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NEWLY CONSTRUCTED BUILDINGS

CEC-CF1R-NCB-01-E (Revised 01/19)

CALIFORNIA ENERGY COMMISSION



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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 Dwelling Units:	
07	Zip Code:		08	Fuel Type:	
09	Climate Zone:		10	Total Conditioned Floor Area (ft ²):	
11	Building Type:		12	Slab Area (ft ²):	
13	Project Scope:		14	Exceptions to Fenestration U-factor & SHGC 150.1(c)3A:	

B. Opaque Surface Details – Framed Walls/ Framed Floors/Concrete Raised Floors (Section 150.1(c)1)											
01	02	03	04	05	06	07	08	09	10	11	12
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 from Table 150.1-A or B	
								Table	Cell		

C. Opaque Surface Details – Nonframed (Section 150.1(c)1)									
01	02	03	04	05	06	07	08	09	10
Tag/ID	Assembly Materials	Thickness (inches)	Proposed				Required		Comments
			Core Insulation R-value	Continuous Insulation R-value	U-Factor	Appendix JA4 Reference		U-Factor from Table 150.1-A or B	
							Table		Cell



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D. Opaque Surface Details – Mass Walls (150.1(c)1Bii)																
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	
Tag/ID	Above or Below Grade?	Proposed								Required						
		Mass Type	Mass Thickness (inches)	Appendix JA4 Reference		Exterior Insulation		Interior Insulation		Appendix JA4 Reference		Exterior Insulation		Interior Insulation		
				Table	Cell	R-value	U-factor	R-value	U-factor	Table	Cell	R-value	U-factor	R-value	U-factor	

Note: When insulation is added to the outside of a mass wall and/or when the inside is furred and insulated, the performance data may be adjusted using Equation 4-4 in the Joint Appendices.

E. Slab Insulation (Table 150.1-A)					
01	02	03	04	05	06
Floor Type	Proposed		Required		Comments
	Insulation R-value	Insulation U-factor	Insulation R-value	Insulation U-factor	

Note: Heated slab floors require mandatory slab insulation (see Table 110.8-A).

F. Ceiling/Roof Insulation (Section 150.1(c)1A)							
01	02	03	04	05	06	07	08
Option (B or C)	Air Space Required?	Proposed		Required		Radiant Barrier Required?	Comments
		Below Roof Deck R-value	Ceiling Insulation R-value	Below Roof Deck R-value	Ceiling Insulation R-value		

Note:

- Cathedral ceilings cannot comply with prescriptive requirements. Performance compliance is required.
- Option B requires below deck insulation in climate zones 4 and 8-16. An air space is required if below deck insulation is required.
- Option C requires heating and cooling ducts be located inside the conditioned space.



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G. Roofing Products (Cool Roof) (Section 150.1(c)11)

01	02	03	04	05	06	07	08	09	10	11	12	13
Tag/ID	Exception	Roof Pitch	Method of Compliance	Product Type	CRRC Product ID Number	Proposed				Minimum Required		
						Initial Solar Reflectance	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)	Aged Solar Reflectance	Thermal Emittance	SRI (Optional)

Notes:

- Exception 1 is for a roof area with photovoltaic panels or solar thermal panels.
- Exception 2 is for roof constructions with 25 lb/ft² or greater.
- When exception 1 or 2 exists, the roof is not required to have a cool roof even if the climate zone specifies a minimum solar reflectance and thermal emittance.
- Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.

H. Opaque Swinging Doors to Exterior (Section 150.1(c)5)

01	02	03	04	05	06	07
Tag/ID	Area	Proposed U-factor	Proposed U-factor Source	Required Maximum U-factor	Weighted Average (Yes/No)	Comments

Notes:

- Any door with 25 percent or more glass is counted as a fenestration product in Tables I and J.
- Do not include fire-rated doors between garage or unconditioned space and conditioned space.
- If using weighted average to achieve required maximum U-factor, attach CF1R-ENV-02-E.



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I. Fenestration/Glazing Allowed Areas and Efficiencies (Section 150.1(c)3)						
01	02	03	04	05	06	07
Maximum Allowed Fenestration Area for All Orientations (ft ²)	Maximum Allowed West-Facing Fenestration Area Only (ft ²)	Maximum Allowed U-factor (Windows)	Maximum Allowed U-factor (Skylights)	Maximum Allowed SHGC (Windows)	Maximum Allowed SHGC (Skylights)	Comments

Note:

- If the selected water heating system option is 2 (Table M, column 02) the maximum weighted average fenestration U-factor is 0.24 or less (windows and skylights).

