

2008 Residential Energy Plan Review Checklist Alterations

(Prescriptive Approach)

	Yes	No	N/A
Is the CF-1R ALT Form signed and dated by both the:			
Designer and/or Owner			
Documentation Author			
Is the CF-1R ALT Form submitted with the building permit application?			
Is the correct Climate Zone (12) listed on the CF-1R ALT Form?			
Does the CF-1R ALT Form have a registration number?			
Is the MF-1R Form submitted with the building permit application?			
DOES THE CF-1R ALT FORM MEET THE PRESCRIPTIVE REQUIREMENTS?			
<i>* The Plans Examiner only needs to verify compliance for the altered building component *</i>			
Envelope Alterations			
Insulation for walls, ceilings, and floors			
Window area and orientation			
U-factor and SHGC values for fenestration			
Exterior Shading			
Cool Roof values (Solar Reflectance and Thermal Emittance)			
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Efficiency and Fuel Type of the Water Heating equipment			
Pipe Insulation Values (<i>Mandatory Measures</i>)			
Lighting Alterations			
All new/replaced lighting is high efficacy lighting (i.e. fluorescent, LED) or meets applicable alternatives			

2008 Residential Energy Plan Review Checklist GUIDE For Alterations

(Prescriptive Approach)

NOTE: This Guide will only discuss the Plan Review process for alterations to residential buildings and the applicable Prescriptive Approach requirements. If you have questions regarding alterations to residential buildings and the Performance Approach, please contact the Energy Standards Hotline:

Phone: 1-800-722-3300

Fax: 916-653-7480

Email: Title24@energy.state.ca.us

DEFINITIONS:

Alteration

An alteration is any change to a building's water-heating system, space-conditioning system, lighting system, or envelope that is not an addition. Some examples of an alteration include:

- Adding or replacing a skylight or window;
- Adding or replacing a central air conditioning system;
- Replacing the outdoor condensing unit of a split A/C system;
- Replacing a furnace;
- Adding or replacing a water heater;
- Adding or replacing hardwired lighting; and
- A reroof.

Repair

A repair is the reconstruction or renewal for the purpose of maintenance of any component, system, or equipment of an existing building. A repair is a component, system, or equipment of an existing building that breaks or malfunctions and a maintenance person fixes it so that it functions properly again. Repairs to low-rise residential buildings are not within the scope of the 2008 Energy Efficiency Standards (Standards) and do not require compliance. Some examples of a repair include:

- Replacing a broken pane of glass in a window;
- Replacing a failed compressor in an outdoor condensing A/C unit;
- Replacing a failed fan motor or gas valve in a furnace; and
- Replacing the heating element in water heater.

Is the CF-1R ALT Form signed and dated by both the Designer and/or Owner and the Documentation Author?

Signatures are necessary to show who is taking legal responsibility for the work of the alteration and the accuracy of the energy efficiency documentation.

For alterations, the individual who applies for the permit shall sign as the Building Designer; the contractor or the homeowner. The Building Designer is also responsible for the accuracy of the energy compliance documentation, even if the actual work is delegated to someone else (the Documentation Author as described below). The person's telephone number is provided to facilitate response to any questions that may arise.

The Documentation Author is the person who prepared the energy compliance documentation. The Documentation Author's signature declares that the energy compliance documentation is accurate and complete. The person's telephone number is provided to facilitate response to any questions that may arise. A Documentation Author may have additional certifications, such as an Energy Analyst or a Certified Energy Plans Examiner, and shall enter their certification number in the EA# or CEPE# box.

Both the Building Designer (contractor or home owner) and Documentation Author shall sign the CF-1R ALT Form. If the CF-1R ALT Form is not signed by both the Designer and the Documentation Author, the Plans Examiner shall request that both signatures be provided on the form prior to approval for a building permit.

Is the CF-1R ALT Form submitted with the building permit application?

Building Plans are usually not required for alterations to residential buildings, so the CF-1R ALT Form shall be submitted along with the building permit application. If the CF-1R ALT Form is not submitted with the building permit application, the Plans Examiner shall request that the applicant submit a completed CF-1R ALT Form to verify compliance.

