

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 06/13)



CERTIFICATE OF COMPLIANCE							CF1R-ALT-01-E
Residential Alterations							(Page 1 of 5)
Project Name:						Date Prepared:	

A. GENERAL INFORMATION								
01	Project Name:					02	Date:	
03	Project Location:					04	Compliance Method:	
05	CA City:					06	Building Front Orientation (deg or cardinal):	
07	Zip Code:					08	Number of Dwelling Units:	
09	Climate Zone:					10	Fuel Type:	
11	Building Type	<input type="checkbox"/> Single Family <input type="checkbox"/> Multi Family				12	Total Conditioned Floor Area:	
13	Project Type:	<input type="checkbox"/> Insulation <input type="checkbox"/> Roof Replacement <input type="checkbox"/> Fenestration/Glazing <input type="checkbox"/> Heating System <input type="checkbox"/> Cooling System <input type="checkbox"/> Duct System <input type="checkbox"/> Water Heating				14	Slab Area:	

B. BUILDING INSULATION DETAILS (Section 150.2(b)1)											
01	02	03	04	05	06		07	08	09	10	11
Tag/ID	Assembly Type	Frame Type	Frame Depth (inches)	Frame Spacing (inches)	Proposed				Required		Comments
					Cavity R-value	Continuous Insulation R-value	U-factor	Appendix JA4 Reference		U-Factor	
			Table	Cell							

C. ROOF REPLACEMENT (Prescriptive Alteration, Section 150.2(b)1H)											
01	02	03	04	05	06	07	08	09	10	11	12
Altering > 50% of roof surface	Roof Pitch	Exception	CRRC Product ID Number	Product Type	R-value Deck Insulation	Aged Solar Reflectance	Thermal Emittance	SRI	Minimum Required		
									Aged Solar Reflectance	Thermal Emittance	SRI

**NOTES**

- Mass roof with 25 lb/ft<sup>2</sup> not required to comply with cool roof requirements
- Roof area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof requirements.
- Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.

**EXCEPTION:**

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 06/13)



CERTIFICATE OF COMPLIANCE		CF1R-ALT-01-E
Residential Alterations		(Page 2 of 5)
Project Name:	Date Prepared:	

D. FENESTRATION/GLAZING AREAS ALLOWED (Section 150.2(b)1)				
01	02	03	04	05
Alteration Type	Fenestration Type	Orientation	Maximum Allowed ft2	Comments

E. FENESTRATION/GLAZING PROPOSED AREAS AND EFFICIENCIES (Section 150.2(b)1)													
01	02	03	04	05	06	07	08	09	10	11	12	13	
Fenestration Type	Frame Type	Orientation	Area Removed ft2	Area Added ft2	Net Added Area ft2	Maximum Allowed U-factor	U-factor	Source	SHGC	Source	Exterior Shading Device	Comments	
a	Net Added West-facing Fenestration Area												
b	Existing + Added West-facing Fenestration Area												
c	Maximum Allowed West-facing Fenestration Area												
d	Is West-facing Fenestration Area $\leq$ Allowed												
e	Net Added Fenestration Area (all orientations)												
f	Existing + Added Fenestration Area (all orientations)												
g	Maximum Allowed Fenestration Area (all orientations)												
h	Is Existing + Added Fenestration Area $\leq$ Allowed												
i	If exterior shading devices are used, what is the calculated value from CF1R-ENV-03												

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 06/13)



CERTIFICATE OF COMPLIANCE							CF1R-ALT-01-E
Residential Alterations							(Page 3 of 5)
Project Name:						Date Prepared:	

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

01	02	03	04	05	06	07	08
Alteration Type	Floor Area Served (ft2)	Heating System Type	Heating Component Altered	Cooling System Type	Cooling Component Altered	Thermostat Type	Comments

- The Appliance Efficiency Standards regulate the minimum efficiency requirement of regulated appliances sold in California. Any new appliance legally offered for sale will meet the minimum efficiency required for prescriptive compliance.