J. Fenestration Proposed Areas and Efficiencies

Note: If meeting Exception 1 to 150.1(c)3A, Installing $\leq 3\text{ft}^2$ glass in door, it is assumed to meet the minimum required U-factor (0.30) & SHGC (0.23).

If meeting Exception 1 to 150.1(c)3A, Installing $\leq 3\text{ft}^2$ tubular skylight, it is assumed to meet the minimum required U-factor (0.55) & SHGC (0.30).

Doors with greater than or equal to 25 percent glazing area are treated as a fenestration product.

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 ²)	Proposed West Facing Fenestration Area (ft ²)	Proposed U-factor	Proposed U-factor Source	Proposed SHGC	Proposed SHGC Source	Exterior Shading Device	Combined SHGC from CF1R-ENV-03
15	Total Proposed Fenestration Area												
16	Maximum Allowed Fenestration Area												
17	Compliance Statement:												
18	Total Proposed West-Facing Fenestration Area												
19	Maximum Allowed West-Facing 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:												

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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:	

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



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K. Space Conditioning (SC) Systems – Heating/Cooling/Ducts (Section 150.1(c)7)											
01	02	03	04	05	06	07	08	09	10	11	12
SC System Identification or Name	Heating System Type	Heating Efficiency Type	Proposed Heating Efficiency	Cooling System Type	Cooling Efficiency Type	Proposed Cooling Efficiency	Distribution System Type	Duct Location	Duct R-value	Thermostat Type	Comments

Notes:

- Any gas heating, heat pump, or cooling appliance sold in California will meet the minimum appliance efficiency standard. Models can be checked at <https://cacertappliances.energy.ca.gov/>.
- If ducted equipment, the duct location must be inside conditioned space if the project is in climate zone 4 or 8-16 and Table F, column 01 is set to Option C.
- 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.

L. Ventilation Cooling in Climate Zones 8-14 (Section 150.1(c)12)							
01	02	03	04	05	06	07	08
Proposed				Required			
Air Flow Rate (in CFM) for Certified Whole House Fan	Number of Fans	Total CFM	Directly Vented to Outside	Attic Free Vent Area (in ft ²)	Airflow Rate (CFM) (1.5 CFM per ft ² of Conditioned Floor Area)	Minimum Attic Vent Free Area (in ²) (Required Airflow Rate x 0.192)	Location/Comments

M. Water Heating Systems (Section 150.1(c)8)													
List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating.													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Water Heating System ID or Name	Water Heating System Type	System Option (from §150.1(c)8)	# of Dwelling Units in System	# of Recir Loops	Water Heater Type	Volume	Fuel Type	# of Water Heaters in System	Rated Input (Range)	Minimum Solar Savings Fraction	Additional PV Capacity	Tank Location	Distribution Type



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Options:

Single Family & Multifamily with Individual Water Heaters

1. Gas or propane instantaneous.
2. 55 gallons or less storage tank with 75,000 Btu or less rated input. Distribution either compact hot water distribution (HERS) or drain water heat recovery (HERS).
3. Greater than 55 gallons storage tank with 75,000 Btu or less rated input.
4. Heat pump water heater. Installed in conditioned space or garage. Either:
 - A. Compact hot water distribution basic and drain water heat recovery (HERS), or
 - B. If climate zone 8-15, a PV system 0.3 kWdc larger than system required by Table O below, or If climate zone 1 or 16, a PV system 1.1 kWdc larger than system required by Table O below
5. Tier 3 heat water heater (as rated by Northwest Energy Efficiency Alliance (NEEA)). Installed in conditioned space or garage. If climate zone 1 or 16 either:
 - A. A PV system that is 0.3 kWdc larger than Table O below, or
 - C. Compact hot water distribution basic.

Multifamily with Central Water Heating

- A. Gas or propane water heating system, a recirculation system, and a minimum solar savings fraction of 0.20 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.35 in Climate Zones 10 through 16.
- B. Gas or propane water heating system, a recirculation system, a minimum solar savings fraction of 0.15 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.30 in Climate Zones 10 through 16, and a drain water heat recovery system.

N. Multifamily Space Conditioning Systems and Water Heating Systems

01	02	03	04	05	06
Dwelling Unit Name	Dwelling Unit Total CFA (ft ²)	Central Water Heating System ID or Name	Dwelling Unit Water Heating System ID or Name	Dwelling Unit Space Conditioning System ID or Name	Comments

O. Photovoltaic Requirements (Section 150.1(c)14)

01	02	03	04	05	06	07
PV Array ID or Name	Value A from Table 150.1-C	Value B from Table 150.1-C	Minimum PV Size	Water Heating Adjustment	Adjusted Minimum PV Size	Comments



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P. HERS Verification Summary

The enforcement agency shall 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.

