquid}}$				
Target Subcooling specified by manufacturer				
Calculate difference: Actual Subcooling – Target Subcooling =				
System passes if difference is between -4°F and +4°F Enter Pass or Fail				

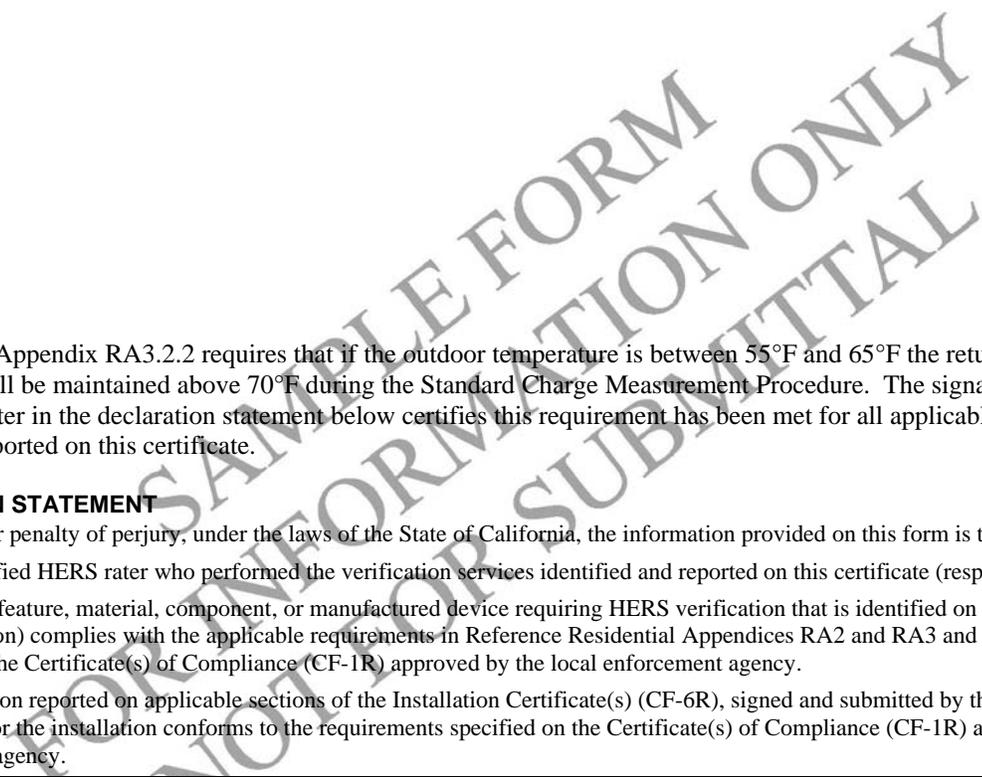
Metering Device Calculations for Refrigerant Charge Verification. This procedure is required to be used for thermostatic expansion valve (TXV) and electronic expansion valve (EXV) systems.

System Name or Identification/Tag				
Calculate: Actual Superheat = $T_{\text{suction}} - T_{\text{evaporator, sat}}$				
Enter allowable superheat range from manufacturer's specifications (or use range between 3°F and 26°F if manufacturer's specification is not available)				
System passes if actual superheat is within the allowable superheat range Enter Pass or Fail				

SAMPLE FORM ONLY
 FOR INFORMATION SUBMITTAL
 NOT FOR SUBMITTAL

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Standard Charge Measurement Summary:				
System shall pass both refrigerant charge criteria, metering device criteria (if applicable), and minimum cooling coil airflow criteria based on measurements taken concurrently during system operation. If corrective actions were taken, all applicable verification criteria must be re-measured and/or recalculated.				
System Name or Identification/Tag				
System meets all refrigerant charge and airflow requirements. Enter Pass or Fail				



Residential Appendix RA3.2.2 requires that if the outdoor temperature is between 55°F and 65°F the return air dry bulb temperature shall be maintained above 70°F during the Standard Charge Measurement Procedure. The signature of the Responsible Rater in the declaration statement below certifies this requirement has been met for all applicable system verifications reported on this certificate.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Maximum Rated Total Cooling Capacity (MRTCC) Compliance Credit

Procedures for calculating the Maximum Rated Total Cooling Capacity (MRTCC) compliance credit and Electrical Input exception are given in Reference Residential Appendix RA1. The value is calculated by the compliance software and given on the Certificate of Compliance (CF-1R). Compliance with this credit requires that the installed space conditioning system must have a cooling capacity rating at ARI conditions that is equal or less than the MRTCC compliance credit value. The system must also meet the HERS verification requirements for duct leakage, and prescriptive cooling coil airflow compliance credits, and if the Electrical Input Exception is utilized, the EER must be verified. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.

1	System Name or Identification/Tag				
2	System Location or Area Served				
3a	ARI Rated Total Cooling Capacity of the installed system (Btu/hr)				
3b	Sum of the ARI Rated Total Cooling Capacities of multiple systems installed in the dwelling (Btu/hr), if applicable.				
<p>Note: MRTCC credit may be calculated for the whole dwelling, or for individual cooling systems in the dwelling. If the MRTCC target value from the CF-1R is for the entire dwelling, and there are multiple cooling systems installed in the dwelling, then the sum of ARI Rated Cooling Capacities of the installed cooling systems must be calculated and entered in row 3b.</p>					
4a	MRTCC target value from the CF-1R (Btu/hr) – if for individual systems				
4b	MRTCC target value from the CF-1R (Btu/hr) – if total for entire dwelling				
5	If the applicable row 3 value is less than or equal to the applicable row 4 value, the unit complies. If the unit complies enter Pass				

Electrical Input Exception for MRTCC compliance credit

Electrical Input Exception for MRTCC compliance credit allows the installed rated total cooling capacity to exceed the MRTCC target value for compliance credit if the electrical input of the oversized cooling system is less than or equal to the electrical input of a standard cooling system. For buildings with more than one cooling system, the proposed electrical input is the sum of the values for each system.

