

2008 BUILDING ENERGY EFFICIENCY STANDARDS

CALIFORNIA
ENERGY
COMMISSION

COMMISSION MANUAL



RESIDENTIAL COMPLIANCE MANUAL

CEC-400-2008-016-CMF
December 2008
Revised May 2009
Revised March 2010

Arnold Schwarzenegger
Governor



1Q-2010

2008 First Quarter Revision Summary of Pages for Residential Compliance Manual

April 1, 2010

SUMMARY OF CHANGE	CHAPTER/FORM	PAGE	PAGE REPLACED
Delete last sentence in paragraph 2 and add clarification on exempt buildings	1.5.3	1-11	1-11,12
Change 150(k)5 to 150(k)12	3.3.2	3-34	3-33,34
In item 3, add clarification for fenestration area allowance	8.3.2	8-8	8-7,8
Correct table and footnote on west facing glass allowed.	Table 8-2	8-9	8-9,10
Delete footnote 3	Table 8-2	8-9	8-9,10
Change Roofing Products under 100 ft2 to N/A	Table 8-2	8-9	8-9,10
"and/or" changes in item 6. Additional clarification under notes	Example 8-28	8-30, 31	8-29 to 32
Clarify language in footnote 4. Change heading in column I JA4 Assembly on page 1; Correct heading and associate footnotes in "Fenestration Proposed Area Calculation"	CF-1R	ALL	ALL
Delete heading "Option 1" & "Option 2". Clarify Language in footnote 4 in Opaque Surface Details. Revised table and footnotes on west facing fenestration on pages 1 & 3. Under Roofing Products, change box #2 from "Low-Sloped" to "Steep-Sloped"	CF-1R ADD	ALL	ALL
Clarify language in footnote 4. Change heading in column I JA4 Assembly on page 1; Correct heading and associate footnotes in "Altered Fenestration Allowed Areas" on page 2; Delete may not exceed 50 gallons from water heating table on page 4	CF-1R-ALT	ALL	ALL
Change note to include option 2 or 3	CF-4R-MECH-21	1 of 2	1 of 2
Change Target (CFM) to Tested (CFM)	CF-4R-MECH-22	2 of 2	2 of 2
Correction for row 2 and 3. Add row for CID Name and Model. Delete row 4	CF-4R-MECH-24	1	1
Correct Row 5&8 of STMS Tables on page 1. Add statement above declaration statement of page 5	CF-4R-MECH 25	1 of 5, 5 of 5	1 of 5, 5 of 5
Correction to instructions for column 9 in "Installed Ventilation Air-Moving Equipment Information" and associated footnotes	CF-6R-MECH-05	3 of 5	3 of 5
Change note to include option 2 or 3	CF-6R-MECH-21-HERS	1 of 2	1 of 2
Change Target (CFM) to Tested (CFM)	CF-6R-MECH-22-HERS	2 of 2	2 of 2
Correction for row 2 Temperature Criteria. Add row for CID Name and Model	CF-6R-MECH-24	1	1
Add statement above declaration statement on page 5	CF-6R-MECH 25	5 of 5	5 of 5
Correct citing under Prescriptive approach paragraph C	Appendix B	8	7,8
New CF-1R-ALT-HVAC Forms		CF-1R-ALT-HVAC CZ 1_3-7	
New CF-1R-ALT-HVAC Forms		CF-1R-ALT-HVAC CZ 2 and 9	
New CF-1R-ALT-HVAC Forms		CF-1R-ALT-HVAC CZ 8	
New CF-1R-ALT-HVAC Forms		CF-1R-ALT-HVAC CZ 10-15	
New CF-1R-ALT-HVAC Forms		CF-1R-ALT-HVAC CZ 16	
Revised CF-4R-ENV-21-QII Forms		1 of 2	
Revised CF-4R-ENV-22-QII Forms		1 of 3	
Revised CF-6R-ENV-21-QII Forms		1 of 2	
Revised CF-6R-ENV-22-QII Forms		1 of 3	



Source: CEC Photographer: Andersen Windows

Answer

The mechanical and envelope requirements of the Standards do not apply if a building inspector determines that the space is unconditioned. Whether conditioned or unconditioned, per §100(c)2, the sunspace must still comply with the applicable lighting requirements of §150(k). The sunspace is unconditioned if:

- The new space is not provided with heating or cooling (or supply ducts).
- The new space can be closed off from the existing house with weather stripped doors.
- The addition is not indirectly conditioned space.

A building official may require a sunspace to be conditioned if it appears to be habitable space, in which case the Standards apply.

1.5.3 Exempt Buildings

The following building types are exempt from the prescriptive and performance standards:

1. Seasonally occupied agricultural housing limited by state or federal agency contract to occupancy not more than 180 days in any calendar year (§100(e)2.D.); however, these buildings must comply with the applicable mandatory requirements.
2. Low-rise residential buildings that use no energy obtained from a depletable source, i.e. a fuel burning generator, for either lighting and/or water heating and obtain space heat from wood heating or other non-mechanical system. Mandatory requirements still apply. (Note: The Public Utilities Commission regulations require that a building must connect to the grid if it is within a certain distance of power lines)

3. Based on discretion of building officials, temporary buildings, temporary outdoor lighting or temporary lighting in an unconditioned building, or structures erected in response to a natural disaster (EXCEPTION 2 to §100(a)). These buildings may also be exempt from the mandatory requirements of the Standards.

