

**DOCKETED**

<b>Docket Number:</b>	15-BSTD-02
<b>Project Title:</b>	Residential Compliance Manual and Documents
<b>TN #:</b>	232816-11
<b>Document Title:</b>	2016-CF1R-ALT-01-E-PrescriptiveAlterationsBuildingpdf
<b>Description:</b>	N/A
<b>Filer:</b>	Corrine Fishman
<b>Organization:</b>	California Energy Commission
<b>Submitter Role:</b>	Public Agency
<b>Submission Date:</b>	4/22/2020 8:40:03 AM
<b>Docketed Date:</b>	4/22/2020

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 09/18)



CERTIFICATE OF COMPLIANCE		CF1R-ALT-01-E
Prescriptive Residential Alterations		(Page 1 of 6)
Project Name:	Date Prepared:	

.A. General Information					
01	Project Name:		02	Date Prepared:	
03	Project Location:		04	Building Front Orientation (deg or cardinal):	
05	CA City:		06	Number of Altered Dwelling Units:	
07	Zip Code:		08	Fuel Type:	
09	Climate Zone:		10	Total Conditioned Floor Area (ft <sup>2</sup> ):	
11	Building Type:		12	Slab Area (ft <sup>2</sup> ):	
13	Project Scope:		14	Exceptions to Minimum Aged Solar Reflectance and Minimum Thermal Emittance or SRI:	

B. Building Insulation Details – Framed (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							

**Note:**

- Where insulation is installed above the roofing membrane, or above the layer used to seal the roof from water penetration, the insulation shall have a maximum water absorption of 0.3 percent by volume when tested according to ASTM Standard C272.

C. Building Insulation Details – Non-framed										
01	02	03	04	05	06	07	08	09	10	11
Tag/ID	Assembly Type	Assembly Materials	Thickness (inches)	Proposed				Required		Comments
				Core Insulation R-value	Continuous Insulation R-value	U-factor	Appendix JA4 Reference		Required	
			Table				Cell	U-factor from Package A		

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 09/18)

CALIFORNIA ENERGY COMMISSION



<b>CERTIFICATE OF COMPLIANCE</b>	<b>CF1R-ALT-01-E</b>
Prescriptive Residential Alterations	(Page 2 of 6)
Project Name:	Date Prepared:

<b>D. Building Insulation Details – Mass Walls</b>															
01	02	03	04	05	06	07		08		09		10		11	
Tag/ID	Wall Above Grade	Mass Type	Mass Thickness (inches)	Interior Furring Strip Thickness (inches)	Exterior Furring Strip Thickness (inches)	Proposed						Required			
						Interior Insulation		Exterior Insulation		Appendix JA4 Reference		Interior Insulation		Exterior Insulation	
						R-value	U-factor	R-value	U-factor	Table	Cell	R-value	U-factor	R-value	U-factor

<b>E. Roof Replacement (Section 150.2(b)1H)</b>														
01	02	03	04	05	06	07	08	09	10	11	12		13	14
Tag/ID	Method of Compliance	Roof Pitch	Exception	CRRC Product ID Number	Product Type	R-value Deck Insulation	Proposed				Minimum Required			
							Initial Solar Reflectance	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)	Aged Solar Reflectance (Max)	Aged Solar Reflectance (Min)	Thermal Emittance	SRI (Optional)

**Notes:**

- 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.

<b>F. Fenestration/Glazing Allowed Areas and Efficiencies (Section 150.2(b)1)</b>									
01	02	03	04		05		06		07
Alteration Type	Maximum Allowed Fenestration Area For All Orientations (ft <sup>2</sup> )	Maximum Allowed West-Facing Fenestration Area Only (ft <sup>2</sup> )	Existing Fenestration Area for All Orientations (ft <sup>2</sup> )	Existing West-Facing Fenestration Area (ft <sup>2</sup> )	Maximum Allowed U-factor (Windows)	Maximum Allowed U-factor (Skylights)	Maximum Allowed SHGC (Windows)	Maximum Allowed SHGC (Skylights)	Comments

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 09/18)



<b>CERTIFICATE OF COMPLIANCE</b>	<b>CF1R-ALT-01-E</b>
Prescriptive Residential Alterations	(Page 3 of 6)
Project Name:	Date Prepared:

