

Prescriptive Residential Alterations That Do Not Require HERS Field Verification

CEC-CF2R-ALT-05-E (Revised 01/15)

CALIFORNIA ENERGY COMMISSION



CERTIFICATE OF INSTALLATION		CF2R-ALT-05-E
Prescriptive Residential Alterations That Do Not Require HERS Field Verification		(Page 1 of 15)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City	Zip Code

This compliance document is only applicable to simple alterations that do not require HERS verification for compliance. When HERS verification is required, a CF1R-ALT-01 shall first be registered with a HERS Provider Data Registry.

Alterations to Space Conditioning Systems that are exempt from HERS verification requirements may use the CF1R-ALT-05 and CF2R-ALT-05 Compliance Documents. Possible exemptions from duct leakage testing include: less than 40 ft of ducts were added or replaced; or the existing duct system was insulated with asbestos; or the existing duct system was previously tested and passed by a HERS Rater. If space conditioning systems are altered and are not exempt from HERS verification, then a CF1R-ALT-02 must be completed and registered with a HERS Provider Data Registry.

Alterations that utilize Closed Cell Spray Polyurethane Foam (ccSPF) with a density of 1.5 to less than 2.5 pounds per cubic foot having an R-value other than 5.8 per inch, or Open Cell Spray Polyurethane Foam (ocSPF) with a density of 0.4 to less than 1.5 pounds per cubic foot having an R-value of 3.6 per inch, shall complete and register a CF1R-ALT-01 with a HERS Provider Data Registry.

If more than one person has responsibility for installation of the items on this certificate, each person shall prepare and sign a certificate applicable to the portion of construction for which they are responsible. Alternatively, the person with chief responsibility for construction shall prepare and sign this certificate for the entire construction. All applicable Mandatory Measures shall be met. Temporary labels shall not be removed before verification by the building inspector.

A. GENERAL INFORMATION					
01	Project Name:		02	Date Prepared:	
03	Project Location:		04	Building Front Orientation (deg):	
05	CA City:		06	Number of Dwelling Units with Additions:	
07	Zip Code:		08	Fuel Type:	
09	Climate Zone:		10	Total Conditioned Floor Area (ft ²) (Addition):	
11	Building Type		12	Slab Area (ft ²):	
13	Project Scope:				



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Insulation

The altered components shall comply with all applicable requirements in The Energy Efficiency Standards Sections 110.7, 110.8, 150.0; All joints, penetrations and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weather stripped, or otherwise sealed to limit infiltration and exhalation.

B. ROOF/CEILING INSULATION

01	02	03	04	05	06	07	08	09	10
I.D.	Manufacturer & Brand	Framing Material	Framing Size & Spacing	Insulation Type	ESR Number	Cavity Insulation R-value	Insulation Depth (inches)	Above Deck Insulation R-value	Below Deck Insulation R-value

C. WALL INSULATION

01	02	03	04	05	06	07	08	09	10
I.D.	Manufacturer & Brand	Framing Material	Framing Size & Spacing	Insulation Type	ESR Number	Cavity Insulation R-value	Insulation Depth (inches)	Exterior Wall Insulation R-value	Interior Wall Insulation R-value

D. MASS INSULATION

01	02	03	04	05	06	07	08
I.D.	Manufacturer & Brand	Location	Mass Thickness (inches)	Furring Strip Type/ Depth (inches)	Insulation Type	Exterior Insulation R-value	Interior Insulation R-value



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E. RAISED FLOOR INSULATION

01	02	03	04	05	06	07	08	09	10
I.D.	Manufacturer & Brand	Framing Material	Framing Size & Spacing	Insulation Type	ESR Number	Cavity Insulation R-value	Insulation Depth (inches)	Exterior Floor Insulation R-value	Interior Floor Insulation R-value

F. SLAB FLOOR/PERIMETER INSULATION

01	02	03	04	05	06	07	08
I.D.	Manufacturer & Brand	Floor Type	Insulation Type	Insulation Depth (inches)	Insulation R-Value	Vertical Insulation Length (inches)	Horizontal Insulation Length (feet)



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Roofing and Radiant Barrier

G. RADIANT BARRIER

01	Brand Name and product number	
02	Installation Type	
03	Total Attic Area (ft ²)	

H. REQUIRED VENT AREA

01	Combined NFA of installed upper and lower vents (in ²)	
02	Minimum required combined NFA of upper and lower vents (in ²)	
03	NFA of installed upper vents (in ²)	
04	Minimum required NFA of upper vents (in ²)	