1.5.4 Building Systems Covered

The low-rise residential standards affect the design of the building envelope; the heating, ventilation and air conditioning (HVAC) system; the water heating system; and the lighting system. The Standards do not apply to residential appliances (Appliance Efficiency Regulations may apply), elevators or dumbwaiters, or to portable lighting systems that are plugged into a wall outlet. Only hardwired lighting is regulated, which includes lighting that is a permanent part of the building.

1.5.5 Additions, Alterations and Repairs

§101(b)

§152 (a)

§152 (b)

Additions, alterations, and repairs are common construction projects for California homeowners. The Standards apply to both additions and alterations, but not to repairs. See Chapter 8 for details.

1. **Additions** are changes to an existing building that increase conditioned floor area and volume.
2. **Alterations**, that are not additions, are changes to a building's envelope, space conditioning system, water heating system or lighting system.
3. **Repairs** are the reconstruction or renewal of any part of an existing building for the purpose of its maintenance. Replacement of any component systems (i.e. re-roofing), or equipment for which there are requirements in the Standards is considered an alteration and not a repair.

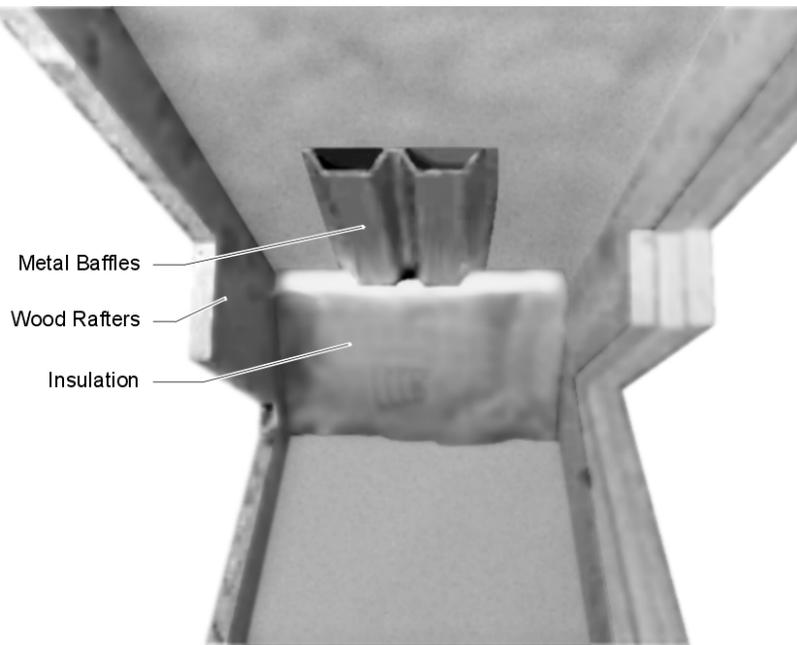
Example 1-3

Question

The Standards do not specify whether buildings damaged by natural disasters can be reconstructed to their original energy performance specifications. What requirements apply under these circumstances?

Answer

Buildings destroyed or damaged by natural disasters must comply with the energy code requirements in effect when the builder or owner applies for a permit to rebuild for those portions of the building that are being rebuilt.



Source: California Energy Commission

Figure 3-9 – Baffles at the Eave in Attics

Ventilation

Where ceiling insulation is installed next to eave or soffit vents, a rigid baffle should be installed at the top plate to direct ventilation air up and over the ceiling insulation. See Figure 3-9. The baffle should extend beyond the height of the ceiling insulation and should have sufficient clearance between the baffle and roof deck at the top. There are a number of acceptable methods for maintaining ventilation air, including pre-formed baffles made of either paper or plastic. In some cases, plywood baffles are used.

The CBC requires a minimum vent area of 1 ft² for each 150 ft² of attic floor area. This ratio may be reduced to 1 to 300 if a ceiling vapor retarder is present or if high (for example, ridge or gable vents) and low (soffit vents) attic ventilation is used.

When part of the vent area is blocked by meshes or louvers, the net free area of the vent must be considered when meeting ventilation requirements.

Wood Rafter Constructions

Ventilating solid rafter spaces is more difficult than ventilating attics because each framing cavity requires its own vent openings. However, the requirement for ventilation is at the discretion of the local building official. It is common practice with cellulose insulation, for instance, to completely fill the cavity so that there is no ventilation at all. Also, if spray polyurethane foam is used, it is applied to the underside of the roof deck leaving no ventilation space. With batt insulation, it is possible to ventilate above the insulation using eave baffles, ridge vents, and careful installation.

Light Fixtures and Recessed Equipment

§150(k)12

Luminaires recessed in insulated ceilings can create thermal bridging through the insulation. Not only does this degrade the performance of the ceiling assembly, but it can also permit condensation on a cold surface of the luminaire if exposed to moist air, as in a bathroom.