G. Fenestration/Glazing Proposed Areas and Efficiencies – Add (Section 150.2(b)1A)													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Tag/ID	Fenestration Type	Frame Type	Dynamic Glazing	Orientation N, S, W, E	Number of Panes	Proposed Fenestration Area (ft <sup>2</sup> )	Proposed West Facing Fenestration Area (ft <sup>2</sup> )	Proposed U-factor	Source	Proposed SHGC	Source	Exterior Shading Device	Combined SHGC from CF1R-ENV-03
15	Existing + Proposed Fenestration Area												
16	Maximum Allowed Fenestration Area												
17	Compliance Statement:												
18	Existing + Proposed West-Facing Fenestration Area												
19	Maximum Allowed West Fenestration Area												
20	Compliance Statement:												
21	Proposed Fenestration U-factor (Windows)												
22	Required Fenestration U-factor (Windows)												
23	Compliance Statement:												
24	Proposed Fenestration SHGC (Windows)												
25	Required Fenestration SHGC (Windows)												
26	Compliance Statement:												
27	Proposed Fenestration U-factor (Skylights)												
28	Required Fenestration U-factor (Skylights)												
29	Compliance Statement:												
30	Proposed Fenestration SHGC (Skylights)												
31	Required Fenestration SHGC (Skylights)												
32	Compliance Statement:												

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 09/18)



CERTIFICATE OF COMPLIANCE										CF1R-ALT-01-E			
Prescriptive Residential Alterations										(Page 4 of 6)			
Project Name:										Date Prepared:			

H. Fenestration/Glazing Proposed Areas and Efficiencies – Replace (Section 150.2(b)1B)														
01	02	03	04	05	06	07	08	9	10	11	12	13	14	
Tag/ ID	Fenestration Type	Frame Type	Dynamic Glazing	Orientation N, S, W, E	Area Removed (ft <sup>2</sup> )	Area Added (ft <sup>2</sup> )	Net Added Area (ft <sup>2</sup> )	Proposed U-factor	Source	Proposed SHGC	Source	Exterior Shading Device	Combined SHGC from CF1R-ENV-03	
15	Net Added West-facing Fenestration Area													
16	Is Net Added Fenestration Area $\leq 0$ for West-Facing Fenestration?													
17	Net Added Fenestration Area (all orientations)													
18	Is Net Added Fenestration Area $\leq 0$ for All Orientations?													
19	Proposed Fenestration U-factor (Windows)													
20	Required Fenestration U-factor (Windows)													
21	Compliance Statement:													
22	Proposed Fenestration SHGC (Windows)													
23	Required Fenestration SHGC (Windows)													
24	Compliance Statement:													
25	Proposed Fenestration U-factor (Skylights)													
26	Required Fenestration U-factor (Skylights)													
27	Compliance Statement:													
28	Proposed Fenestration SHGC (Skylights)													
29	Required Fenestration U-factor (Skylights)													
30	Compliance Statement:													

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 09/18)



<b>CERTIFICATE OF COMPLIANCE</b>	<b>CF1R-ALT-01-E</b>
Prescriptive Residential Alterations	(Page 5 of 6)
Project Name:	Date Prepared:

I. Space Conditioning (SC) Systems - Heating/Cooling (Section 150.2(b))		
01	02	03
Dwelling Unit Name	Dwelling Unit Total CFA (ft <sup>2</sup> )	Comments

J. Water Heating Systems (Section 150.2(b)1G)														
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Water Heating System Identification or Name	Water Heating System Type	Water Heater Type	# of Water Heaters in System	Water Heater Storage Volume (gal)	Fuel Type	Rated Input Type	Rated Input Value	Heating Efficiency Type	Heating Efficiency Value	Standby Loss (%)	Exterior Insul. R-Value	Back-Up Solar Savings Fraction	Central DHW System Distribution Type	Dwelling Unit DHW System Distribution Type

K. Space Conditioning Systems and Water Heating Systems in Multifamily Dwelling Unit					
01	02	03	04	05	06
Dwelling Unit Name	Dwelling Unit Total CFA (ft <sup>2</sup> )	Central Water Heating System Identification or Name	Dwelling Unit Water Heating System Identification or Name	Dwelling Unit: Alteration to Existing or Installation of Space Conditioning System(s)?	Comments

**RESIDENTIAL ALTERATIONS**

CEC-CF1R-ALT-01-E (Revised 09/18)



<b>CERTIFICATE OF COMPLIANCE</b>		<b>CF1R-ALT-01-E</b>
Prescriptive Residential Alterations		(Page 6 of 6)
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>1. The information provided on this Certificate of Compliance is true and correct.</li> <li>2. 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>3. 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>4. 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>5. 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**

**CF1R-ALT-01-E User Instructions**

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 2016 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 CF1R is used it means the CF1R-ALT-01.