I. ROOFING PRODUCTS (COOL ROOF) INSTALLATION INFORMATION

01	02	03	04	05	06	07	08
Roof Pitch	CRRC Product ID Number	Product Type	CRRC Listed Aged Solar Reflectance	Initial Solar Reflectance	Aged Solar Reflectance	Thermal Emittance	SRI



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J. RADIANT BARRIER AND ATTIC VENTILATION – ADDITIONAL REQUIREMENTS**Radiant Barrier**

01	Radiant barrier must be installed on all vertical surfaces in the attic including gable ends.
02	The emittance of the radiant barrier shall be less than or equal to 0.05 as tested with ASTM C1371, or E408.
03	The product shall meet all requirements for California certified insulation materials [radiant barriers] of the Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, as specified by CCR, Title 24, Part 12, Chapter 12-13, Standards for Insulating Material
04	When determining the Total Attic Area, the area over unconditioned spaces such as the garage is included when the attic spaces are connected.

Lower Vents

05	Lower vents are within one foot of the eave.
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Upper Vents

06	Upper vents are within three feet of the ridge
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Vent Area

07	The NFA of upper vents must be within required NFA range of upper vents Note: per Exception to R806.2 of the CBC Title 24, Part 2, Vol. 2.5, if the net free ventilating area is less than 1:150, then the upper ventilation must be at least 40% and no more than 50%. Part 2 contains additional requirements that must be met if the area is less than 1:150.
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The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

K. ROOFING PRODUCTS (COOL ROOF) – ADDITIONAL REQUIREMENTS

01	Any roof area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof requirements.
02	Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.
03	Mass roof 25 lb ft ² or greater: Mass roofs are not required to have a cool roof even if the climate zone specifies minimum performance requirements.

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.



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Mechanical and Plumbing

N. SPACE CONDITIONING (SC) SYSTEMS – HEATING/COOLING (Prescriptive section 150.2(b))

Alterations to Space Conditioning Systems shall be exempt from HERS verification requirements as prerequisite for use of the CF1R-ALT-05 and CF2R-ALT-05 Compliance Documents. If new space conditioning systems are installed or existing systems are altered and are not exempt from HERS verification, then a CF1R-ALT-01 shall be completed and registered with a HERS Provider Data Registry. In each row below for each dwelling unit in the building, check the box that indicates the exemption from HERS verification compliance:

- a: space conditioning system was not altered;
- b: less than 40 ft of ducts were added or replaced;
- c: (exempt from duct leakage testing) if: the existing duct system was insulated with asbestos;
- d: (exempt from duct leakage testing) if: the existing duct system was previously tested and passed by a HERS Rater.

01	02	03	04			
Dwelling Unit Name	SC System Identification or Name	SC System Location or Area Served	Exemption from HERS Verification			
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d
			<input type="checkbox"/> a	<input type="checkbox"/> b	<input type="checkbox"/> c	<input type="checkbox"/> d



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Lighting

General Lighting Requirements

Additional new lighting, and altered lighting, shall comply with all applicable requirements specified in Section 150.0(k).

Kitchen Lighting requirements

150.0(k)1C: The wattage of permanently installed luminaires should be determined as specified in Section 130.0(c).

150.0(k)1C: In the kitchen, Any electrical boxes finished with a blank cover count as 180 watts of low efficacy lighting.

Compliance demonstrated using Method (a) because only high efficacy luminaires have been installed in the kitchen.

Compliance demonstrated using Method (b). At least 50% of the installed watts from permanently installed high efficacy. Total A \geq Total B in Installed Wattage Calculation Table (below)

Compliance demonstrated with additional low efficacy wattage allowance of EXCEPTION to 150(k)3

EXCEPTION to 150.0(k)3: Additional low efficacy watts may be allowed when all luminaires in the kitchen are controlled by a vacancy sensor or dimmers, and

1. See 150.0(k)2A where high efficacy and low efficacy luminaires must be separately controlled.

2. See 150.0(k)2G where EMCS may be used as a dimmer; Section 150.0(k)2H where EMCS may be used as a vacancy sensor; or, 150.0(k)2I where multi-scene programmable controller may be used as a dimmer.

NOTES: Compliance demonstrated using Method (c). Kitchen lighting qualifies for additional low efficacy lighting and as demonstrated in Installed Wattage Calculation Table in Method (b) (above) in addition to Additional Low Efficacy Wattage Calculation Table (below).

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.