If the Building Department requires Building Plans for an alteration, the CF-1R ALT Form shall be filed on the plans. To simplify enforcement the California Energy Commission (Energy Commission) recommends that the CF-1R ALT Form be printed on the plans (electronically incorporated on the plans).

Is the correct Climate Zone listed on the CF-1R ALT Form?

The Plans Examiner shall verify the correct Climate Zone on the CF-1R ALT Form because there are different energy efficiency requirements for each specific Climate Zone. There are 16 different Climate Zones in the state of California. To verify Climate Zone by zip code or city go to the Energy Commission's website at: www.energy.ca.gov/maps/building_climate_zones.html or call the Energy Standards Hotline at 1-800-772-3300. The City of Pleasanton is in Climate Zone 12.

The CF-1R ALT Form shall be re-submitted to determine compliance with the appropriate Climate Zone if the Climate Zone is incorrect or not listed on the CF-1R ALT Form.

Does the CF-1R ALT Form have a registration number?

Under the 2008 Standards the CF-1R ALT Form submitted with the building permit application will have to be a registered form from an approved HERS Provider for certain projects. Forms submitted for alterations will require HERS registration of the CF-1R ALT Form on the following date:

- October 1, 2010 – Any Low-rise residential home requiring HERS Verification will be required to submit a registered CF-1R ALT Form.

When registration is required the applicant will submit their energy documentation to one of the approved HERS providers for registration. The approved HERS Provider will input the data of the alteration into a registry database and create a CF-1R ALT Form with a registration number, date, and seal of the HERS Provider at the bottom of each page. An approved HERS Provider may be found on the Energy Commission website at: <http://www.energy.ca.gov/HERS/>

For alterations that require registration, the Plans Examiner shall verify that the CF-1R ALT Form has a registration number at the bottom of each page. If the submitted form does not have a registration number, the Plans Examiner shall require that the applicant submit a registered form from an approved HERS Provider.

Is the MF-1R Form submitted with the building permit application?

The MF-1R Form lists the Mandatory Measures, which are minimum energy efficiency requirements that apply to all alterations. The Mandatory Measures ensure a minimum level of energy performance for all alterations to obtain energy efficiency.

For the 2008 Standards, the MF-1R Form is no longer a checklist but a summary of the Mandatory Measures. Building Plans are usually not required for alterations to residential buildings, so the MF-1R Form should be submitted along with the building permit application. If the MF-1R Form is not submitted with the building permit application, the Plans Examiner should request that the applicant submit an MF-1R Form to verify compliance with the Mandatory Measures. The MF-1R Form can be found in Appendix A of the 2008 Residential Compliance Manual at: <http://www.energy.ca.gov/title24/2008standards/>

When a Building Department requires Building Plans for an alteration, the MF-1R Form should be filed on the plans. To simplify enforcement the Energy Commission recommends that the MF-1R be printed on the plans (electronically incorporated on the plans). Having the MF-1R Form on the plans simplifies the Plan Review process and helps the Inspector identify the Mandatory Measures that must be verified in the field.

Does the CF-1R ALT Form meet the Prescriptive Requirements?

The Plans Examiner shall verify that the energy efficiency values and building measures identified on the CF-1R ALT Form meet the Prescriptive Approach requirements detailed in the subsequent sections of this Guide. If the Building Department requires Building Plans for an alteration, the Plans Examiner shall also verify that the energy efficiency values and

building measures components identified on the CF-1R ALT Form are specified on the appropriate sections of the Building Plans. For more information on verifying the energy efficiency values and components on the plans, the Plans Examiner may refer to the 2008 Residential Energy Plan Review Checklist Guide for Newly Constructed Buildings at: www.energyvideos.com

NOTE: The Plans Examiner only needs to verify compliance for the altered building component.

Envelope Alterations

Insulation for walls, ceilings, and floors

When the exterior envelope (wall, ceiling, or floor) will be altered, the Plans Examiner shall verify that the insulation values identified on the CF-1R ALT Form meet or exceed the following requirements:

- When the entire wall, ceiling, or floor is replaced, the altered assembly shall meet the insulation requirements of Component Package D (Package D) in Standards Table 151-C (see *Standards Table 151-C* on page 15).
- Alterations that involve opening the framed cavity of the wall, ceiling, or floor shall meet the mandatory minimum insulation requirements of §150. The opened cavity of the altered assembly shall meet the following insulation requirements:
 - a) Walls R-13
 - b) Ceilings R-19*
 - c) Floors R-13

* R-19 insulation shall be placed in the opened cavity only if the existing insulation was installed between the framed studs. Insulation added to the attic space above the ceiling shall meet the insulation requirements of §118(d) detailed below in *Existing Attics*.