Instructions for sections with column numbers and row numbers 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: Date of document preparation.
3. Project Location: Legal street address of property or other applicable identifying information.
4. 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 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 Altered Dwelling Units: 1 for single family, 1 or more for multi-family.
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 natural gas is not connected to the building, or if the conditions of Section 150.2(b)1Giic or 150.2(b)1Giid are met. See instruction at section H for more information.

9. Climate Zone: From Joint Appendix JA2.1.1.
10. 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.
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 ft<sup>2</sup>.
13. Project Scope: Check all that apply – insulation, roof replacement > 50%, space heating system, space cooling system, duct system, water heating, adding fenestration/glazing, replacing fenestration/glazing, adding fenestration/glazing ≤ 75 ft<sup>2</sup> windows, replacing fenestration/glazing ≤ 75 ft<sup>2</sup> window, adding fenestration/glazing ≤ 16 ft<sup>2</sup> skylight and or replacing fenestration/glazing skylights
14. Exceptions to Minimum Aged Solar Reflectance and Minimum Thermal Emittance or SRI: No exception, Air-space of 1.0 inch (25mm) is provided between the top of the roof deck to the bottom of the roofing product, the installed 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, existing ducts in the attic are insulated and sealed according to Section 150.1(c)9, building with at least R-38 ceiling insulation, buildings with a radiant barrier in the attic meeting the requirements of Section 150.1(c)2, buildings that have no ducts in attic, R-2 or greater insulation above the roof deck.

**B. Building Insulation Details - Framed (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.
3. Frame Type: Wood or Metal.
4. Frame Depth: Nominal dimensions (in inches) of framing material such as 2x4 or 2x6.
5. Frame Spacing: 16, 24, or 48 inches on center.
6. Proposed 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.

Proposed Continuous Insulation R-value: Insulation installed on the exterior. See Joint Appendix JA4 for guidance.

7. Proposed 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 attic assembly is 4.2.1).
9. Appendix JA4 Cell: Cell number used to determine the R-value or U-factor (e.g., an R-38 ceiling with 24-inch on center framing is A21).
10. Required U-factor: From mandatory requirements in Sections 110.0 and 150.0.
11. Comments: Any notes regarding location or unique conditions.

**C. Building Insulation Details – Non-framed**

1. Tag/ID: A label (if any) from the plans, such as A1.4 or wall.
2. Assembly Type: Roof or Wall.
3. Assembly Material: SIP OSB, SIP I-Joist, SIP Single 2x, SIP Double 2x, see JA4 for guidance.
4. Thickness: Thickness in inches.
5. Proposed Core Insulation R-value: Insulation installed within the materials or on the inside. See Joint Appendix JA4 for guidance.
6. Proposed Continuous Insulation R-value: Insulation installed on the exterior. See Joint Appendix JA4 for guidance.
7. Proposed U-factor: Assembly U-factor from JA4 or CF1R-ENV-02. Must be less than or equal to Column 10.
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 Package A: Based on assembly type and climate zone.
11. Comments: Any notes regarding location, unique conditions, or attachments.

**D. Building Insulation Details – Mass Walls**

1. Tag/ID: A label (if any) from the plans, for example, A1.4 or wall.
2. Walls Above Grade: Yes or No.
3. Mass Type: Clay Brick, Clay Hollow Unit, CMU Light Weight, CMU Medium Weight, CMU Normal Weight, Concrete, ICF. See JA4 for guidance.
4. Mass Thickness: Thickness (in inches) of mass.
5. Interior Furring Strips Thickness: If furring strips are required to meet the required wall R-value or U-factor shown in Columns 10 and 11, indicate the thickness of the furring strip (in inches). See Table 4.3.14 of Joint Appendix 4.