For these reasons, luminaires recessed in insulated ceilings must meet three requirements:

1. They must be approved for zero clearance insulation cover (IC) by Underwriters Laboratories or other testing/rating laboratories recognized by the International Conference of Building Officials. This enables insulation to be packed in direct contact with the luminaire. (See Figure 3-10).
2. The luminaire must have a label certifying air tight (AT) construction. Air tight construction means that leakage through the luminaire will not exceed 2.0 cfm when exposed to a 75 Pa pressure difference, when tested in accordance with ASTM E283.
3. The luminaire must be sealed with a gasket or caulk between the housing and ceiling. For more information see Section 6.10 of this manual.

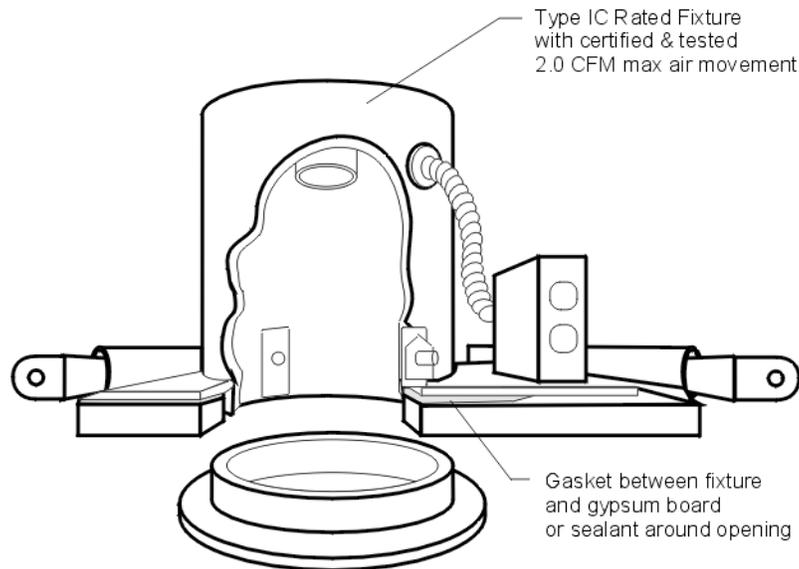


Figure 3-10 – IC-Rated Light Fixture

temperature of a cool roof is lower on hot sunny days than for a conventional roof, reducing cooling loads and the energy required to provide air conditioning.

The benefit of a high reflectance is obvious: while dark surfaces absorb the sun’s energy (visible light, invisible infrared, and ultraviolet radiation) and become hot, light-colored surfaces reflect solar energy and stay cooler. However, high emittance is also important. Emittance refers to the ability of heat to escape from a surface once it is absorbed. Surfaces with low emittance (usually shiny metallic surfaces) contribute to the transmission of heat into the roof components under the roof surface. The heat can increase the building’s air conditioning load resulting in increased air conditioning load and less comfort for the occupants. High-emitting roof surfaces give off absorbed heat relatively quickly through the path of least resistance - upward (and out of the building).

Rating and Labeling

Roofing products that are used for compliance with the standards (prescriptive and performance approaches) are required to be tested and labeled by the Cool Roof Rating Council (CRRC) per §10-113 and that liquid applied products meet minimum standards for performance and durability per §118(i)4. The CRRC is the supervisory entity responsible for certifying cool roof products. The CRRC test procedure is documented in CRRC-1, the CRRC Product Rating Program Manual. This test procedure includes tests for both solar reflectance and thermal emittance.

The roofing products manufacturer must have its roofing product tested for solar reflectance and thermal emittance, and be labeled according to CRRC procedures. Figure 8-1 provides an example of an approved CRRC product label.

	Initial	Weathered	
	Solar Reflectance	0.00	Pending
	Thermal Emittance	0.00	Pending
	Rated Product ID Number	-----	
Licensed Seller ID Number	-----		
Classification	Production Line		
<p>Cool Roof Rating Council ratings are determined for a fixed set of conditions, and may not be appropriate for determining seasonal energy performance. The actual effect of solar reflectance and thermal emittance on building performance may vary.</p> <p>Manufacturer of product stipulates that these ratings were determined in accordance with the applicable Cool Roof Rating Council procedures.</p>			

Figure 8-1-CRRC Product Label and Information

8.3.2 Prescriptive Requirements for Additions Alone

§152(a)

In general, the prescriptive requirements apply to additions in the same way they apply to entirely new buildings and must be documented on the new CF-1R Form. However, there are a few exceptions as noted below and summarized in Table 8-2. Mechanical ventilation requirements do not apply to additions that are less than 1,000 ft².

Use the CF-1R-ADD form to document existing, removed and proposed fenestration by orientation. The total net percentage of fenestration should be 20 percent or less including West facing fenestration. West facing area includes skylights tilted to the west or tilted in any direction when the pitch is less than 1:12 (9.5 degrees from the horizontal), and must not exceed 5 percent of the conditioned floor area (CFA) in climate zones 2, 4, and 7-15.

Plan checkers will verify the CF-1R-ADD form, total Percentage of Fenestration calculation against the Total Net Fenestration and the CFA to make sure that they do not exceed the allowable limits for total fenestration area as well as west-facing fenestration area.