Quality Insulation Installation – Section 150.1(c)1E

- The dwelling unit shall meet all requirements of Quality Insulation Installation (QII) as specified in Reference Appendix RA3.5 as verified by a HERS rater.
EXCEPTION: Multifamily dwelling units in Climate Zone 7.

Duct Leakage Verification- Section 150.0(m)11

- Duct leakage testing is required (Residential Appendix RA3.1) in all climate zones for ducted heating and cooling systems.

Zonally Controlled Systems – Bypass Dampers - Section 150.1(c)13

- If system is zonally controlled, no bypass ducts are allowed, as confirmed by HERS verification (Reference Appendix RA 3.4.1.6).

Refrigerant Charge Verification – Section 150.1(c)7a

- Refrigerant charge testing is required (Residential Appendix RA3.2) in climate zones 2 and 8-15 for all air-cooled air conditioners and air source heat pumps, including ducted split systems, ducted package systems, small duct high velocity systems, and mini-split systems.
- Some exceptions apply to factory charged package systems.

Central System Air Handlers – Air Flow and Fan Efficacy Verification - Section 150.0(m)13

- Airflow (minimum 350 cfm/ton) and Fan Efficacy (max 0.45 Watts/cfm for gas furnace air handlers / 0.58 Watts/cfm for air handlers that are not gas furnaces) on systems with ducted air conditioning as field verified by a HERS rater or Return Duct and Filter System Design according to tables 150.0-B/C will be HERS verified
- Heat-only systems with Central Fan Integrated (CFI) ventilation are required to have less than 0.45 Watts/cfm as verified by a HERS rater.
- Small duct high velocity systems: airflow (minimum 250 cfm/ton) and fan efficacy (max 0.62 W/cfm) as verified by a HERS rater..

Indoor Air Quality Mechanical Ventilation – Section 150.0(o)

- Mechanical ventilation airflow rate according to ASHRAE 62.2 is required to be verified by a HERS rater (RA3.7).



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DOCUMENTATION AUTHOR'S DECLARATION STATEMENT	
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:
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 Compliance is true and correct. 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). 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. 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. 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. 	
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-NCB-01-E User Instructions

Minimum requirements for prescriptive compliance can be found in Building Energy Efficiency Standards Section 150.1(c), and Table 150.1-A (Package A). Completing these compliance documents will require that you have the Reference Appendices for the 2019 Building Energy Efficiency Standards, which contains the Joint Appendices used to determine climate zone and to complete the table for opaque surfaces. When the term CF1R is used it means the CF1R-NCB-01. Worksheets are identified by their entire name and subsequently by only the worksheet number, such as CF1R-ENV-02.

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

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 location 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 multifamily 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.
5. CA City: Legal city/town of property.
6. Number of Dwelling Units: 1 for single family (including duplexes and townhomes), 3 or more for multifamily. NOTE: Duplexes and townhomes are single family and require a single CF1R for each dwelling unit.
7. Zip Code: 5-digit zip code for the project location (used to determine climate zone).
8. Fuel Type: Natural Gas, or Liquefied Propane Gas.
9. Climate zone: Use the EZ Building Climate Zone search tool <http://caenergy.maps.arcgis.com/apps/webappviewer/index.html?id=4831772c00eb4f729924167244bbca22>.
10. Total Conditioned Floor Area: Enter the total new conditioned floor area in ft², as measured from the outside of exterior walls. If the project is an addition, this form is used only for additions that are greater than 1,000 ft².
11. Building Type: Single Family (includes duplex), Multifamily (a building that shares common walls and common floors or ceilings), or Multifamily with central water heating.
12. Battery Storage Included for Credit: Select yes or no. Minimum battery capacity required 7.5 kWh. See Table O for all requirements.
13. Project Scope: Newly constructed building, or new addition greater than 1,000 ft².
14. Exceptions to Fenestration U-factor and SHGC: Installing less than or equal to 3 ft² glass in door, Installing less than or equal to 3 ft² tubular skylight, Installing less than or equal to 16 ft² skylight, or Not Applicable.
15. Average ceiling height in feet, used to calculate IAQ CFM.
16. Vertical distance in feet from the lowest above-grade floor to the highest ceiling, used to calculate IAQ CFM.