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Kitchen Lighting Requirements Worksheet

Dwelling Unit Name: _____

This Table is applicable only if Kitchen Lighting using Method (b) or (c) is selected in Table Q

Method (b) Total Wattage Calculation							
Luminaire Type	Luminaire (Fixture)		Quantity		=	Total Watts	
	High Efficacy Watts	Low Efficacy Watts				High Efficacy	Low Efficacy
			X		=		
			X		=		
			X		=		
			X		=		
			X		=		
			X		=		
Complies with method (b) if Total A \geq Total B							
						A	\geq B

Method (c) Total Additional Low Efficacy Wattage Calculation (see footnote)			
Watts from Method (b)		Additional Watts Low Efficacy	Total Low Efficacy Watts Allowed
High Efficacy	Low Efficacy		

1. Insert 50 if house is \leq 2,500 square feet; Insert 100 if house is $>$ 2,500 square feet.



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Pool and Spa

R. POOL AND SPA SYSTEM TYPE

01	Pool and Spa System Type	
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S. POOL AND SPA SYSTEMS AND EQUIPMENT REQUIREMENTS (SECTION 110.4(a) and 110.5)

01	Heater has a thermal efficiency that complies with the Appliance Efficiency Regulations.
02	A readily accessible on-off switch is mounted on the outside of the heater, which allows the heater to be shut off without the user adjusting the thermostat setting.
03	A weatherproof plate or card containing instructions for the energy-efficient operation of the pool or spa heater is permanently mounted.
04	No electric resistance heating except for listed package units that have fully insulated enclosures and tight fitting covers that are insulated to at least R-6. Or if documentation is provided that at least 60 % of the annual heating energy is from site solar energy or recovered energy.
05	Heating system has no pilot light.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

T. POOL AND SPA SYSTEM INSTALLATION REQUIREMENTS (SECTION 110.4(b))

01	To allow for the future addition of solar heating equipment, at least 36" of pipe is installed between the filter and heater, or dedicated suction and return lines are installed, or built-in or built-up connections for future solar heating are provided.
02	A cover is provided for outdoor pools or spas that have a heat pump or gas heater.
03	Pool system has directional inlets to adequately mix the pool water
04	Pool system has a time switch that allows the pump to be set or programmed to run during off-peak periods only
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

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U. POOL PUMP SIZING AND FLOW RATE SPECIFICATION (SECTION 150.0(p))			
01	The pool pump specified is listed in the CEC database of certified pool pumps.		
02	The pool pump flow rate shall not exceed the maximum pump flow rate calculated based on pool sizing in the table below. The return pipe diameter, suction pipe diameter, and filter area shall be at least as large as the required minimums shown in the table. Alternatively, a flow calculation or flow test result shall be provided to demonstrate that the pump flow rate is less than 6 hour filtration turnover, and the return pipe flow rate does not exceed 8 feet per second and that the suction pipe flow rate does not exceed 6 feet per second.		
03	An alternative compliance calculation or a flow test result is provided for this pool or spa use (must attach flow calculation or flow test result to this form)		
04	The pump is capable of operating at 2 or more speeds (not applicable if pump is less than 1 horsepower).		
05	Each auxiliary pool load is served by either a separate pump, or the system is served by a multi-speed pump.		
06	Volume of pool (gallons):		
07	Filter Type (Cartridge, Sand, DE):		
	08a	08b	08c
	Required Min Return Pipe Diameter (inches)	Required Min Suction Pipe Diameter (inches)	Required Min Filter Area (ft ²)
			08d
			Required Max Pump Flow (gpm)
09	Return Pipe Diameter (inches).		
10	Suction Pipe Diameter (inches).		
11	Filter Surface Area (ft ²).		
12	Max Pump Flow Rate (gallons per minute).		
13	Measured flow rate return line (feet per second)		
14	Measured flow rate suction line (feet per second)		
15	Compliance statement		U. 03 = Yes, U. 13 ≤ U. 08, and U. 14 ≤ U. 06 <input type="checkbox"/> Yes <input type="checkbox"/> No
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.			

V. POOL SYSTEM PIPING (Section 150.0(p)2)	
01	The suction side pipe is straight for at least 4 pipe diameters before entering the pump (See table below for the required straight run lengths for various pipe sizes).
02	All elbows are sweep elbows, or an elbow type that has a pressure drop that is less than the pressure drop of a straight pipe with a length of 30 pipe diameters.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

W. POOL FILTERS AND VALVES (Section 150.0(p)3 and 4)	
01	If a filter is used in a pool intended for public use: The size of the filter is at least the size specified in NSF/ANSI 50.
02	If a backwash valve is used: The diameter of the backwash valve is at least 2 inches, or the diameter of the return pipe, whichever is greater.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	



