2013 Residential Energy Standards Overview

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Goals of this Course

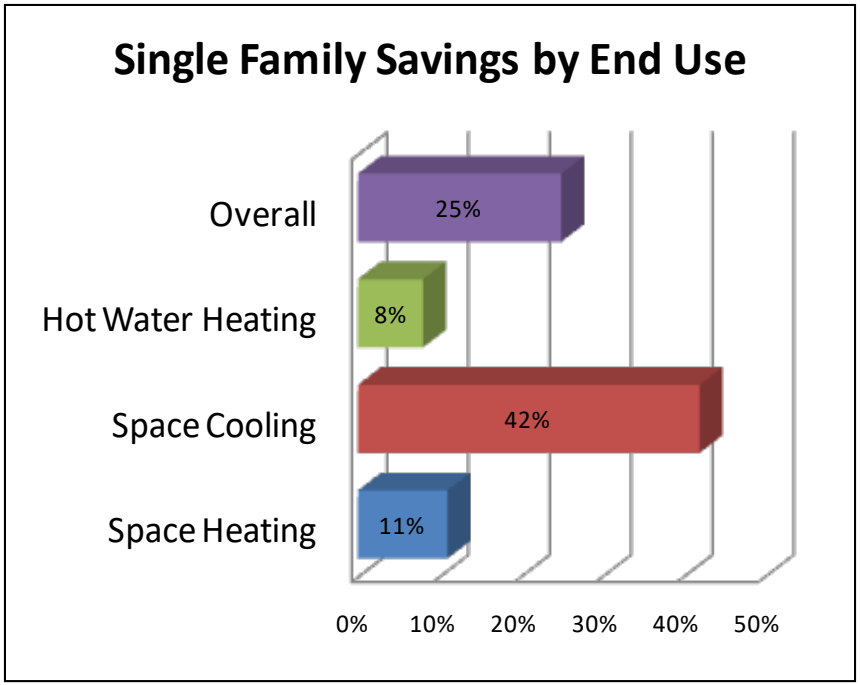
- Identify/clarify the major changes in the 2013 Energy Standards for residential newly constructed buildings, additions, and alterations ***(in sequential order of §)***
- Simplify compliance and enforcement for the 2013 changes during:
  - ➢ The plan review process (Plans Examiners)
    - ✓ Identify what to look for on the compliance forms and building plans
  - ➢ The field inspection process (Field Inspectors)
    - ✓ Identify which building components and forms to verify

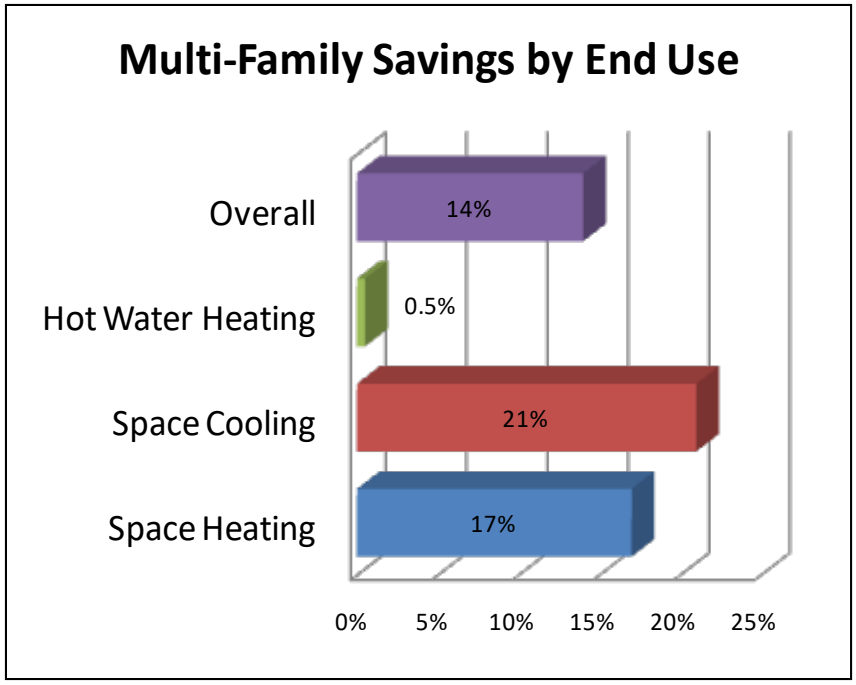
QUESTIONS…

- **Question sessions**
  - 30 minutes before lunch
  - 30 minutes before end
    - Raise hand to ask question
- **All other questions**
  - Type into Q and A box at anytime
    - List of Q and A from webinar will be posted online

