

Prescriptive Certificate of Compliance: Residential		CF-1R
Newly Constructed Buildings and Additions Greater Than 1,000 ft²		(Page 1 of 5)
Project Name:	Climate Zone #	# of Stories

General Information		
Site Address:	Enforcement Agency:	Date:
Building Type <input type="checkbox"/> Single Family <input type="checkbox"/> Multi Family	Conditioned Floor Area ¹ (CFA):	
Circle the Front Orientation: N, E, S, W, or Degrees _____	Project Type: <input type="checkbox"/> New Building Construction <input type="checkbox"/> New Addition ¹ greater than 1,000 ft ² <i>1. Additions greater than 1,000 ft² must comply with Component Package D.</i>	
Component Package: (Check one) C _____ D _____ E (_____ E Alternative) in Climate zone 1 and 16 only. See footnotes to Table 151-D for alternative optional requirements.		

Opaque Surface Details For the furred portioned of Mass Walls see Furring Strips Construction Table below.

A	B	C	D	E	F	G	H	I	J
Proposed <small>See Note</small>				Standard	Values From JA4 Table				
Tag/ ID ¹	Assembly Name or Type ²	Framing Material and Size ²	Thickness, Spacing, or Other ³	U- factor ⁴	JA4 Table Number ⁵	Framed Cavity R-value ⁶	Continuous Insulation R-Value ⁷	JA4 Assembly Row/Col ⁸	Proposed Assembly U-factor ⁹

Note: For furred assemblies, accounting for Continuous Insulation R-value, see Page JA4-3 and Equation 4-1. For calculating furred walls use the Mass and Furring Construction table below.

1. For Tag/ID indicate the identification name that matches the building plans.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc...Indicate in column G the Frame material and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the thickness for mass in inches or Spacing between framing members enter; 16" or 24" OC; or Other for all other assembly description such as Concrete Sandwich Panel, Spandrel Panel, Logs, Straw Bale Panel and etc....
4. Based on the Climate Zone; enter the equivalent U-factor found in JA4 Table based on the R-Value from Table 151-B, C, or D
5. Enter the Table number that closely resembles the proposed assembly.
6. Enter the R-value that is being installed in the wall cavity or between the framing; otherwise, enter "0".
7. Enter the Continuous Insulation R-value for the proposed assembly; otherwise, enter "0".
8. Enter the row and column of the U-factor value based on Column F Table Number and enter the Assembly U-factor in Column J.
9. The **Proposed** Assembly U-factor, Column J, must be equal to or less than the **Standard** U-factor in Column E to comply.

Furring Strips Construction Table for Mass Walls Only

A	B	C	D	E	F	G	H	I	J	K	L	M
Proposed Properties of Masonry and Concrete Walls From Reference Joint Appendix Table 4.3.5, 4.3.6, 4.3.7					Added Interior or Exterior Insulation in Furring Space from Reference Joint Appendix Table 4.3.13						Final Assembly U-factor ^{6,7}	Comment
Mass Thickness ¹	Assembly Name or Type ²	JA4 Table Number ³	JA4-Mass Cell Value ⁴	Mass U-Factor ⁵	Interior or Exterior of Insulation Layer	Frame Thickness	Frame Type Wood or Metal	Furring Cavity R-value ³	JA4-Mass Cell Value ⁴	Effective R-value ⁵		

1. Indicate the Mass Thickness from Reference Joint Appendix JA.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc...Indicate the Frame type and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the Table number that closely resembles the proposed assembly.
4. Enter the row and column of the U-factor value.
5. Enter the Effective R-value listed in the JA4 Table Number.
6. The Final Assembly is calculated by using Equation 4-1 or Equation 4-4 of the Reference Joint Appendix JA4. Enter the value in Column L.
7. Insert the Final Assembly U-factor value back on to the Opaque Surface Details table in Column J.

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FENESTRATION: PROPOSED AREAS					
Fenestration Type and Frame (Window, Glass Door or Skylight)	Orientation (North, East, South, West)	Proposed Area ¹ (ft ²)	Maximum Allowed U-factor ^{2,3}	Maximum Allowed SHGC ^{2,3,4}	NFRC or Default Values ⁵
<i>Total</i>					

1. Fenestration area is the area of total glazed product (i.e. glass plus frame). Exception: When a door is less than 50% glass, the fenestration area may be the glass area plus a 2" "frame" around the glass.
2. Enter value from Component Package Requirements from either Table 151-B, 151-C, or 151-D.
3. Actual fenestration efficiencies installed shall be indicated on the installation form, CF-6R-ENV. The efficiencies should be equivalent to or less than that listed on the CF-1R Form Page 1. Otherwise, revise the CF-1R and resubmit for plan check review.
4. Submit a completed WS-3R Form if a reduced SHGC is calculated with exterior shading or overhangs.
5. If applicable at this stage enter "NFRC" Certified windows or are CEC "Default" values found in Table 116-A or B.

FENESTRATION PROPOSED AREA CALCULATION				
	CFA ft ²	Allowed % of CFA ²	Allowed Area (CFA x Allowed %)	Total Proposed Area (From Table Above)
Total Fenestration Area ^{1,2}				
West Fenestration Area ³ (Required only in Climate Zones 2, 4 & 7 -15)		.05		
Total Area ³				
			≥	

1. For Component Package C, see Table 151-B for Climate Zone Maximum Total Area Allowance.
2. For all other packages enter 20% when no West orientation restriction or 15% when West fenestration is being installed in Climate Zones 2, 4, & 7-15.
3. The Proposed West Fenestration Area includes west-sloping skylight area and any other skylight area with a pitch less than 1:12.
4. To meet energy compliance the Total Proposed Area must be less than or equal to the Allowed Area.

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ROOFING PRODUCTS (COOL ROOFS) §151(f)12

Check applicable box below if the newly installed roof is exempted from the roofing product "Cool Roof" requirements. Note: If any one of the boxes are checked below, the Aged Solar Reflectance and Thermal Emittance requirements for roofing products in §118(i) are not applicable. Do not fill table below.

- Cool Roofs Not Required in Climate Zones 1-12, 14, and 16 with a Low Sloped. Less or 2:12 pitch.
- Cool Roofs Not Required in Climate Zones 1 through 9 and 16 with a Steep-Sloped Roofs (pitch greater than 2:12) and product unit weight less than 5lb/ft².

Other Exceptions

- Roofing area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof criteria.
- Roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft² is exempt from the above Cool Roof criteria.

Note: If no CRRC-1 label is available, this compliance method cannot be used, use the Performance Approach to show compliance, otherwise, check the applicable box below if Exempt from the Roofing Products "Cool Roof" Requirement:

CRRC Product ID Number ¹	Roof Slope		Product Weight		Product Type ²	Aged Solar Reflectance ^{3,4}		Thermal Emittance	SRI ⁵
	≤ 2:12	> 2:12	< 5lb/ft ²	≥ 5lb/ft ²					
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			

1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council's Rated Product Directory at www.coolroofs.org/products/search.php
2. Indicate the type of product is being used for the roof top, i.e. single-ply roof, asphalt roof, metal roof, etc.
3. If the Aged Reflectance is not available in the Cool Roof Rating Council's Rated Product Directory then use the Initial Reflectance value from the same directory and use the equation $(0.2+0.7(\rho_{initial} - 0.2))$ to obtain a calculated aged value. Where ρ is the Initial Solar Reflectance.
4. Check box if the Aged Reflectance is a calculated value using the equation above.
5. Calculate the SRI value by using the SRI- Worksheet at <http://www.energy.ca.gov/title24/> and enter the resulting value in the SRI Column above and attach a copy of the SRI- Worksheet to the CF-1R.

To apply **Liquid Field Applied Coatings**, the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §118(i)4. Select the applicable coating:

<input type="checkbox"/> Aluminum-Pigmented Asphalt Roof Coating	<input type="checkbox"/> Cement-Based Roof Coating	<input type="checkbox"/> Other _____
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HVAC SYSTEMS - HEATING

Heating Equipment Type and Capacity ^{1,2,3}	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location ⁴	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Heating Type (Central Furnace, Wall Furnace, Heat pump, Boiler, Electric Resistance, Hydronic, etc.)
2. Electric resistance heating is allowed only in Component Package C, or except where electric heating is supplemental (i.e., if total capacity ≤ 2 KW or 7,000 Btu/hr electric heating is controlled by a time-limiting device not exceeding 30 minutes). See §151(b) 3 exception.
3. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R Form for additional requirements and check applicable boxes.
4. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

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HVAC SYSTEMS - COOLING

Cooling Equipment Type and Capacity ^{1,2}	Minimum Efficiency (SEER/EER or COP)	Distribution Type and Location ³	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Type (A/C, Heat pump, Evaporative Cooling, etc)
2. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R Form for additional requirements and check applicable boxes.
3. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

WATER HEATING

List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be gas or propane fired and may not use recirculation pumps. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.