1. If the Total of Fenestration exceeds 20 percent of the conditioned floor area (CFA), the performance compliance approach must be used. Likewise, if the total west-facing fenestration area in climate zones 2, 4, and 7-15, exceeds 5 percent of the CFA, then the performance compliance approach must be used.
2. If the addition has a floor area of 100 ft² or less, then up to 50 ft² of fenestration area is allowed. Additions that add up to 50 ft² of fenestration area need to meet the Package D requirements for fenestration U-factor and SHGC, but are exempt from the fenestration maximum total area limits (this includes both 20 percent of conditioned floor limit and the 5 percent west-facing limit). There is no credit for glazing removed when using this option. For additions with floor areas of 100 ft² or less that have greater than 50 ft² of added fenestration area, the performance compliance is optional, or choose the less than 1,000 ft² Column.
3. If the addition has a floor area equal to or less than 1,000 ft², then only R-13 wall insulation is required in all climate zones. All other requirements of Package D apply, as indicated in Table 8-2.

The Standard allows the area of fenestration removed during the remodel to be added to the Package D fenestration area allowance (20 percent of floor area). However, the total allowed for west-facing fenestration is 5 percent of the CFA of the addition plus the amount of west-facing glazing removed from the existing building as a result to make way for the addition. The CF-1R-ADD Form is used to determine credit for glazing removed.

4. If the addition has a floor area greater than 1,000 ft² the new fenestration must meet the Package D requirements for fenestration U-factor and SHGC. The 20 percent CFA limitation on added fenestration area and 5 percent limitation on west-facing fenestration (in climate zones 2, 4, and 7-15) applies.

Table 8-2 – Prescriptive Envelope Requirements for Additions

Component	Size of Addition		
	100 ft ² or less	1,000 ft ² or less	More than 1,000 ft ²
Ceiling Insulation	R-19	Package D	Package D
Wall Insulation ¹	R-13	R-13	Package D
Floor Insulation	R-13	Package D	Package D
Fenestration U- factor	Package D	Package D	Package D
Glazing Area	≤ 50 ft ²	Package D (20%) + Glass Removed to make way for the addition ³	Package D
		For west orientation: CFA x 5% of the addition + glass removed to make way for the addition ⁴	
Solar Heat Gain Coefficient (SHGC)	Package D	Package D	Package D
Radiant Barrier ²	N/A	Package D	Package D
Roofing Products	N/A	Package D	Package D

1. Heavy mass and light mass walls may meet the Package D requirements for mass wall insulation instead of R-13.
2. Radiant barrier requirements are not applicable for additions less than 100 ft². For additions greater than 100 ft² in climate zones 2, 4, and 8-15 it is applicable to the roof area of the addition. It is not necessary to retrofit a radiant barrier in the existing attic. N/A (not allowed) means that feature is not allowed in a particular climate zone.
3. The removed glass area can be added to the maximum allowed 20% of the CFA of the addition.
4. For west orientations in climate zones 2, 4, 7-15, no more than 5% of the CFA is allowed for west facing glass plus west-facing glass area removed to make way for the addition.

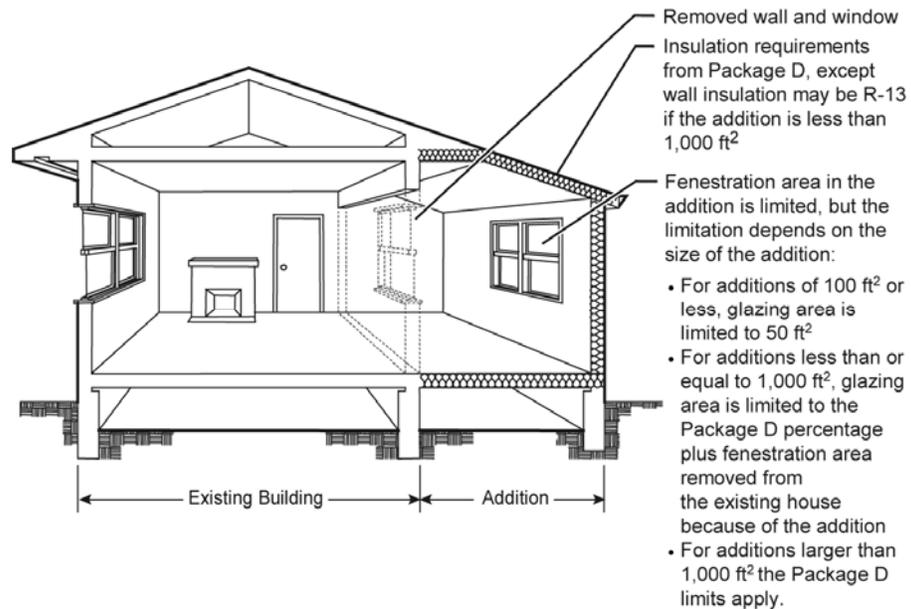


Figure 8-2 – Addition Alone Prescriptive Compliance Approach

Greenhouse Windows

Greenhouse windows are special windows that project from the façade of the building. In addition to the projected area, greenhouse windows typically have two sides, a top and a bottom surface from which heat is exchanged. The NFRC-rated U-factor for greenhouse windows is typically quite high and does not meet the prescriptive requirements for fenestration products.

When greenhouse windows are used in additions or alterations, they are deemed to comply with the prescriptive U-factor requirement when they are dual-glazed, though the prescriptive SHGC limit still applies. This applies only for greenhouse windows used in additions or alterations, not in newly constructed buildings. Greenhouse windows must either meet the SHGC requirements with an NFRC rating, or, if they are being installed with other fenestration products, they may use the default SHGC values from Standards Table 116-B and weight average the SHGC values as described in §151(f)4A.