1	System Name or Identification/Tag				
2	System Location or Area Served				
6	ARI Rated EER of the installed unit (Btu/Watt-hr)				
7a	Calculate Proposed Electrical Input ⁷				
7b	Sum of the Proposed Electrical Input values for entire multiple systems installed in the dwelling (Watt), if applicable.				
8a	Calculate Standard Total Electric Input ⁸ (Watt) – if for individual systems				
8b	Calculate Standard Total Electric Input ⁸ (Watt) – if total for entire dwelling				
9	If the applicable row 7 value is less than or equal to the applicable row 8 value, the unit complies. If the unit complies enter Pass				

Maximum Rated Total Cooling Capacity

(Page 2 of 2)

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Notes:

7) Proposed Electrical Input (Watt) = ARI Rated Total Cooling Capacity (Btu/hr) / ARI Rated EER (Btu/Watt-hr) if the proposed Air Conditioner is listed in the ARI database with a specified furnace or air handler and that furnace or air handler is to be installed.

Otherwise, if the proposed Air Conditioner is listed in the ARI database without a furnace or air handler, the proposed electrical input is either:

Proposed Electrical Input (Watt) = ARI Rated Total Cooling Capacity (Btu/hr) / ARI Rated EER (Btu/Watt-hr) + ARI Rated Total Cooling Capacity (Btu/hr) x .0048 (Watt-hr/Btu);

or

Proposed Electrical Input (Watt) = ARI Rated Total Cooling Capacity (Btu/hr) / ARI Rated EER (Btu/Watt-hr) - ARI Rated Total Cooling Capacity (Btu/hr) x .0122 (Watt-hr/Btu) + The measured fan power (Watt); where the measured fan power is determined at an airflow equal to or greater than 350 CFM per ton using the procedure described in RA3.3 of the Residential Appendices

8) Standard Total Electric Input (Watt) = MRTCC target from the CF-1R (Btu/hr) / 10 (Btu/Watt-hr)

- Systems must meet the Cooling Coil Airflow HERS verification requirement in order to receive credit for MRTCC.
- Systems must meet the Duct Sealing HERS verification requirements in order to receive credit for MRTCC.
- Systems must meet the HERS verification requirement for EER if the Electrical Input Exception is utilized to comply with the MTRCC compliance credit

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-28
Low Leakage Air Handler Verification		(Page 1 of 1)
Site Address:	Enforcement Agency:	Permit Number:

Verified Low Leakage Air Handler (LLAH) with Sealed and Tested Duct System *An additional compliance credit is available for verified low leakage ducts if a Low Leakage Air Handler is installed. The air handler must be connected to a Sealed and Tested New Duct System to receive the credit. Refer to Residential Appendix RA3.1.4.3.10. As many as 4 systems in the dwelling can be documented for compliance using this form. Attach an additional form(s) for any additional systems in the dwelling as applicable.*

System Name or Identification/Tag			
System Location or Area Served			
LLAH Unit Make			
LLAH Unit Model			
<input type="checkbox"/> The LLAH must be connected to a New Duct System that meets the HERS verification requirement for Sealed and Tested Ducts in order to receive compliance credit. <input type="checkbox"/> The LLAH cabinet (furnace or heat pump fan and inside coil) must be certified to the Commission to leak 2 percent or less of its nominal air conditioning cfm delivered when pressurized to 1-inch water gauge with all present air inlets, air outlets, and condensate drain port(s) sealed.			
If the installed LLAH documentation confirms the unit meets the certification requirement and Duct Testing is specified on the CF-1R, the unit complies. If the unit complies enter Pass			

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Site Address:	Enforcement Agency:	Permit Number:
----------------------	----------------------------	-----------------------

Enter the Duct System Name or Identification/Tag:
Enter the Duct System Location or Area Served:
Note: Submit one Installation Certificate for each duct system that must demonstrate compliance in the dwelling.

SUPPLY DUCT LOCATION COMPLIANCE CREDITS

Credit is available for supply duct systems entirely in conditioned space or with reduced surface area in unconditioned spaces.

LESS THAN 12 LINEAR FEET OF SUPPLY DUCT OUTSIDE OF CONDITIONED SPACE COMPLIANCE CREDIT. *A detailed duct design is not required for compliance with this measure. HERS verification is required for compliance with this measure.*

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Less than 12 linear feet of supply duct outside of conditioned space.
Yes to this compliance credit is a pass <input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail		

SUPPLY DUCTS LOCATED IN CONDITIONED SPACE COMPLIANCE CREDIT. *A detailed duct design is not required for compliance with this measure. HERS verification is required for compliance with this measure.*

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Ducts are located within the conditioned volume of building.
Yes to this compliance credit is a pass <input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail		

SUPPLY DUCT SURFACE AREA REDUCTION AND R-VALUE COMPLIANCE CREDITS

Credit is available for supply duct systems with reduced surface area in unconditioned space with varying combinations of higher performance insulation. In order to claim these credits a detailed duct system design is required to be documented on the plans approved by the enforcement agency, and the installation must be certified to be consistent with the approved plans by the installer, and the installation must be verified by a HERS rater. The size, R-value, and location of each duct segment in an unconditioned space including details describing if ducts are buried in attic insulation must be shown in the design drawings approved by the enforcement agency, entered into the compliance software, and shown on the CF-1R for the building. Procedures for field verification and diagnostic testing for this group of compliance credits are described in Reference Residential Appendix RA3.1

SUPPLY DUCT SURFACE AREA REDUCTION COMPLIANCE CREDIT

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Prescriptive Cooling Coil Airflow compliance has been verified.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	The building's duct system design was approved by the enforcement agency, and the duct system design is detailed in the special features section of the CF-1R approved by the enforcement agency.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	The installed duct system does not have severely twisted or compressed sections that would restrict required operating airflow.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	The installed duct system layout, including duct sizes and locations of supply & return registers match the duct system design plans approved by the enforcement agency, and the installed duct system meets the requirements for Verified Duct Design specified in Reference Residential Appendix RA3.1.4.1.1.1
Yes to all is a pass <input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail		

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-29
Supply Duct Compliance Credits - Location; Surface Area; R-value		(Page 2 of 2)
Site Address:	Enforcement Agency:	Permit Number:

BURIED DUCTS ON THE CEILING R-VALUE COMPLIANCE CREDIT

In order to claim credit for buried ducts on the ceiling, the conditions for the Supply Duct Surface Area Reduction (above) must be met, the approved duct design must identify which portions of the duct system are "Buried", and the installed duct system must conform to the approved duct design. Also, the duct system must meet prescriptive Duct Leakage test requirements and the building must meet Quality Insulation Installation requirements.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	The duct design passes the Supply Duct Surface Area Reduction compliance credit, buried ducts are shown on the approved duct design and on the approved CF-1R, and the installed duct system is consistent with the approved duct design drawings.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Duct Leakage requirements
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Quality Insulation Installation requirements
Yes to all is a pass		<input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail

DEEPLY BURIED DUCTS R-VALUE COMPLIANCE CREDIT

In order to claim credit for buried ducts on the ceiling, the conditions for the Supply Duct Surface Area Reduction (above) must be met, the approved duct design must identify which portions of the duct system are "Deeply Buried", and the installed duct system must conform to the approved duct design. Also, the duct system must meet prescriptive Duct Leakage test requirements and the building must meet Quality Insulation Installation requirements.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	The duct design passes the Supply Duct Surface Area Reduction compliance credit, buried ducts are shown on the approved duct design and on the approved CF-1R, and the installed duct system is consistent with the approved duct design drawings.
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Duct Leakage requirements
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Meets Verified Quality Insulation Installation requirements
Yes to all is a pass		<input checked="" type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided on this form is true and correct.
- I am the certified HERS rater who performed the verification services identified and reported on this certificate (responsible rater).
- The installed feature, material, component, or manufactured device requiring HERS verification that is identified on this certificate (the installation) complies with the applicable requirements in Reference Residential Appendices RA2 and RA3 and the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the local enforcement agency.
- The information reported on applicable sections of the Installation Certificate(s) (CF-6R), signed and submitted by the person(s) responsible for the installation conforms to the requirements specified on the Certificate(s) of Compliance (CF-1R) approved by the enforcement agency.

Builder or Installer information as shown on the Installation Certificate (CF-6R)		
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)		
Responsible Person's Name:	CSLB License:	
HERS Provider Data Registry Information		
Sample Group # (if applicable):	<input type="checkbox"/> tested/verified dwelling	<input type="checkbox"/> not-tested/verified dwelling in a HERS sample group
HERS Rater Information		
HERS Rater Company Name:		
Responsible Rater's Name	Responsible Rater's Signature	
Responsible Rater's Certification Number w/ this HERS Provider:	Date Signed:	

Appendix B

APPLICABLE TABLES AND LANGUAGE FROM STANDARDS AND RACM

Standards Tables 116-A and 116-B

TABLE 116-A DEFAULT FENESTRATION PRODUCT U-FACTORS

FRAME ^{1,2}	PRODUCT TYPE	SINGLE-PANE U-FACTOR	DOUBLE-PANE U-FACTOR	GLASS BLOCK ² U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.a
	Doors	1.25	0.77	N.a
	Skylight	1.98	1.30	N.a
Metal, Thermal Break	Operable	N.a	0.66	N.a
	Fixed	N.a	0.55	N.a
	Greenhouse/garden window	N.a	1.12	N.a
	Doors	N.a	0.59	N.a
	Skylight	N.a	1.11	N.a
Nonmetal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Doors	0.99	0.53	N.a
	Greenhouse/garden windows	1.94	1.06	N.a
	Skylight	1.47	0.84	N.a
<p>1. For all dual-glazed fenestration products, adjust the listed U-factors as follows:</p> <ul style="list-style-type: none"> a. Add 0.05 to products with dividers between panes if spacer is less than 7/16 inch wide. b. Add 0.05 to any product with true divided lite (dividers through the panes). <p>2. Translucent or transparent panels shall use glass block values.</p>				

TABLE 116-B DEFAULT SOLAR HEAT GAIN COEFFICIENT (SHGC)

FRAME TYPE	PRODUCT	GLAZING	TOTAL WINDOW SHGC		
			Single Pane	Double Pane	Glass Block ¹
Metal	Operable	Clear	0.80	0.70	0.70
	Fixed	Clear	0.83	0.73	0.73
	Operable	Tinted	0.67	0.59	N.a
	Fixed	Tinted	0.68	0.60	N.a
Metal, Thermal Break	Operable	Clear	N.a	0.63	N.a
	Fixed	Clear	N.a	0.69	N.a
	Operable	Tinted	N.a.	0.53	N.a
	Fixed	Tinted	N.a.	0.57	N.a
Nonmetal	Operable	Clear	0.74	0.65	0.70
	Fixed	Clear	0.76	0.67	0.67
	Operable	Tinted	0.60	0.53	N.a
	Fixed	Tinted	0.63	0.55	N.a

1. Translucent or transparent panels shall use glass block values.

§118 (d) and §118 (e)

(d) **Installation of Insulation in Existing Buildings.** Insulation installed in an existing attic, or on an existing duct or water heater, shall comply with the applicable requirements of subsections 1, 2, and 3 below. If a contractor installs the insulation, the contractor shall certify to the customer, in writing, that the insulation meets the applicable requirements of subsections 1, 2, and 3 below.

- Attics.** If insulation is installed in the existing attic of a low-rise residential building, the R-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall be at least R-38 in climate zones 1 and 16; and R-30 in all other climate zones.

EXCEPTION to §118 (d) 1: Where the accessible space in the attic is not large enough to accommodate the required R-value, the entire accessible space shall be filled with insulation provided such installation does not violate Section 1203.2 of Title 24, Part 2.

- Water heaters.** If external insulation is installed on an existing unfired water storage tank or on an existing back-up tank for a solar water-heating system, it shall have an R-value of at least R-12, or the heat loss of the tank surface based on an 80°F water-air temperature difference shall be less than 6.5 Btu per hour per square foot.
- Ducts.** If insulation is installed on an existing space-conditioning duct, it shall comply with Section 605 of the CMC.

(e) **Placement of roof/ceiling insulation.** Insulation installed to limit heat loss and gain through the top of conditioned spaces shall comply with the following:

1. Insulation shall be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in §117, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling; and
2. When insulation is installed at the roof in nonresidential buildings, fixed vents or openings to the outdoors or to unconditioned spaces shall not be installed and the space between the ceiling and the roof is either directly or indirectly conditioned space and shall not be considered an attic for the purposes of complying with CBC attic ventilation requirements; and
3. Insulation placed on top of a suspended ceiling with removable ceiling panels shall be deemed to have no effect on envelope heat loss; and

EXCEPTION to §118(e) 3: When there are conditioned spaces with a combined floor area no greater than 2,000 ft² in an otherwise unconditioned building, and when the average height of the space between the ceiling and the roof over these spaces is greater than 12 ft, insulation placed in direct contact with a suspended ceiling with removable ceiling panels shall be an acceptable method of reducing heat loss from a conditioned space and shall be accounted for in heat loss calculations.