Water Heater Type/Fuel Type ¹	Distribution Type (Standard, Recirculating) ²	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value ³

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The water heating tank and pipes shall be insulated to meet the requirements of §150(j)

SPECIAL FEATURES The enforcement agency should pay special attention to the Special Features specified in this checklist below. These items may require written justification and documentation and special verification.

Radiant Barrier (Roof) YES NO
 YES: Required in Climate Zones 2, 4, and 8-15 in Component Packages C, D and E.

Slab Edge (Perimeter) Insulation YES NO
 YES: In all Climate Zones using Component Package C, and in Climate Zone 16 under Component Packages D and E, R-7 insulation is required.

Heated Slab Insulation YES NO
 YES: Slab edge insulation required for heated slabs in all Component Packages in all Climate Zones. See details in Table 118-A of the standards.

Raised Slab Insulation YES NO
 YES: In Climate Zones 1, 2, 11, 13, 14 & 16 R-8 insulation is required, and in Climate Zones 12 & 15 R-4 insulation is required under Component Packages D and E. Raised slab insulation is not required in Component Package C.

Thermal Mass YES NO
 YES: In Component Package C for all Climate Zones, a Minimum Interior Mass Capacity (IMC) must be achieved per Table 151-A of the standards. If Yes, submit a completed WS-1R Form.

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<p>HERS VERIFICATION SUMMARY <i>The enforcement agency should pay special attention to the HERS Measures specified in this checklist below. A completed and signed CF-4R Form for all the measures specified shall be submitted to the building inspector before final inspection.</i></p>		
<p>Duct Sealing & Testing <input type="checkbox"/> YES <input type="checkbox"/> NO YES: New ducted systems are to be sealed and duct leakage shall be less than 6% per §151(f)10 in all Component Packages in all Climate Zones. <i>HERS verification is required for this measure.</i></p>		
<p>Refrigerant Charge - Split System <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 8-15 in all Component Packages, when a newly ducted split A/C or heat pump is installed, a refrigerant charge measurement shall be verified per §151(f)7A. <i>HERS verification is required for this measure.</i></p>		
<p>Central Forced Air Handlers: Integrated Ventilation System Watt Draw <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In all Component Packages and in all Climate Zones, when a central fan integrated ventilation system is installed to meet the ventilation requirements of §150(o), the central forced air system fans must draw less than 0.58 watts per CFM per §151(f)11. <i>HERS verification is required for this measure.</i></p>		
<p>Ducted Split Central Air Conditioners and Heat Pumps: Airflow and Watt Draw <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In all Component Packages in Climate Zones 10 through 15, when a newly ducted split A/C or heat pump system is installed, the airflow and fan watt draw shall be verified per §151(f)7B. <i>HERS verification is required for this measure.</i></p>		

Documentation Author's Declaration Statement		
<ul style="list-style-type: none"> • I certify that this Certificate of Compliance documentation is accurate and complete. 		
Name:	Signature:	
Company:	Date:	
Address:	If Applicable <input type="checkbox"/> CEA or <input type="checkbox"/> CEPE (Certification #):	
City/State/Zip:	Phone:	

Responsible Building Designer's Declaration Statement		
<ul style="list-style-type: none"> • I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance. • I certify that the energy features and performance specifications for the building design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations. • The building design features identified on this Certificate of Compliance are consistent with the information provided to document this building design on the other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. 		
Name:	Signature:	
Company:	Date:	
Address:	License:	
City/State/Zip:	Phone:	

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

Prescriptive Certificate of Compliance:		CF-1R ADD
Residential Additions		(Page 2 of 5)
Site Address:	Enforcement Agency:	Date:

1. For Tag/ID indicate the identification name that matches the building plans.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc... Indicate in column G the Frame material and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the thickness for mass in inches or Spacing between framing members enter; 16" or 24" OC; or Other for all other assembly description such as Concrete Sandwich Panel, Spandrel Panel, Logs, Straw Bale Panel, and etc....
4. Based on the Climate Zone; enter the equivalent U-factor found in JA4 Table based on the R-Value from Table 151-C
5. Enter the Table number that closely resembles the proposed assembly.
6. Enter the R-value that is being installed in the wall cavity or between the framing; otherwise, enter "0".
7. Enter the Continuous Insulation R-value for the proposed assembly; otherwise, enter "0".
8. Enter the row and column of the U-factor value based on Column F Table Number and enter the Assembly U-factor in Column J.
9. The **Proposed Assembly U-factor, Column J, must be equal to or less than the Standard U-factor in Column E to comply.**

FURRING STRIPS CONSTRUCTION TABLE FOR MASS WALLS ONLY

A	B	C	D	E	F	G	H	I	J	K	L	M
Proposed Properties of Masonry and Concrete Walls From Reference Joint Appendix Table 4.3.5, 4.3.6, 4.3.7					Added Interior or Exterior Insulation in Furring Space from Reference Joint Appendix Table 4.3.13							
Mass Thickness ¹	Assembly Name or Type ²	JA4 Table Number ³	JA4-Mass Cell Value ⁴	Mass U-Factor ⁵	Interior or Exterior of Insulation Layer	Frame Thickness	Frame Type Wood or Metal	Furring Cavity R-value ³	JA4-Mass Cell Value ⁴	Effective R-value ⁵	Final Assembly U-factor ^{6,7}	Comment

1. Indicate the Mass Thickness from Reference Joint Appendix JA.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc... Indicate the Frame type and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the Table number that closely resembles the proposed assembly.
4. Enter the row and column of the U-factor value.
5. Enter the Effective R-value listed in the JA4 Table Number.
6. The Final Assembly is calculated by using Equation 4-1 or Equation 4-4 of the Reference Joint Appendix JA4. Enter the value in Column L.
7. Insert the Final Assembly U-factor value back on to the Opaque Surface Details table in Column J.

FENESTRATION PROPOSED AREAS

Fenestration Type and Frame (Window, Glass Door or Skylight)	Orientation (North, East, South, West)	Proposed Area ¹ (ft ²)	Maximum U-factor ^{2, 3}	Maximum SHGC ^{2, 3, 4}	NFRC or Default Values ⁵
Total					

1. Fenestration area is the area of total glazed product (i.e. glass plus frame). Exception: When a door is less than 50% glass, the fenestration area may be the glass area plus a "2 inch frame" around the glass.
2. Enter value from Component Package D Requirements in Table 151-C.
3. Actual fenestration products installed and as indicated in CF-6R-ENV Form shall be equivalent to or have a lower U-factor and/or a lower SHGC value than that specified on the Fenestration Proposed Area table above.
4. Submit a completed WS-3R Form if a reduced SHGC is calculated with exterior shading.
5. If applicable at this stage enter "NFRC" for NFRC Certified windows or CEC "Default" values found in Table 116-A or B.

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Residential Additions		(Page 3 of 5)
Site Address:	Enforcement Agency:	Date:

ADDITION ALLOWED FENESTRATION AREAS						
	A	B	C	D	E	F
	CFA of Addition ft ²	Allowed % of CFA	Allowed Area (A x B)	Area Removed ² ft ²	Maximum Allowed Area (C + D)	Proposed Area ⁵ (Table Above)
Total Fenestration Area ³		0.20				≥
West Fenestration Area ^{1,4} (Required In CZ's 2, 4 & 7 -15)		0.05				≥

1. West Fenestration Area includes west-sloping skylights and any skylights with a pitch less than 1:12.
2. Glass removed to make way for the addition.
3. For additions less than 1,000 ft² the standards allows glazing removed during the remodel to be added to the glazing area allowance. The maximum allowed glazing area for the addition is the CFA x 20% + glass removed to make way for the addition.
4. In climate zones 2, 4, 7-15, no more than 5% of the CFA is allowed for west-facing glazing plus west-facing glass area removed to make way for the addition. The maximum allowed west-facing glazing area is the CFA x 5% + west-facing glass removed to make way for the addition.
5. To meet compliance, the Proposed Area must be less than or equal to the Total Allowed Area for BOTH the Total and West Fenestration Areas.