B. Opaque Surface Details – Framed Walls/Framed Floors/Concrete Raised Floors

1. Tag/ID: A label (if any) from the plans, such as A1.4 or wall.
2. Assembly Type: Wall or Floor (NOTE: ceilings, SIP walls, mass walls and concrete raised floors are entered in different tables).
3. Frame type: Enter wood or metal. If the assembly is a concrete raised floors enter NA.
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: Cavity R-value of insulation installed between framing members.
7. Proposed Continuous Insulation R-value: R-value of rigid or continuous insulation (not interrupted by framing).
8. Proposed U-factor: The U-factor for the proposed assembly from either JA4 or CF1R ENV-02-E if calculating a weighted average. Must be less than or equal to Column 09 or have an attached CF1R-ENV-02-E to show that a weighted U-factor for multiple assemblies will meet the maximum value.
9. Appendix JA4 Table: Table number used to determine the R-value or U-factor (e.g., a wood framed wall is 4.3.1).
10. Appendix JA4 Cell: Cell number used to determine the R-value or U-factor (e.g., a 2x6 wall R-21 cavity insulation and R-5 continuous insulation is D7).
11. Required U-factor from Table 150.1-A (single family) or (150.1-B (multifamily): Value required based on climate zone and assembly type.
12. Comments: Any notes regarding location, unique conditions, or attachments.

C. Opaque Surface Details – Structurally Insulated Panel (SIP) Walls

1. Tag/ID: A label (if any) from the plans, for example, A1.4 or wall.
2. Assembly materials: SIP OSB, SIP I-Joist, SIP Single 2x, SIP Double 2x, ICF see JA4 for guidance.
3. Thickness: Thickness in inches.
4. Proposed Core Insulation R-value: Insulation installed within the materials or on the inside. See Joint Appendix JA4 for guidance.
5. Proposed Continuous Insulation R-value: Insulation installed on the exterior. See Joint Appendix JA4 for guidance.
6. Proposed U-factor: Assembly U-factor from JA4 or CF1R-ENV-02. Must be less than or equal to Column 9 or have an attached CF1R-ENV-02-E to show that a weighted U-factor for multiple assemblies will meet the maximum value in Column 9.
7. Appendix JA4 Table: Table number used to determine the R-value or U-factor (e.g., an ICF wall is 4.3.13).
8. 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).
9. Required U-factor from Table 150.1-A or 150.1-B: Based on assembly type and climate zone.
10. Comments: Any notes regarding location, unique conditions, or attachments.

D. Opaque Surface 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. See JA4 for guidance.
4. Mass Thickness: Thickness (in inches) of mass.
5. Appendix JA4 Reference Table: Table number used to determine the R-value or U-factor (e.g., an ICF wall is 4.3.13).
6. Appendix JA4 Reference 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 C1).
- 7-8. Proposed Exterior Insulation R-value or U-factor: Enter the R-value or U-factor of proposed insulation on the outside surface of the mass wall. See JA4 for guidance. Use the same descriptor (R-value or U-factor) throughout Table D.
- 9-10. Proposed Interior Insulation R-value or U-factor: Enter the R-value or U-factor of proposed insulation on the inside surface of the mass wall. See JA4 for guidance. Use the same descriptor (R-value or U-factor) throughout Table D.
11. Appendix JA4 Table: Table number used to determine the R-value or U-factor (e.g., an ICF wall is 4.3.13).
12. 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).
- 13-14. Required Exterior Insulation R-value or U-factor: The required R-value or U-factor (whichever descriptor was selected in Column 7 or 8) for exterior insulation will be completed based on the Table 150.1-A requirements for the wall type.
- 15-16. Required Interior Insulation R-value or U-factor: The required R-value or U-factor (whichever descriptor was selected in Column 9 or 10) for interior insulation will be completed based on the Table 150.1-A requirements for the wall type.

E. Slab Insulation

This section is for insulation requirements for slab on grade, heated slab and raised concrete floors. Slab edge performance specifications and installation criteria are found in Sections 150.0(l) and 150.1(c)1D (Table 150.1-A). Requirements vary by climate zone and slab conditions. Heated slab insulation requirements are from Table 110.8-A.

1. Floor type: Types include slab-on-grade or raised slab.
 - Slab-on-grade floors require slab edge insulation in climate zone 16 only.
 - Raised slabs must be insulated to R8 in climate zones 1, 2, 11, 13, 14 and 16, R-4 in climate zones 12 and 15, and no insulation is required in climate zones 3-10.
2. Proposed R-value: When required, insulation can be specified by either R-value or U-factor. If specifying an R-value complete column 2.
3. Proposed U-Factor: When required, specify the U-factor of the proposed insulation in Column 3.
4. Required Insulation R-value: Auto input.
5. Required Insulation U-factor: Auto input.
6. Comments: Any notes regarding location, unique conditions, or attachments.