Let's discuss the 2013 Building Energy Efficiency Standards

2013 Residential Energy Savings

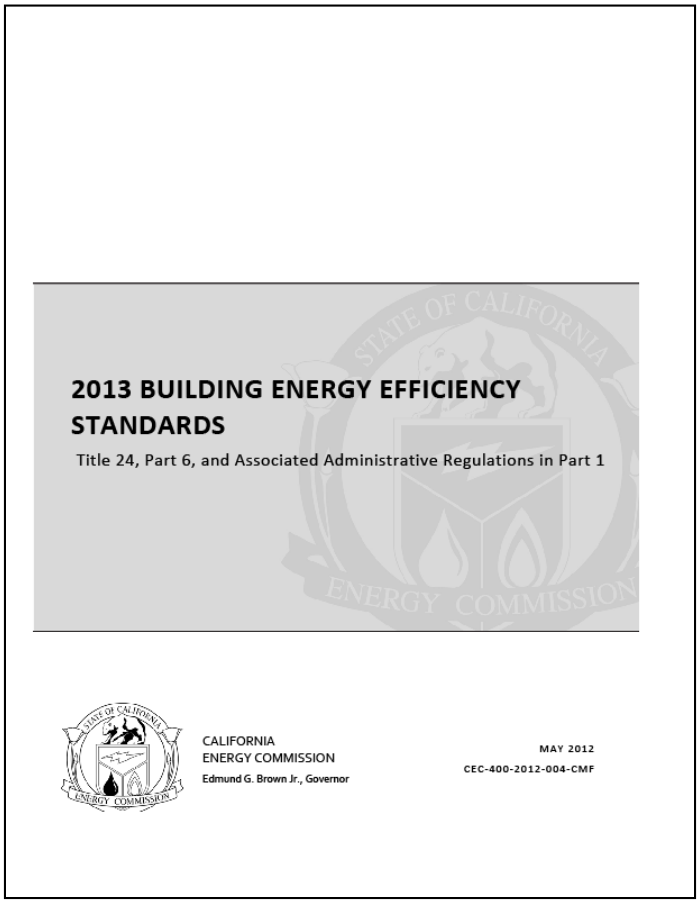




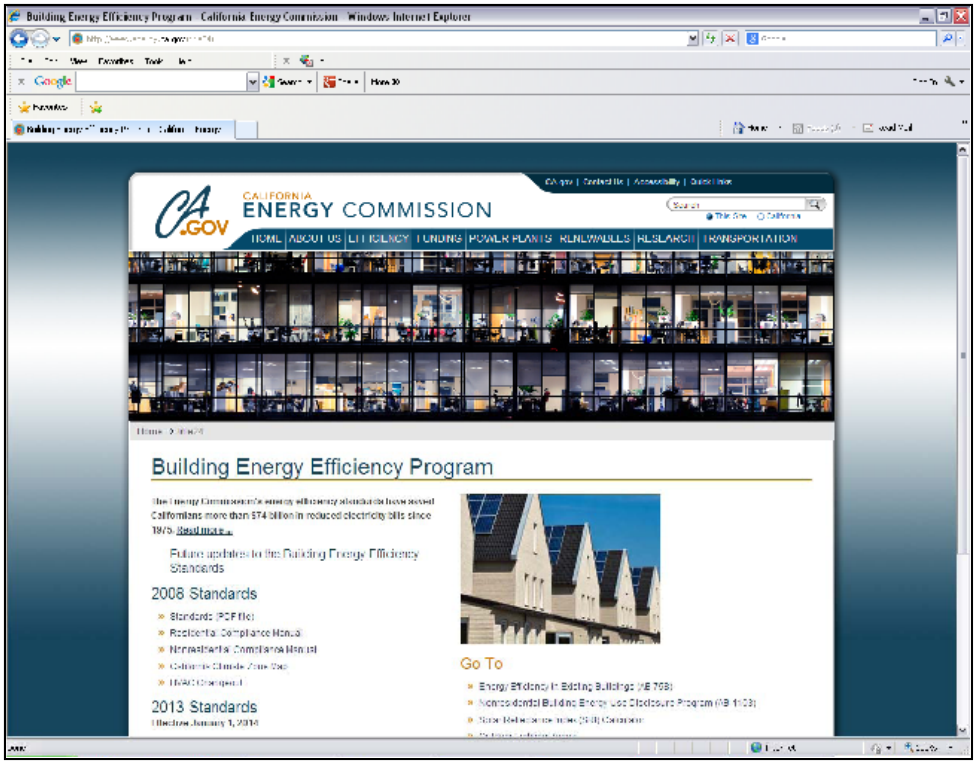
* Will save 23.6 GWH/yr; 1.1 Mtherms/yr; 35 MW (first year)

2013 Building Energy Efficiency Standards

- **Effective on July 1, 2014**
  - Building permit applications submitted on or after this date
- **Master plans for tract homes affected:**
  - Need to resubmit if permits pulled on/after effective date