Existing Attics

Per §118(d), when insulation is installed in an existing attic, the R-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall be at least R-38. If the accessible space in the attic is not large enough to accommodate the required R-value, then the entire attic space shall be filled with insulation (provided such installation does not violate Section 1203.2 of Title 24, Part 2).

Window area and orientation

When windows and/or skylights will be added, the Plans Examiner shall verify that the window areas identified on the CF-1R ALT Form meet the allowed fenestration area requirements of Package D:

- Alterations that add window and/or skylight area of 50 ft² or less are exempt from the Total Fenestration Area (20%) and West-Facing Fenestration Area (5%) requirements of Package D.
- Alterations that add more than 50 ft² of window and/or skylight shall meet the Total Fenestration Area (20%) and West-Facing Area (5% - Climate Zones 2, 4, and 7 through 15) requirements of Package D. The applicant shall complete the

Altered Fenestration Allowed Area table on Page 2 of the CF-1R ALT Form and identify all existing and added fenestration in this table to verify compliance with the fenestration area requirements of Package D.

NOTE: Alterations that only replace windows are exempt from the fenestration area requirements of Package D.

Front Orientation and Conditioned Floor Area (CFA)

When windows and/or skylights will be added or replaced, the Plans Examiner shall verify the front orientation of the existing home so that they may verify the correct orientation of the altered fenestration. When windows and/or skylights will be added (not replaced), the Plans Examiner shall also verify the conditioned floor area of the existing home so that they may verify compliance with the Prescriptive Approach fenestration area requirements.

U-factor and SHGC values for fenestration

When windows and/or skylights will be added or replaced, the Plans Examiner shall verify that the window U-factor and Solar Heat Gain Coefficient (SHGC) values identified on the CF-1R ALT Form meet the U-Factor and SHGC requirements of Package D in Standards Table 151-C (see *Standards Table 151-C* on page 15).

NOTE: Replacing the glass in an existing sash and frame or replacing a single sash in a multi-sash window are considered to be repairs and are exempt from the U-factor and SHGC requirements of Package D.

Exterior Shading

To obtain credit for exterior shading and reduce the SHGC of a window, the WS-3R Form shall be completed and submitted along with the CF-1R ALT Form. Because the WS-3R includes a simple addition and multiplication calculation, only a handful of exterior shading devices are considered. When a reduced SHGC value is identified on the CF-1R ALT Form, the Plans Examiner shall verify that the reduced SHGC value matches the SHGC value calculated on the WS-3R Form.

Cool Roof Values (Solar Reflectance and Thermal Emittance)

When more than 50% of the exterior surface of the roof or more than 1,000 ft² of roof will be replaced, whichever is less, the altered exterior surface area of the existing roofs shall meet the following requirements:

- For alterations to steep-sloped roofs (rise to run greater than 2:12):
 - i. Roofing products with a density of less than 5 pounds per square foot in the City of Pleasanton shall have a minimum 3-year aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum Solar Reflectance Index (SRI) of 16.
 - ii. Roofing products with a density of 5 pounds per square foot or more in the City of Pleasanton shall have a minimum 3-year aged solar reflectance of 0.15 and a minimum thermal emittance of 0.75, or a minimum SRI of 10.

When a roof alteration requires a cool roof, the Plans Examiner shall verify that the solar reflectance and thermal emittance values, or the Solar Reflectance Index value identified on the CF-1R ALT Form meets or exceeds the Prescriptive Approach requirements.

Alternatives and Exception

- For steep-sloped roofs, the following shall be considered equivalent to (an alternative) the cool roof requirements (see Cool Roof Values on page 6):
 - a) 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
 - b) Existing ducts in the attic are insulated and sealed according to Section 151(f)10; or
 - c) In the City of Pleasanton (CZ12), 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
 - d) Buildings with at least R-30 ceiling insulation; or**
 - e) Buildings with a radiant barrier in the attic meeting the requirements of Section 151(f)2; or**
 - f) Buildings that have no ducts in the attic.