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DOCUMENTATION AUTHOR'S DECLARATION STATEMENT		
1. I certify that this Certificate of Installation documentation is accurate and complete.		
Documentation Author Name:	Documentation Author Signature:	
Documentation Author Company Name:	Date Signed:	
Address:	CEA/HERS Certification Identification (if applicable):	
City/State/Zip:	Phone:	
RESPONSIBLE PERSON'S DECLARATION STATEMENT		
I certify the following under penalty of perjury, under the laws of the State of California:		
<ol style="list-style-type: none"> The information provided on this Certificate of Installation is true and correct. I am eligible under Division 3 of the Business and Professions Code in the applicable classification to accept responsibility for the system design, construction, or installation of features, materials, components, or manufactured devices for the scope of work identified on this Certificate of Installation, and attest to the declarations in this statement (responsible builder/installer), otherwise I am an authorized representative of the responsible builder/installer. The constructed or installed features, materials, components or manufactured devices (the installation) identified on this Certificate of Installation conforms to all applicable codes and regulations, and the installation conforms to the requirements given on the plans and specifications approved by the enforcement agency. I reviewed a copy of the Certificate of Compliance approved by the enforcement agency that identifies the specific requirements for the scope of construction or installation identified on this Certificate of Installation, and I have ensured that the requirements that apply to the construction or installation have been met. I will ensure that a registered copy of this Certificate of Installation 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 registered copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy. 		
Responsible Builder/Installer Name:	Responsible Builder/Installer Signature:	
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)	Position With Company (Title):	
Address:	CSLB License:	
City/State/Zip:	Phone	Date Signed:

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

CF2R-ALT-05-E User Instructions

NOTE: If more space is needed, print a duplicate page and fill in.

Minimum requirements for prescriptive alteration compliance can be found in Building Energy Efficiency Standards Section 150.2(b)1.

Completing these forms will require that you have the Reference Appendices for the 2013 Building Energy Efficiency Standards (P400-2012-005). This document contains the Joint Appendices which are used to determine climate zone. When the term CF2R is used it means the CF2R-ALT-05. Worksheets are identified by their entire name and subsequently by only the worksheet number, such as WS-02.

Instructions for sections with column numbers and row letters are given separately.

If any part of the alteration does not comply, prescriptive compliance fails, in which case the performance compliance approach must be used in an attempt to achieve compliance.

A. GENERAL INFORMATION

1. Project Name: Identifying information, such as owner's name.
2. Date Prepared: Date of document preparation.
3. Project Location: Legal street address of property or other applicable identifying information.
4. Building Front Orientation: Building front orientation expressed in degrees, where North = 0, East = 90, South = 180, and West = 270. Indicate cardinal if it is a subdivision or multi-family project built in multiple orientations. The standards (section 100.1) include the following additional details for determining orientation:
 - Cardinal covers all orientations (for buildings that will be built in multiple orientations);
 - North is oriented to within 45 degrees of true north, including 45 degrees east of north;
 - East is oriented to within 45 degrees of true east, including 45 degrees south of east;
 - South is oriented to within 45 degrees of true south, including 45 degrees west of south;
 - West is oriented to within 45 degrees of true west, including 45 degrees south of west.
5. CA City: Legal city/town of property.
6. Number of Dwelling Units: 1 for single-family, 1 or more for multifamily.
7. Zip Code: 5-digit zip code for the project location (used to determine climate zone).
8. Fuel Type: Natural Gas, Liquefied Propane Gas, or Electricity.

NOTE: Prescriptive compliance only allows electricity if existing appliances are electric and natural gas is not available in the building.

9. Climate zone: From Joint Appendix JA2.1.1.
10. Total Conditioned Floor Area: Enter the new conditioned floor area in ft², as measured from the outside of exterior walls of the dwelling unit or building being altered.
11. Building Type: Single Family (includes duplex), or Multi-Family (a building that shares common walls and common floors or ceilings).
12. Slab Area: Area of the first floor slab (if any) in ft².

Project Scope: Insulation, Roof Replacement, Fenestration/Glazing, Heating System, Cooling System, Duct System, and/or Water Heating System alteration.

B. ROOF/CEILING INSULATION

1. I.D.: A label from the plans (e.g., A1.4 or Roof) documenting the location of the installed insulation.
2. Manufacturer & Brand: Indicate the manufacturer and brand of the product being installed.
3. Framing Material: Wood or Metal.
4. Framing Size & Spacing: Indicate the framing size and spacing (e.g., 2x4 @ 16 in O.C.); enter n/a if not applicable.
5. Insulation Type: List the type of insulation used, such as: Batt, Loose Fill, or SPF.
6. ESR Number: If using a non-standard R-value for SPF insulation, complete an ICC Evaluation Service Report and record the ESR number.
7. Cavity Insulation R-value: Indicate the cavity insulation R-value.
8. Insulation Depth: Indicate, in inches, the amount of insulation installed.
9. Above Deck Insulation R-Value: Indicate the R-value of continuous insulation, having no framing penetration, installed above the roof deck.
10. Below Deck Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed below the roof deck.