2013 Documents



- Building Energy Efficiency Standards
- Residential Compliance Manual
- Reference Appendices
- All docs. available online at:

  www.energy.ca.gov/title24

Summary of Major Changes

- **Section #s** *(see cheat sheet handout)*
- **Forms nomenclature**
  - CF-6R → CF2R
  - CF-4R → CF3R
- **Mandatory HERS testing**
- **Solar Zone ready reqs.**
- **Prescriptive reqs. more stringent**
  - Package D → Package A
  - Package C + E removed
- **HERS Testing for Additions**
  - Existing conditions – Performance Approach

** See summary of changes handout*

Let's talk about the changes to the Administrative Regulations §10-103

Signatures, Registration, Additions/Alterations

2008 – *§10-103(a)1, 3, 5*

- Doc. Author signature on CF-1R
- Registration req. for HERS related forms
- CF-1R req. for alterations and additions at permit/plan review
- CF-6R req. for alterations and additions at Final

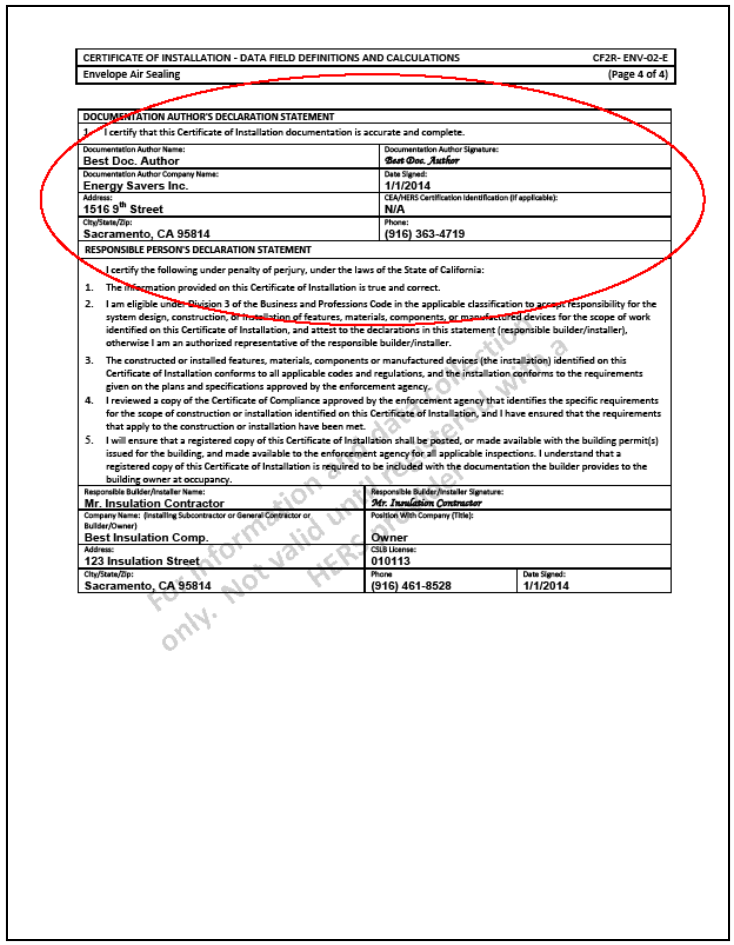
2013 – *§10-103(a)1, 3, 5*

- Doc. Author signature on CF2R and CF3R forms
- Registration req. for ALL forms if HERS testing is required (i.e. LTG, ENV, etc. CF2R's)
- Can exempt alterations and additions < 300 ft^2 from CF1R
- Can exempt alterations and additions < 300 ft^2 from CF2R

§10-103 and the Plans Examiner

- Bldg. Dept. may not require CF1R for alterations ONLY if HERS Testing is not required:
  - Window/skylight replacement/installations
  - Water heating replacements/installations
  - Re-roofs
- Bldg. Dept. may not require CF1R for additions < 300 ft^2 ONLY if HERS Testing is not required.
- "Shorthand" versions of CF1R available for alterations and additions

§10-103 and the Field Inspector



CERTIFICATE OF INSTALLATION - DATA FIELD DEFINITIONS AND CALCULATIONS — CF2R- ENV-02-E
Envelope Air Sealing — (Page 4 of 4)

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Installation documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Best Doc. Author	*Best Doc. Author*
Documentation Author Company Name:	Date Signed:
Energy Savers Inc.	1/1/2014
Address:	CEA/HERS Certification Identification (If applicable):
1516 9th Street	N/A
City/State/Zip:	Phone:
Sacramento, CA 95814	(916) 363-4719