- For low-sloped roofs, buildings with no ducts in the attic are exempt from the cool roof requirements (see Cool Roof Values above).

When a roof alteration is exempt from or meets an alternative to the Cool Roof requirements, the Plans Examiner shall verify that the applicable exception or alternative is identified on the CF-1R ALT Form.

Solar Reflectance and Thermal Emittance – §118(i)

The Mandatory Measures require that all roofing products installed to meet the Cool Roof requirements for alterations shall be certified to the Cool Roof Rating Council (CRRC). Roofing products that are not certified to the CRRC cannot be installed to meet the Cool Roof requirements. Certified roofing products can be found on the CRRC website at: <http://www.coolroofs.org/>

The Mandatory Measures also mandate how the applicant shall determine the Solar Reflectance and Thermal Emittance of the roofing product to meet the Cool Roof Requirements. Under the 2008 Standards, the Prescriptive Approach requires that the roofing product meet a 3-year aged solar reflectance value; not an initial solar reflectance value. The efficiency values of the roofing product shall be determined by one of the following methods (on next page):

- The roofing product is certified to the CRRC with a 3-year aged solar reflectance and thermal emittance values.
- The roofing product is certified to the CRRC with an initial solar reflectance and thermal emittance values. The applicant shall input the initial solar reflectance into the equation R_{aged} below to calculate the aged solar reflectance:

$$R_{aged} = 0.2 + 0.7(\text{initial solar reflectance} - 0.2)$$

Here is an example of how to calculate the aged solar reflectance for a CRRC certified roofing product with an initial solar reflectance of 0.77:

$$R_{aged} = 0.2 + 0.7(0.77 - 0.2)$$

$$R_{aged} = 0.2 + 0.7(0.57)$$

$$R_{aged} = 0.2 + 0.40$$

$$R_{aged} = 0.60$$

- The roofing product is certified to the CRRC with a 3-year aged solar reflectance and thermal emittance values, but these values do not meet the Prescriptive requirements (see Cool Roof Values on pages 6 and 7). As an alternative, the applicant may input the 3-year aged solar reflectance and thermal emittance into the Solar Reflectance Index (SRI) calculator to meet the SRI requirement (see Cool Roof Values on pages 6 and 7). The SRI calculator can be downloaded from the Energy Commission website at: <http://www.energy.ca.gov/title24/>

HVAC Alterations

Efficiencies of HVAC equipment

When HVAC equipment will be added or replaced, the Plans Examiner shall verify that the HVAC equipment efficiencies identified on the CF-1R ALT Form meet the minimum HVAC efficiency requirements in the 2007 Appliance Efficiency Regulations:

- Single phase air conditioners and heat pumps with an output capacity below 65,000 Btu/hr shall have a minimum 13 Seasonal Energy Efficiency Ratio (SEER).
- Central furnaces with an output capacity below 225,000 Btu/hr shall have a minimum 78% Annual Fuel Utilization Efficiency (AFUE).

When higher efficient equipment (above 13 SEER or above 78% AFUE) is identified on the CF-1R ALT Form, the Plans Examiner should highlight (circle in red pen, use a stamp, highlight, etc.) the higher HVAC values on the CF-1R ALT Form to inform the Inspector that higher HVAC efficiency values shall be verified in the field.

Non-Central Gas Heaters

Non-ducted, non-central gas fired heating equipment (wall furnace, space heater, etc.) identified on the CF-1R ALT Form shall meet the minimum efficiency requirements in Table E-2 (on next page) of the 2007 Appliance Efficiency Regulations.