Greenhouse windows add volume, but not floor area to the building and are therefore alterations, not additions, if this is the only change.

Skylights

Skylights must still comply with the prescriptive U-factor and SHGC maximum values limit in Package D. The SHGC for skylights may be determined either by using an NFRC rating, a default value from Standards Table 116-B, or by calculating the SHGC using a manufacturer's center of glass SHGC_c to determine SHGC_{fen} with the following equation:

$$SHGC_t = 0.08 + 0.86 \times SHGC_c$$

8.3.3 Prescriptive Requirements for Alterations

§152(b)1A and §152(b)1B

Fenestration

When over 50 ft² of fenestration area is added to an existing building, then the fenestration must meet the requirements of Package D for U-factor, fenestration area, and SHGC. The area requirement means that the total fenestration area for the whole building, including the added fenestration, must not exceed 20 percent of the conditioned floor area, and in climate zones 2, 4, and 7-15, the 5 percent west-facing area limit must be complied with. Use the worksheet form CF-1R ALT to document existing, removed and proposed fenestration by orientation. Plan checkers will verify the CF-1R ALT Total Percentage of Fenestration calculation against the Total Net Fenestration and the CFA to make sure that they do not exceed the allowable limits for total fenestration.

If the Total Percentage of Fenestration exceeds 20 percent, the performance compliance approach must be used. Alterations add up to 50 ft² of fenestration area (Exception to §152(b)1A) need to meet the Package D requirements for fenestration U-factor and SHGC, but are exempt from the fenestration maximum 20 percent total area and the 5 percent west-facing areas' limits.

Example 8-25**Question**

An up-flow air-handling unit with a furnace and air conditioning coil is located on a platform in the garage of an existing house. The platform is used as a return air plenum. The air-handling unit is being replaced and the platform is being repositioned to the corner of the garage (3ft away from the current location). What requirements apply to this alteration?

Answer

The mandatory requirements apply to this alteration. In particular, §150(m) prohibits raised platforms or building cavities from being used to convey conditioned air (including return air and supply air). When the platform is relocated, it is being altered, and the mandatory requirement applies. A sheet metal or other suitable duct must be installed to carry the return air to the replaced air handler. This requirement would not apply if the platform were not being altered.

In addition, the prescriptive duct sealing requirements apply per §152(b) because the air handler is being replaced, unless one of a few exceptions applies.

Example 8-26**Question:**

What is meant by the term "air handler"?

Answer:

The term "air handler" is used to identify the system component that provides the central system forced air movement for the ducted heating or cooling space-conditioning system. The term "air handler" may be properly used to identify various types of central system forced air-moving components that must meet the functional requirements for different types of space-conditioning systems. For instance: A "gas furnace" air handler includes a gas combustion heat exchanger, and the central system fan, but does not include a DX cooling coil; An "electric furnace" air handler has electric heating coils, and the central system fan, but does not include a DX cooling coil; A "fan-coil unit" air handler for a split system heat pump has a DX cooling/heating coil, and the central system fan; A hydronic heat pump air handler includes the air-side DX coil, compressor, water-cooled condenser, and the central system fan. There are other air handler configuration variations as well.

Example 8-27**Question**

I have a residential building that was made in the 1920's. It has a freestanding gas furnace and I want to change it to an electric wall heater. Is this permitted?

Answer

No. §152(b)1Cii states that the new space-conditioning system 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. For your situation you would have to use gas or a heat pump for compliance.

Example 8-28

Question

What are the Standards requirements for Duct Sealing, Duct Insulation, Refrigerant Charge (RC), Cooling Coil Airflow (CCA), Fan Watt Draw (FWD), Saturation Temperature Measurement Sensors (STMS) and Temperature Measurement Access Holes (TMAH), Hole for the placement of a Static Pressure Probe (HSPP) or Permanently installed Static Pressure Probe (PSPP) for the following changeout scenarios in an existing home?

1. New or replacement outdoor condensing unit and/or indoor cooling or heating coil only (no duct alteration).
2. New or replacement furnace heat exchanger only (no duct alteration).
3. New or replacement air handler unit only (no duct alteration).
4. New or replacement entire duct system only (no air handler alteration).
5. New or replacement entire duct system and air handler only.
6. New or replacement entire duct system and outdoor condensing unit, and/or indoor cooling and/or heating coil (no air handler alteration).
7. New or replacement entire duct system, outdoor condensing unit, indoor cooling or heating coil, and air handler (i.e. entire space conditioning system).
8. New or replacement entire duct system and packaged air conditioner or heat pump (i.e. entire space conditioning system).
9. New or replacement packaged air conditioner or heat pump (no duct alteration).
10. More than 40 ft of new or replacement ducts installed (but not replacing the entire duct system as in #4 above) in unconditioned space (no other alteration).