ROOFING PRODUCTS (COOL ROOFS) §151(f)12								
Check applicable box below if the roof addition is exempt from the roofing product "Cool Roof" requirements. Note: If any one of the boxes are checked below, the Aged Solar Reflectance and Thermal Emittance requirements for roofing products in §118(i) are not applicable. Do not fill table below.								
<input type="checkbox"/> Roofing compliance <u>Not</u> Required in Climate Zones 1-12, 14, and 16 with a Low-Sloped. Less or 2:12 pitch.								
<input type="checkbox"/> Roofing compliance <u>Not</u> Required in Climate Zones 1 through 9 and 16 with a Steep-Sloped. Roofs pitch greater than 2:12 and product weight less than 5lb/ft ² .								
<input type="checkbox"/> Roofing area covered by building integrated; photovoltaic panels and solar thermal panels are exempt from the above Cool Roof criteria								
<input type="checkbox"/> Roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft ² is exempt from the above Cool Roof criteria.								
Note: If no CRRC-1 label is available, this compliance method cannot be used, use the Performance Approach to show compliance, otherwise, check the applicable box below if Exempt from the Roofing Products "Cool Roof" Requirement:								
CRRC Product ID Number ¹	Roof Slope		Product Weight		Product Type ²	Aged Solar Reflectance ^{3,4}	Thermal Emittance	SRI ⁵
	≤ 2:12	> 2:12	< 5lb/ft ²	≥ 5lb/ft ²				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴		
1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council's Rated Product Directory at www.coolroofs.org/products/search.php .								
2. Indicate the type of product is being used for the roof top, i.e. single-ply roof, asphalt roof, metal roof, etc.								
3. If the Aged Reflectance is not available in the Cool Roof Rating Council's Rated Product Directory then use the Initial Reflectance value from the same directory and use the equation $(0.2+0.7(\rho_{initial} - 0.2))$ to obtain a calculated aged value. Where ρ is the Initial Solar Reflectance.								
4. Check box if the Aged Reflectance is a calculated value using the equation above.								
5. Calculate the SRI value by using the SRI- Worksheet at http://www.energy.ca.gov/title24/ and enter the resulting value in the SRI Column above and attach a copy of the SRI- Worksheet to the CF-1R.								
To apply Liquid Field Applied Coatings , the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §118(i)4. Select the applicable coating:								
<input type="checkbox"/> Aluminum-Pigmented Asphalt Roof Coating			<input type="checkbox"/> Cement-Based Roof Coating			<input type="checkbox"/> Other _____		

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HVAC SYSTEMS - HEATING					
Heating Equipment Type and Capacity ^{1,2,3}	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location ⁴	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Heating Type (Central Furnace, Wall Furnace, Heat pump, Boiler, Electric Resistance, etc.)
2. Electric resistance heating is allowed only in Component Package C, or except where electric heating is supplemental (i.e., if total capacity ≤ 2 KW or 7,000 Btu/hr electric heating is controlled by a time-limiting device not exceeding 30 minutes). See §151(b)3 exception.
3. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R-ADD Form for additional requirements and check applicable boxes.
4. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

HVAC SYSTEMS - COOLING					
Cooling Equipment Type and Capacity ^{1,2}	Minimum Efficiency (SEER/EER or COP)	Distribution Type and Location ³	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Cooling Type (A/C, Heat pump, Evap. Cooling, etc.)
2. Refer to the HERS Verification section on Pages 3 and 4 of the CF-1R-ADD Form for additional requirements and check applicable boxes.
3. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

WATER HEATING					
List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be storage gas or propane fired, non-recirculating, and may not exceed 50 gallons. If no natural gas is connected to the building, an electric storage DHW heater less than 50 gallons with an energy factor greater than 0.90 may be used. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.					
Water Heater Type/Fuel Type ¹	Distribution Type (Standard, Recirculating) ²	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value ³

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc.)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The water heating tank and pipes shall be insulated to meet the requirements of §150(j).

SPECIAL FEATURES The enforcement agency should pay special attention to the Special Features specified in this checklist below. These items may require written justification and documentation and special verification. Applicable special features shall be marked with a YES and be specified within the plans.	
Radiant Barrier (Roof)	
<input type="checkbox"/> YES	<input type="checkbox"/> NO Required in Climate Zones 2, 4, and 8-15 for additions larger than 100 ft ² .
Slab Edge (Perimeter) Insulation	
<input type="checkbox"/> YES	<input type="checkbox"/> NO In Climate Zone 16 under Component Package D, R-7 insulation is required.
Heated Slab Insulation	
<input type="checkbox"/> YES	<input type="checkbox"/> NO Slab edge insulation required for heated slabs in all Climate Zones. See details in Table 118-A of the standards.
Raised Slab Insulation	
<input type="checkbox"/> YES	<input type="checkbox"/> NO In Climate Zones 1, 2, 11, 13, 14 & 16 R-8 insulation is required, and in Climate Zones 12 & 15 R-4 insulation is required under Component Package D.
Thermal Mass - To obtain Compliance Credit for the installation of thermal mass, use the Performance Approach.	

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HERS VERIFICATION SUMMARY - The enforcement agency should pay special attention to the HERS Measures specified in this checklist below. A completed and signed CF-4R Form for all the measures specified shall be submitted to the building inspector before final inspection.

Duct Sealing & Testing *HERS verification is required for this measure.*

<input type="checkbox"/> YES	<input type="checkbox"/> NO	In all Climate Zones, if a new space-conditioning system (HVAC equipment and ducting) is installed to serve the addition alone, the ducts are to be sealed and tested per §151(f)10.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 9-16, if more than 40 linear feet of new or replacement ducts are installed in unconditioned space to serve the addition, the ducts are to be sealed and tested per §152(b)1D. <input type="checkbox"/> EXCEPTION: Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 9-16, if the existing HVAC equipment is replaced (including replacement of the air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger) and will serve the addition, the ducts are to be sealed and tested per §152(b)1E. <input type="checkbox"/> EXCEPTION: Duct systems that are documented to have been previously sealed confirmed through HERS verification in accordance with procedures in the Reference Residential Appendix RA3. <input type="checkbox"/> EXCEPTION: Duct systems with less than 40 linear feet in unconditioned space. <input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.

Refrigerant Charge - Split System *HERS verification is required for this measure.*

<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 8-15, if a newly ducted split A/C or heat pump is installed to serve the addition alone, a refrigerant charge measurement shall be verified per §151(f)7A.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 2 and 8-15, if the existing HVAC equipment is replaced (including replacement of the air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger) and will serve the addition, a refrigerant charge measurement shall be verified per §152(b)1F.

Central Fan Integrated Ventilation System – Airflow and Fan Watt Draw - do not apply for additions 1,000 ft² or less.

Ducted Split Systems - Air Conditioners and Heat Pumps: Airflow and Fan Watt Draw *HERS verification is required.*

<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 10 through 15, if a new space-conditioning system (HVAC equipment and ducting) is installed to serve the addition alone, the airflow and fan watt draw shall be verified per §151(f)7B.
<input type="checkbox"/> YES	<input type="checkbox"/> NO	In Climate Zones 10 through 15, if the existing space-conditioning system (HVAC equipment and ducting) is replaced and will serve the addition, the airflow and fan watt draw shall be verified per §152(b)1F.

Documentation Author's Declaration Statement

• I certify that this Certificate of Compliance documentation is accurate and complete.

Name:	Signature:
Company:	Date:
Address:	If Applicable <input type="checkbox"/> CEA or <input type="checkbox"/> CEPE (Certification #):
City/State/Zip:	Phone:

Responsible Building Designer's Declaration Statement

- I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance.
- I certify that the energy features and performance specifications for the building design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations.
- The building design features identified on this Certificate of Compliance are consistent with the information provided to document this building design on the other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.