NOTE: A suggestion is provided to highlight that there is a mandatory slab edge insulation requirement for heated slab floors. Since mandatory requirements are not listed on the Certificate of Compliance, this is provided for information purposes only. The specific requirements are in Sections 110.8(g) and Table 110.8-A.

F. Ceiling/Roof Insulation

1. Option (B or C): Option B (may require Below Roof Deck Insulation), or Option C (requires any ducts in conditioned space).
2. Air Space Required: Yes or No. If the climate zone and attic/roof option selected require roof deck insulation, an air space is required.
3. Proposed Below Roof Deck R-value: Whether below roof deck insulation is required will vary depending on climate zone.
4. Proposed Ceiling Insulation R-value: The required insulation R-value will vary depending on the option and climate zone.
5. Required Below Roof Deck R-value: This field will be auto populated. The required below roof deck R-value will vary depending on option and climate zone.
6. Required Ceiling Insulation R-value: This field will be auto populated. The required insulation R-value will vary depending on option and climate zone.
7. Radiant Barrier Required?: This field will be auto populated. The radiant barrier requirement will vary depending on option and climate zone.
8. Comments: Any notes regarding location, unique conditions, or attachments.

Note:

1. Cathedral ceilings cannot comply with the prescriptive approach.
2. If attic is unvented, prescriptive compliance cannot be used. Compliance may be attempted using the performance approach.

G. Roofing Products (Cool Roof)

Roofing requirements are found in Sections 110.8(i) and 150.1(c)11. Depending on the climate zone and roof slope, a cool roof (defined as a minimum aged solar reflectance and thermal emittance, or a minimum SRI) may be required for prescriptive compliance.

Exceptions include (1) low-slope roofs (pitch 2:12 or less) in climate zones 1-12, 14 and 16; (2) steep-slope roofs (pitch greater than 2:12) in climate zones 1-9 and 16; (3) roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft²; and (4) any roof area 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).

1. Tag/ID: A label (if any) from the plans, such as R1.
2. Exception: Select 1, 2, or none. (1) roof area with photovoltaic panels or solar thermal panels, (2) roof constructions with 25 lb/ft² or greater. If exception 1 or 2 exist, the roof is not required to have a cool roof even if the climate zone specifies minimum performance requirements.
3. Roof Pitch: Select from either greater than or equal to 2:12 or pitch is less than 2:12. Typical expressed as 4:12 meaning the roof rises 4 feet in 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. Method of Compliance: Indicate if the method of compliance is based on Aged Solar Reflectance and Thermal Emittance, or on the Solar Reflectance Index (SRI).
5. Product Type: See Cool Roof Rating Council's Directory. Product types include single-ply roof, wood shingles, asphalt roof, metal roof, tile roof.

6. The CRRC Product ID Number is obtained from the Cool Roof Rating Council’s Rated Product Directory at <https://coolroofs.org/directory>. Products are listed by manufacturer, brand, type of installation, roofing material, and color, as well as product performance.
7. 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.
8. 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 or the aging equation $\rho_{aged}=[0.2+\beta(\rho_{initial}-0.2)]$, where $\rho_{initial}$ = the initial solar reflectance and soiling resistance β is listed by product type below.

VALUES OF SOILING RESISTANCE β BY PRODUCT TYPE

Product Type	CRRC Product Category	β
Field-Applied Coating	Field-Applied Coating	0.65
Other	Not A Field-Applied Coating	0.70

9. Proposed Thermal Emittance: From the product specification default value. If using a calculated SRI place the Thermal Emittance used to calculate SRI.
10. Proposed SRI (optional): 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.
11. Minimum Required Aged Solar Reflectance: Based on climate zone and roof slope.
12. Minimum Required Thermal Emittance: Based on climate zone and roof slope.
13. Minimum Required SRI (optional): 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.

H. Opaque Swinging Doors to Exterior

1. Tag/ID: Provide a name or designator for each unique door. This designator should be used consistently throughout the plan set (elevations, door schedules, etc.)
2. Area: Calculated area (in sq.ft.) for each unique door.
3. Proposed U-factor: Enter the proposed U-factor. If value is greater than 0.20, column 06 will autocomplete as Yes.
4. Source: NFRC or Reference Joint Appendix Table 4.5.1s 110.6-A and 110.6-B, Equations NA6-1 and NA6-2, or Area-Weighted Average Worksheet (CF1R-ENV-02).
5. Required Maximum U-factor. This field will always be 0.20.
6. Weighted Average: If column 03 is greater than 0.20 U-factor, attach form CF1R-ENV-02-E:
7. Comments: Any notes regarding location, unique conditions, or attachments.