C. WALL INSULATION

1. I.D.: A label from the plans, (e.g., A1.4 or Wall1) documenting the location of the installed insulation.
2. Manufacturer & Brand: Indicate the manufacturer and brand of the product being installed.
3. Framing Material: Wood or Metal.
4. Framing Size & Spacing: Indicate the framing size and spacing (e.g., 2x4 @ 16 in O.C.); enter n/a if not applicable.
5. Insulation Type: List the type of insulation used, such as batt, loose fill, or SPF.
6. ESR Number: If using a non-standard R-value for SPF insulation, complete an ICC Evaluation Service Report and record the ESR number.
7. Cavity Insulation R-value: Indicate the cavity insulation R-value.
8. Insulation Depth: Indicate, in inches, the amount of insulation installed.

9. Exterior Wall Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed on the outside of the wall.
10. Interior Wall Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed on the inside of the wall.

D. MASS INSULATION

1. I.D.: A label from the plans (e.g., A1.4 or Wall1) documenting the location of the installed insulation.
2. Manufacturer & Brand: Indicate the manufacturer and brand of the product being installed.
3. Location: Indicate the location of the insulation, such as: Above Grade, Below Grade, Wall, or Roof.
4. Mass Thickness: Indicate the thickness of the mass, in inches, the insulation is applied to.
5. Furring Strip Type/Depth: Indicate the type, and thickness, of furring material installed (e.g., wood/1.0 inch thick).
6. Insulation Type: List the type of insulation used, such as: SPF, EPS, or EPDM.
7. Exterior Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed on the outside of the assembly.
8. Interior Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed on the inside of the assembly.

E. RAISED FLOOR INSULATION

1. I.D.: A label from the plans (e.g., A1.4 or Floor1) documenting the location of the installed insulation.
2. Manufacturer & Brand: Indicate the manufacturer and brand of the product being installed.
3. Framing Material: Wood or Metal.
4. Framing Size & Spacing: Indicate the framing size and spacing (e.g., 2x4 @ 16 in O.C.); enter n/a if not applicable.
5. Insulation Type: List the type of insulation used, such as: Batt, Loose Fill, or SPF.
6. ESR Number: If using a non-standard R-value for SPF insulation, complete an ICC Evaluation Service Report and record the ESR number.
7. Cavity Insulation R-value: Indicate the cavity insulation R-value.
8. Insulation Depth: Indicate, in inches, the amount of insulation installed.
9. Exterior Floor Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed on the outside of the floor.
10. Interior Floor Insulation R-Value: Indicate the R-value of the continuous insulation, having no framing penetration, installed on the inside of the floor.

F. SLAB FLOOR/PERIMETER INSULATION

1. I.D.: A label from the plans (e.g., A1.4 or Slab Floor1) documenting the location of the installed insulation.
2. Manufacturer & Brand: Indicate the manufacturer and brand of the product being installed.
3. Floor Type: Indicate the type of floor the insulation is being applied to, such as: Heated Slab or Slab on Grade.
4. Insulation Type: List the type of insulation used, such as: EPDM, Polyisocyanurate, or Polystyrene.
5. Insulation Depth: Indicate, in inches, the depth of insulation installed. Refer to F02 for additional information.
6. Insulation R-Value: Indicate the insulation R-value being installed vertically and horizontally (if applicable).
7. Vertical Insulation Length: Indicate, in inches, the length of the insulation being installed. Refer to F03 for additional information on installing both vertical and horizontal slab insulation
8. Horizontal Insulation Length: Indicate, in feet, the length of the insulation being installed from the outside edge of the vertical insulation to the center of the slab.

G. RADIANT BARRIER

1. Brand Name and Product Number: Indicate the brand name and product number of the product used.
2. Installation Type: Indicate the installation type from the following list:
 - a. Attached to underside of roof deck
 - b. Attached to bottom of truss/rafters
 - c. Attached between truss/rafters
 - d. Draped over top of truss/rafters

One of these four installation methods must be used; no other methods are allowed.

3. Total Attic Area (ft²): Provide the total attic area over conditioned space. When determining the total attic area, the area over unconditioned spaces such as garage is included when the attic spaces are connected. At least one square foot of net free venting area is required for each 300 square feet of attic (1:300).