Name:	Signature:
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

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

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 1 of 5)
Project Name:	Climate Zone #	# of Stories

General Information		
Site Address:	Enforcement Agency:	Date:
Building Type <input type="checkbox"/> Single Family <input type="checkbox"/> Multi Family	Circle the Front Orientation: N, E, S, W, or degrees _____	
Conditioned Floor Area (CFA): _____	Project Type: <input type="checkbox"/> Alterations <input type="checkbox"/> Envelope <input type="checkbox"/> Fenestration <input type="checkbox"/> Roof <input type="checkbox"/> HVAC Replacement or Change Out <input type="checkbox"/> Duct Replacement <input type="checkbox"/> Water Heater	

NOTE: This form is not to be used for Newly Constructed Buildings or Additions

Insulation Values For Opaque Surfaces (for Furring use the Mass and Furring Strips Construction table below)

Assembly Alteration

Opening of framed cavity alone – Alterations that involve the opening of the framed cavity of a wall, ceiling, or floor must install the mandatory minimum insulation value per §150 for the altered assembly. Fill in Columns A – C and enter mandatory insulation value in Column H.

Replacement of entire assembly – Replacement of an entire wall, ceiling, or floor assembly requires the installation of Component Package- D insulation values in Table 151-C. Fill in Columns A – J.

Opaque Surface Details For the furred portioned of Mass Walls see Furring Strips Construction Table below.

A	B	C	D	E	F	G	H	I	J
Proposed <small>See Note</small>				Standard	Values From JA4 Table				
Tag/ ID ¹	Assembly Name or Type ²	Framing Material and Size ²	Thickness, Spacing, or Other ³	U- factor ⁴	JA4 Table Number ⁵	Framed Cavity R-value ⁶	Continuous Insulation R-Value ⁷	JA4 Assembly Row/Col ⁸	Proposed Assembly U-factor ⁹

Note: For furred assemblies, accounting for Continuous Insulation R-value, see Page JA4-3 and Equation 4-1. For calculating furred walls use the Mass and Furring Construction table below.

1. For Tag/ID indicate the identification name that matches the building plans.
2. Indicate the Assembly Name or type: Roof/Ceiling, Walls, Floors, Slabs, Crawl Space, Doors and etc... Indicate in column G the Frame material and Size: For Wood, Metal, Metal Buildings, Mass, enter 2x4, 2x6, or etc... see JA4 for other possible frame type assemblies.
3. Enter the thickness for mass in inches or Spacing between framing members enter; 16" or 24" OC; or Other for all other assembly description such as Concrete Sandwich Panel, Spandrel Panel, Logs, Straw Bale Panel and etc....
4. Based on the Climate Zone; enter the equivalent U-factor found in JA4 Table based on the R-Value from Table 151-B, C, or D
5. Enter the Table number that closely resembles the proposed assembly.
6. Enter the R-value that is being installed in the wall cavity or between the framing; otherwise, enter "0".
7. Enter the Continuous Insulation R-value for the proposed assembly; otherwise, enter "0".
8. Enter the row and column of the U-factor value based on Column F Table Number and enter the Assembly U-factor in Column J
9. The **Proposed** Assembly U-factor, Column J, must be equal to or less than the **Standard** U-factor in Column E to comply.

Furring Strips Construction Table for Mass Walls Only

A	B	C	D	E	F	G	H	I	J	K	L	M
Proposed Properties of Masonry and Concrete Walls From Reference Joint Appendix Table 4.3.5, 4.3.6, 4.3.7					Added Interior or Exterior Insulation in Furring Space from Reference Joint Appendix Table 4.3.13						Final Assembly U-factor ^{6,7}	Comment
Mass Thickness ¹	Assembly Name or Type ²	JA4 Table Number ³	JA4-Mass Cell Value ⁴	Mass U-Factor ⁵	Interior or Exterior of Insulation Layer	Frame Thickness	Frame Type Wood or Metal	Furring Cavity R-value ³	JA4-Mass Cell Value ⁴	Effective R-value ⁵		

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Project Name:	Climate Zone #	# of Stories

Mass and Furring Strips Construction (footnotes)

1. Indicate the type of assembly to include; Hollow Unit Masonry Walls, Solid Unit Masonry, Solid Concrete Walls, Etc. Additional assemblies can be found Reference Joint Appendix JA4.
2. This is the U-Factor based on the thickness of the assembly in inches.
3. The R-value of the insulation to be added on the interior or exterior of the assembly.
4. The Calculated R-Value is the R-value of the furred out section of the assembly.
- 5-6. The Final Assembly is calculated using Equation 4-2 or Equation 4-4 of the Reference Joint Appendix JA4. The equation is the inverse of Column D added to Column I. Column K is the inverse from column J.
7. Insert the calculated U-factor value on to the Opaque Surface Details in Column J

FENESTRATION PROPOSED AREAS					
<input type="checkbox"/> Replacing window alone – Replacement windows shall meet the U-Factor and SHGC Value requirements of Component Package D in Table 151-C. The Total Fenestration and West-facing Area requirements are not applicable.					
<input type="checkbox"/> Adding 50ft² or less of window area – Newly installed windows shall meet the U-Factor and SHGC Value requirements of Component Package D in Table 151-C.					
<input type="checkbox"/> Adding more than 50ft² of window area – Newly installed windows shall meet the U-Factor and SHGC Value and the Fenestration Area requirements of Component Package D in Table 151-C. Complete the Altered Fenestration Allowed Area Table on Page 2 of the CF-1R-ALT					
Fenestration Type and Frame (Window, Glass Door or Skylight)	Orientation (North, East, South, West)	Proposed Area ¹ (ft ²)	Maximum U-factor ^{2,3}	Maximum SHGC ^{2,3,4}	NFRC or Default Value ⁵
<ol style="list-style-type: none"> 1. Fenestration area is the area of total glazed product (i.e. glass plus frame). Exception: When a door is less than 50% glass, the fenestration area may be the glass area plus a “2 inch frame” around the glass. 2. Enter value from Component Package D Requirements in Table 151-C. 3. Actual fenestration products installed and as indicated in CF-6R-ENV Form shall be equivalent to or have a lower U-factor and/or a lower SHGC value than that specified on the CF-1R ALT Form. 4. Submit a completed WS-3R Form if a reduced SHGC is calculated with exterior shading. 5. If applicable at this stage enter “NFRC” for NFRC Certified windows or are CEC “Default” values found in Table 116-A or B. 					

ALTERED FENESTRATION ALLOWED AREAS (Complete if more than 50ft² of fenestration is added)							
	A	B	C	D	E	F	G
	CFA of Entire Dwelling	Allowed % of CFA ^{2,3}	Existing Fenestration Area ⁴	Area Removed ⁵	Fenestration Area Added ⁶	Allowed Area (A x B)	Proposed Area ^{1,4} (E-D) + C
Total Fenestration Area ² (ft ²)							≥
West Fenestration Area ^{1,3} (Required In CZ's 2, 4 & 7 -15)							≥
<ol style="list-style-type: none"> 1. The Proposed West Fenestration Area includes West-sloping skylight area and any other skylight area with a pitch less than 1:12. 2. Enter 20% when no West orientation restriction or 15% when West fenestration is being installed in Climate Zones 2, 4, & 7-15. Note that the maximum allowed fenestration can only be 5% of the CFA as indicated in Column F. Column G must be equal to or less than Column F. 3. In climate zones 2, 4, 7-15, no more than 5% of the CFA is allowed for west-facing glazing. 4. Existing Fenestration area must be counted toward the maximum allowed 15% or 20% of the whole building and calculated in Column G. The Proposed Area must be less than or equal to Column F. 5. Enter the fenestration removed as part of the alteration if any in column D. 6. Enter the Fenestration area that is being added as part of the alteration. 							

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 3 of 5)
Project Name:	Climate Zone #	# of Stories

ROOFING PRODUCTS (COOL ROOFS) §151(f)12

When the area of exterior roof surface to be replaced exceeds more than 50% of the existing roof area, or more than 1,000 ft², whichever is less, the new roofing area must meet the roofing product “Cool Roof” requirements of §152(b)1Hi, 152(b)1Hii, or 152(b)1Hiii.

Check applicable alternative or exception below if the roof alteration is exempt from the roofing product “Cool Roof” requirements. Note: If any one of the alternatives or exception below is checked, the Aged Solar Reflectance and Thermal Emittance requirements for roofing products in §118(i) are not applicable. Do not fill table below.

- Cool Roofs Not Required in Climate Zones 1-12, 14, and 16 with a Low Sloped. Less or 2:12 pitch.
- Cool Roofs Not Required in Climate Zones 1 through 9 and 16 with a Steep-Sloped Roofs (pitch greater than 2:12) and product unit weight less than 5lb/ft².