Answer

1. Duct sealing (§152(b)1E), RC, CCA \geq 300 CFM/ton, TMAH.
2. Duct sealing (§152(b)1E), RC, CCA \geq 300 CFM/ton, TMAH.
3. Duct sealing (§152(b)1E), RC, CCA \geq 300 CFM/ton, TMAH.
4. Duct sealing < 6 percent (§152(b)1Di), Duct Insulation, CCA \geq 300 CFM/ton.
5. Duct sealing < 6 percent (§152(b)1Di), Duct Insulation, RC, CCA \geq 300 CFM/ton, TMAH.
6. Duct sealing < 6 percent (§152(b)1Di), Duct Insulation, RC, CCA \geq 300 CFM/ton, TMAH.
7. Duct sealing < 6 percent (§152(b)1Di), Duct Insulation, RC, CCA \geq 350 CFM/ton, FWD \leq 0.58 watt/CFM, TMAH, STMS, and either HSPP or PSPP.
8. Duct sealing < 6 percent (§152(b)1Di), Duct Insulation.
9. Duct sealing (§152(b)1E).
10. Duct sealing (§152(b)1Dii), Duct Insulation.

Notes: RC with CCA \geq 300 CFM/ton is required in climate zones 2, 8-15. CCA \geq 350 CFM/ton and FWD with HSPP or PSPP are required in climate zones 10-15 only for a completely new or replacement entire space conditioning system. Duct sealing is required in climate zones 2, 9-16. New or replacement ducts must meet the mandatory requirements of §150(m) for collars, joints, and plenum connections, and the Duct Insulation requirements of Package D in §151(f)10. Duct sealing, RC, CCA, FWD, STMS, TMAH, HSPP and PSPP must be verified by a HERS rater. An entirely new duct system can 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, as described in the Duct Sealing and Insulation section above. All Non-setback thermostats must be replaced with setback thermostats meeting the requirements of Standards Section 112(c).

8.5 Water Heating

8.5.1 Replacement Water Heaters

152(b)1G

Replacement water heaters must be either gas, LPG or the existing fuel type. The only exceptions are when it can be demonstrated that the TDV energy use of the new system is less than the existing system or when the water heater is being replaced as part of an alteration that is complying via the performance method. In other words, additional calculations are required if the replacement water heater is not either gas, LPG or the existing fuel type. The main intent of this requirement is to restrict the switch from gas to electric resistance water heaters.

When a water heater is replaced, then the mandatory requirements also apply to the water heater itself as well as any other components that are replaced. The water heater must be certified by the Energy Commission for minimum efficiency. New pipes must be insulated wherever insulation is required by the mandatory requirements.

8.5.2 Additions

§ 152(a), Exception No. 2

If an addition increases the number of water heaters serving a dwelling unit, then compliance for the addition may be determined using any of the compliance approaches under certain conditions. The “addition alone” compliance may be used for one additional water heater if either:

1. The additional unit is a 50 gallon or less, gas storage or gas instantaneous, nonrecirculating water heater with an EF equal to or greater than the federal minimum standards as defined in the Prescriptive Requirements section of Chapter 5,
2. The home does not have natural gas or propane available and the additional water heater is a 50gallon or less electric water heater, or electric instantaneous with an EF equal to or greater than the federal minimum standards, or
3. A water-heating system determined by the Executive Director of the Energy Commission to use no more energy than the one

specified in the first bullet 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 the second bullet above.

If either of the first two conditions is met, water heating calculations are not required with any of the compliance approaches, and no credit is allowed or penalty taken. Computer compliance calculations are used to determine the alternative described in the third bullet.

In order to receive credit for a water heating alteration that exceeds minimum efficiency requirements, or to use a water heater that does not meet either of the two conditions listed above, two options are available. The existing-plus-addition performance compliance method or the whole building compliance approach may be used. See the Vendor's Compliance Software User Manual.

8.5.3 Alterations to Systems

If it takes an extended period of time for hot water to get to a point of use or if a cold water surge comes along after warm water is turned the best remedy is usually altering the distribution system. Turning up the temperature setting on the water heater will only waste more energy. Most of these alternatives will save water and some will save energy, but before any alteration to the distribution is done, the energy performance of that medication must be confirmed.

With one exception, any alteration to the hot water distribution system must be analyzed using the performance approach to assure that the energy use of the system has not been increased. The exception to this rule is the installation of a manually controlled demand recirculation system. All other alterations, including automated controlled demand recirculation, must use the performance approach to verify energy equivalency.

Example 8-27

Question

An existing 1,500 ft² single family residence is getting a 500 ft² addition. A new 50 gallon gas water heater will replace the existing water heating system. How do the water heating requirements apply?

Answer

Since this is an alteration to an existing water heating system, no water heating calculations are required, but the mandatory measures apply. The water heater must have an EF equal to or greater than the federal minimum standards, or R-12 insulation wrap. The first 5 ft. of hot and cold pipes must be insulated. Building energy compliance for the addition may be demonstrated for either the addition alone or for the existing-plus-addition.

Example 8-28

Question

An existing 2,000ft² single family residence has one 50 gallon gas water heater, and a 600 ft² addition with a new instantaneous gas water heater is proposed. How does this comply?

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						Final Assembly U-factor ^{6,7}	Comment
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		

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
<i>Newly Constructed Buildings and Additions Greater Than 1,000 ft²</i>		(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 _____
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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 ²	Allowed Area (A x B)	Area Removed ^{3, 4} ft ²	Allowed Area (C + D)	Proposed Area ⁵ (Table Above)
Total Fenestration Area ^{2, 3}						≥
West Fenestration Area ^{1, 2, 4} (Required In CZ's 2, 4 & 7-15)						≥

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.
3. Fenestration area removed to make way for the addition. 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 CFA x (15% or 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 energy compliance, the Proposed Area must be less than or equal to the 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.