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Installation is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code in the applicable classification to accept responsibility for the system design, construction, or installation of features, materials, components, or manufactured devices for the scope of work identified on this Certificate of Installation, and attest to the declarations in this statement (responsible builder/installer), otherwise I am an authorized representative of the responsible builder/installer.
3. The constructed or installed features, materials, components or manufactured devices (the installation) identified on this Certificate of Installation conforms to all applicable codes and regulations, and the installation conforms to the requirements given on the plans and specifications approved by the enforcement agency.
4. I reviewed a copy of the Certificate of Compliance approved by the enforcement agency that identifies the specific requirements for the scope of construction or installation identified on this Certificate of Installation, and I have ensured that the requirements that apply to the construction or installation have been met.
5. I will ensure that a registered copy of this Certificate of Installation shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Builder/Installer Name:	Responsible Builder/Installer Signature:	
Mr. Insulation Contractor	*Mr. Insulation Contractor*	
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)	Position With Company (Title):	
Best Insulation Comp.	Owner	
Address:	CSLB License:	
123 Insulation Street	010113	
City/State/Zip:	Phone	Date Signed:
Sacramento, CA 95814	(916) 461-8528	1/1/2014

- Verify Doc. Author signature on CF2R and CF3R forms
  - ➢ Will be captured in Registry for most docs.
- Verify that LTG, ENV, PLMB, etc. CF2R forms are registered when HERS testing required
- Bldg. Dept. may not require CF2R for alterations and additions < 300 ft^2 ONLY if HERS Testing is not required

Let's talk about the changes to the Energy Standards – Mandatory Measures

Which § are the Mandatory Measures?

2008 Standards

- §110 to §119 (res and nonres)
  - Min. HVAC efficiencies
  - Pool and Spa
  - Fenestration cert./labeling
  - Lighting Controls
  - Cool Roof cert./labeling
- Section 150 (all res)
- § in TABLE 100-A

2013 Standards

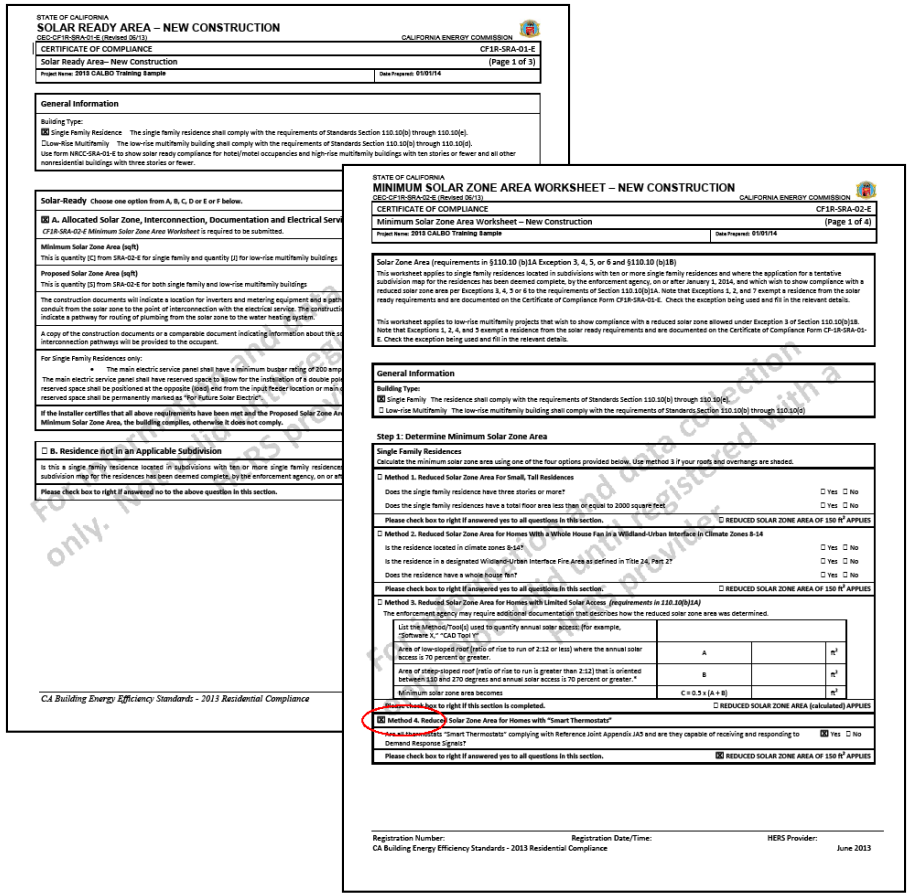
- §110.0 to §110.10
  - Solar Ready
- §150.0
  - Duct Leakage
  - Airflow/Fan watt draw
  - ASHRAE 62.2
- § in TABLE 100.0-A

Solar Ready

- New Mandatory measures in §110.10
- Applicable to subdivisions ≥ 10 homes and all low-rise multi-family buildings
- Requirements for:
  - Solar zone (location and area)
  - Orientation and Shading
  - Interconnection pathways
  - Structural Design Loads
  - Main electrical service panel *(single family only)*

§110.10 and the Plans Examiner

- **CF1R-SRA-01 form**
  - ➢ Ident. if meeting solar zone reqs. or exception
- **CF1R-SRA-02 form**
  - ➢ Solar zone worksheet req. if not exempt
- **Verify specs. on plans**