6. Exterior Furring Strip Thickness: If furring strips are required to meet the required wall R-value or U-factor shown in Columns 10 and 11, indicate the thickness of the furring strip (in inches). See Table 4.3.14 of Joint Appendix 4.
7. Proposed Interior Insulation R-value or U-factor: Enter either the R-value or U-factor of proposed insulation on the inside surface of the mass wall. See Column 10 for the required interior insulation value for the wall type selected. See JA4 for guidance. Use the same descriptor (R-value or U-factor) throughout Table D.
8. Proposed Exterior Insulation R-value or U-factor: Enter either the R-value or U-factor of proposed insulation on the outside surface of the mass wall. See Column 11 for the required exterior insulation value for the wall type selected. See JA4 for guidance.
9. Appendix JA4 Table: Table number used to determine the R-value or U-factor (e.g., an ICF wall is 4.3.13).  
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 Interior Insulation R-value or U-factor: The required R-value or U-factor (whichever descriptor was selected in Column 6) for interior insulation will be completed based on the Table 150.1-A requirements for the wall type.
11. Required Exterior Insulation R-value or U-factor: The required R-value or U-factor (whichever descriptor was selected in Column 7) for exterior insulation will be completed based on the Table 150.1-A requirements for the wall type.

#### E. Roof Replacement (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 are exempt; however, 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 a minimum SRI of 16.

1. Tag/ID: A label, if any, from the plans, for example R-1.
2. Method of Compliance: Indicate if the method of compliance is going to be based on Aged Solar Reflectance and Thermal Emittance, the Solar Reflectance Index (SRI), or an Exception.
3. Roof Pitch: Expressed as 4:12, for example, which means the roof rises 4 feet within a span of 12 feet. When roofs have multiple pitches the requirements are based on the pitch of 50% or more of the roof.
4. Exception: If meeting one of the exceptions. Indicate which exception is, or will be, met.

NOTE: 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-2 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.

NOTE: 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 trade off—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).

NOTE: If one of the exceptions above has been selected than the rest of Section C is Not Required.

- 5. The CRRC Product ID Number is obtained from the Cool Roof Rating Council’s Rated Product Directory at [www.coolroofs.org/products/results](http://www.coolroofs.org/products/results). Products are listed by manufacturer, brand, type of installation, roofing material, and color, as well as product performance.
- 6. Product Type: See Cool Roof Rating Council’s directory. Generally product types include single-ply roof, wood shingles, asphalt roof, metal roof, tile roof.
- 7. R-value Deck Insulation: If one of the exceptions selected includes adding roof deck insulation, indicate the R-value of insulation.
- 8. Proposed Initial Solar Reflectance: Based on the product chosen from the Cool Roof Rating Council’s Rated Product Directory. If using default assumption indicate NA since the Aged Solar Reflectance is available.
- 9. 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 calculated Aged Solar Reflectance using the Solar Reflectance Index (SRI) Calculation worksheet located on the California Energy Commission website ([http://energy.ca.gov/title24/2013standards/documents/solar\\_reflectance/](http://energy.ca.gov/title24/2013standards/documents/solar_reflectance/)) or the aging equation  $\rho_{aged}=[0.2+\beta[\rho_{initial}-0.2]]$ , where  $\rho_{initial}$  = the initial solar reflectance and soiling resistance  $\beta$  is listed by product type below.

VALUES OF SOILING RESISTANCE  $\beta$  BY PRODUCT TYPE

Product Type	CRRC Product Category	$\beta$
Field-Applied Coating	Field-Applied Coating	0.65
Other	Not A Field-Applied Coating	0.70

- 10. Proposed Thermal Emittance: From the product specification default value. If using a calculated SRI place the Thermal Emittance used to calculate SRI.
- 11. Proposed SRI: It is optional to meet the SRI but if chosen to do so, use the Solar Reflectance Index (SRI) Calculation Worksheet found on the California Energy Commission website [http://www.energy.ca.gov/title24/2013standards/documents/solar\\_reflectance/](http://www.energy.ca.gov/title24/2013standards/documents/solar_reflectance/).
- 12. Minimum Required Aged Solar Reflectance: Based on climate zone and roof slope.
- 13. Minimum Required Thermal Emittance: Based on climate zone and roof slope.
- 14. Minimum Required SRI: Based on climate zone and roof slope.

NOTE: 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.

**F. Fenestration/Glazing Allowed Areas and Efficiencies (Section 150.2(b)1)**

The climate zone and scope of the alteration 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).