- Roofing compliance Not Required in Climate Zones 1-12, 14, and 16 with a Low-Sloped. Less or 2:12 pitch.
- Roofing compliance Not 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/ft².
- 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"/> 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		
	<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 _____
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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								
<i>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.</i>								
<i>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.</i>								
<input type="checkbox"/> Cool Roofs <u>Not</u> Required in Climate Zones 1-12, 14, and 16 with a Low Sloped. Less or 2:12 pitch. <input type="checkbox"/> Cool Roofs <u>Not</u> 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/ft ² .								
Alternatives to §152(b)1Hi and §152(b)Hii, Steep-slope roof (pitch > 2:12)								
<input type="checkbox"/> Insulation with a thermal resistance of at least 0.85 hr-ft ² -°F/Btu or at least a 3/4 inch air-space is added to the roof deck over an attic; or <input type="checkbox"/> Existing ducts in the attic are insulated and sealed according to §151(f)10; or <input type="checkbox"/> In climate zones 10, 12 and 13, with 1 ft ² of free ventilation area of attic ventilation for every 150 ft ² 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 <input type="checkbox"/> Building has at least R-30 ceiling insulation; or <input type="checkbox"/> Building has radiant barrier in the attic meeting the requirements of §151(f)2; or <input type="checkbox"/> Building has no ducts in the attic; or <input type="checkbox"/> 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)								
<input type="checkbox"/> Building has no ducts in the attic.								
Other Exceptions								
<input type="checkbox"/> Roofing area covered by building integrated; photovoltaic panels and solar thermal panels are exempt from the below 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 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 ≤ 2:12	Roof Slope > 2:12	Product Weight < 5lb/ft ²	Product Weight ≥ 5lb/ft ²	Product Type ²	Aged Solar Reflectance ^{3,4}	Thermal Emittance	SRI ⁵
	<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		
<ol style="list-style-type: none"> 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 _____		

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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 <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zone 16 in Component Packages D, R-7 insulation is required.
Heated Slab Insulation <input type="checkbox"/> YES <input type="checkbox"/> 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 <input type="checkbox"/> YES <input type="checkbox"/> 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.

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(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 <i>HERS verification is required for this measure.</i></p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 9-16, if more than 40 linear feet of new or replacement ducts are installed in unconditioned space, the ducts are to be sealed per §152(b)1Di and the newly installed ducts are to be insulated per §151(f)10.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 9-16, if the existing space-conditioning system (HVAC equipment and ducting) is replaced, the ducts are to be sealed per §152(b)1Di.</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 9-16, if the existing HVAC equipment is replaced (including the replacement of the air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger) the ducts are to be sealed per §152(b)1E.</p> <p style="padding-left: 40px;"><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.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Duct systems with less than 40 linear feet in unconditioned space.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.</p>	
<p>Refrigerant Charge - Split System <i>HERS verification is required for this measure.</i></p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 8-15, when the existing HVAC equipment is replaced (including the replacement of the air handler, outdoor condensing unit of a split system A/C or heat pump, cooling or heating coil, or the furnace heat exchanger) a refrigerant charge measurement shall be verified per §152(b)1F.</p>	
<p>Central Fan Integrated (CFI) Ventilation System and Fan Watt Draw</p> <p>The ventilation requirements of §150(o) do not apply to existing residential homes.</p>	
<p>Ducted Split Systems - Air Conditioners and Heat Pumps: Airflow <i>HERS verification is required for this measure.</i></p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 10 through 15, when the existing space-conditioning system (HVAC equipment and ducting) is replaced, the airflow and fan watt draw shall be verified per §152(b)1Ci to meet the requirements of §151(f)7B.</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.

Site Address:	Enforcement Agency:	Permit Number:
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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

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:	

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:	

CERTIFICATE OF FIELD VERIFICATION AND DIAGNOSTIC TESTING		CF-4R-MECH-25
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 checked="" type="checkbox"/> Fail	