**G. DUCT SYSTEMS (Section 150.2(b)1D)**

01	02	03	04	05	06
Duct Alteration Type	Distribution System Type	Duct Location	Added Duct Length	Duct R-Value	Comments
New/Replacement, Extension					

- The prescriptive requirements preclude the use of bypass ducts in association with zonally controlled systems. A HERS Rater shall verify that zonally controlled systems have no bypass ducts.

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

01	02	03	04	05	06	07	08	09
Existing Water Heater Fuel Type	Proposed DHW Water Heater Type	Proposed Water Heater Fuel Type	Proposed Water Heater Efficiency (EF, AFUE)	Water Heater Volume (gal)	Central Distribution Type	Dwelling Unit Distribution Type	Solar Water Heater Solar Fraction	Comments

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 06/13)



CERTIFICATE OF COMPLIANCE		CF1R-ALT-01-E
Residential Alterations		(Page 4 of 5)
Project Name:	Date Prepared:	

<b>I. HERS VERIFICATION SUMMARY</b> The enforcement agency should pay special attention to the HERS Measures specified in this checklist below. A registered Certificate of Verification for all the measures specified shall be submitted to the building inspector before final inspection.	
<b>Ducts</b>	
<ul style="list-style-type: none"> <li>Duct Leakage Testing in accordance with Section 150.2(b)1C,D, and E is required (Residential Appendix RA3.1)</li> </ul>	
<b>Refrigerant Charge</b>	
<ul style="list-style-type: none"> <li>Refrigerant Charge Verification in accordance with Section 150.2(b)1F is required in climate zones 2 and 8-15 (Residential Appendix RA3.2).</li> </ul>	
<b>Central System Air Handlers</b>	
<ul style="list-style-type: none"> <li>Airflow or Fan Efficacy Verification is required for ducted air cooled air conditioners and air source heat pumps in accordance with Section 150.2(b)1C, and F (Residential Appendix RA3.2. and RA3.3).</li> </ul>	

For information and data collection only. Not valid until registered with a HERS provider

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 06/13)



CERTIFICATE OF COMPLIANCE		CF1R-ALT-01-E
Residential Alterations		(Page 5 of 5)
Project Name:	Date Prepared:	

<b>DOCUMENTATION AUTHOR'S DECLARATION STATEMENT</b>	
1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company:	Signature Date:
Address:	CEA/ HERS Certification Identification (if applicable):
City/State/Zip:	Phone:
<b>RESPONSIBLE PERSON'S DECLARATION STATEMENT</b>	
I certify the following under penalty of perjury, under the laws of the State of California:	
<ol style="list-style-type: none"> <li>The information provided on this Certificate of Compliance is true and correct.</li> <li>I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).</li> <li>That the energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.</li> <li>The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.</li> <li>I will ensure that a registered copy of this Certificate of Compliance shall be 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 Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.</li> </ol>	
Responsible Designer Name:	Responsible Designer Signature:
Company :	Date Signed:
Address:	License:
City/State/Zip:	Phone:

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

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. This document contains the Joint Appendices which are used to determine climate zone and to complete the section for opaque surfaces. When the term CF-1R is used it means the CF-1R-PRSC-ALT-01. 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 numbers are given separately.

If any part of the alteration does not comply, prescriptive compliance fails and the performance compliance approach must be used.

#### **A. GENERAL INFORMATION**

Project Name: Identifying information, such as owner's name.

Date: Date of document preparation.

Project Location: Legal street address of property or other applicable identifying information.

Compliance Method: Prescriptive.

CA City: Legal city/town of property.

Building Front Orientation: Building front expressed in degrees, where North = 0, East = 90, South = 180, and West = 270. Indicate cardinal if it is a subdivision or multi-family project that will be 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.

Zip Code: 5-digit zip code for the project location (used to determine climate zone).

Number of Dwelling Units: 1 for single-family, 1 or more for multifamily.

Climate zone: From Joint Appendix JA2.1.1.

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.

Building Type: Single Family (includes duplex), or Multi Family (a building that shares common walls and common floors or ceilings).