Table E-2 (2007 Appliance Efficiency Regulations)

Appliance	Design Type	Capacity (Btu per hour)	Minimum AFUE (%)
Wall furnace	Fan	≤ 42,000	73
Wall furnace	Fan	> 42,000	74
Wall furnace	Gravity	≤ 10,000	59
Wall furnace	Gravity	> 10,000 ≤ 12,000	60
Wall furnace	Gravity	> 12,000 ≤ 15,000	61
Wall furnace	Gravity	> 15,000 ≤ 19,000	62
Wall furnace	Gravity	> 19,000 ≤ 27,000	63
Wall furnace	Gravity	> 27,000 ≤ 46,000	64
Wall furnace	Gravity	> 46,000	65
Floor furnace	All	≤ 37,000	56
Floor furnace	All	> 37,000	57
Room heater	All	≤ 18,000	57
Room heater	All	> 18,000 and ≤ 20,000	58
Room heater	All	> 20,000 and ≤ 27,000	63
Room heater	All	> 27,000 and ≤ 46,000	64
Room heater	All	> 46,000	65

Duct Insulation

When ducting will be added or replaced, the Plans Examiner shall verify that the duct insulation values identified on the CF-1R ALT Form meet the Prescriptive duct insulation requirements:

- 40 linear feet or less of ducts are added in unconditioned space: R-4.2 [Mandatory Measures §150(m)].
- More than 40 linear feet of ducts are added in unconditioned space: Duct insulation requirements of Package D.
- Newly installed ducted HVAC systems shall meet the Prescriptive duct insulation requirements of Package D listed in Standards Table 151-C.

When higher duct insulation values (above R-4.2) are identified on the CF-1R ALT Form, the Plans Examiner should highlight (circle in red pen, use a stamp, highlight, etc.) the higher duct insulation values on the CF-1R ALT Form to inform the Inspector that higher duct insulation values shall be verified in the field.

HERS Measures

Items listed in the HERS Verification Summary on the CF-1R ALT Form identify features that rely on diagnostic testing and independent verification by certified HERS raters to

ensure proper field installation. For this reason, it is important that the Plans Examiner make special note of all of these measures on the CF-1R ALT Form (highlight, circle in red pen, use a stamp, etc.) to alert the Inspector that a completed CF-4R Form shall be submitted before the Final Inspection is complete.

Diagnostic testing and verification by a certified HERS Rater is in addition to local building department inspections. A listing of certified HERS raters maybe found on the HERS provider website at: <http://www.energy.ca.gov/HERS/>

Duct Sealing and Testing

The following HVAC alterations will require duct sealing and testing:

- In the City of Pleasanton, whenever the entire existing duct system is replaced or a new space-conditioning system (HVAC equipment and ducting) will be added, the ducts are to be sealed and tested per §152(b)1Di.
- In the City of Pleasanton, whenever more than more than 40 linear feet of ducting will be added or replaced in unconditioned space, the ducts are to be sealed and tested per §152(b)1Dii.

Exception: Existing duct systems that are extended, which are constructed, insulated or sealed with asbestos.

- In the City of Pleasanton, whenever HVAC equipment will be added or replaced (including the air handler, outdoor condensing unit of a split system A/C or heat pump, cooling or heating coil, or the furnace heat exchanger), the ducts are to be sealed and tested per §152(b)1E.

Exceptions:

- a. Duct systems that are documented to have been previously sealed, confirmed through HERS verification in accordance with procedures in Reference Residential Appendix RA3.
- b. Duct systems with less than 40 linear feet in unconditioned space.
- c. Existing duct systems constructed, insulated or sealed with asbestos.

When applicable, the applicant shall identify that Duct Sealing and Testing is required under the HERS Verification Summary on Page 5 of the CF-1R ALT Form. The Plans Examiner shall make a special note (see *HERS Measures* on page 9) on the CF-1R ALT Form that the HERS Measure Duct Sealing and Testing is required and that a CF-4R shall be submitted before the Final Inspection.

Refrigerant Charge Measurement

The following HVAC alterations will require a refrigerant charge measurement:

- In the City of Pleasanton, whenever a new split space-conditioning system (HVAC equipment and ducting) will be added, a refrigerant charge measurement shall be verified per §151(f)7A.
- In the City of Pleasanton, whenever HVAC equipment will be added or replaced (including 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.

Exception: Heating only systems.

When applicable, the applicant shall identify that a Refrigerant Charge Measurement is required under the HERS Verification Summary on Page 5 of the CF-1R ALT Form. The Plans Examiner shall make a special note (see *HERS Measures* on page 9) on the CF-1R ALT Form that the HERS Measure Refrigerant Charge Measurement is required and that a CF-4R shall be submitted before the Final Inspection.