STMS - Sensor on the Evaporator Coil

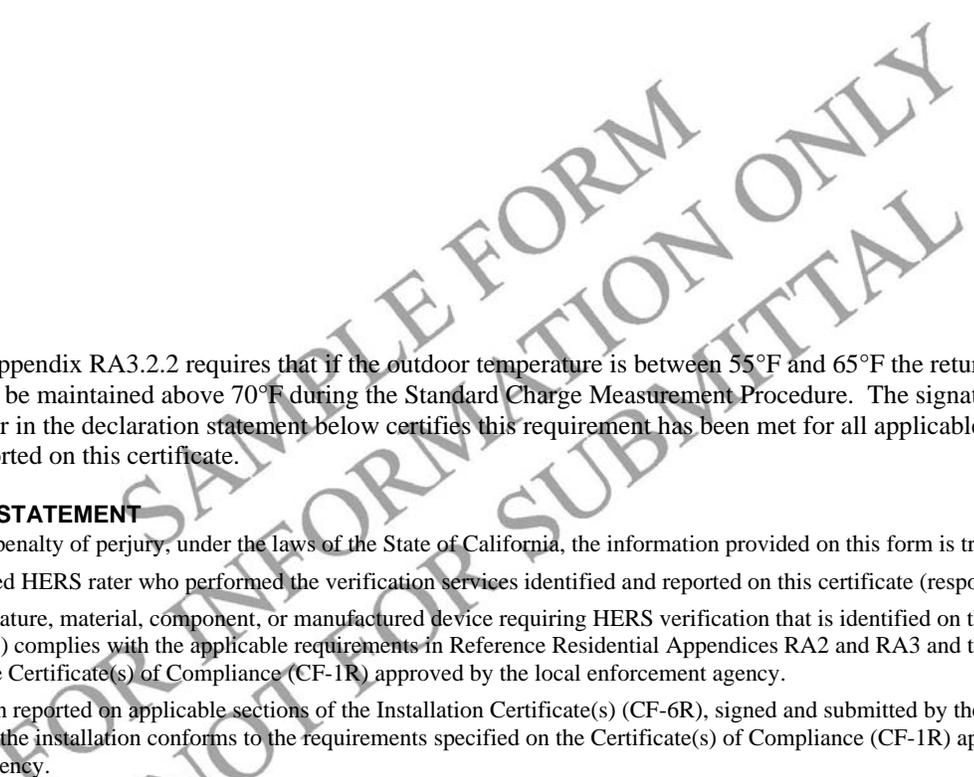
System Name or Identification/Tag							
3	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The sensor is factory installed, or field installed according to manufacturer's specifications, or is installed by methods/specifications approved by the Executive Director.				
4	<input type="checkbox"/> 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	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 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	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 checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass	<input checked="" type="checkbox"/> Fail

Site Address:	Enforcement Agency:	Permit Number:
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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:
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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:
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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

Site Address:	Enforcement Agency:	Permit Number:
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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-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"/> <input type="checkbox"/> Pass	<input checked="" type="checkbox"/> <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 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):

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

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, 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: <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 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 Zone 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
<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 For Packaged Units: Duct leakage < 15 percent 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. For Packaged Units: Duct leakage < 6 percent</p>				
<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		
<p>For Split Systems: Duct leakage < 6 percent, RC, CCA ≥ 300 CFM/ton, TMAH 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 <input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.</p>				
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 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 Zone 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 <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 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:	

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"/>	<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		

Site Address:	Enforcement Agency:	Permit Number:
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✓ 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:
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*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 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:
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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).
<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)
<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
✓ CEILING INSULATION			
<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).
<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).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NO gaps or voids allowed for loose fill and SPF. (NA if batts).
<input type="checkbox"/>	<input type="checkbox"/>		All ceiling insulation installed to uniformly fit the cavity side-to-side and end-to-end.
<input type="checkbox"/>	<input type="checkbox"/>		Insulation in full contact with the ceiling, NO gaps.
<input type="checkbox"/>	<input type="checkbox"/>		Insulation in contact with air barrier on all five sides.
<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).
<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).
<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).
<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)
<input type="checkbox"/>	<input type="checkbox"/>		Attic access gasketed
<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
<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
<input type="checkbox"/>	<input type="checkbox"/>		Wall insulation same or better than what is listed on the CF-1R
<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).
<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).
<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).
<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

Site Address:	Enforcement Agency:	Permit Number:
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			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"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	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).
✓ 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 (between floors). 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).
<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

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:	

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"/>	<input type="checkbox"/>	<input type="checkbox"/>	All floor joist cavity insulation installed to uniformly fit the cavity side-to-side and end-to-end. (NA if floors slab on grade).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation in full contact with the subfloor, NO gaps. (NA if floors are slab on grade).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation in contact with air barrier on all five sides. (ends, sides, back). NA if floors are slab on grade.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Batts cut to fit around wiring and plumbing, or split (delaminated). (NA if loose fill, SPF, or slab on grade).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Batt insulation has continuous support. (NA if loose fill, SPF, or slab on grade).
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 ½ 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"/>	Insulation R-value same or greater than listed on the CF-1R.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF insulation properly adhered to avoid gaps and provide an air seal (NA for other forms of insulation).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	For SPF list the required floor cavity R-value from CF-1R, R=_____
Yes	No	NA	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"/>	<input type="checkbox"/>	<input type="checkbox"/>	Standard depth cavities insulation fills cavity and touches air barrier on all six sides. (NA if SPF used and meets the required R-value).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BATTS , not a single void/depression deeper than ¾" in ANY stud bay. (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"/>	Loose Fill no gaps or voids of any depth allowed. (NA if batts or SPF).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SPF insulation properly adhered to avoid gaps and provide an air seal (NA for other forms of insulation).
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Any gaps between studs or insulation larger than 1/8" must be filled with insulation or foam.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All Rim-joists to the outside insulated.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Special attention must be paid to corner channels, wall intersections, and behind tub/shower enclosures insulated to proper R-Value.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All skylight shafts and attic kneewalls insulated with minimum R-19.
Yes	No	NA	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insulation in full contact with drywall or wall finishes of skylight shafts and attic kneewalls.
Yes	No	NA	

Site Address:	Enforcement Agency:	Permit Number:
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<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 1/2 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 3/4". (NA if loose fill or SPF).
<input type="checkbox"/> Yes	<input type="checkbox"/> No		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	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 1/2-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):