Total Conditioned Floor Area: Enter the new conditioned floor area in ft<sup>2</sup>, as measured from the outside of exterior walls of the dwelling unit or building being altered.

Project Type: Check all that apply – insulation, roof replacement, fenestration/glazing, heating system, cooling system, duct system, and/or water heating alteration.

Slab Area: Area of the first floor slab (if any) in ft<sup>2</sup>.

#### **B. BUILDING INSULATION DETAILS (Section 150.2(b)1)**

1. Tag/ID: A label (if any) from the plans, such as A1.4 or wall.
2. Assembly Type: Roof, Ceiling, Wall, Floor over crawlspace or floor over exterior.
3. Frame Type: Wood or Metal.
4. Frame Depth: Nominal dimensions of framing material such as 4 (if 2x4) or 6 (if 2x6).
5. Frame Spacing: 16 or 24 inches on center.
6. Cavity R-value. Insulation installed between framing.

NOTE: Section 110.8(d) specifies that if adding insulation to an existing attic, the resulting attic insulation must total R-30. However, the amount of insulation required is limited to the amount of room available for insulation without conflicting with Building Code Section 1203.2.

7. U-factor: The U-factor for the entire wall, roof or floor assembly.

8. Appendix JA4 Table: Table number used to determine the R-value or U-factor (e.g., an ICF wall is 4.3.13).
9. Appendix JA4 Cell: Cell number used to determine the R-value or U-factor (e.g., an 8-inch thick ICF wall with 2 inches of EPS (R-15.4) is A6).
10. Required U-factor: from mandatory requirements in Sections 110.0 and 150.0.
11. Comments or notes regarding location or unique condition.

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

When 50% or more of the roof is being replaced the roofing requirements are triggered. Any areas of roof covered by building integrated photovoltaic panels and solar thermal panels (the area of roof not covered by photovoltaic panels would still need to meet any applicable cool roof requirements). Additionally, there are many alternatives/exceptions when a cool roof is required.

When the roof is steep slope (pitch greater than 2:12) the roof requirements include a cool roof in climate zones 10-15. The minimum requirement is 0.20 aged solar reflectance, 0.75 thermal emittance, or an SRI of 16.

#### **EXCEPTIONS AND ALTERNATIVES FOR STEEP SLOPE ROOFS:**

- (a) Mass roof 25 lbs/ft<sup>2</sup> or greater (uncommon situation such as sod roof);
- (b) Air space 1" from top of roof deck to bottom of roofing;
- (c) Roofing product has a profile ratio of rise to width of 1 to 5 for 50 percent or greater of the width of the roofing product;
- (d) Ducts already meet Section 150.1(c) insulation and duct leakage requirements;
- (e) Roof has R-38 insulation;
- (f) Roof has a radiant barrier;
- (g) No ducts are installed in the attic; or
- (h) R-4 insulation above the roof deck.

In climate zones 13-15, when there is a low slope roof (pitch 2:12 or less) the cool roof requirements are for a minimum aged solar reflectance of 0.63, a minimum 0.75 thermal emittance, or a minimum SRI of 75.

#### **EXCEPTIONS AND ALTERNATIVES FOR LOW SLOPE ROOFS:**

- (a) Mass roof 25 lbs/ft<sup>2</sup> or greater (uncommon situation such as sod roof);
- (b) No ducts are installed in the attic; or



- (c) Roof deck installation—by installing roof deck insulation, a lower aged solar reflectance is required: R-2 (0.62-0.60), R-4 (0.59-0.55), R-6 (0.54-0.50), R-8 (0.49-0.45), R-12 (0.44-0.40), R-16 (0.39-0.35), R-20 (0.34-0.30), R-24 (0.29-0.25).