Alternatives to §152(b)1Hi and §152(b)1Hii, Steep-slope roof (pitch > 2:12)

- Insulation with a thermal resistance of at least 0.85 hr-ft²-°F/Btu or at least a 3/4 inch air-space is added to the roof deck over an attic; or
- Existing ducts in the attic are insulated and sealed according to §151(f)10; or
- In climate zones 10, 12 and 13, with 1 ft² of free ventilation area of attic ventilation for every 150 ft² of attic floor area, and where at least 30 percent of the free ventilation area is within 2 feet vertical distance of the roof ridge; or
- Building has at least R-30 ceiling insulation; or
- Building has radiant barrier in the attic meeting the requirements of §151(f)2; or
- Building has no ducts in the attic; or
- In climate zones 10, 11, 13 and 14, R-3 or greater roof deck insulation above vented attic.

Exception to §152(b)1Hiii, Low-slope roof (pitch ≤ 2:12)

- Building has no ducts in the attic.

Other Exceptions

- Roofing area covered by building integrated; photovoltaic panels and solar thermal panels are exempt from the below Cool Roof criteria.
- Roof constructions that have thermal mass over the roof membrane with at least 25 lb/ft² is exempt from the below Cool Roof criteria.

Note: If no CRRC-1 label is available, this compliance method cannot be used, use the Performance Approach to show compliance, otherwise, Check the applicable box below if Exempt from the Roofing Products “Cool Roof” Requirement:

CRRC Product ID Number ¹	Roof Slope		Product Weight		Product Type ²	Aged Solar Reflectance ^{3,4}		Thermal Emittance	SRI ⁵
	≤ 2:12	> 2:12	< 5lb/ft ²	≥ 5lb/ft ²					
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> ⁴			

1. The CRRC Product ID Number can be obtained from the Cool Roof Rating Council’s Rated Product Directory at www.coolroofs.org/products/search.php
2. Indicate the type of product is being used for the roof top, i.e. single-ply roof, asphalt roof, metal roof, etc.
3. If the Aged Reflectance is not available in the Cool Roof Rating Council’s Rated Product Directory then use the Initial Reflectance value from the same directory and use the equation $(0.2+0.7(p_{initial} - 0.2))$ to obtain a calculated aged value. Where p is the Initial Solar Reflectance.
4. Check box if the Aged Reflectance is a calculated value using the equation above.
5. Calculate the SRI value by using the SRI- Worksheet at <http://www.energy.ca.gov/title24/> and enter the resulting value in the SRI Column above and attach a copy of the SRI- Worksheet to the CF-1R.

To apply **Liquid Field Applied Coatings**, the coating must be applied across the entire roof surface and meet the dry mil thickness or coverage recommended by the coatings manufacturer and meet minimum performance requirements listed in §118(i)4. Select the applicable coating:

<input type="checkbox"/> Aluminum-Pigmented Asphalt Roof Coating	<input type="checkbox"/> Cement-Based Roof Coating	<input type="checkbox"/> Other _____
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Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
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Project Name:	Climate Zone #	# of Stories

HVAC SYSTEMS - HEATING

Heating Equipment Type and Capacity ^{1,2,3}	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location ⁴	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Heating Type (Central Furnace, Wall Furnace, Heat pump, Boiler, Electric Resistance, etc.)
2. Electric resistance heating is allowed only in Component Package C, or except where electric heating is supplemental (i.e., if total capacity ≤ 2 KW or 7,000 Btu/hr electric heating is controlled by a time-limiting device not exceeding 30 minutes). See §151(b)3 exception.
3. Refer to the HERS Verification section on Page 4 of the CF-1R-ALT Form for additional requirements and check applicable boxes.
4. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

HVAC SYSTEMS - COOLING

Cooling Equipment Type and Capacity ^{1,2}	Minimum Efficiency (SEER/EER or COP)	Distribution Type and Location ³	Duct or Piping Insulation R-Value	Thermostat Type	Configuration (Central, Split, Space, Package or Hydronic)

1. Indicate Cooling Type (A/C, Heat pump, Evap. Cooling, etc)
2. Refer to the HERS Verification section on Page 4 of the CF-1R-ALT Form for additional requirements and check applicable boxes.
3. Indicate Type or Location (Ducts, Hydronic in Floor, Radiators, etc.)

WATER HEATING

List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating. Individual dwelling DHW heaters must be gas or propane fired. Hot water pipe insulation from the DHW heater to the kitchen(s) and on all underground hot water pipes is required in all component packages in all climate zones.

Water Heater Type/Fuel Type ¹	Distribution Type (Standard, Recirculating) ²	Number In System	Tank Capacity (gal)	Energy Factor or Thermal Efficiency	External Tank Insulation R-Value ³

1. Indicate Type (Storage Gas, Heat Pump, Instantaneous, etc.)
2. Recirculating systems serving multiple dwelling units shall meet the recirculation requirements of §150(n). The Prescriptive requirements do not allow the installation of a recirculating water heating system for single dwelling units.
3. The external water heating tank and pipes shall be insulated to meet the requirements of §150(j).

SPECIAL FEATURES The enforcement agency should pay special attention to the Special Features specified in this checklist below. These items may require written justification and documentation and special verification.

NEW ROOF ASSEMBLY - Radiant Barrier
The radiant barrier requirement of §151(f)2 does not apply to roof alterations.

Slab Edge (Perimeter) Insulation YES NO
YES: In Climate Zone 16 in Component Packages D, R-7 insulation is required.

Heated Slab Insulation YES NO
YES: Slab edge insulation required for all heated slabs in all Climate Zones. See details in Table 118-A of the standards.

Raised Slab Insulation YES NO
YES: In Climate Zones 1, 2, 11, 13, 14 & 16, R-8 insulation is required; in Climate Zones 12 & 15, R-4 is required under component Package D.

Thermal Mass
To obtain Compliance Credit for the installation of thermal mass, use the Performance Approach.

Prescriptive Certificate of Compliance: Residential		CF-1R-ALT
Residential Alterations		(Page 5 of 5)
Project Name:	Climate Zone #	# of Stories

<p>HERS VERIFICATION SUMMARY <i>The enforcement agency should pay special attention to the HERS Measures specified in this checklist below. A completed and signed CF-4R Form for all the measures specified shall be submitted to the building inspector before final inspection.</i></p>	
<p>Duct Sealing & Testing <i>HERS verification is required for this measure.</i></p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 9-16, if more than 40 linear feet of new or replacement ducts are installed in unconditioned space, the ducts are to be sealed per §152(b)1Di and the newly installed ducts are to be insulated per §151(f)10.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 9-16, if the existing space-conditioning system (HVAC equipment and ducting) is replaced, the ducts are to be sealed per §152(b)1Di.</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 9-16, if the existing HVAC equipment is replaced (including the replacement of the air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger) the ducts are to be sealed per §152(b)1E.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Duct systems that are documented to have been previously sealed confirmed through HERS verification in accordance with procedures in the Reference Residential Appendix RA3.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Duct systems with less than 40 linear feet in unconditioned space.</p> <p style="padding-left: 40px;"><input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.</p>	
<p>Refrigerant Charge - Split System <i>HERS verification is required for this measure.</i></p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 2 and 8-15, when the existing HVAC equipment is replaced (including the replacement of the air handler, outdoor condensing unit of a split system A/C or heat pump, cooling or heating coil, or the furnace heat exchanger) a refrigerant charge measurement shall be verified per §152(b)1F.</p>	
<p>Central Fan Integrated (CFI) Ventilation System and Fan Watt Draw</p> <p>The ventilation requirements of §150(o) do not apply to existing residential homes.</p>	
<p>Ducted Split Systems - Air Conditioners and Heat Pumps: Airflow <i>HERS verification is required for this measure.</i></p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zones 10 through 15, when the existing space-conditioning system (HVAC equipment and ducting) is replaced, the airflow and fan watt draw shall be verified per §152(b)1Ci to meet the requirements of §151(f)7B.</p>	

Documentation Author's Declaration Statement	
<ul style="list-style-type: none"> • I certify that this Certificate of Compliance documentation is accurate and complete. 	
Name:	Signature:
Company:	Date:
Address:	If Applicable <input type="checkbox"/> CEA or <input type="checkbox"/> CEPE (Certification #):
City/State/Zip:	Phone:

Responsible Building Designer's Declaration Statement	
<ul style="list-style-type: none"> • I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance. • I certify that the energy features and performance specifications for the building design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations. • The building design features identified on this Certificate of Compliance are consistent with the information provided to document this building design on the other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. 	
Name:	Signature:
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