4. Insulation shall be installed below the roofing membrane or layer used to seal the roof from water penetration unless the insulation has a maximum water absorption of 0.3 percent by volume when tested according to ASTM Standard C 272.

NOTE: Vents, which do not penetrate the roof deck that are designed for wind resistance for roof membranes are not within the scope of §118(e)2.

§150 (a) and §150 (b)

Any new construction in a low-rise residential building shall meet the requirements of this Section.

- (a) **Ceiling Insulation.** The opaque portions of ceilings separating conditioned spaces from unconditioned spaces or ambient air shall meet the requirements of either Item 1 or 2 below:
 1. Ceilings shall be insulated between wood-framing members with insulation resulting in an installed thermal resistance of R-19 or greater for the insulation alone.

ALTERNATIVE to §150 (a) 1: Insulation which is not penetrated by framing members may meet an R-value equivalent to installing R-19 insulation between wood-framing members and accounting for the thermal effects of framing members.
 2. The weighted average U-factor of ceilings shall not exceed the U-factor that would result from installing R-19 insulation between wood-framing members in the entire ceiling and accounting for the effects of framing members.
- (b) **Loose-fill Insulation.** When loose-fill insulation is installed, the minimum installed weight per square foot shall conform with the insulation manufacturer's installed design weight per square foot at the manufacturer's labeled R-value.

Standards Tables 151-B, 151-C and 151-D

STANDARDS TABLE 151-B COMPONENT PACKAGE C

Climate Zone	1, 16	3	4	5	6	7	8, 9	10	2, 11-13	14	15
BUILDING ENVELOPE											
Insulation minimums ¹											
Ceiling	R49	R38	R38	R38	R38	R38	R38	R49	R49	R49	R49
Wood-frame walls	R29	R25	R25	R25	R21	R21	R21	R25	R29	R29	R29
“Heavy mass” walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
“Light mass” walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Below-grade walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Slab floor perimeter	R7	R7	R7	R7	R7	R7	R7	R7	R7	R7	R7
Raised floors	R30	R30	R30	R30	R21	R21	R21	R30	R30	R30	R21
Concrete raised floors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radiant Barrier	NR	NR	REQ	NR	NR	NR	REQ	REQ	REQ	REQ	REQ
Roofing Products	See Standards TABLE 151-C, COMPONENT PACKAGE D										
FENESTRATION											
Maximum U-factor ²	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Maximum Solar Heat Gain Coefficient (SHGC) ³	NR	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Maximum total area	14%	14%	14%	16%	14%	14%	14%	16%	16%	14%	16%
Maximum West facing area	NR	NR	5%	NR	NR	5%	5%	5%	5%	5%	5%
THERMAL MASS ⁴	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
SPACE-HEATING⁵											
Electric-resistant allowed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If gas, AFUE =	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
If heat pump, HSPF ⁶ =	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
SPACE-COOLING											
SEER =	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
If split system, Refrigerant charge measurement or charge indicator display	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ
Central Forced Air Handler:	See TABLE 151-C, COMPONENT PACKAGE D										
DUCTS											
Duct sealing	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Duct Insulation	R-8	R-8	R-8	R-8	R-8	R-8	R-8	R-8	R-8	R-8	R-8
WATER-HEATING	System shall meet §151 (f) 8 or §151 (b)1 ⁷										

STANDARDS TABLE 151-C COMPONENT PACKAGE D

Climate Zone		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
Insulation minimums ¹	Ceilings	R38	R30	R38	R38	R38	R38	R38	R38										
	Walls	Wood-frame walls	R21	R13	R19	R19	R19	R21	R21	R21									
		Heavy mass walls	R4.76	R2.44	R4.76	R4.76	R4.76	R4.76	R4.76	R4.76									
		Light mass walls	NA																
		Below-grade walls	R0	R13															
	Floors	Slab floor perimeter	NR	R7															
		Raised floors	R19	R19															
Concrete raised floors		R8	R8	R0	R8	R4	R8	R8	R4	R8									
Radiant Barrier		NR	REQ	NR	REQ	NR	NR	NR	REQ	NR									
Roofing Products	Low-sloped	Aged Solar Reflectance	NR	0.55	NR	0.55	NR												
		Thermal Emittance	NR	0.75	NR	0.75	NR												
	Steep Sloped (less than 5 lb/ft ²)	Aged Solar Reflectance	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR									
		Thermal Emittance	NR	0.75	0.75	0.75	0.75	0.75	0.75	NR									
	Steep Sloped (5 lb/ft ² or more)	Aged Solar Reflectance	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
		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	0.75
Fenestration	Maximum U-factor ²		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
	Maximum Solar Heat Gain Coefficient (SHGC) ³		NR	0.40	NR	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.35	NR	
	Maximum Total Area		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
	Maximum West Facing Area		NR	5%	NR	5%	NR	NR	5%	5%	5%	5%	5%	5%	5%	5%	5%	NR	
THERMAL MASS ⁴		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR		
SPACE-HEATING ^{5, 10}	Electric-resistant allowed		No																
	If gas, AFUE =		MIN																
	If heat pump, HSPF ⁶ =		MIN																
SPACE-COOLING	SEER =		MIN																
	If split system, Refrigerant charge measurement or charge indicator display		NR	REQ	NR	NR	NR	NR	NR	REQ	NR								
Central Forced Air Handlers	Cooling Airflow and Watt Draw		NR	REQ	REQ	REQ	REQ	REQ	REQ	NR									
	Central Fan Integrated Ventilation System Watt Draw		REQ																
DUCTS	Duct sealing		REQ																
	Duct Insulation		R-6	R-6	R-6	R-6	R-6	R-4.2	R-4.2	R-4.2	R-6	R-6	R-6	R-6	R-6	R-8	R-8	R-8	
WATER-HEATING		System shall meet §151(f)8 or §151(b)1																	