STATE OF CALIFORNIA
SOLAR READY AREA – NEW CONSTRUCTION
CEC-CF1R-SRA-01-E (Revised 06/13)
CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF COMPLIANCE
CF1R-SRA-01-E
Solar Ready Area– New Construction
(Page 1 of 3)
Project Name: 2013 CALBO Training Sample
Date Prepared: 01/01/14
General Information
Building Type:
☒ Single Family Residence The single family residence shall comply with the requirements of Standards Section 110.10(b) through 110.10(e).
☐ Low-Rise Multifamily The low-rise multifamily building shall comply with the requirements of Standards Section 110.10(b) through 110.10(d).
Use form NRCC-SRA-01-E to show solar ready compliance for hotel/motel occupancies and high-rise multifamily buildings with ten stories or fewer and all other nonresidential buildings with three stories or fewer.
Solar-Ready Choose one option from A, B, C, D or E or F below.
☒ A. Allocated Solar Zone, Interconnection, Documentation and Electrical Servi
CF1R-SRA-02-E Minimum Solar Zone Area Worksheet is required to be submitted.
Minimum Solar Zone Area (sqft)
This is quantity [C] from SRA-02-E for single family and quantity [J] for low-rise multifamily buildings
Proposed Solar Zone Area (sqft)
This is quantity [S] from SRA-02-E for both single family and low-rise multifamily buildings
The construction documents will indicate a location for inverters and metering equipment and a path
conduit from the solar zone to the point of interconnection with the electrical service. The construct
indicate a pathway for routing of plumbing from the solar zone to the water heating system.
A copy of the construction documents or a comparable document indicating information about the s
interconnection pathways will be provided to the occupant.
For Single Family Residences only:
• The main electric service panel shall have a minimum busbar rating of 200 amp
The main electric service panel shall have reserved space to allow for the installation of a double pol
reserved space shall be positioned at the opposite (load) end from the input feeder location or main
reserved space shall be permanently marked as "For Future Solar Electric".
If the installer certifies that all above requirements have been met and the Proposed Solar Zone Ar
Minimum Solar Zone Area, the building complies, otherwise it does not comply.
☐ B. Residence not in an Applicable Subdivision
Is this a single family residence located in subdivisions with ten or more single family residence
subdivision map for the residences has been deemed complete, by the enforcement agency, on or af
Please check box to right if answered no to the above question in this section.
CA Building Energy Efficiency Standards - 2013 Residential Compliance
STATE OF CALIFORNIA
MINIMUM SOLAR ZONE AREA WORKSHEET – NEW CONSTRUCTION
CEC-CF1R-SRA-02-E (Revised 06/13)
CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF COMPLIANCE
CF1R-SRA-02-E
Minimum Solar Zone Area Worksheet – New Construction
(Page 1 of 4)
Project Name: 2013 CALBO Training Sample
Date Prepared: 01/01/14
Solar Zone Area (requirements in §110.10 (b)1A Exception 3, 4, 5, or 6 and §110.10 (b)1B)
This worksheet applies to single family residences located in subdivisions with ten or more single family residences and where the application for a tentative subdivision map for the residences has been deemed complete, by the enforcement agency, on or after January 1, 2014, and which wish to show compliance with a reduced solar zone area per Exceptions 3, 4, 5 or 6 to the requirements of Section 110.10(b)1A. Note that Exceptions 1, 2, and 7 exempt a residence from the solar ready requirements and are documented on the Certificate of Compliance Form CF1R-SRA-01-E. Check the exception being used and fill in the relevant details.
This worksheet applies to low-rise multifamily projects that wish to show compliance with a reduced solar zone allowed under Exception 3 of Section 110.10(b)1B. Note that Exceptions 1, 2, 4, and 5 exempt a residence from the solar ready requirements and are documented on the Certificate of Compliance Form CF-1R-SRA-01-E. Check the exception being used and fill in the relevant details.
General Information
Building Type:
☒ Single Family The residence shall comply with the requirements of Standards Section 110.10(b) through 110.10(e).
☐ Low-rise Multifamily The low-rise multifamily building shall comply with the requirements of Standards Section 110.10(b) through 110.10(d)
Step 1: Determine Minimum Solar Zone Area
Single Family Residences
Calculate the minimum solar zone area using one of the four options provided below. Use method 3 if your roofs and overhangs are shaded.
☐ Method 1. Reduced Solar Zone Area For Small, Tall Residences
Does the single family residence have three stories or more? ☐ Yes ☐ No
Does the single family residences have a total floor area less than or equal to 2000 square feet ☐ Yes ☐ No
Please check box to right if answered yes to all questions in this section. ☐ REDUCED SOLAR ZONE AREA OF 150 ft² APPLIES
☐ Method 2. Reduced Solar Zone Area for Homes With a Whole House Fan in a Wildland-Urban Interface in Climate Zones 8-14
Is the residence located in climate zones 8-14? ☐ Yes ☐ No
Is the residence in a designated Wildland-Urban Interface Fire Area as defined in Title 24, Part 2? ☐ Yes ☐ No
Does the residence have a whole house fan? ☐ Yes ☐ No
Please check box to right if answered yes to all questions in this section. ☐ REDUCED SOLAR ZONE AREA OF 150 ft² APPLIES
☐ Method 3. Reduced Solar Zone Area for Homes with Limited Solar Access (requirements in 110.10(b)1A)
The enforcement agency may require additional documentation that describes how the reduced solar zone area was determined.
List the software/Tool(s) used to quantify annual solar access: (for example, "Software X," "CAD Tool Y")
Area of low-sloped roof (ratio of rise to run of 2:12 or less) where the annual solar access is 70 percent or greater. A ft²
Area of steep-sloped roof (ratio of rise to run is greater than 2:12) that is oriented between 110 and 270 degrees and annual solar access is 70 percent or greater.* B ft²
Minimum solar zone area becomes C = 0.5 x (A + B) ft²
Please check box to right if this section is completed. ☐ REDUCED SOLAR ZONE AREA (calculated) APPLIES
☒ Method 4. Reduced Solar Zone Area for Homes with "Smart Thermostats"
Are all thermostats "Smart Thermostats" complying with Reference Joint Appendix JA5 and are they capable of receiving and responding to Demand Response Signals? ☒ Yes ☐ No
Please check box to right if answered yes to all questions in this section. ☒ REDUCED SOLAR ZONE AREA OF 150 ft² APPLIES
Registration Number: Registration Date/Time: HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance June 2013