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

Simplified Prescriptive Certificate of Compliance: 2008 Residential HVAC Alterations **CF-1R-ALT-HVAC**

Climate Zones 1 and 3 - 7

Site Address:		Enforcement Agency:		Date:	Permit #:
Equipment Type¹	List Minimum Efficiency²		Conditioned Floor Area	Duct insulation requirement	Thermostat
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other _____	<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____	<input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance	Served by system _____ sf	Over 40 ft of ducts added or replaced in unconditioned space <input type="checkbox"/> R 6 (CZ 1, 3-5)	<input type="checkbox"/> Setback <i>(If not already present, must be installed)</i>
1. Equipment Type: Choose the equipment being installed; if more than one system, use another CF-1R-ALT-HVAC for each system. 2. Minimum Equipment Efficiencies: 13 SEER, 78% AFUE, 7.7HSPF for typical residential systems.					
Contractor (Documentation Author's /Responsible Designer's Declaration Statement) <ul style="list-style-type: none"> I certify that this Certificate of Compliance documentation is accurate and complete. I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the design identified on this Certificate of Compliance. I certify that the energy features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations. The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application. 					
Name:			Signature:		
Company:				Date:	
Address:				License:	
City/State/Zip:				Phone:	

Site Address:		Enforcement Agency:	Date:	Permit #:
Equipment Type ¹	List Minimum Efficiency ²		Duct insulation requirement	Conditioned Floor Area
<input type="checkbox"/> Packaged Unit <input type="checkbox"/> Furnace <input type="checkbox"/> Indoor Coil <input type="checkbox"/> Condensing Unit <input type="checkbox"/> Other	<input type="checkbox"/> AFUE _____ <input type="checkbox"/> SEER _____ <input type="checkbox"/> EER _____	<input type="checkbox"/> COP _____ <input type="checkbox"/> HSPF _____ <input type="checkbox"/> Resistance _____	Over 40 ft of ducts added or replaced in unconditioned space <input type="checkbox"/> R 6 (CZ 10-13) <input type="checkbox"/> R 8 (CZ 14-15)	Served by system _____ sf <input type="checkbox"/> Setback <i>(If not already present, must be installed)</i>
<p>1. Equipment Type: Choose the equipment being installed; if more than one system, use another CF-1R-ALT-HVAC for each system.</p> <p>2. Minimum Equipment Efficiencies: 13 SEER, 78% AFUE, 7.7HSPF for typical residential systems.</p>				
<p>HERS VERIFICATION SUMMARY Listed below are four HVAC alteration Options. The installer decides what work is being done and picks one of the appropriate Options. Each Option lists the HERS measures that must be conducted. A copy of the forms shall be left on site for final inspection and a copy given to the homeowner. At final, the inspector verifies that the work listed on this form was in fact the work completed by the installer. The inspector also verifies that each appropriate CF-6R and registered CF-4R forms (no hand filled CF-4Rs allowed) are filled out and signed. Beginning October 1, 2010, a registered copy of the CF-1R and CF-6R shall also be on site for final inspection.</p>				
<input type="checkbox"/> 1. HVAC Changeout		Required Forms:		
<ul style="list-style-type: none"> All HVAC Equipment replaced 		CF-6R forms: MECH-04, MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25		
<ul style="list-style-type: none"> Condenser Coil and /or Indoor Coil and /or Furnace 		CF-6R forms: MECH-21-HERS and (for split systems) MECH- 25-HERS CF-4R forms: MECH- 21 and (for split systems) MECH-25		
<p>For Split Systems: Duct leakage < 15 percent; RC, CCA ≥ 300 CFM/ton (Minimum Air Flow Requirement), TMAH For Packaged Units: Duct leakage < 15 percent Exempted from duct leakage testing if:</p> <ul style="list-style-type: none"> Duct system was documented to have been previously sealed and confirmed through HERS verification, or Duct systems with less than 40 linear feet in unconditioned space, or Existing duct systems are constructed, insulated or sealed with asbestos 				
<input type="checkbox"/> 2. New HVAC System		Required Forms:		
<ul style="list-style-type: none"> Cut in or Changeout with new ducts: (all new ducting <u>and</u> all new equipment) 		CF-6R forms: MECH-04, MECH-20-HERS, and (for split systems) MECH-22-HERS, and MECH-25-HERS CF-4R forms: MECH 20-, and (for split systems) MECH-22, and MECH 25		
<p>For Split Systems: Duct leakage < 6 percent; RC, CCA ≥ 350 CFM/ton, FWD, TMAH, STMS, and either HSPP or PSPP. For Packaged Units: Duct leakage < 6 percent</p>				
<input type="checkbox"/> 3. New Ducts with Replacement		Required Forms:		
<ul style="list-style-type: none"> Includes replacing or installing all new ducting and/or outdoor condensing unit and/or indoor coil and/or furnace. Not all equipment changed. 		CF-6R forms: MECH-04, MECH-20-HERS, and (for split systems) MECH-25-HERS CF-4R forms: MECH-20 and (for split systems) MECH-25		
<p>For Split Systems: Duct leakage < 6 percent, RC, CCA ≥ 300 CFM/ton, TMAH For Packaged Units: Duct leakage < 6 percent</p>				
<input type="checkbox"/> 4. New Ducting over 40 feet		Required Forms:		
<ul style="list-style-type: none"> Includes adding or replacing more than 40 linear feet of duct in unconditioned space. 		CF-6R forms: MECH-04, MECH-21-HERS CF-4R forms: MECH-21		
<p>For split system or packaged units: Duct leakage < 15 percent <input type="checkbox"/> EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.</p>				
<p>Contractor (Documentation Author's /Responsible Designer's Declaration Statement)</p> <ul style="list-style-type: none"> I certify that this Certificate of Compliance documentation is accurate and complete. I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the design identified on this Certificate of Compliance. I certify that the energy features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations. The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application. 				
Name:		Signature:		
Company:			Date:	
Address:			License:	
City/State/Zip:			Phone:	

Mandatory Measures Summary

MF-1R

Residential

(Page 1 of 3)

Site Address:

Enforcement Agency:

Date:

NOTE: Low-rise residential buildings subject to the Standards must comply with all applicable mandatory measures listed, regardless of the compliance approach used. More stringent energy measures listed on the Certificate of Compliance (CF-1R, CF-1R-ADD, or CF-1R-ALT Form) shall supersede the items marked with an asterisk () below. This Mandatory Measures Summary shall be incorporated into the permit documents and the applicable features shall be considered by all parties as minimum component performance specifications whether they are shown elsewhere in the documents or in this summary. Submit all applicable sections of the MF-1R Form with plans.*

DESCRIPTION

Building Envelope Measures:

§116(a)1: Doors and windows between conditioned and unconditioned spaces are manufactured to limit air leakage.

§116(a)4: Fenestration products (except field-fabricated windows) have a label listing the certified U-Factor, certified Solar Heat Gain Coefficient (SHGC), and infiltration that meets the requirements of §10-111(a).

§117: Exterior doors and windows are weather-stripped; all joints and penetrations are caulked and sealed.

§118(a): Insulation specified or installed meets Standards for Insulating Material. Indicate type and include on CF-6R Form.

§118(i): The thermal emittance and solar reflectance values of the cool roofing material meets the requirements of §118(i) when the installation of a Cool Roof is specified on the CF-1R Form.

*§150(a): Minimum R-19 insulation in wood-frame ceiling or equivalent U-factor.

§150(b): Loose fill insulation shall conform with manufacturer's installed design labeled R-Value.

*§150(c): Minimum R-13 insulation in wood-frame wall or equivalent U-factor.

*§150(d): Minimum R-13 insulation in raised wood-frame floor or equivalent U-factor.

§150(f): Air retarding wrap is tested, labeled, and installed according to ASTM E1677-95(2000) when specified on the CF-1R Form.

§150(g): Mandatory Vapor barrier installed in Climate Zones 14 or 16.

§150(i): Water absorption rate for slab edge insulation material alone without facings is no greater than 0.3%; water vapor permeance rate is no greater than 2.0 perm/inch and shall be protected from physical damage and UV light deterioration.

Fireplaces, Decorative Gas Appliances and Gas Log Measures:

§150(e)1A: Masonry or factory-built fireplaces have a closable metal or glass door covering the entire opening of the firebox.