I. Fenestration/Glazing Allowed Areas and Efficiencies

- a. Maximum Allowed Fenestration Area for All Orientations: Calculated value based on conditioned floor area multiplied by 20% for all orientations.
- b. Maximum Allowed West-Facing Fenestration Area Only: Calculated value based on conditioned floor area multiplied by 5% (Used in climate zones 2, 4, and 6-15 for west-facing fenestration).
- c. Maximum Allowed U-factor (Windows): Maximum U-factor from Table 150.1-A or 150.1-B. This field will always be 0.30.
- d. Maximum Allowed U-factor (Skylights): Maximum U-factor from Table 150.1-A or 150.1-B. This field will almost always be 0.30 unless meeting one of the Exceptions to 150.1(c)3A. If meeting one of the Exceptions, this field will be 0.55.
- e. Maximum Allowed SHGC (Windows): Maximum SHGC from Table 150.1-A or 150.1-B. This field will either be 0.23 or N/R, depending on the climate zone. N/R means there is no maximum SHGC required in this climate zone. The SHGC will be the area weighted averaged, CF1R-ENV-02, with other higher fenestration windows.
- f. Maximum Allowed SHGC (Skylights): Maximum SHGC from Table 150.1-A or 150.1-B. This field will almost always be 0.25 unless meeting one of the Exceptions to 150.1(c)3A. If meeting one of the Exceptions, this field will be 0.30.

- g. Comments: Any notes regarding location, unique conditions, or attachments.

J. Fenestration Proposed Areas and Efficiencies

1. Tag/ID: Provide a name or designator for each unique type of fenestration surface. This designator should be used consistently throughout the plan set (elevations, finish schedules, etc.) such as Window-1, Skylight-1, etc. to identify each surface. It should also be consistently used on the other forms in the compliance documentation.
2. Fenestration Type: Indicate the type of fenestration construction (e.g., Fixed Window, Operable Window, Skylight, Tubular Skylight, or Glass in Door).

NOTE: Doors with glazing are counted in one of two ways. The entire door area of a door with 25% or more glazing is considered fenestration. A door with less than 25% glazing can be considered as all fenestration, or can be calculated as the actual glass area with a 2-inch (0.17 ft) frame all around.

3. Frame Type: Indicate the frame type as either metal, metal thermal break, or nonmetal.
4. Dynamic Glazing: Indicate whether the fenestration has an integrated shading device, chromogenic glazing, or none for no dynamic glazing. Chromogenic glazing shall be considered separately from other fenestration types.
5. Orientation: Orientation can be North, East, South, West. If documentation is for a building that may be built in any direction, in a climate zone that limits west-facing fenestration, complete this section assuming the side of the building with the most fenestration faces west.

NOTE: West includes any vertical fenestration oriented to within 45 degrees of true west, excluding 45 degrees south of west; any skylights oriented west; and skylights facing any direction with a pitch of less than 1:12.

6. Number of Panes: Indicate the number of panes for each Tag/ID; is it a single, double, or triple pane window?
7. Proposed Fenestration Area (ft²): Indicate the area (in ft²) of each exterior fenestration type, excluding west-facing fenestration.
8. Proposed West Facing Fenestration Area (ft²): In climate zones 2, 4, and 6-16, indicate the area (in ft²) of each exterior west-facing fenestration type separately.

NOTE: Skylights installed in a roof with a 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) 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 the exceptions) have a higher U-factor than 0.32, first complete a form CF1R-ENV-02 to calculate the Area-Weighted Average U-factor, which must be 0.32 or less, and attach it to the CF1R-NCB-01.

NOTE: (1) For the exceptions – up to 3 ft² of tubular skylights and up to 16 ft² of skylight area, enter 0.55.
(2) For the exception – up to 3 ft² of glass in door, enter 0.32.
(3) 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 10.

10. Source: NFRC, Tables 110.6-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, and 6-16, enter the SHGC from
 - (a) NFRC-rated certification information; or
 - (b) default 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 the exceptions) 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-NCB-01.

- NOTE: (1) For the exceptions – up to 3 ft² of tubular skylights and up to 16 ft² of skylight area, enter 0.30.
(2) For the exception – up to 3 ft² of glass in door, enter 0.25.

12. Source: NFRC, Tables 110.6-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-E Solar Heat Gain Coefficient Worksheet) and attach the CF1R-ENV-03-E.

NOTE: An exterior shading device is not used for products with an NFRC rated U-factor and SHGC based on a factory integrated shading device. Chromogenic glazing shall be considered separately from other fenestration.