Complete the fields for this section as follows:

1. Altering > 50% of roof surface: Indicate Yes or No. A yes triggers the prescriptive requirements for meeting a cool roof requirement.
2. Roof Pitch: When roofs have multiple pitches the requirements are based on the pitch of 50% or more of the roof.
3. Exception: If meeting one of the exceptions. Indicate which exception is, or will be, met.
4. The CRRC Product ID Number: obtained from the Cool Roof Rating Council's Rated Product Directory at [www.coolroofs.org/products/search.php](http://www.coolroofs.org/products/search.php). Products are listed by manufacturer, brand, type of installation, roofing material, and color, as well as product performance.
5. Product Type: See Cool Roof Rating Council's directory. Generally product types include single-ply, wood shingles, asphalt, metal, and tile.
6. R-value Deck Insulation: If one of the exceptions selected includes adding roof deck insulation, indicate the R-value of insulation.
7. Proposed Aged Solar Reflectance: Value is from the Cool Roof Rating Council's Rated Product Directory. If the aged value is not available, calculate the SRI using the initial solar reflectance (see column 9).
8. Proposed Thermal Emittance: From the product specifications.
9. Proposed SRI: It is optional to meet either the SRI or the solar reflectance/thermal emittance. To calculate the SRI value use the 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.
10. Minimum Required Aged Solar Reflectance: auto-complete based on climate zone and roof slope.
11. Minimum Required Thermal Emittance: auto-complete based on climate zone and roof slope.
12. Minimum SRI: auto-complete based on climate zone and roof slope.

If the cool roofing requirements will be met by a liquid field applied coating, Section 110.8(i)4 requires the coating be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the manufacturer.

#### **D. FENESTRATION/GLAZING AREAS ALLOWED**

The climate zone and size of the addition will affect the amount of fenestration (also known as glazing) allowed. If limited to 20%, this is calculated as Conditioned Floor Area x 0.20 = total ft<sup>2</sup> of fenestration allowed (20%). Fenestration areas are expressed in feet, not inches. When west-facing fenestration is limited (in climate zones 2, 4, and 6-16), it is limited to a maximum of 5%. Additions of 1,000 ft<sup>2</sup> or less have alternate requirements. For example, the limit may be 120 ft<sup>2</sup> of fenestration or 25%. While west-facing fenestration may be limited, if there is no west fenestration the upper limit remains at 120 ft<sup>2</sup> or 25% (or the values shown in columns 2 and 3).

The Alteration Type and Fenestration Type will affect how the standards apply and whether the fenestration area is limited. Percentages are determined as Conditioned Floor Area x 0.20 = total ft<sup>2</sup> of fenestration allowed (20%). Depending on the climate zone, If west-facing fenestration is limited, it is limited to a maximum of 5%. The overall total fenestration area is limited to 20%, not 25%. Fenestration areas are expressed in feet, not inches.

1. Alteration Type. Enter **Repair, Replace75, ReplaceALL, Add75, Add76, ReplaceSky, Add16Sky, or AddSky** as describe below:

**Repair:** A repair is when glass in an existing sash and frame is replaced or replacement of sashes in an existing frame. Repairs are not required to meet any requirements of the energy efficiency standards.

**Replace75:** When up to 75 ft<sup>2</sup> of fenestration is replaced, the replacement vertical fenestration must meet a maximum 0.40 U-factor and in climate zones 2, 4, 6-16 a maximum 0.35 SHGC.

**ReplaceAll:** When all fenestration (with an area of greater than 75 ft<sup>2</sup>) is replaced, the new fenestration product must have a maximum U-factor of 0.32 and in climate zones 2, 4, 6-16 a maximum SHGC of 0.25. This alteration does not trigger the area limits of Package A.

**Add75:** When adding fenestration up to 75 ft<sup>2</sup>, the selected fenestration product must have a maximum U-factor of 0.32 and in climate zones 2, 4, 6-16 a maximum SHGC of 0.25. This alteration does not trigger the area limits of Package A.

**Add76:** When more than 75 ft<sup>2</sup> is added to the existing fenestration, in addition to the above requirements, the maximum fenestration area of the dwelling unit cannot exceed 20% and the maximum West-facing fenestration area (in climate zones 2, 4, 6-16) cannot exceed 5%.