§150(e)1B: Masonry or factory-built fireplaces have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper and or a combustion-air control device.

§150(e)2: Continuous burning pilot lights and the use of indoor air for cooling a firebox jacket, when that indoor air is vented to the outside of the building, are prohibited.

Space Conditioning, Water Heating and Plumbing System Measures:

§110-§113: HVAC equipment, water heaters, showerheads, faucets and all other regulated appliances are certified by the Energy Commission.

§113(c)5: Water heating recirculation loops serving multiple dwelling units and High-Rise residential occupancies meet the air release valve, backflow prevention, pump isolation valve, and recirculation loop connection requirements of §113(c)5.

§115: Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces, household cooking appliances (appliances with an electrical supply voltage connection with pilot lights that consume less than 150 Btu/hr are exempt), and pool and spa heaters.

§150(h): Heating and/or cooling loads are calculated in accordance with ASHRAE, SMACNA or ACCA.

§150(i): Heating systems are equipped with thermostats that meet the setback requirements of Section 112(c).

§150(j)1A: Storage gas water heaters rated with an Energy Factor no greater than the federal minimal standard are externally wrapped with insulation having an installed thermal resistance of R-12 or greater.

§150(j)1B: Unfired storage tanks, such as storage tanks or backup tanks for solar water-heating system, or other indirect hot water tanks have R-12 external insulation or R-16 internal insulation where the internal insulation R-value is indicated on the exterior of the tank.

§150(j)2: First 5 feet of hot and cold water pipes closest to water heater tank, non-recirculating systems, and entire length of recirculating sections of hot water pipes are insulated per Standards Table 150-B.

§150(j)2: Cooling system piping (suction, chilled water, or brine lines), and piping insulated between heating source and indirect hot water tank shall be insulated to Table 150-B and Equation 150-A.

§150(j)2: Pipe insulation for steam hydronic heating systems or hot water systems >15 psi, meets the requirements of Standards Table 123-A.

§150(j)3A: Insulation is protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind.

§150(j)3A: Insulation for chilled water piping and refrigerant suction lines includes a vapor retardant or is enclosed entirely in conditioned space.

Mandatory Measures Summary

MF-1R

Residential

(Page 2 of 3)

Site Address:

Enforcement Agency:

Date:

§150(j)4: Solar water-heating systems and/or collectors are certified by the Solar Rating and Certification Corporation.

Ducts and Fans Measures:

§150(m)1: All air-distribution system ducts and plenums installed, are sealed and insulated to meet the requirements of CMC Sections 601, 602, 603, 604, 605 and Standard 6-5; supply-air and return-air ducts and plenums are insulated to a minimum installed level of R-4.2 or enclosed entirely in conditioned space. Openings shall be sealed with mastic, tape or other duct-closure system that meets the applicable requirements of UL 181, UL 181A, or UL 181B or aerosol sealant that meets the requirements of UL 723. If mastic or tape is used to seal openings greater than 1/4 inch, the combination of mastic and either mesh or tape shall be used.

§150(m)1: Building cavities, support platforms for air handlers, and plenums defined or constructed with materials other than sealed sheet metal, duct board or flexible duct shall not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. Ducts installed in cavities and support platforms shall not be compressed to cause reductions in the cross-sectional area of the ducts.

§150(m)2D: Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.

§150(m)7: Exhaust fan systems have back draft or automatic dampers.

§150(m)8: Gravity ventilating systems serving conditioned space have either automatic or readily accessible, manually operated dampers.

§150(m)9: Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.

§150(m)10: Flexible ducts cannot have porous inner cores.

§150(o): All dwelling units shall meet the requirements of ANSI/ASHRAE Standard 62.2-2007 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings. Window operation is not a permissible method of providing the Whole Building Ventilation required in Section 4 of that Standard.

Pool and Spa Heating Systems and Equipment Measures:

§114(a): Any pool or spa heating system shall be certified to have: a thermal efficiency that complies with the Appliance Efficiency Regulations; an on-off switch mounted outside of the heater; a permanent weatherproof plate or card with operating instructions; and shall not use electric resistance heating or a pilot light.

§114(b)1: Any pool or spa heating equipment shall be installed with at least 36" of pipe between filter and heater, or dedicated suction and return lines, or built-up connections for future solar heating.

§114(b)2: Outdoor pools or spas that have a heat pump or gas heater shall have a cover.

§114(b)3: Pools shall have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.

§150(p): Residential pool systems or equipment meet the pump sizing, flow rate, piping, filters, and valve requirements of §150(p).

Residential Lighting Measures:

§150(k)1: High efficacy luminaires or LED Light Engine with Integral Heat Sink has an efficacy that is no lower than the efficacies contained in Table 150-C and is not a low efficacy luminaire as specified by §150(k)2.

§150(k)3: The wattage of permanently installed luminaires shall be determined as specified by §130(d).

§150(k)4: Ballasts for fluorescent lamps rated 13 Watts or greater shall be electronic and shall have an output frequency no less than 20 kHz.

§150(k)5: Permanently installed night lights and night lights integral to a permanently installed luminaire or exhaust fan shall contain only high efficacy lamps meeting the minimum efficacies contained in Table 150-C and shall not contain a line-voltage socket or line-voltage lamp holder; OR shall be rated to consume no more than five watts of power as determined by §130(d), and shall not contain a medium screw-base socket.

§150(k)6: Lighting integral to exhaust fans, in rooms other than kitchens, shall meet the applicable requirements of §150(k).

§150(k)7: All switching devices and controls shall meet the requirements of §150(k)7.

§150(k)8: A minimum of 50 percent of the total rated wattage of permanently installed lighting in kitchens shall be high efficacy.
EXCEPTION: Up to 50 watts for dwelling units less than or equal to 2,500 ft² or 100 watts for dwelling units larger than 2,500 ft² may be exempt from the 50% high efficacy requirement when: all low efficacy luminaires in the kitchen are controlled by a manual on occupant sensor, dimmer, energy management system (EMCS), or a multi-scene programmable control system; and all permanently installed luminaries in garages, laundry rooms, closets greater than 70 square feet, and utility rooms are high efficacy and controlled by a manual-on occupant sensor.

§150(k)9: Permanently installed lighting that is internal to cabinets shall use no more than 20 watts of power per linear foot of illuminated cabinet.

§150(k)10: Permanently installed luminaires in bathrooms, attached and detached garages, laundry rooms, closets and utility rooms shall be high efficacy.

Mandatory Measures Summary

MF-1R

Residential

(Page 3 of 3)

Site Address:

Enforcement Agency:

Date:

EXCEPTION 1: Permanently installed low efficacy luminaires shall be allowed provided that they are controlled by a manual-on occupant sensor certified to comply with the applicable requirements of §119.

EXCEPTION 2: Permanently installed low efficacy luminaires in closets less than 70 square feet are not required to be controlled by a manual-on occupant sensor.

§150(k)11: Permanently installed luminaires located in rooms or areas other than in kitchens, bathrooms, garages, laundry rooms, closets, and utility rooms shall be high efficacy luminaires.

EXCEPTION 1: Permanently installed low efficacy luminaires shall be allowed provided they are controlled by either a dimmer switch that complies with the applicable requirements of §119, or by a manual-on occupant sensor that complies with the applicable requirements of §119.

EXCEPTION 2: Lighting in detached storage building less than 1000 square feet located on a residential site is not required to comply with §150(k)11.

§150(k)12: Luminaires recessed into insulated ceilings shall be listed for zero clearance insulation contact (IC) by Underwriters Laboratories or other nationally recognized testing/rating laboratory; and have a label that certifies the luminaire is airtight with air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283; and be sealed with a gasket or caulk between the luminaire housing and ceiling.

§150(k)13: Luminaires providing outdoor lighting, including lighting for private patios in low-rise residential buildings with four or more dwelling units, entrances, balconies, and porches, which are permanently mounted to a residential building or to other buildings on the same lot shall be high efficacy.

EXCEPTION 1: Permanently installed outdoor low efficacy luminaires shall be allowed provided that they are controlled by a manual on/off switch, a motion sensor not having an override or bypass switch that disables the motion sensor, and one of the following controls: a photocontrol not having an override or bypass switch that disables the photocontrol; OR an astronomical time clock not having an override or bypass switch that disables the astronomical time clock; OR an energy management control system (EMCS) not having an override or bypass switch that allows the luminaire to be always on

EXCEPTION 2: Outdoor luminaires used to comply with Exception 1 to §150(k)13 may be controlled by a temporary override switch which bypasses the motion sensing function provided that the motion sensor is automatically reactivated within six hours.