Airflow (Fan Flow) and Fan Watt Draw

The following HVAC alterations will require airflow and fan watt draw testing:

- In the City of Pleasanton, whenever a central space-conditioning system (HVAC equipment and ducting) is added, the airflow and fan watt draw shall be verified per §151(f)7B.
- In the City of Pleasanton, whenever the entire existing space-conditioning system (HVAC equipment and ducting) is replaced, the airflow and fan watt draw shall be verified per §152(b)1F.

When applicable, the applicant shall identify that Airflow and Fan Watt Draw testing is required under the HERS Verification Summary on Page 5 of the CF-1R ALT Form. The Plans Examiner shall make a special note (see *HERS Measures* on page 9) on the CF-1R ALT Form that the HERS Measure Airflow and Fan Watt Draw testing is required and that a CF-4R shall be submitted before the Final Inspection.

Water Heating Alterations

Efficiency and Fuel Type of Water Heating equipment

Water Heater Efficiency

When water heating equipment will be added or replaced, the Plans Examiner shall verify that the water heater efficiency (Energy Factor) identified on the CF-1R ALT Form meets the minimum water heater efficiency requirements in the 2007 Appliance Efficiency Regulations. Storage water heaters shall have an Energy Factor equal to or greater than the minimum efficiency requirements in Table F-4 (see *2007 Appliance Efficiency Regulations Table F-4* on the next page).

When a higher efficiency storage water heater (an Energy Factor greater than 0.58) is identified on the CF-1R ALT Form, the Plans Examiner should highlight (circle in red pen, use a stamp, highlight, etc.) the higher Energy Factor of the water heater on the CF-1R ALT Form to inform the Inspector that a higher Energy Factor efficiency value shall be verified in the field.

NOTE: The 2007 Appliance Efficiency Regulations may be downloaded from the Energy Commission's website at: <http://www.energy.ca.gov/appliances/>

Water Heater Type

When water heater equipment will be added or replaced, the Plans Examiner shall verify that the type of water heater identified on the CF-1R ALT Form is either gas, propane, or the existing fuel type. The Prescriptive Approach will allow an existing electric water heater to be replaced with an electric water heater, but does not allow switching from a gas water heater to an electric water heater.

Water Heater Tank Insulation

When a storage water heater with an Energy Factor below 0.58 is identified on the CF-1R ALT Form, the Plans Examiner shall verify that an external insulation blanket of R-12 or greater is specified on the CF-1R ALT Form. The Plans Examiner should highlight (circle in red pen, use a stamp, highlight, etc.) the external tank insulation of the water heater on the CF-1R ALT Form to inform the Inspector that an insulation blanket of R-12 or greater shall be verified in the field.

2007 Appliance Efficiency Regulations – Table F-4

Appliance	Minimum Energy Factor	
	Effective April 15, 1991	Effective January 20, 2004
Gas-fired storage-type water heaters	0.62 – (.0019 x V)	0.67 – (.0019 x V)
Oil-fired water heaters (storage and instantaneous)	0.59 – (.0019 x V)	0.59 – (.0019 x V)
Electric storage water heaters (excluding tabletop water heaters)	0.93 – (.00132 x V)	0.97 – (.00132 x V)
Electric tabletop water heaters	0.93 – (.00132 x V)	0.93 – (.00132 x V)
Gas-fired instantaneous water heaters	0.62 – (.0019 x V)	0.62 – (.0019 x V)
Electric instantaneous water heaters (excluding tabletop water heaters)	0.93 – (.00132 x V)	0.93 – (.00132 x V)
Heat pump water heaters	0.93 – (.00132 x V)	0.97 – (.00132 x V)
V = rated volume in gallons.		

Pipe Insulation Values (Mandatory Measures)

Any newly added or replaced piping shall meet the mandatory insulation requirements of §150(j). The Mandatory Measures require that the following piping shall be insulated to meet the insulation conductivity and minimum insulation thickness requirements listed in Standards Table 150-A and Table 150-B. The Plans Examiner should highlight (circle in red pen, use a stamp, highlight, etc.) the pipe insulation requirements listed on the MF-1R Form to inform the Inspector that the following altered piping shall be insulated:

- First 5 feet of the hot and cold water lines from the storage tank (nonrecirculating systems)
- Recirculating sections
- Piping from the heating source to the storage tank (indirect-fired systems)