1. Alteration Type: Auto-filled with the project scope in A13: adding fenestration/glazing, replacing fenestration/glazing, adding fenestration/glazing  $\leq 75$  ft<sup>2</sup> windows, replacing fenestration/glazing  $\leq 75$  ft<sup>2</sup> window, adding fenestration/glazing  $\leq 16$  ft<sup>2</sup> skylight and or replacing fenestration/glazing skylights.
2. Maximum Allowed Fenestration Area for All Orientations (ft<sup>2</sup>): 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>.
3. Maximum Allowed West-Facing Fenestration Area Only: Calculated value based on Conditioned Floor Area multiplied by 5%(Used in climate zones 2, 4, and 6-16)

NOTE: (1) If adding fenestration/glazing  $\leq 16$  ft<sup>2</sup> skylight, enter NA

(2) 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

4. Existing Fenestration Area for All Orientations: Enter the area, in ft<sup>2</sup>, of the existing fenestration/glazing.  
Existing West-Facing Fenestration Area: Enter the area, in ft<sup>2</sup>, of the existing west-facing fenestration/glazing. If project has no existing west-facing fenestration then enter "0".
5. Maximum Allowed U-factor: Maximum U-factor from Package A or Table 150.1-A. This field will almost always be 0.32. For skylights this will be 0.55.
6. Maximum Allowed SHGC: Maximum SHGC from Package A or Table 150.1-A. This field will almost always be either 0.25 or N/A, depending on climate zone. N/A means there is no maximum SHGC required in this climate zone. For skylights this will be 0.30.
7. Comments: Note any special location or comment here.

#### **G. Fenestration/Glazing Proposed Areas and Efficiencies – Add (Section 150.2(b)1A)**

1. Tag/ID: A label (if any) from the plans, such as W1.
2. Fenestration Type: Indicate the type of fenestration construction e.g., Fixed Window, Operable Window, or Skylight.

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.

3. Frame type: Metal, metal thermal break, or non-metal.
4. Dynamic Glazing: Indicate if the fenestration has integrated shading device, chromogenic glazing, or none for no dynamic glazing. Chromogenic glazing shall be considered separately from other fenestration types.
5. Orientation (North, East, South, West). In climate zones where the West-facing glazing is limited, list west-facing individually. The definitions in the Energy 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 north of west.

NOTE: 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.

6. Number of Panes: Indicate the number of panes for each Tag/ID; is it single, double, or triple pane window?
7. Proposed Fenestration Area (ft<sup>2</sup>): Indicate the area (in ft<sup>2</sup>) of each exterior fenestration type, excluding west-facing fenestration.
8. Proposed West Facing Fenestration Area (ft<sup>2</sup>): In climate zones 2, 4, 6-16, indicate the area (in ft<sup>2</sup>) of each exterior west-facing fenestration type separately.

NOTE: Skylights installed in a roof with pitch less than 1:12 are considered to face west.

9. Proposed 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; or
  - (b) the default value from Table 110.6-A; or
  - (c) the NA6.2 alternate default U-factor (for non-rated site-built fenestration only); or
  - (d) the Area-weighted Average from CF1R-ENV-02.

If any products (other than skylights) have a higher U-factor than 0.32, first complete a CF1R-ENV-02 to calculate the Area-Weighted Average U-factor, and attach it to the CF1R-ALT-01.

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 9 and 11.

10. Source: NFRC, Table 100.6-A and 110.6-B, Equations NA6-1 and NA6-2, or Area-Weighted Average Worksheet (CF1R-ENV-02). The source of the U-factor data for the fenestration product.
11. Proposed SHGC: In climate zones 2, 4, 6-16 enter
  - (a) the NFRC-SHGC based on the proposed brand and type of fenestration using National Fenestration Rating Council ([www.nfrc.com](http://www.nfrc.com)) certified values; or
  - (b) the default value Table 110.6-B; or
  - (c) the NA6.3 alternate default SHGC (for non-rated site-built fenestration only); or
  - (d) the Area-weighted Average from CF1R-ENV-02.

If any products (other than skylights) have a higher SHGC than required by Package A, first complete a form CF1R-ENV-02 to calculate the Area-Weighted Average SHGC and attach it to the CF1R-ALT-01.

12. Source: NFRC, Table 100.6-A and 110.6-B, Equations NA6-1 and NA6-2, or Area-Weighted Average Worksheet (CF1R-ENV-02). The source of the SHGC data for the fenestration product.
13. Exterior Shading Device: If exterior shading devices are used to meet the SHGC requirement, indicate the type of device (from Table S-1 of CF1R-ENV-03 Solar Heat Gain Coefficient Worksheet) and attach an ENV-03.