**ReplaceSky:** When an equal area of existing skylights is replaced, the replacement skylights must meet a maximum 0.55 U-factor and in climate zones 2, 4, 6-16 a maximum 0.30 SHGC.

**Add16Sky:** When up to 16 ft<sup>2</sup> of skylight area is added, the product selected must meet a maximum U-factor of 0.55 and in climate zones 2, 4, 6-16 a maximum 0.30 SHGC.

**AddSky:** When greater than 16 ft<sup>2</sup> of skylight area is added, the product selected must meet a maximum U-factor and SHGC of Table 150.1-A, which is a maximum 0.32 U-factor and in climate zones 2, 4, 6-16 a maximum 0.25 SHGC.

The remaining fields are auto completed based on alteration type, conditioned floor area, and climate zone.

2. Fenestration Type:
3. Orientation: In climate zones with a west-facing limit (2, 4, 6-16), two values will be displayed, one for west and one for the other orientations (E, S, and W).
4. Maximum Allowed ft<sup>2</sup>: If West-facing fenestration is limited two rows will appear. West-facing fenestration area is limited to 5%, and the maximum total fenestration area is 20%. Depending on the type of fenestration and the alteration type, this field may show values such as 75 ft<sup>2</sup> or 16 ft<sup>2</sup>.

The values in these fields will be entered into the lower Section E, rows c and g.

NOTE: West includes any vertical fenestration oriented to within 45 degrees of true west, including 45 degrees south of west. For skylights, west also includes any skylight area facing any direction with a pitch of less than 1:12

5. Comments: Note any special location or comment here.

#### **E. FENESTRATION/GLAZING PROPOSED AREAS AND EFFICIENCIES**

1. Fenestration Type: Window, glass door, skylight, or glass block.
2. Frame type: Vinyl, wood, metal, metal thermal break, clad, fiberglass, or none.
3. Orientation (North, East, South, West) or in degrees. In climate zones where the West-facing glazing is limited, list west-facing individually. The definitions in the Energy Efficiency Standards include these specific details:
  - 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.

Skylights in a roof pitch greater than 1:12 can be included as facing the same orientation as that portion of the roof angle. If the skylight is in a roof with a pitch less than 1:12, the skylight is assumed to face west.

4. Area Removed ft<sup>2</sup>: The size of window(s) being replaced or removed (combine windows with the same characteristics).

NOTE: Doors with glazing are counted in one of two ways. A door with 50% or more glazing is counted as the entire door area. A door with less than 50% glazing can be counted as the entire door area or can be calculated as the actual glass area with a 2-inch (0.17 ft<sup>2</sup>) frame all around.

5. Area Added ft<sup>2</sup>: The size of new or replacement window(s), doors, skylights.
6. Net Added Area ft<sup>2</sup>: The difference between columns 4 and 5 (can be a negative number if reducing the area).
7. Maximum Allowed U-factor: This field will vary depending on the type of alteration specified in Section D.

NOTE: For up to 3 ft<sup>2</sup> of tubular skylights and up to 3 ft<sup>2</sup> of glazing in a door, this field and column 8 can be n/a. For up to 16 ft<sup>2</sup> of skylight, enter 0.55.

8. U-factor: Enter (a) the NFRC U-factor based on the proposed brand and type of fenestration using National Fenestration Rating Council ([www.nfrc.org](http://www.nfrc.org)) certified values, (b) the default value from Table 110.6-A, or (c) the weighted average U-factor calculated on form CF-1R-PRSC-WS-02, Area Weighted Average Calculation Worksheet. For the exceptions, up to 3 ft<sup>2</sup> of tubular skylights and up to 3 ft<sup>2</sup> of glazing in a door enter N/A, and for up to 16 ft<sup>2</sup> of skylight, enter 0.55. If any products (other than the exceptions) have a higher U-factor than 0.32, first complete a WS-02 to calculate a weighted average U-factor and attach it to the CF-1R.