** Forms must be registered if HERS req.*

§110.10 and the Field Inspector

- **Verify at Final**
  - Refer to CF1R-SRA for method of compliance
    - Solar zone (unobstructed)
    - Electrical panel *(single family only)*
- **Verify of solar installed**
  - CF2R-SPV form
  - CF2R-STH form (H_2O heating)

** Forms must be registered if HERS req.*

Insulation

2008 – *§150(a), (c), (d)*

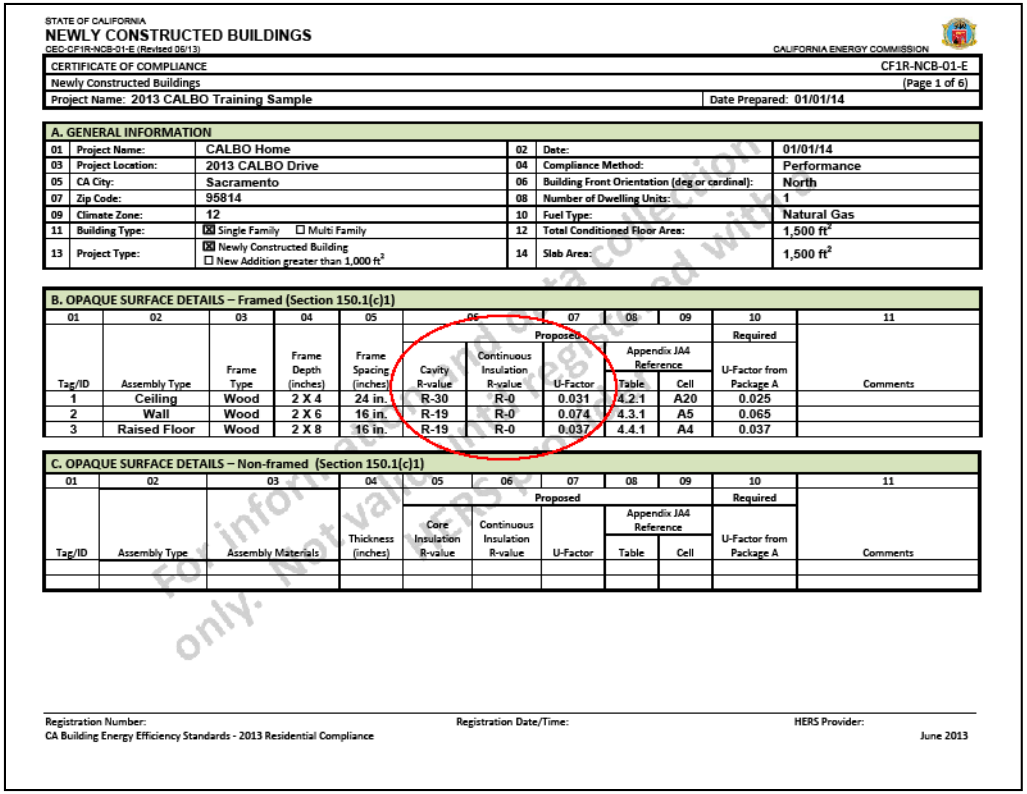
- Ceiling insulation
  - Minimum R-19 required
- Wall Insulation
  - Minimum R-13 required
- Raised floor insulation
  - Minimum R-13 Required
- Weighted avg. permitted to meet equivalent U-factor