H. REQUIRED VENT AREA

1. Combined NFA of installed upper and lower vents (in²): Indicate the total combined NFA of installed upper and lower vents in square inches.
2. Minimum required combined NFA of upper and lower vents (in²): Total attic area divided by 300 and multiplied by 144.
3. NFA of installed upper vents (in²): Indicate the total NFA of installed upper vents in square inches.
4. Minimum required NFA of upper vents (in²): Table H item 1 (combined NFA of installed upper and lower vents) multiplied by 0.3.

I. ROOFING PRODUCTS (COOL ROOF) INSTALLATION INFORMATION

1. Roof Pitch: Indicate whether the roof pitch is $\leq 2:12$ or $> 2:12$
2. CRRC Product ID Number: If a cool roof is installed, obtain the Product ID Number from the Cool Roof Rating Council's (CRRC) product packaging label or rated products directory (<http://coolroofs.org/products/results>).
3. Product Type: Indicate the product type being used.
4. CRRC Listed Aged Solar Reflectance: State whether the 3-year aged solar reflectance value of the product used is listed on the CRRC product packaging label or rated products directory—Yes or No.
5. Installed Initial Solar Reflectance: Indicate the initial solar reflectance value of the product used; obtained from the CRRC product packaging label or rated products directory.
6. Aged Solar Reflectance: Indicate the aged solar reflectance value of the product used; obtained from the CRRC product packaging label or rated product directory.
 - Note: If the 3-year aged value is not available then use the equation in Section 110.8(i)2 of the Energy Standards to calculate the 3-year aged solar reflectance. One can also use the "Calculated Aged Solar Reflectance" from the Solar Reflectance Index (SRI) Calculation Worksheet" available at the California Energy Commission's website
7. Thermal Emittance: Indicate the thermal emittance value of the product used; obtained from the CRRC product packaging label or rated products directory. This can be either the initial or aged value.
8. SRI: If applicable, obtain the value of the product used from the CRRC rated products directory, or the "Solar Reflectance Index (SRI) Calculation Worksheet" available at the California Energy Commission's website.

J. RADIANT BARRIER AND ATTIC VENTILATION – ADDITIONAL REQUIREMENTS

This section contains additional requirements for Radiant Barriers, Lower Vents, Upper Vents, and Vent Area.

K. ROOFING PRODUCTS (COOL ROOF) – ADDITIONAL REQUIREMENTS

This section contains additional requirements for Roofing Products. Other exceptions apply for additions and/or alterations.

L. FENESTRATION/GLAZING

1. Tag/ID: The labeling format used in the plans- ensure each unique type is used consistently throughout the plan set (elevations, finish schedules, etc.) to identify each matching fenestration product, such as: Window-1, Skylight-1 etc. It should also be consistently used on the other forms in the same compliance documentation.
2. Manufacturer/Brand: Provide the manufacturer and brand name which identifies the fenestration product being installed.
3. Fenestration Area (ft²): Indicate the total installed surface area (ft²) of the fenestration.
4. Orientation: Indicate the orientation of the same like fenestration. Use different lines if the orientation of the same fenestration varies. Enter N, S, E, or W.
5. Chromogenic: Is the glazing product chromogenic? Yes or No
6. U-factor: Indicate the specified U-factor of the fenestration product(s) being installed. Do not mix different types on the same line.
7. SHGC: Indicate the specified SHGC of the fenestration product(s) being installed. Do not mix different types on the same line.
8. Source: NFRC, CEC Default, NA6 Alternative. Enter the appropriate temporary label certificate identified as either NFRC, CEC Default or by using the information in NA6. All windows installed must have a label certificate which identifies the window's efficiencies. NFRC rated products have a temporary label that can be looked up in the NFRC product directory (<http://search.nfrc.org/search/searchDefault.aspx>).
9. Fenestration Type: Provide a description of the window type, for instance, the frame material, coatings, whether it is operable or fixed.
10. Exterior Shading Devices: If exterior shading devices are installed in conjunction with fenestration then indicate the type used (e.g. sunscreens, vertical roller or shades, retractable or drop arm or operable awnings, or roll down blinds or slats); or if an overhang is, or will be installed.
11. Comments/Special Features: Additional information for the field inspector.

M. FENESTRATION/GLAZING – ADDITIONAL REQUIREMENTS

This section contains additional requirements for Fenestration/Glazing.

N. SPACE CONDITIONING (SC) SYSTEM – HEATING/COOLING

Requirements of the standards apply to a heating and cooling system alteration based on the type of alteration and the system type (Section 150.2(b)1). A completely new system will meet all mandatory and prescriptive requirements, which vary by climate zone (based on Section 150.2(b)1C).