TABLE 151-D COMPONENT PACKAGE E

		Climate Zone																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Insulation minimums ¹	Ceilings	R38	R30	R38	R30	R38	R38	R30	R30	R30	R30	R38	R38	R38	R38	R38	R49	
	Walls	Wood-frame walls	R21	R19	R21	R21	R21											
		Heavy mass walls	R4.76	R2.44	R4.76	R4.76	R4.76	R4.76	R4.76	R4.76								
		Light mass walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Below-grade walls	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R13
	Floors	Slab floor perimeter	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	R7
		Raised floors	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19
Concrete raised floors		R8	R8	R0	R8	R4	R8	R8	R4	R8								
Radiant Barrier		NR	REQ	NR	REQ	NR	NR	NR	REQ	NR								
Roofing Products	Low-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.55	NR	0.55	NR	
		Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75	NR	
	Steep Sloped (less than 5 lb/ft ²)	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR
		Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	NR
	Steep Sloped (5 lb/ft ² or more)	Aged Solar Reflectance	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
		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
Fenestration	Maximum U-factor ²		0.50 ⁸	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.45 ⁹	
	Maximum Solar Heat Gain Coefficient (SHGC) ³		NR	0.40	0.40	0.25	0.40	0.40	0.25	0.40	0.40	0.40	0.25	0.25	0.30	0.25	0.25	NR
	Maximum Total Area		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Maximum West Facing Area		NR	5%	NR	5%	NR	NR	5%	5%	5%	5%	5%	5%	5%	5%	5%	NR
THERMAL MASS ⁴		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	
SPACE-HEATING ^{5, 10}	Electric-resistant allowed		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
	If gas, AFUE =		MIN ⁸	MIN	MIN ⁹													
	If heat pump, HSPF ⁶ =		MIN ⁸	MIN	MIN ⁹													
SPACE-COOLING	SEER =		MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
	If split system, Refrigerant charge measurement or charge indicator display		NR	REQ	NR	NR	NR	NR	NR	REQ	NR							
Central Forced Air Handlers	Cooling Airflow and Watt Draw		NR	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	NR
	Central Fan Integrated Ventilation System Watt Draw		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
DUCTS	Duct sealing		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	
	Duct Insulation		R-8	R-6	R-8	R-6	R-6	R-4.2	R-4.2	R-4.2	R-6	R-6	R-8	R-8	R-8	R-8	R-8	R-8
WATER-HEATING		System shall meet §151(f)8 or §151(b)1																

Footnote requirements to TABLE 151-B, TABLE 151-C and TABLE 151-D.

- 1 The R-values shown for ceiling, wood frame wall and raised floor are for wood-frame construction with insulation installed between the framing members. For alternative construction assemblies, see §151(f)1A.

The heavy mass wall R-value in parentheses is the minimum R-value for the entire wall assembly if the wall weight exceeds 40 pounds per square foot. The light mass wall R-value in brackets is the minimum R-value for the entire assembly if the heat capacity of the wall meets or exceeds the result of multiplying the bracketed minimum R-value by 0.65. Any insulation installed on heavy or light mass walls must be integral with, or installed on the outside of, the exterior mass. The inside surface of the thermal mass, including plaster or gypsum board in direct contact with the masonry wall, shall be exposed to the room air. The exterior wall used to meet the R-value in parentheses cannot also be used to meet the thermal mass requirement.
- 2 The installed fenestration products shall meet the requirements of §151(f)3.
- 3 The installed fenestration products shall meet the requirements of §151(f)4.
- 4 If the package requires thermal mass, the thermal mass shall meet the requirements of §151(f)5.
- 5 Thermostats shall be installed in conjunction with all space-heating systems in accordance with §151(f)9.
- 6 HSPF means "heating seasonal performance factor."
- 7 Electric-resistance water heating may be installed as the main water heating source in Package C only if the water heater is located within the building envelope and a minimum of 25 percent of the energy for water heating is provided by a passive or active solar system.
- 8 As an alternative under Package E in climate zone 1, glazing with a maximum 0.57 U-factor and a 92 percent AFUE furnace or an 8.4 HSPF heat pump may be substituted for the Package E glazing U-factor requirement. All other requirements of Package E must be met.
- 9 As an alternative under Package E in climate zone 16, glazing with a maximum 0.57 U-factor and a 90 percent AFUE furnace or an 8.4 HSPF heat pump may be substituted for may be substituted for the Package E glazing U-factor requirement. All other requirements of Package E must be met.
- 10 A supplemental heating unit may be installed in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed two kilowatts or 7,000 Btu/hr and is controlled by a time-limiting device not exceeding 60 minutes.

§152 (a) and §152 (b)

(a) **Additions.** Additions to existing residential buildings shall meet the requirements of §111 through §118, §119, and §150, and either §152(a)1 or 2.

1. **Prescriptive approach.** Additions to existing buildings shall meet the following additional requirements:

- A. Fenestration in additions up to 100 ft² shall not have more than 50 ft² of fenestration area, and shall meet the U-factor and Solar Heat Gain Coefficient requirements of Package D (§151(f)3A, §151(f)4 and Standards TABLE 151-C) or
- B. Additions up to 1000 ft² shall meet all the requirements of Package D (§151(f) and Standards TABLE 151-C), except that the addition's total glazing area limit is the maximum allowed in Package D plus the glazing area that was removed as a result of the construction of the addition, and the wall insulation value need not exceed R-13.

EXCEPTION TO §152(a)1B: In climate zones 2, 4, 7-15 the total allowed west-facing glazing area shall be five percent of the conditioned floor area of the addition plus the amount of west-facing glazing removed from the existing building as a result of the construction of the addition.

- C. Additions of more than 1000 ft² shall meet all the prescriptive requirements of §151(f).

2. **Performance approach.** Performance calculations shall meet the requirements of §151(a) through (e), pursuant to either Item A or B, below.

- A. For additions alone, the addition complies if the addition alone meets the combined water-heating and space-conditioning energy budgets as specified in §151(b).
- B. For existing plus addition plus alteration compliance. The energy use of the combination of the altered existing building plus the proposed addition shall be equal to or less than the energy use of the existing building with all alterations meeting the requirements of §152(b)2, plus the standard energy budget of an addition that complies with §151(a) through (e). When determining the standard design, the fenestration area shall be the smaller of the sum of the installed fenestration area up to 20 percent of the conditioned floor area of the addition plus glass removed from the existing building as a result of the construction of the addition or the proposed glass area in the addition.

EXCEPTION 1 to §152(a): Existing structures with R-11 framed walls showing compliance with §152(a)2 (Performance Approach) are exempt from §150(c).