2013 – *§150.0(a), (c), (d)*

- Ceiling insulation
  - Minimum R-30 required
- Wall insulation
  - Minimum R-13 req. in 2 X 4
  - Minimum R-19 req. in 2 X 6
- Raised floor insulation
  - Minimum R-19 required

§150.0(a) and the Plans Examiner

- **Still verify R-values on CF1R** *(Section B)*
  - Opaque Surface Details
  - Must meet or exceed mandatory minimums
- **Still verify R-values on building plans**
  - Structural/Architectural Plans



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 06/13)
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 1 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/14

A. GENERAL INFORMATION

01	Project Name:	CALBO Home	02	Date:	01/01/14
03	Project Location:	2013 CALBO Drive	04	Compliance Method:	Performance
05	CA City:	Sacramento	06	Building Front Orientation (deg or cardinal):	North
07	Zip Code:	95814	08	Number of Dwelling Units:	1
09	Climate Zone:	12	10	Fuel Type:	Natural Gas
11	Building Type:	☒ Single Family ☐ Multi Family	12	Total Conditioned Floor Area:	1,500 ft²
13	Project Type:	☒ Newly Constructed Building ☐ New Addition greater than 1,000 ft²	14	Slab Area:	1,500 ft²

B. OPAQUE SURFACE DETAILS – Framed (Section 150.1(c)1)

01	02	03	04	05	06	07	08	09	10	11
					Proposed				Required	
Tag/ID	Assembly Type	Frame Type	Frame Depth (inches)	Frame Spacing (inches)	Cavity R-value	Continuous Insulation R-value	U-Factor	Appendix JA4 Reference: Table	Appendix JA4 Reference: Cell	U-Factor from Package A	Comments
1	Ceiling	Wood	2 X 4	24 in.	R-30	R-0	0.031	4.2.1	A20	0.025	
2	Wall	Wood	2 X 6	16 in.	R-19	R-0	0.074	4.3.1	A5	0.065	
3	Raised Floor	Wood	2 X 8	16 in.	R-19	R-0	0.037	4.4.1	A4	0.037	

C. OPAQUE SURFACE DETAILS – Non-framed (Section 150.1(c)1)

01	02	03	04	05	06	07	08	09	10	11
				Proposed					Required	
Tag/ID	Assembly Type	Assembly Materials	Thickness (inches)	Core Insulation R-value	Continuous Insulation R-value	U-Factor	Appendix JA4 Reference: Table	Appendix JA4 Reference: Cell	U-Factor from Package A	Comments

Registration Number: | Registration Date/Time: | HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance | June 2013

§150.0(a) and the Field Inspector

- **Verify installed R-values:**
  - Still verify wall and raised floor insulation at Insulation Stage
  - Still verify ceiling insulation at Final
  - Values must meet or exceed mandatory minimums
- **Verify R-values on CF2R-ENV-03-E form**
  - Must be registered if HERS testing req.

Pipe Insulation

2008 – §150(j)2, 3

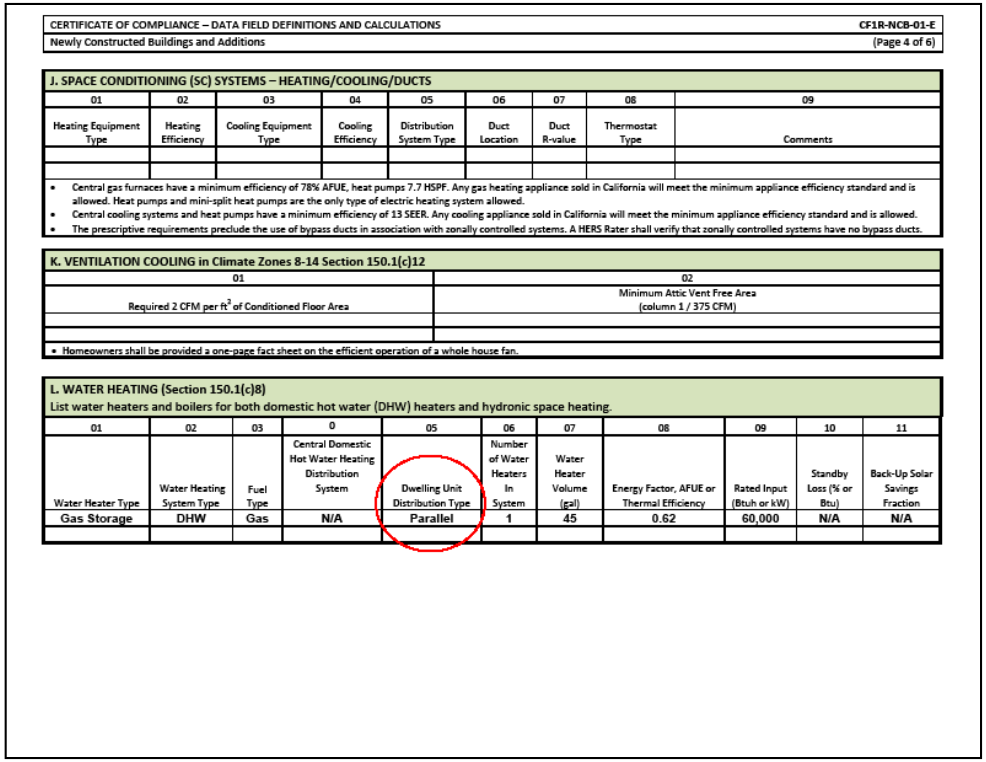
- Insulation req. for:
  - Recirc. sections
  - First 5 ft. of hot and cold
  - Cooling systems lines; etc.
- Insulation thickness in TABLE 150-A and 150-B
- Outside refrigerant line shall include a vapor retardant facing