NOTE: Computer performance compliance can be used to trade-off any requirements that are not mandatory.

When parts of a system are replaced, it may trigger some of the same requirements that apply to new systems and duct alterations. A Certificate of Compliance for Alterations to Space Conditioning Systems (CF1R-ALT-02) is required for each dwelling unit with a space conditioning system alteration.

1. Dwelling Unit Name: Name of dwelling unit or any other identifying name.
2. SC System Identification or Name: Name of the Space Conditioning (SC) System or any other identifying name.
3. SC System Location or Area Served: Zone, or area, served by the Space Conditioning (SC) System.
4. Exemption from HERS Verification: Section 150.2(b)1E
 - a. Space Conditioning (SC) System was not altered.
 - b. Duct systems that have been documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Residential Appendix RA3.1.
 - c. Duct systems with less than 40 linear feet in unconditioned spaces as determined by visual inspection.
 - d. Existing duct systems constructed, insulated, or sealed with asbestos.

O. INSTALLED WATER HEATING SYSTEM

Water heating compliance for an alteration is described in Section 150.2(b). For a single dwelling a gas or propane water heater, with a storage tank of 60 gallons maximum or instantaneous (tankless), can be used. Dwelling Unit distribution systems are limited to Standard trunk and branch or demand recirculation for gas or propane water heaters. Demand recirculation is not allowed for electric water heaters. If there is no natural gas connected to the building, an electric water heater may be replaced with another electric water heater. However, changing from gas to electric is not allowed. Multi-family central systems must use certified equipment as defined under Section 110.1 and 110.3.

NOTE: If the proposed installation does not meet the requirements allowed specifically for alterations, use form CF1R-NCB-01 to document the water heater alteration.

1. Dwelling Unit Name: Name of dwelling unit or any other identifying name.
2. Water Heating System Identification or Name: Name of the Water Heating System or any other identifying name.
3. Water Heating System Location or Area Served: Zone, or area, served by the Water Heating System.
4. Water Heating System Type: Domestic Hot Water (DHW), Hydronic, Combined Hydronic, or Central. DHW is for domestic hot water, hydronic is a water heating system used for space heating only; combined hydronic is when the water heater will provide both space conditioning and domestic hot water.
5. Water Heater Type: For non-central systems only Small Storage or Small Instantaneous are allowed. For central systems pick from Large Storage, Small Storage, Heat Pump, Boiler, Large Instantaneous, Small Instantaneous or Indirect.
6. Number of Water Heaters in System: In single-family and multi-family with water heaters in each dwelling unit the value is 1. For multi-family central systems serving multiple dwelling units enter the total number of water heaters.
7. Water Heater Storage Volume: Tank capacity in gallons. For individual water heaters for a dwelling unit this will be 60 gallons or less. If instantaneous, enter n/a. For multi-family central systems enter the total storage volume.
8. Fuel Type: Gas, Propane, Electric (Only if natural gas is not available)
9. Rated Input Type: Enter the equipment input rating type, for gas or propane fired the units are Btuh, for electric fired system the units are kW.
10. Rated Input Value: Enter the numeric value of the rated input.
11. Heating Efficiency Type: Energy Factor, AFUE, or Thermal Efficiency. From product literature or a California Energy Commission directory.
12. Heating Efficiency Value: Enter the value from product literature or a California Energy Commission directory
13. Standby Loss (%): Applies only to large storage water heaters; enter n/a for small storage or instantaneous water heaters.
14. Exterior Insulation R-Value: Enter the R-value if exterior insulation on the storage tank is installed
15. Back-Up Solar Savings Fraction: If compliance requires a back-up solar system, indicate the solar contribution (e.g., 0.30). External calculations are required.

P. INSTALLED WATER HEATER MANUFACTURER INFORMATION

This table reports the manufacturer information of the installed water heater(s). Require one line for each installed water heater.

1. Water Heating System ID or Name: Name of the Water Heating System or any other identifying name.
2. Manufacturer: Provide the manufacturer's name which identifies the Water Heater being installed.
3. Model Number: Provide the model number which identifies the Water Heater being installed.

Q. INSTALLED KITCHEN LIGHTING COMPLIANCE

1. Dwelling Unit Name: Name of dwelling unit or any other identifying name.
2. Kitchen Lighting Compliance Method: Indicate the compliance method used from the following list:
 - a. Method A: Only high efficacy luminaires have been installed in the kitchen.
 - b. Method B: At least 50% of installed watts are from permanently installed high efficacy lighting.
 - c. Method C: Installation qualifies for additional low efficacy lighting allotment.
 - d. N/A: No kitchen lighting installed.
3. Total High Efficacy (MethodB): If using compliance method b, indicate the total watts of high efficacy lighting installed.
4. Total Low Efficacy (Method B): If using compliance method b, indicate the total watts of low efficacy lighting installed.
5. Total Additional Low Efficacy (Method C): If using compliance method c, indicate the total low efficacy watts allowed.