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 in column I. 13), indicate the SHGC calculated on form CF1R-ENV-03 and attach the form for each window with an exterior shading device.
- 15.–32. Automatically completed entries; no user input required.

K. Space Conditioning (SC) Systems – Heating/Cooling/Ducts

1. Space Conditioning System Identification or Name: Provide a unique name for each unique space conditioning system type in the building. If the same space conditioning system type is used in more than one location in the building, it is sufficient to list the unique space conditioning system type only once. In order for one space conditioning system type to be considered the same as another, it must have the same description in Columns 2 through 9.
2. Heating System Type: Indicate heating system type as furnace, central heat pump, boiler, hydronic, wood heat, wall furnace, room 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 a time-limiting control device that allows it to be operated for 30-minutes at a time.
3. Heating Efficiency Type: AFUE, HSPF, COP
4. Proposed Heating Efficiency: Equipment must be certified to the California Energy Commission. This can be checked by going to <https://cacertappliances.energy.ca.gov/> and performing a quick or advanced search based on equipment type. NOTE: Electric resistance heat is prohibited as the primary source of heating. Only if all exceptional method criteria are met (see Residential Compliance Manual, Chapter 4), electric resistance heat may be installed as a back-up heating source. Other than as a back-up to wood heat, the only electric heating appliance allowed is a heat pump.
5. Cooling System Type: Indicate cooling system type or specify “no cooling system installed.” Categories include central air split system, central air package system, heat pump, room air or room heat pump, mini-split heat pump or air conditioner, multi-split heat pump or air conditioner, VRF (variable refrigerant flow (VRF) heat pump or air conditioner, small duct high velocity heat pump or air conditioner, or no cooling.
6. Cooling Efficiency Type: SEER, EER.
7. Proposed Cooling Efficiency: For central cooling systems, the minimum efficiency required by the appliance efficiency standards is 14 SEER. Any cooling appliance sold in California is acceptable.
8. Distribution System Type: This could be ducted, radiant floor, piping, or ductless.
9. Duct Location: If the system has ducts, indicate where they will be installed. Locations include attic, garage, conditioned space, radiant floor. In climate zones 4 and 8-16, unless roof deck insulation is included in Table F (roof option B), the ducts must be located inside conditioned space.
10. Duct R-value: This value is from Table 150.1-A or 150.1-B. If system is ductless this field will be N/A.
11. Thermostat Type: Select a setback thermostat or an Energy Management System (EMS) for most systems, or N/A if exempt. Controls for most systems can be by a device that allows a person to program up to 4 temperature setpoints within 24 hours.
12. Comments: Include any comments here.

L. Ventilation Cooling in Climate Zones 8-14

One or more whole house fans are required to provide night-time cooling ventilation in climate zones 8-14. The requirement is found in Section 150.1(c)12.

1. Proposed air flow rate for certified whole house fan: Value from appliance directory listing (<https://cacertappliances.energy.ca.gov/Pages/Search/AdvancedSearch.aspx>)
2. Proposed number of fans: Number of fans.
3. Proposed total air flow rate: Column 1 x column 2.
4. Directly vented to outside: Default is No. Yes or No to indicate if the fan is directly vented to outside (not typical).
5. Attic free vent area (in ft²): If column 4 is No, this is the amount of attic venting required for the venting of air from the attic (minimum from column 07)
6. Required Whole House Fan Airflow Rate (CFM): 1.5 CFM per ft² of conditioned floor area (auto complete).
7. Required Minimum Attic Free Vent Area (in²): Minimum attic vent free area = Column 1 multiplied by 144 and divided by 750, which is equivalent to multiplying by 0.192 (auto complete).
8. Location/Comments: Include any comments or fan location.