EXCEPTION 2 to §152(a): If the addition will increase the total number of water heaters in the building, one of the following types of water heaters may be installed to comply with §152(a)1 or §152(a)2A:

- 1. A gas storage non-recirculating water heating system that does not exceed 50 gallons capacity; or
- 2. If no natural gas is connected to the building, an electric storage water heater that does not exceed 50 gallons capacity, has an energy factor not less than 0.90; or

3. A water heating system determined by the executive director to use no more energy than the one specified in Item 1 above; or if no natural gas is connected to the building, a water heating system determined by the executive director to use no more energy than the one specified in Item 2 above.

For prescriptive compliance with §152(a)1, the water heating systems requirement in §151(f)8 shall not apply. For performance compliance for the addition alone, only the space-conditioning budgets of §151(b)2 shall be used; the water-heating budgets of §151(b)1 shall not apply.

The performance approach for the existing building and the addition in §152(a)2B may be used to show compliance, regardless of the type of water heater installed.

EXCEPTION 3 to §152(a): When heating and/or cooling will be extended to an addition from the existing system(s), the existing heating and cooling equipment need not comply with Title 24, Part 6. The heating system capacity must be adequate to meet the minimum requirements of CBC Section 1204.

EXCEPTION 4 to §152(a): When ducts will be extended from an existing duct system to serve the addition, the ducts shall meet the requirements of §152(b)1D.

EXCEPTION 5 to §152(a): Additions 1,000 ft² or less are exempt from the requirements of §150(o). For additions larger than 1,000 ft², application of §150(o) shall be based on the conditioned floor area of the entire dwelling unit, not just the addition.

(b) **Alterations.** Alterations to existing residential buildings or alterations in conjunction with a change in building occupancy to a low-rise residential occupancy shall meet either Item 1 or 2 below.

1. **Prescriptive approach.** The altered component and any newly installed equipment serving the alteration shall meet the applicable requirements of §110 through §118, §119, and §150(a) through §150(p); and
 - A. Alterations that add fenestration area shall meet the U-factor requirements of Package D (§151(f)3A and Standards Table 151-C), the total fenestration area and west-facing fenestration area requirements of Package D (§151(f)3B and C and Table 151-C), and the Solar Heat Gain coefficient requirements of Package D (§151(f)4 and Standards Table 151-C).

EXCEPTION to §152(b)1A: Alterations that add fenestration area of up to 50 ft² shall not be required to meet the total fenestration area and west-facing fenestration area requirements of §151(f)3B and C. The existing west-facing fenestration area shall not be increased by more than 50 ft².

- B Replacement fenestration, where existing glazing is replaced with a new manufactured fenestration product in the same orientation and tilt, shall meet the U-factor and Solar Heat Gain Coefficient requirements of Package D (§151(f)3A and §151(f)4 and Standards Table 151-C).

NOTE: Glass replaced in an existing sash and frame, or replacement of a single sash in a multi-sash fenestration product are considered repairs.

- C. New or replacement space-conditioning systems shall:
 - i. Meet the requirements of §150(h), §150(i), §150(j)2, §151(f)6, §151(f)7, and §151(f)9; and

- ii. Be limited to natural gas, liquefied petroleum gas, or the existing fuel type unless it can be demonstrated that the TDV energy use of the new system is more efficient than the existing system.
- D. When more than 40 ft of new or replacement space-conditioning ducts are installed in unconditioned space, the new ducts shall meet the requirements of §150(m) and the duct insulation requirements of Package D §151(f)10. If ducts are installed in climate zones 2, 9, 10, 11, 12, 13, 14, 15, or 16, the duct system shall be sealed, as confirmed through field verification and diagnostic testing in accordance with procedures for duct sealing of existing duct systems as specified in the Reference Residential Appendix RA3, to meet one of the following requirements:
- i. If the new ducts form an entirely new duct system directly connected to the air handler, the measured duct leakage shall be less than 6 percent of fan flow and meet the airflow requirements of Reference Residential Appendix RA3; or
 - ii. If the new ducts are an extension of an existing duct system, the combined new and existing duct system shall meet one of the following requirements:
 - a. The measured duct leakage shall be less than 15 percent of system fan flow; or
 - b. The measured duct leakage to outside shall be less than 10 percent of system fan flow; or
 - c. The duct leakage shall be reduced by more than 60 percent relative to the leakage prior to the installation of the new ducts and a visual inspection including a smoke test shall demonstrate that all accessible leaks have been sealed; or
 - d. If it is not possible to meet the duct sealing requirements of Subsection a, b, or c, all accessible leaks shall be sealed and verified through a visual inspection and a smoke test by a certified HERS rater.

EXCEPTION to §152(b)1Dii: Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.

- E. In climate zones 2, 9, 10, 11, 12, 13, 14, 15, and 16, when a space-conditioning system is altered by the installation or replacement of space-conditioning equipment (including replacement of the air handler, outdoor condensing unit of a split system air conditioner or heat pump, cooling or heating coil, or the furnace heat exchanger) the duct system that is connected to the new or replacement space-conditioning equipment shall be sealed, as confirmed through field verification and diagnostic testing in accordance with procedures for duct sealing of existing duct systems as specified in the Reference Residential Appendix RA3, to one of the following requirements.
- i. The measured duct leakage shall be less than 15 percent of system fan flow; or
 - ii. The measured duct leakage to outside shall be less than 10 percent of system fan flow; or
 - iii. The measured duct leakage shall be reduced by more than 60 percent relative to the measured leakage prior to the installation or replacement of the space conditioning equipment and a visual inspection, including a smoke test, shall demonstrate that all accessible leaks have been sealed; or

- iv. If it is not possible to meet the duct requirements of i, ii, or iii, all accessible leaks shall be sealed and verified through a visual inspection and a smoke test by a certified HERS rater.

EXCEPTION 1 to §152(b)1E: Duct systems that are documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Residential Appendix RA3.

EXCEPTION 2 to §152(b)1E: Duct systems with less than 40 linear feet in unconditioned spaces.

EXCEPTION 3 to §152(b)1E: Existing duct systems constructed, insulated or sealed with asbestos.