R. POOL AND SPA SYSTEM TYPE

1. Pool and Spa System: Pick from: Pool only, Spa only, or Pool and Spa.

S. POOL AND SPA SYSTEMS AND EQUIPMENT REQUIREMENTS

Before any pool or spa heating system or equipment may be installed, the manufacturer must certify to the Energy Commission that the system or equipment complies with §110.4 and §110.5. The requirements include minimum heating efficiency according to Appliance Efficiency Regulations, an on-off switch outside the heater, permanent and weatherproof operating instructions, no continuous pilot light, and no electric resistance heating.

T. POOL AND SPA SYSTEM INSTALLATION REQUIREMENTS

A time switch or similar control mechanism must be installed as part of the pool water circulation control system that will allow all pumps to be set or programmed to run only during the off-peak electric demand period and for the minimum time necessary to maintain the water in the condition required by applicable public health standards.

U. POOL AND PUMP SIZING AND FLOW RATE SPECIFICATION

The pool filtration flow rate may not be greater than the rate needed to turn over the pool water volume in 6 hours or 36 gpm, whichever is greater. Calculate Max Flow Rate using the following equation:

$$\text{Max Flow Rate (gpm)} = \frac{\text{Pool Volume (gallons)}}{360\text{min.}}$$

Pool piping must be sized according to the maximum flow rate needed for all auxiliary loads. Show work to calculate return and suction line flow rate, minimum filter area, and the maximum pump flow rate correspond to the pool volume in accordance to section 150.0(p), or refer to Table 1 below for the prescriptive values. The maximum velocity allowed is 8 fps in the return line and 6 fps in the suction line, and the maximum pump flow rate is less than 6 hour filtration turnover.

3. Indicate whether or not the alternative calculation is used.
6. Volume of Pool: The Pool volume in gallons (gal).
7. Filter Type: Select from Cartridge, Sand, or DE.
8. Requirements:
 - a. Required Min Return Pipe Diameter: The minimum diameter required of the return pipe in inches (in).
 - b. Required Min Suction Pipe Diameter: The minimum diameter required of the suction pipe in inches (in).
 - c. Required Min Filter Area: The minimum filter area required in square feet (ft²)
 - d. Required Max Pump Flow: The maximum pump flow required in gallons per minute (gpm).
9. Return Pipe Diameter (in): The diameter of the return pipe in inches (in).
10. Suction Pipe Diameter (in): The diameter of the suction pipe in inches (in).
11. Filter Surface Area: The surface area of the filter in square feet (ft²).
12. Max Pump Flow Rate: The maximum pump flow rate in gallons per minute (gpm).
13. Measured Flow Rate Return Line: The measured flow rate of the return line in feet per second (fps).
14. Measured Flow Rate Suction Line: The measured flow rate of the suction line in feet per second (fps).
15. Compliance Statement: Verify that an alternative compliance calculation or flow test result is provided for this pool or spa use (U. 03 = Yes), and verify whether U. 13 is less than or equal to U. 08, and U. 14 is less than or equal to U. 06. Indicate Yes or No. If no, project fails prescriptive compliance.

V. POOL SYSTEM PIPING

There must be a length of straight pipe that is greater than or equal to at least 4 inches pipe diameters installed before the pump. Refer to Table 2 below for the required pipe length. Traditional hard 90° elbows are not allowed. All elbows must be sweep elbows or a type of elbow that has a pressure drop less than the pressure drop of straight pipe with a length of 30 pipe diameters.

W. POOL FILTERS AND VALVES

Backwash valves must be sized to the diameter of the return pipe or two inches, whichever is greater. Multiport backwash valves have a high pressure drop and are discouraged.

Table 1
Pool sizing (Values are based on a maximum allowable turnover rate of 6-hours)
Note: For pumps greater than 1 hp. The maximum Pump Flow is the lowest speed default filtration

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

Table 2
Pipe Diameter/Pipe Length

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

DOCUMENTATION DECLARATION STATEMENTS

1. The person who prepared the CF2R will sign and complete the fields for their name, company (if applicable), address, phone number, certification information (if applicable), date and signature.
2. The person who is assuming responsibility for the project being built to comply with Title 24, Part 6, will complete the fields for their name, company (if applicable), address, phone number, license number (if applicable), date and signature.