NOTES:(1) An exterior shading device is not used for products with an NFRC rated U-factor and SHGC based on a factory integrated shading device.

(2) Chromogenic glazing shall be considered separately from other fenestration.

(3) 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 3.5.5).

14. Combined SHGC from CF1R-ENV-03: If exterior shading devices are combined with the SHGC value of the fenestration to meet the prescriptive SHGC requirements (as indicated by a value in Column E. 13), indicate the SHGC calculated on compliance document CF1R-ENV-03 and attach the one for each window with an exterior shading device.
- 15.-32. Automatically completed entries; no user input required.

**H. Fenestration/Glazing Proposed Areas and Efficiencies – Replace** (Section 150.2(b)1B)

1. Tag/ID: A label (if any) from the plans, such as W1.
2. Fenestration Type: Indicate the type of fenestration construction e.g., Fixed Window, Operable Window, or Skylight.

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.

3. Frame type: Metal, metal thermal break, or non-metal.
4. Dynamic Glazing: Indicate if the fenestration has integrated shading device, chromogenic glazing, or none for no dynamic Glazing. Chromogenic glazing shall be considered separately from other fenestration types.
5. Orientation (North, East, South, West). In climate zones where the West-facing glazing is limited, list west-facing individually. The definitions in the Energy 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 north of west.

NOTE: 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.

6. Area Removed (ft<sup>2</sup>): Enter the area, in ft<sup>2</sup>, of the fenestration/glazing being removed.
7. Area Added (ft<sup>2</sup>): Enter the area, in ft<sup>2</sup>, of the fenestration/glazing being added.
8. Net Added Area (ft<sup>2</sup>): The difference between the Area Added and the Area Removed.

## 9. Proposed 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; or
- (b) the default value from Table 110.6-A; or
- (c) the NA6.2 alternate default U-factor (for non-rated site-built fenestration only); or
- (d) the Area-Weighted Average from CF1R-ENV-02.

If any products (other than skylights) have a higher U-factor than 0.32, first complete a CF1R-ENV-02 to calculate the Area-Weighted Average U-factor and attach it to the CF1R-ALT-01.

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 9 and 11.

## 10. Source: NFRC, Table 110.6-A and 110.6-B, Equations NA6-1 and NA6-2, or Area-weighted Average Worksheet (ENV-02). The source of the U-factor data for the fenestration product.

## 11. Proposed SHGC: In climate zones 2, 4, 6-16 enter

- (e) the NFRC-SHGC based on the proposed brand and type of fenestration using National Fenestration Rating Council ([www.nfrc.com](http://www.nfrc.com)) certified values, or
- (f) the default value Table 110.6-B, or
- (g) the NA6.3 alternate default SHGC (for non-rated site-built fenestration only), or
- (h) the Area-weighted Average from CF1R-ENV-02.

If any products (other than skylights) have a higher SHGC than required by Package A, first complete a form CF1R-ENV-02 to calculate the area-weighted average SHGC and attach it to the CF1R-ALT-01.

## 12. Source: NFRC, Table 110.6-A and 110.6-B, Equations NA6-1 and NA6-2, or Area-weighted Average Worksheet (ENV-02). The source of the SHGC data for the fenestration product.

## 13. Exterior Shading Device: If exterior shading devices are used to meet the SHGC requirement, indicate the type of device (from Table S-1 of CF1R-ENV-03 Solar Heat Gain Coefficient Worksheet) and attach an ENV-03.

NOTES: (1) An exterior shading device is not used for products with an NFRC rated U-factor and SHGC based on a factory integrated shading device.

(2) Chromogenic glazing shall be considered separately from other fenestration.

(3) 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 3.5.5).

## 14. Combined SHGC from CF1R-ENV-03: If exterior shading devices are combined with the SHGC value of the fenestration to meet the prescriptive SHGC requirements (as indicated by a value in column F. 13), indicate the SHGC calculated on compliance document CF1R-ENV-03 and attach the form for each window with an exterior shading device.

## 15.-30. Automatically completed entries; no user input required.

**I. Space Conditioning (SC) Systems – Heating/Cooling** (Section 150.2(b))

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. Dwelling Unit Total CFA (ft<sup>2</sup>): Conditioned Floor Area in ft<sup>2</sup>, as measured from the outside of exterior walls of the dwelling unit or building being altered.
3. Comments: Any notes regarding location or unique conditions.