- F. When a space-conditioning system is altered by the installation or replacement of the air handler, outdoor condensing unit of a split system air conditioner or heat pump, cooling or heating coil, or the furnace heat exchanger, the following requirements shall be met:
 - i. Non-setback thermostats shall be replaced with setback thermostats meeting the requirements of §112(c); and
 - ii. Meet the refrigerant charge and airflow requirements of Reference Residential Appendix RA3.

EXCEPTION to §152(b)1Fii: Heating only systems need not comply with this requirement.

- G. New service water-heating systems or components shall:
 - i. Meet the requirements of §150; and
 - ii. Be limited to natural gas, liquefied petroleum gas, or the existing fuel type unless it can be demonstrated that the TDV energy use of the new system is more efficient than the existing system.
- H. Replacements of the exterior surface of existing roofs shall meet the requirements of §118 and the applicable requirements of Subsections i through iii where more than 50 percent of the roof or more than 1,000 ft² roof, whichever is less, is being replaced:
 - i. For Steep-sloped roofs, roofing products with a density of less than five pounds per square foot in climate zones 10 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.
 - ii. For steep-sloped roofs, roofing products with a density of five pounds per square foot or more in climate zones 1 through 16 shall have a minimum aged solar reflectance of 0.15 and a minimum thermal emittance of 0.75, or a minimum SRI of 10.

ALTERNATIVE TO §152(b)1Hi and ii: The following shall be considered equivalent to Subsection i and ii:

- a. Insulation with a thermal resistance of at least 0.85 hr·ft²·°F/Btu or at least a 3/4 inch air-space is added to the roof deck over an attic or
- b. Existing ducts in the attic are insulated and sealed according to §151(f)10; or
- c. In climate zones 10, 12 and 13, with 1 ft² of free ventilation area of attic ventilation for every 150 ft² of attic floor area, and where at

- least 30 percent of the free ventilation area is within 2 ft vertical distance of the roof ridge; or
- d. Buildings with at least R-30 ceiling insulation; or
 - e. Buildings with a radiant barrier in the attic meeting the requirements of §151(f)2; or
 - f. Buildings that have no ducts in the attic; or
 - g. In climate zones 10, 11, 13 and 14, R-3 or greater roof deck insulation above vented attic.
- iii. Low-sloped roofs in climate zones 13 and 15 shall have a 3-year aged solar reflectance equal or greater than 0.55 and a thermal emittance equal or greater than 0.75, or a minimum SRI of 64.

EXCEPTION to §152(b)1Hiii: Buildings with no ducts in the attic.

2. Performance approach.

- A. The altered components shall meet the applicable requirements of §110 through §118, §119, and §150(a) through (p); and
- B. When the altered components do not meet the requirements specified in the Sections that are stated in subsections i through viii, the standard energy budget (energy budget) shall be based on the requirements stated in those Sections as follows:
 - i. Ceiling Insulation. The energy budget shall be based on the requirements of §118(d).
 - ii. Wall Insulation. The energy budget shall be based on the requirements of §150(c).
 - iii. Raised-floor Insulation. The energy budget shall be based on the requirements of §150(d).
 - iv. Fenestration. The energy budget shall be based on the U-factor and SHGC value requirements of Standards Table 151-C. The allowed glass area shall be the glass area of the existing building.
 - v. Space-Heating and Space-Cooling Equipment. The energy budget shall be based on the requirements of Standards Table 151-C.
 - vi. Ducts. The energy budget shall be based on the requirements of §152(b)1D.
 - vii. Water Heating Systems. The energy budget shall be based on requirements of §151(b)1.
 - viii. Roofing Products. The energy budget shall be based on §152(b)1H.
- C. When the altered components meet the requirements specified in §152(b)2B, subsections i through viii, the standard energy budget shall be based on existing conditions.

NOTES TO §152(b)2:

- A. If an existing component must be replaced with a new component, that component is considered an altered component for the purpose of determining the energy budget and must meet the requirements of §152(b)2B.
- B. The proposed design shall be based on the actual values of the altered components.

C. The standard design shall assume the same geometry and orientation as the proposed design.

EXCEPTION to §152(b): Any dual-glazed greenhouse window installed as part of an alteration complies with the U-factor requirements in §151(f)3.

Residential Table – Vintage Table Values**TABLE R3-50 – DEFAULT ASSUMPTIONS FOR EXISTING BUILDINGS – VINTAGE TABLE VALUES****Default Assumptions for Year Built (Vintage)**

Conservation Measure	Before 1978	1978 to 1983	1984 to 1991	1992 to 1998	1999 - 2000	2001- 2003	2004- 2005	2006 and Later
INSULATION U-FACTOR								
Roof/Ceiling	0.079	0.049	0.049	0.049	0.049	0.049	0.049	0.049
Wall	0.356	0.110	0.110	0.102	0.102	0.102	0.102	0.102
Raised Floor –Crawl Space	0.099	0.099	0.099	0.046	0.046	0.046	0.046	0.046
Cool Roof	0.10	0.10	0.10	0.10	0.10	0.10	0.10	Pres Pkg.
Radiant Barrier	None	None	None	None	None	None	Pres Pkg.	Pres Pkg.
Raised Floor-No CrawlSp	0.238	0.238	0.238	0.064	0.064	0.064	0.064	0.064
Slab Edge F-factor =	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Ducts	R-2.1	R-2.1	R-2.1	R-4.2	R-4.2	R-4.2	R-4.2	Pres Pkg.
LEAKAGE								
Building (SLA)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Duct Leakage Factor (See Table 4-13)	0.86	0.86	0.86	0.86	0.86	0.89	0.89	0.89
FENESTRATION								
U-factor	Use Standards Table 116-A , §116 for all Vintages							
SHGC	Use Standards Table 116-B , §116 for all Vintages							
Shading Dev.	Use Table R3-27 and R3-28 for all Vintages in the Residential ACM Manual – Performance Approach							
SPACE HEATING EFFICIENCY								
Gas Furnace (Central) AFUE	0.75	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Gas Heater (Room) AFUE	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Hydronic/Comb Hydronic	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heat Pump HSPF	5.6	5.6	6.6	6.6	6.8	6.8	6.8	7.4
Electric Resistance HSPF	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413
Electric Resistance Radiant HSPF	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
SPACE COOLING EFFICIENCY								
All Types, SEER	8.0	8.0	8.9	9.7	9.7	9.7	9.7	13.0
WATER HEATING								
Energy Factor	0.525	0.525	0.525	0.525	0.575	0.575	0.575	0.575