NOTE: Dynamic glazing is a glazing system that changes its performance U-factor and SHGC based on the physical environment. Dynamic glazing includes chromogenic glazing or integrated shading systems (this does not include internally or externally mounted shading devices). If using dynamic glazing, use the lowest tested U-factor and SHGC in Columns 8 and 11.

9. Source: NFRC, Default or WS-02. The source of the U-factor data for the fenestration product.
10. Maximum Allowed SHGC: This field will vary depending on the type of alteration specified in Section D for climate zones 2, 4 and 6-16. In climate zones 1, 3 and 5, where there is no maximum SHGC requirement, this value is n/a.
11. Source: NFRC, Default (from Table 110.6-B) or WS-02. The source of the SHGC data for the fenestration product.
12. Exterior Shading Device: If exterior shading devices are used to meet the SHGC requirement, indicate the type of device (from Table S-1 of CF-1R-PRSC-WS-03 Solar Heat Gain Coefficient Worksheet) and attach a WS-03.

If using an overhang for south-facing glazing, the glazing must be fully shaded at solar noon on August 21 and substantially exposed to direct sunlight at solar noon on December 21 (see Residential Manual, Section 3.\_\_\_\_).

13. Comments: Note any special location or comment here.

To determine compliance with allowable fenestration areas, complete rows a-h.

- a. Net Added West-facing Fenestration Area: If limited, enter the total amount of west-facing fenestration ONLY that will be added to the dwelling unit when alterations are complete.

- b. Existing + Added West-facing Fenestration Area: If more than 75 ft of fenestration is added, the dwelling unit cannot exceed 5% west-facing fenestration in climate zones 2, 4, and 6-16. Enter the area of West-facing fenestration ONLY that will be in the dwelling unit when alterations are complete.
- c. Maximum Allowed West-facing Fenestration Area: Conditioned Floor Area x 0.05 (for climate zones affected).
- d. Is West-facing Fenestration Area  $\leq$  Allowed: Indicate Yes if west-facing fenestration area is less than or equal to the maximum area allowed, West-facing fenestration area is in compliance.
- e. Net Added Fenestration Area (all orientations): This field is to show the net area of added fenestration for all orientations. When limited, the maximum is either up to 75 ft of added fenestration or a 20% limit is placed on the dwelling unit when alterations are complete. The total includes all existing and new fenestration, including the area of fenestration with exceptions for U-factor and SHGC.
- f. Existing + Added Fenestration Area (all orientations): If more than 75 ft of fenestration is added, the dwelling unit cannot exceed 20% fenestration. Enter the area of all fenestration existing and new in the dwelling unit when alterations are complete (including West facing).
- g. Maximum Allowed Total Fenestration Area (all orientations). Conditioned Floor Area x 0.20.
- h. Is Existing + Added Fenestration Area  $\leq$  Allowed: Indicate Yes if the total fenestration area is less than or equal to the maximum area allowed, the fenestration area is in compliance.
- i. If exterior shading devices are used to meet the SHGC requirements, enter the value calculated on the WS-03 and attach it to the CF-1R.

NOTE: If any fenestration has a U-factor greater than the maximum, with the exception of the 3 allowances for tubular skylights, glass in door, and skylights with 0.55 or less, complete a WS-02 and attach it to the CF-1R. If adding fenestration in climate zones with a maximum SHGC requirement, and any fenestration has an SHGC greater than required (with the exception of the 3 allowances for tubular skylights, glass in door, and skylights with 0.55 or less), complete a WS-02 and attach it to the CF-1R.

## F. HVAC SYSTEMS – 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.

### Cooling System Alterations

If a new system is installed, this triggers all of the cooling system requirements of a new dwelling, as well as duct sealing requirements that apply to duct alterations, even if duct alterations are not proposed. Similar requirements are triggered if the cooling system alteration includes adding or replacing: including air handler, outdoor condensing unit or cooling coil.

In addition to requirements of some form of refrigerant charge verification, if the alteration is to a refrigerant-containing system such as compressor, condensing coil, evaporative coil, refrigerant metering device or refrigerant piping, the setback thermostat requirements of Section 110.2(c) apply.