Lighting Alterations

All new/replaced lighting is high efficacy lighting (i.e. fluorescent, LED) or meets applicable alternatives

High Efficacy Lighting:

LED lighting systems and GU-24 lamp holders can now be installed to meet the High Efficacy requirements under the following conditions:

- LED lighting systems must be tested by the manufacturer and certified to the Energy Commission, and meet the lamp efficacy values listed in Table 150-C (see Table 150-C below).
NOTE: LED lighting which is not listed as high efficacy on the Energy Commission database shall be classified as low efficacy.
- GU-24 lamp holders must be rated for use only with high efficacy lamps or high efficacy LED lighting that meet the lamp efficacy values listed in Table 150-C.

Standards Table 150-C

Lamp Power Rating for Non-LED Lighting (see Note 1), or System Power Rating for LED Lighting (see Notes 2, 3, and 4)	Minimum Lamp Efficacy for Non-LED Lighting, or Minimum System Efficacy for LED Lighting
5 watts or less	30 lumens per watt
over 5 watts to 15 watts	40 lumens per watt
over 15 watts to 40 watts	50 lumens per watt
over 40 watts	60 lumens per watt

Notes:

1. Determine minimum lamp efficacy category for lighting systems which are not LED using the initial rated lumens divided by the rated watts of the lamp (not including the ballast).
2. To qualify as high efficacy, an LED luminaire shall meet the minimum system efficacy requirements in Table 150-C when determined according to Reference Joint Appendix JA8, and be certified to comply with Section 119(m), and input power shall be determined according to Section 130(d)5.
3. For a Hybrid LED Luminaire to qualify as a high efficacy luminaire, all lighting systems in the luminaire shall qualify as high efficacy according to Section 150(k)1, and the LED Light Engine with Integral Heat Sink shall comply with Note 4, below.
4. To qualify as high efficacy, an LED Light Engine with Integral Heat Sink shall meet the minimum system efficacy requirements in Table 150-C when determined according to Reference Joint Appendix JA8, shall be certified to comply with Section 119(m), and input power shall be determined according to Section 130(d)5.

Mandatory Measures:

ALL added or replaced lighting in a residential building shall be high efficacy (*except Kitchen Lighting; see below and on the next page*), or depending on the location of the lighting, be controlled by a dimmer switch or a manual-on occupant sensor (occupant sensor). The Plans Examiner should highlight (circle in red pen, use a stamp, highlight, etc.) the lighting requirements listed on the MF-1R Form to inform the Inspector that the altered lighting shall meet the following requirements:

Kitchen Lighting

When lighting will added or replaced in the kitchen, all newly installed lights shall be high efficacy until a minimum of 50% of the total rated wattage of permanently installed

lighting is high efficacy. Lighting in areas adjacent to the kitchen, such as in dining and nook areas, is considered kitchen lighting if it is not separately switched from the kitchen lighting, and shall be considered when calculating the installed wattage of the kitchen lighting.

When lighting will be added or replaced inside cabinets for the purpose of illuminating only the inside of the cabinets, the total installed wattage of internal cabinet lighting shall not exceed 20 watts per linear foot of illuminated cabinets. *NOTE:* Internal cabinet lighting is not considered kitchen lighting and will not be included when calculating the installed wattage of the kitchen lighting.

Lighting in bathrooms, garages, laundry rooms, closets, and utility rooms

Lighting that will be added or replaced in these areas must be high efficacy luminaires, but low efficacy luminaires are allowed if they are controlled by a manual-on occupant sensor.

Lighting in other areas of the house (Hallways, living room, bedrooms, etc.)

Lighting that will be added or replaced in these areas must be high efficacy, but low efficacy luminaires are allowed if they are controlled by either a dimmer switch or a manual-on occupant sensor. *NOTE:* Closets less than 70 square feet are not required to be controlled by a manual-on occupant sensor, a dimmer, or be high efficacy.

Switching

Lighting that will be added or replaced shall meet the new switching requirements of the 2008 Energy Standards:

- All permanently installed high efficacy luminaires shall be switched separately from low efficacy luminaires; and
- Exhaust fans shall be switched separately from lighting system(s).