EXCEPTION 3: Permanently installed luminaires in or around swimming pool, water features, or other location subject to Article 680 of the California Electric Code need not be high efficacy luminaires.

§150(k)14: Internally illuminated address signs shall comply with Section 148; OR not contain a screw-base socket, and consume no more than five watts of power as determined according to §130(d).

§150(k)15: Lighting for parking lots and carports with a total of for 8 or more vehicles per site shall comply with the applicable requirements in Sections 130, 132, 134, and 147. Lighting for parking garages for 8 or more vehicles shall comply with the applicable requirements of Sections 130, 131, 134, and 146

§150(k)16: Permanently installed lighting in the enclosed, non-dwelling spaces of low-rise residential buildings with four or more dwelling units shall be high efficacy luminaires.

EXCEPTION: Permanently installed low efficacy luminaires shall be allowed provided that they are controlled by an occupant sensor(s) certified to comply with the applicable requirements of §119.

Area Weighted Average Calculation Worksheet

WS-2R

Residential

(Page 1 of 1)

Site Address:

Enforcement Agency:

Date:

This worksheet should be used to calculate weight-averaged U-factors or averaged SHGC values for prescriptive envelope compliance. R-values can never be area weighted; only area-weighted U-factors.

Whenever two or more types of a building feature, material, or construction assembly occur in a building, a weighted average of the different types must be calculated. Weighted averaging is simply a mathematical technique for combining different amounts of various components into a single number. Weighted averaging is frequently done when there is more than one level of floor, wall, or ceiling insulation in a building, or more than one type of window (the SHGC values of skylights cannot be averaged per §151(f)4A).

- a. "Area" can be replaced throughout the formula by "Length" or any other unit of measure used for the value being averaged.
- b. "Value" can be replaced throughout the formula by "U-factor," "Solar Heat Gain Coefficient," or any other value that varies throughout a residence and is appropriate to weight average.

Item No.	Type 1 Value ^b	x	Type 1 Area ^a	+	Type 2 Value ^b	x	Type 2 Area ^a	+	Type 3 Value ^b	x	Type 3 Area ^a	÷	Total Area	=	Weighted Average Value
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	
	[()]	x	()	+	()	x	()	+	()	x	()	÷		=	

Solar Heat Gain Coefficient Worksheet

WS-3R

Residential

(Page 1 of 2)

Site Address:

Enforcement Agency:

Date:

Items 1 through 4 must be completed for glazing/shading combinations by using the Default Table for Fenestration Products (Table 116-B of the Standards), NFRC certified data, or Solar Heat Gain Coefficients Used for Exterior Shading Attachments (Table S-1 below) for the specific conditions indicated (#1a or #1b or #3).

General Information

1a. For Fenestration Products w/NFRC testing and labels:
OR

SHGC_{fen} = _____

1b. For Fenestration Products without NFRC testing and labels (Table 116-B of the Standards):

SHGC_{fen} = _____

1c. Frame Type

1d. Product Type

1e. Glazing Type

1f. Single/Double Pane

metal, non-metal,
metal w/thermal break

operable/fixed

(visibly) tinted
clear (not visibly tinted)

single pane/double pane

2. Skylight (Y/N) _____

(A skylight is fenestration mounted on a roof surface at a slope less than 60° from the horizon.)

Combined Exterior Shade with Fenestration

3. SHGC_{Exterior Shade}: _____

Exterior Shade Type: _____

(If no exterior shade, assume standard bug screens, SHGC_{Exterior Shade} = 0.76 for ordinary windows. This requirement does not apply to skylights where SHGC_{Exterior Shade} is assumed to be 1.00. If another exterior shade is substituted for bug screens, use one of the values from Table S-1.

4.
$$\left[\left(\frac{\text{SHGC}_{max}}{\text{SHGC}_{min}} \times 0.2875 \right) + 0.75 \right] \times \text{SHGC}_{min} = \text{Total SHGC}$$

Where:

SHGC_{max} = Larger of (#1a or #1b) or #3

SHGC_{min} = Smaller of (#1a or #1b) or #3

Note: Calculated Solar Heat Gain Coefficient values for Total SHGC may be used directly for prescriptive packages.

- Package C Target Value for Total SHGC is 0.40 for Climate Zones 2 through 15
- Package D Target Value for Total SHGC is 0.40 for Climate Zones 2, 4 through 14 and 0.35 in Climate Zone 15
- Package E Target Value for Total SHGC is 0.40 for Climate Zones 2, 3, 5, 6, 8 through 10, and 0.25 in Climate Zones 4, 7, 11, 12, 14, and 15, and 0.30 in Climate Zone 13.

Table S-1: Solar Heat Gain Coefficients Used for Permanently Installed Exterior Shading Attachments for WS-3R^{1,2}

Exterior Shading Device³

With Single Pane
Clear Glass & Metal Framing⁴

1) Standard Bug Screens	0.76
2) Exterior Sunscreens with Weave 53 x 16/inch	0.30
3) Louvered Sunscreens w/Louvers as Wide as Openings	0.27
4) Low Sun Angle (LSA) Louvered Sunscreens	0.13
5) Vertical Roller or Shades or Retractable/Drop Arm/Marquisolette and Operable Awnings ²	0.13
6) Roll Down Blinds or Slats	0.13
7) None (for skylights only)	1.00

Notes:

1. These values may be used on line 3 of the Solar Heat Gain Coefficient (SHGC) Worksheet (WS-3R) to calculate exterior shading with other glazing types and combined interior and exterior shading with glazing.
2. Exterior operable awnings (canvas, plastic or metal), except those that roll vertically down and cover the entire window, should be treated as overhangs (use the SHGC equation) for the purposes of compliance with the Standards. See Fixed Shading Devices and Exterior Shading Devices in the Residential compliance Manual, Chapter 3.
3. Standard bug screens must be assumed for all fenestration unless replaced by other exterior shading attachments. The solar heat gain coefficient listed for bug screens is an area-weighted value that assumes that the screens are only on operable windows. The solar heat gain coefficient of any other exterior shade screens applied only to some window areas must be area-weighted with the solar heat gain coefficient of standard bug screens for all other glazing (see Form WS-2R). Different shading conditions may also be modeled explicitly in the computer performance method.
4. Reference glass for determining solar heat gain coefficients is 1/8 inch double strength (DSS) glass.

Solar Heat Gain Coefficient Worksheet		WS-3R
Residential		(Page 2 of 2)
Site Address:	Enforcement Agency:	Date:

Instructions for WS-3R

The following explains how to calculate solar heat gain coefficients on WS-3R. The number of each item below corresponds to the appropriate item on WS-3R.

Enter either:

1a. For products with NFRC testing and labels, enter the product’s labeled SHGC as #1a. $SHGC_{fen}$

OR

1b.	Enter the default $SHGC_{fen}$ from Table 116-B of the Standards corresponding to the fenestration characteristics described in entries 1c, 1d, 1e, and 1f. Entries for 1c, 1d, 1e, and 1f are only needed if 1b is entered for $SHGC_{fen}$.
-----	--

If 1b is entered, then:

1c	Describe the Frame Type [metal, metal w/thermal break, or non-metal (non-metal includes both vinyl and wood)].
1d	The Product Type (operable or fixed).
1e	The glazing type (tinted or uncoated). Note that tints or coatings that cannot be easily observed by the building official must be classified as “uncoated.” Tints must be easily visible to the naked eye.
1f	Single or double pane glazing.

2. For skylights mounted on a roof surface, enter “Y,” otherwise enter “N.” A skylight is fenestration mounted at a slope less than 60° from the horizon.
3. Describe the exterior shading device in the space provided (e.g., roll down awning). List $SHGC_{Exterior\ Shade}$, the SHGC of the exterior shade with 1/8” clear single pane glass and metal framing, from Table S-1. If a single window or skylight has multiple exterior shades (i.e., shade screens and awnings) use the one shading device with the lower SHGC.

If no exterior shade is proposed, assume standard bug screens with a SHGC of 0.76 (or a SHGC of 1.00 for horizontal glazing). This applies to the full area of fixed fenestration products as well as operable.
4. Calculate $SHGC_{Shade\ Open}$ using values from Items 3 and either 1a or 1b. The result is the combined SHGC of the fenestration product and exterior device with the interior *shade open*.