### Heating System Alterations

If a new system is installed, this triggers all system requirements for a new dwelling, as well as duct sealing requirements that apply to duct alterations, even if duct alterations are not proposed. Similar requirements are triggered if the heating system alteration includes replacing an air handler or heating coil.

Your HERS rater will know the more specific requirements that apply when the project details are known.

If altering or installing a space conditioning system, complete the following section.

1. Alteration type: Select “New” if a completely new system is being installed. Select “Alter” if parts of an existing system are being replaced. Select “Repair” if unsure of what specific changes to the system are to be made.
2. Floor Area Served (ft<sup>2</sup>): Indicate the conditioned floor area that the system will be heating and/or cooling.
3. Heating System Type: Type includes furnace, central heat pump, boiler, hydronic, wood heat, wall furnace, room heater, room heat pump, mini-split heat pump or electric resistance (if it meets the exception). An exception to Section 150.1(c)6 allows electric resistance heating only when it is supplemental to another system, as indicated by a capacity of < 2 kW or 7,000 Btu/hr, and has a time-limiting control device that allows it to be operated for 30-minutes at a time.
4. Heating Component Altered: Select all that apply from (a) condensing coil, (b) evaporator coil, (c) compressor, or (d) air handler/furnace.
5. Cooling System Type: Indicate cooling system type or specify “no cooling.” Categories include central air split system, central air package system, heat pump, room air or room heat pump, mini-split heat pump, or no cooling.
6. Cooling Component Altered: Select all that apply from (a) condensing coil, (b) evaporator coil, (c) compressor, (d) refrigerant metering device, (e) refrigerant piping, or (f) air handler/furnace.
7. Thermostat type: Typically setback or EMS. Non-central systems that are exempt (see below) are N/A.

Requirements are found in Section 110.2(c) with special requirements for heat pumps in Section 110.2(b). Controls for most systems can be by a central energy management control system (“EMS”) or a setback thermostat with a mechanism allowing a person to program up to 4 temperature setpoints within 24 hours (“setback”).

**EXEMPTIONS:** If the system type is a gravity gas wall, floor or room heater, non-central electric heater, fireplace, decorative gas appliance, wood stove, room air conditioner or room heat pump, a setback thermostat or energy management control system is not required (“N/A”).

**NOTE:** Ventilation Cooling or a whole house fan (a prescriptive requirement in climate zones 8-14) is not required for additions less than or equal to 1,000 ft<sup>2</sup>. Other mandatory requirements still apply.

6. Comments: Any notes regarding location or unique conditions.

## G. DUCT SYSTEMS

If a duct system is being added or completely replaced, the duct insulation and duct sealing requirements apply as if it was a new dwelling unit. If a duct system is altered or extended (by more than 40 feet of added duct), and in some cases when the heating and/or cooling system is completely replaced or altered, duct sealing requirements are triggered. (See Section 150.2(b)1.)

The HERS Rater will know what requirements apply for duct leakage testing and the varying levels of leakage allowed based on the specifics of the building alteration.

1. Duct Alteration Type: Select Extend (if extending the ductwork from an existing system, New (if a new system is being installed for the addition only) or Replacement (if a replacement system will serve an area larger than the addition alone).
2. Distribution System Type: Select ducted, radiant floor, piping, or ductless.
3. Duct location: If the system has ducts, indicate where they will be installed. Locations include attic, garage, conditioned space, radiant floor.
4. Added Duct Length: If the alteration type is Extend, indicate the length of duct being added in unconditioned space.
5. Duct R-value: If system is New or Replacement, a ducted system in Climate Zones 1-10 and 12-13 require R-6 duct insulation, and in climate zones 11 and 14-16 ducted systems require R-8 duct insulation. If ducts are installed in conditioned space (which must be field verified), this field will be N/A. If system is ductless this field will be N/A.
6. Comments: Any notes regarding location or unique conditions.