Appliance Efficiency Standards

**Table F-3
Standards for Large Water Heaters**

Appliance	Input to Volume Ratio	Size (Volume)	Minimum Thermal Efficiency (%)	Maximum Standby Loss^{1,2}
Gas storage water heaters	< 4,000 Btu/hr/gal	any	80	$Q/800 + 110(V_r)1/2$ Btu/hr
Gas instantaneous water heaters	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	80	$Q/800 + 110(V_r)1/2$ Btu/hr
Gas hot water supply boilers	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	80	$Q/800 + 110(V_r)1/2$ Btu/hr
Oil storage water heaters	< 4,000 Btu/hr/gal	any	78	$Q/800 + 110(V_r)1/2$ Btu/hr
Oil instantaneous water heaters	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	78	$Q/800 + 110(V_r)1/2$ Btu/hr
Oil hot water supply boilers	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	78	$Q/800 + 110(V_r)1/2$ Btu/hr
Electric storage water heaters	< 4,000 Btu/hr/gal	any	–	$0.3 + 27/V_m$ %/hr

¹ Standby loss is based on a 70° F temperature difference between stored water and ambient requirements. In the standby loss equations, V_r is the rated volume in gallons, V_m is the measured volume in gallons, and Q is the nameplate input rate in Btu/hr.

² Water heaters and hot water supply boilers having more than 140 gallons of storage capacity are not required to meet the standby loss requirement if the tank surface is thermally insulated to R-12.5, if a standing pilot light is not installed, and for gas- or oil-fired storage water heaters, there is a flue damper or fan-assisted combustion.

Table F-4
Standards for Small Federally-Regulated Water Heaters

Appliance	Minimum Energy Factor	
	Effective April 15, 1991	Effective January 20, 2004
Gas-fired storage-type water heaters	$0.62 - (.0019 \times V)$	$0.67 - (.0019 \times V)$
Oil-fired water heaters (storage and instantaneous)	$0.59 - (.0019 \times V)$	$0.59 - (.0019 \times V)$
Electric storage water heaters (excluding tabletop water heaters)	$0.93 - (.00132 \times V)$	$0.97 - (.00132 \times V)$
Electric tabletop water heaters	$0.93 - (.00132 \times V)$	$0.93 - (.00132 \times V)$
Gas-fired instantaneous water heaters	$0.62 - (.0019 \times V)$	$0.62 - (.0019 \times V)$
Electric instantaneous water heaters (excluding tabletop water heaters)	$0.93 - (.00132 \times V)$	$0.93 - (.00132 \times V)$
Heat pump water heaters	$0.93 - (.00132 \times V)$	$0.97 - (.00132 \times V)$
<i>V = rated volume in gallons.</i>		

Appendix C

NATURAL GAS APPLIANCE TESTING (NGAT) STANDARDS

The NGAT standards, "Natural Gas Appliance Testing (NGAT) Standards", are found in Section 24 of the "California Conventional Home Weatherization Installation Standards" manual (WIS); edition dated April 1, 2006. A copy may be obtained from contacting:

James E. O'Bannon
Richard Heath and Associates
1026 Mangrove Avenue, Suite 20
Chico, CA 95926
Phone: (530) 898-1323
Fax: (530) 898-1325
email: jim@rhainc.com

Appendix D

Eligibility Criteria for Radiant Barriers, Section RA4.2.2

Radiant barriers shall meet specific eligibility and installation criteria to be modeled by any ACM and receive energy credit for compliance with the energy efficiency standards for low-rise residential buildings.

The emittance of the radiant barrier shall be less than or equal to 0.05 as tested in accordance with ASTM C-1371 or ASTM E-408.

Installation shall conform to ASTM C-1158 [Standard Practice For Use and Installation Of Radiant Barrier Systems (RBS) In Building Construction.], ASTM C-727 (Standard Practice For Installation and Use Of Reflective Insulation In Building Constructions.), ASTM C-1313 (Standard Specification for Sheet Radiant Barriers for Building Construction Applications), and ASTM C-1224 (Standard Specification for Reflective Insulation for Building Applications). The radiant barrier shall be securely installed in a permanent manner with the shiny side facing down toward the interior of the building (ceiling or attic floor). Moreover, radiant barriers shall be installed at the top chords of the roof truss/rafters in **any** of the following methods:

1. Draped over the truss/rafter (the top chords) before the upper roof decking is installed.
2. Spanning between the truss/rafters (top chords) and secured (stapled) to each side.
3. Secured (stapled) to the bottom surface of the truss/rafter (top chord). A minimum air space shall be maintained between the top surface of the radiant barrier and roof decking of not less than 1.5 inches at the center of the truss/rafter span.
4. Attached [laminated] directly to the underside of the roof decking. The radiant barrier shall be laminated and perforated by the manufacturer to allow moisture/vapor transfer through the roof deck.

In addition, the radiant barrier shall be installed to cover all gable end walls and other vertical surfaces in the attic.

The attic shall be ventilated to:

1. Conform to the radiant barrier manufacturer's instructions.
2. Provide a minimum free ventilation area of not less than one square foot of vent area for each 150 ft² of attic floor area.
3. Provide no less than 30 percent upper vents.

Ridge vents or gable end vents are recommended to achieve the best performance. The material should be cut to allow for full airflow to the venting.

- The radiant barrier (except for radiant barriers laminated directly to the roof deck) shall be installed to have a minimum gap of 3.5 inches between the bottom of the radiant barrier and the top of the ceiling insulation to allow ventilation air to flow between the roof decking and

the top surface of the radiant barrier, and have a minimum of six (6) inches (measured horizontally) left at the roof peak to allow hot air to escape from the air space between the roof decking and the top surface of the radiant barrier.

- When installed in enclosed rafter spaces where ceilings are applied directly to the underside of roof rafters, a minimum air space of 1 inch shall be provided between the radiant barrier and the top of the ceiling insulation, and ventilation shall be provided for every rafter space. Vents shall be provided at both the upper and lower ends of the enclosed rafter space.
- The product shall meet all requirements for California certified insulation materials (radiant barriers) of the Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, as specified by CCR, Title 24, Part 12, Chapter 12-13, Standards for Insulating Material.
- The use of a radiant barrier shall be listed in the *Special Features and Modeling Assumptions* listings of the CF-1R and described in detail in the ACM Compliance Supplement.