Outdoor Lighting

Permanently installed outdoor lighting (mounted/attached to the building) that will be added or replaced shall be high efficacy. Low efficacy lighting is allowed, but only when fixtures are controlled by:

- A motion sensor; and
- One of the following controls:
 - a. A photo-control; or
 - b. An astronomical time clock; or
 - c. An energy management control system (EMCS).

NOTE: Permanently installed luminaires in or around swimming pools, water features, or other locations subject to Article 680 of the California Electric Code are exempt from the high efficacy requirements and can be low-efficacy luminaires.

Standards Table 151-C

			Climate Zone															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Insulation minimums ¹	Ceilings		R38	R30	R30	R30	R30	R30	R30	R30	R30	R30	R38	R38	R38	R38	R38	
	Walls	Wood-frame walls	R21	R13	R13	R13	R13	R13	R13	R13	R13	R13	R19	R19	R19	R21	R21	R21
		Heavy mass walls	R4.76	R2.44	R2.44	R2.44	R2.44	R2.44	R2.44	R2.44	R2.44	R2.44	R4.76	R4.76	R4.76	R4.76	R4.76	R4.76
		Light mass walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Below-grade walls	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R0	R13
	Floors	Slab floor perim.	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	R7
		Raised floors	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19	R19
Concrete raised floors		R8	R8	R0	R0	R0	R0	R0	R0	R0	R0	R8	R4	R8	R8	R4	R8	
Radiant Barrier			NR	REQ	NR	REQ	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR	
Roofing Products	Low-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.55	NR	0.55	NR
		Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75	NR
	Steep Sloped (less than 5 lb/ft ²)	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR
		Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	NR
	Steep Sloped (5 lb/ft ² or more)	Aged Solar Reflectance	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Thermal Emittance		0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Fenestration	Maximum U-factor ²		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
	Maximum Solar Heat Gain Coefficient (SHGC) ³		NR	0.40	NR	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.35	NR
	Maximum Total Area		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Maximum West Facing Area		NR	5%	NR	5%	NR	NR	5%	5%	5%	5%	5%	5%	5%	5%	5%	NR
THERMAL MASS ⁴			NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	
SPACE- HEATING ^{5, 10}	Electric-resistant allowed		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
	If gas, AFUE =		MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
	If heat pump, HSPF ⁶ =		MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
SPACE- COOLING	SEER =		MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
	If split system, Refrigerant charge measurement or charge indicator display		NR	REQ	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
Central Forced Air Handlers	Cooling Airflow and Watt Draw		NR	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	NR	
	Central Fan Integrated Ventilation System Watt Draw		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
DUCTS	Duct sealing		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	
	Duct Insulation		R-6	R-6	R-6	R-6	R-6	R-4.2	R-4.2	R-4.2	R-6	R-6	R-6	R-6	R-6	R-8	R-8	R-8
WATER-HEATING			System shall meet Section 151(f)8 or Section 151(b)1															

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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 ¹	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 Cell Value 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 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 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 Standard U-factor from Table 151-B, C or D for each different assembly Name or type.
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

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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	Existing Fenestration Area	Fenestration Area Removed	Fenestration Area Added	Total Area Allowed (A x B)	Proposed Area ² (E-D) + C
Total Fenestration Area (ft ²)		.20					≥
West Fenestration Area ¹ (Required In CZ's 2, 4 & 7 -15)		.05					≥
<ol style="list-style-type: none"> 1. West Fenestration Area includes west-sloping skylights and any skylights with a pitch less than 1:12. 2. West facing glazing area removed cannot be "counted" twice." In order to distribute the west glazing area removed to the other orientations, input the west glazing area removed in the Total Fenestration Area row, column D. 3. Include the Proposed Area of the West facing fenestration in both Area columns below. 4. 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. 							

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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"/>			
	<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 $(0.2 + 0.7(p_{initial} - 0.2))$ 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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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, and may not exceed 50 gallons. 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 <input type="checkbox"/> YES <input type="checkbox"/> NO YES: In Climate Zone 16 in Component Packages D, R-7 insulation is required.
Heated Slab Insulation <input type="checkbox"/> YES <input type="checkbox"/> 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 <input type="checkbox"/> YES <input type="checkbox"/> 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.

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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)1Dii 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.

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

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Residential

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Site Address:

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§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

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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.