**J. Water Heating Systems** (Section 150.2(b)1G)

Water heating compliance for an alteration is described in Section 150.2(b)1G. For a single dwelling unit, a gas or propane water heater that meets the requirements of 150.1(c)8 can be used. If no natural gas is connected to the building, an electric water heater with an energy factor greater than or equal to the minimal energy factor required under the Appliance Efficiency Regulation, and with storage capacity of less than 60 gallons can be used. Dwelling Unit distribution systems are limited to Standard trunk and branch or demand recirculation for gas or propane water heater. 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 conditions of Section 150.2(b)1Giic or 150.2(b)1Giid are met. Multi-family central systems must use certified equipment as defined under Section 110.1 and 110.3.

1. Water Heating System Identification or Name: Enter a unique name for the Water Heating System.
2. 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 are when the water heater will provide both space conditioning and domestic hot water.
3. Water Heater Type: For non-central systems only Small/Consumer Storage, Residential-Duty Commercial Storage, Large Storage (less than or equal to 105,000 Btu/h) or Small/Consumer Instantaneous are allowed. For central systems pick from Large/Commercial Storage, Small/Consumer Storage, Residential-Duty Commercial Storage, Heat Pump, Boiler, Large/Commercial Instantaneous, Small/Consumer Instantaneous, Residential-Duty Commercial Instantaneous or Indirect.
4. Number of Water Heaters in System: In single family and multi-family with water heaters in each dwelling units the value is 1. For multi-family central systems serving multiple dwelling units enter the total number of water heaters.
5. Water Heater Volume (gal): 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.
6. Fuel Type: Gas, Propane, Electric (only if natural gas is not connected, or if the conditions of Section 150.2(b)1Giic or 150.2(b)1Giid are met)

NOTE: The following table lists replacement heat pump water heating systems by climate zone that meet the requirements of 150.2(b)Giic and/or 150.2(b)Giid.



Precalculated Replacement Heat Pump Water Heating Systems for Single Dwelling Units

<b>CZ</b>	<b>Energy Factor greater than or equal to</b>
1	2.75
2	2.75
3	2.75
4	2.8
5	2.75
6	2.33
7	2.5
8	2.33
9	2.33
10	2.33
11	2.5
12	2.8
13	2.5
14	2.5
15	2.33
16	EF ≥ 3, plus a solar water heating system with solar saving fraction ≥ 0.4

7. Rated Input Type: Enter the equipment input rating type. For gas or propane fired system the units are Btuh, for electric fired system the units are kW.
8. Rated Input Value: Enter the numeric value of rated input.
9. Heating Efficiency Type: Energy Factor, AFUE, UEF or Thermal Efficiency. From product literature or a California Energy Commission directory.
10. Heating Efficiency Value: Enter the value from product literature or a California Energy Commission directory
11. Standby Loss (percent): Applies only to large storage water heaters. Enter N/A for small storage or instantaneous water heaters.
12. Exterior Insulation R-Value: Enter the R-value if exterior insulation on the storage tank is installed
13. 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.
14. Central DHW Distribution System: For multi-family buildings with using a central distribution system a demand recirculation system with at least two distribution loops must be installed. This requirement applies to any building with eight or more units. If the system is non-central or project is individual units enter N/A.
15. Dwelling Unit DHW Distribution Type: For a Central DHW this field shall be Standard. If non-central then pick from Standard, Demand Recirculation – Manual Control, Demand Recirculation – Sensor Control.

**K. Space Conditioning Systems and Water Heating Systems in Multifamily Dwelling Units**

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. Dwelling Unit Total CFA (ft<sup>2</sup>): Conditioned Floor Area in ft<sup>2</sup>, as measured from the outside of exterior walls of the dwelling unit or building being altered.
3. Central Water Heating System Identification or Name: Select one of the central DHW system names.
4. Dwelling Unit Water Heating System Identification or Name: Select the applicable water heating system name(s) that were entered in Section H or select N/A if no water heating systems are planned to be installed in this dwelling. If more than one water heating system type is needed in the dwelling unit, enter another row of data for the dwelling unit and select the additional water heating system name.
5. Dwelling Unit - Alteration to the Space Conditioning System(s)?: If altering one or more of the Space conditioning systems in the dwelling enter yes, otherwise enter no
6. Comments: Any notes regarding location or unique conditions.

**Signatures**

1. The person who prepared the CF1R 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 CF1R must be registered with a HERS provider prior to submitting for a building permit. See Residential Manual Section 2.1.1.