NOTE: When duct sealing to an existing duct system is triggered by the changes being made, a narrow exception is provided only when the existing duct system is constructed, insulated or sealed with asbestos.

NOTE: Some alterations to the heating and/or cooling system will trigger duct sealing requirements as shown in Section I.

## H. WATER HEATING SYSTEMS

Dwelling unit water heating compliance for an alteration ranges from options found in Section 150.2(b) to using any of the prescriptive options found in Section 150.1(c)8. Water allowed includes gas or propane water heater, 60 gallons maximum or instantaneous (tankless). Dwelling Unit distribution systems are limited to trunk and branch or manual controlled demand recirculation. 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, unless the new water heater is a heat pump water heater (which meets section 150.2(b)1Giii). 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 CF-1R-PRSC-NCB-01 to document the water heater alteration.

1. Existing Fuel Type: Gas, Propane or Electricity.
2. Proposed Water Heater Type: proposed water heater type is small storage (equipment with 75,000 Btu or less input), instantaneous (input of 200,000 Btu or less) , heat pump, or central (for multi-family).

NOTE: Electricity is only allowed if (a) the existing water heater fuel type is electric, (b) if the proposed water heater type is a heat pump water heater, or (c) the electric storage or instantaneous water heater is located inside the conditioned space, has no recirculation pumps, and has a solar water-heating system sized to meet 50% of the water heating requirements (see Residential Manual). Otherwise, this compliance approach cannot be used and computer performance compliance is required.

3. Proposed Fuel Type: Gas, Propane or Electricity.
4. Proposed Water Heater Efficiency (EF, AFUE) for small storage, instantaneous, and heat pumps enter Energy Factor. For Central Systems enter AFUE or Thermal Efficiency for Boilers or Large Storage Gas Water Heaters.
5. Water Heater Volume: Enter volume of storage up to 60 gallons allowed for storage water heaters. For instantaneous water heaters or boilers enter n/a. For multi-family systems enter total storage.
6. Central Recirculation Distribution System: For multi-family buildings with using a central distribution system either the existing distribution system must be used or a demand recirculation system with at least two distribution loops must be installed. The two loop requirement applies to any building with eight or more units. If the system is non-central with water heaters in each unit enter n/a.



7. Dwelling Unit Distribution Type: This shall be the existing system or either trunk and branch (standard), or a manual controlled demand recirculating system.
8. Solar Water Heating Solar Fraction: For installations of electric water heaters a solar water heating system must be installed with a fraction of at least 50 percent.
9. Comments: Note any special location or comment here.

## I. HERS MEASURES

HERS measures that are required will be listed in this section. A HERS rater will be required to complete inspections, verifications, or testing during construction of the addition. Possible verifications include:

1. Duct Leakage Testing: All duct systems must meet maximum duct leakage requirements. Typically the maximum leakage is 6% but varies for when the duct leakage test is performed and the type of building (single family, townhouse, multifamily). The only exception is if the heating and cooling systems are ductless.
2. Refrigerant Charge: Some type of refrigerant charge verification or Charge Indicator Display is required in climate zones 2 and 8-15 for most common systems such as ducted split and packaged systems, and mini-split systems. See Section 150(c)7.A. or Reference Residential Appendix RA3.2. If a building is built in climate zones 1, 3-17 or 16, or has no cooling system, no refrigerant charge verification is required.
3. Central System Air Handlers: Unless a building has no cooling system or has a non-ducted cooling system, the system must meet mandatory and prescriptive requirements for an airflow greater than 350 CFM per ton of nominal cooling capacity, and a fan efficacy less than or equal to 0.58 W/CFM. See 150.0(m)13, 150.1(c)10, and Reference Residential Appendix RA3.

## SIGNATURES

1. The person who prepared the CF-1R will sign and complete the fields for their name, company (if applicable), address, phone number, certification information (if applicable), date and signature (may be electronic).
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 (may be electronic).

## REGISTRATION

1. The CF-1R must be registered with a HERS provider prior to submitting for a building permit. See Residential Manual Section 2.1.1.