M. Water Heating Systems for Individual Dwelling Units

1. Water Heating System Identification or Name: Provide a unique name for each unique water heating system type in the building. If the same water heating system type is used in more than one location in the building, it is sufficient to list the unique water heating system type only once.
2. Water Heater 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. A central water heater serves multiple dwelling units in a multi-family building.
3. System option:
 - (1) A single gas or propane instantaneous water heater with an input of 200,000 Btu per hour or less and no storage tank.
 - (2) A single gas or propane storage type water heater with an input of 75,000 Btu per hour or less, rated volume less than or equal to 55 gallons and that meets the requirements of Sections 110.1 and 110.3. The dwelling unit shall have installed fenestration products with a weighted aver U-factor of 0.24 or less and either:
 - A. A compact hot water distribution system that is field verified as specified in the Reference Appendix RA4.4.16; or
 - B. A drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9.
 - (3) A single gas or propane storage type water heater (small storage or consumer storage) with an input of 75,000 Btu per hour or less, rated volume greater than 55 gallons.
 - (4) A heat pump water heater located in the garage or conditioned space, and either:
 - C. A compact hot water distribution system as specified in the Reference Appendix RA4.4.6, and a drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9; or
 - D. In climate zones 2-15, a PV system with 0.3 kWdc capacity larger than the PV requirements in Table O; or
 - E. In climate zones 1 or 16, a PV system with 1.1 kWdc capacity larger than the PV requirements in Table O.
 - (5) A single NEEA Tier 3 heat pump water heater located in the garage or conditioned space, and:
 - A. In climate zones 1 or 16, a PV system with 0.3 kWdc capacity larger than the PV requirements in Table O, and
 - B. In climate zones 1 or 16, a compact hot water distribution system as specified in the Reference Appendix RA4.4.6.
4. # of Dwelling Units: Enter a whole number for how many dwelling units are in the building.
5. # of Recirculation loops: User entry based on number of dwelling units
6. Water heater Type: Tankless, storage, heat pump.
7. Volume (gal): Tank capacity in gallons. For instantaneous water heaters, enter N/A.
8. Fuel Type: Gas, Propane, heat pump.
9. Number of water heaters: No more than 1 per dwelling unit allowed.
10. Rated Input (Range): Select the maximum input rating
11. Minimum Solar Savings Fraction: Field is auto filled based on which system option was chosen.
12. Additional PV Capacity: Auto entered. If the option selected requires added solar capacity, it is entered here and in Table P.
13. Tank Location: List based on which system option was chosen.
14. Distribution Type: Pick Standard, Demand Recirculation – Manual Control, Demand Recirculation – Sensor Control.

N. Multifamily Central Space Conditioning System and Water Heating System

1. Dwelling Unit Name: Enter one unique name for each of the number of dwelling units identified in Section A field 06.
2. Dwelling Unit Total CFA: Enter the conditioned floor area for the dwelling unit.
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 one of the Dwelling Unit water heating system names entered in Section L. 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 Water Heating System Identification or Name: Select one of the Dwelling Unit water heating system names entered in Section L. 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.
6. Comments: Include any comments here.

O. Photovoltaic Requirements

Tables referenced in this section may be found in either the Energy Standards or Chapter 7 of the Residential Manual.

1. PV Array ID or Name
2. Adjustment Factor (A): Auto-filled look up value from Table 150.1-C.
3. Adjustment Factor (B): Auto-filled look up value from Table 150.1-C.
4. Minimum PV Size: Calculated value for the minimum PV size before any adjustments or exceptions.
5. Water Heating Adjustment: If the selected water heating system requires any additional PV, that value is shown here.
6. Adjusted Minimum PV Size: After all adjustments made, required PV.
7. Comments: Include any comments here.

P. HERS Verification Summary

1. Quality Insulation Installation: All buildings must comply with Quality Insulation Installation (QII) criteria. Multiple inspections, starting with a framing inspection, are required by a HERS rater. QII criteria is specified in Reference Appendix RA3.5 (only multifamily buildings in climate zone 7 are exempt).
2. Duct Leakage verification: All ducted systems must meet maximum duct leakage requirements. Typically the maximum leakage is 5% 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.
3. Zonally Controlled Systems - Bypass Dampers: The prescriptive requirements preclude the use of bypass ducts in association with zonally controlled systems. A HERS Rater will verify that zonally controlled systems have no bypass ducts.
4. Refrigerant Charge Verification: Some type of refrigerant charge verification or Fault 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 150.1(c)7A. 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.
5. Central System Air Handlers - Airflow Rate and Fan Efficacy Verification: Unless a building has no cooling system or has a non-ducted cooling system, the system must meet mandatory and prescriptive requirements for airflow and fan efficacy.
 - a. A typical central forced air unit is required to have 350 CFM or greater per ton of nominal cooling capacity, and a fan efficacy less than or equal to 0.45 W/CFM; or
 - b. A central ducted heat pump is required to have 350 CFM or greater per ton of nominal cooling capacity and a fan efficacy of less than or equal to 0.58 W/CFM; or
 - c. Small duct high velocity systems must meet an airflow requirement 250 cfm/ton or greater and a fan efficacy of at least 0.62 W/cfm.See 150.0(m)13, 150.1(c)10, and Reference Residential Appendix RA3.
6. Indoor Air Quality Mechanical Ventilation: All new dwellings are required to meet the whole-building mechanical ventilation airflow rate according to ASHRAE 62.2 is required (RA3.7).

Documentation Declaration Statements

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).