2013 – *§150.0(j)2, 3*

- Insulation req. for:
  - All piping ¾ inch or greater
  - Piping from heating source to the kitchen
- Insulation thickness in TABLE 120.3-A
- Outside refrigerant line shall have Class I or Class II vapor retardant

§150.0(j)2, 3 and the Plans Examiner

- **Still verify dist. type on CF1R** *(Section L)*
  - ➢ Water Heating details
- **Piping credits may be HERS verified for more credit**
- **Verify mandatory note block on plans**
  - ➢ Can req. TABLE 120.3-A on Plans



CERTIFICATE OF COMPLIANCE – DATA FIELD DEFINITIONS AND CALCULATIONS — CF1R-NCB-01-E
Newly Constructed Buildings and Additions — (Page 4 of 6)

J. SPACE CONDITIONING (SC) SYSTEMS – HEATING/COOLING/DUCTS

01 Heating Equipment Type	02 Heating Efficiency	03 Cooling Equipment Type	04 Cooling Efficiency	05 Distribution System Type	06 Duct Location	07 Duct R-value	08 Thermostat Type	09 Comments

- Central gas furnaces have a minimum efficiency of 78% AFUE, heat pumps 7.7 HSPF. Any gas heating appliance sold in California will meet the minimum appliance efficiency standard and is allowed. Heat pumps and mini-split heat pumps are the only type of electric heating system allowed.
- Central cooling systems and heat pumps have a minimum efficiency of 13 SEER. Any cooling appliance sold in California will meet the minimum appliance efficiency standard and is allowed.
- The prescriptive requirements preclude the use of bypass ducts in association with zonally controlled systems. A HERS Rater shall verify that zonally controlled systems have no bypass ducts.

K. VENTILATION COOLING in Climate Zones 8-14 Section 150.1(c)12

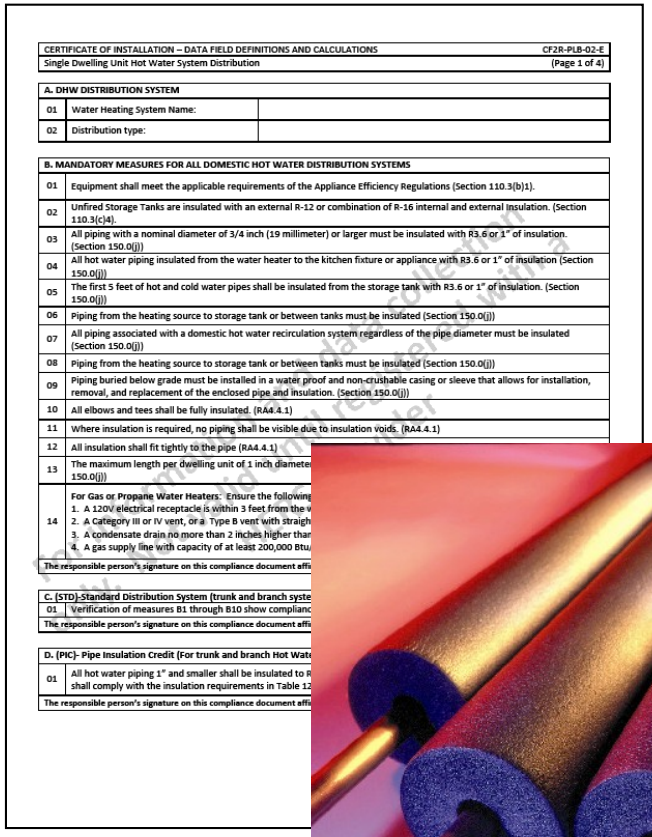
01 Required 2 CFM per ft^2 of Conditioned Floor Area	02 Minimum Attic Vent Free Area (column 1 / 375 CFM)

- Homeowners shall be provided a one-page fact sheet on the efficient operation of a whole house fan.

L. WATER HEATING (Section 150.1(c)8)
List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating.

01 Water Heater Type	02 Water Heating System Type	03 Fuel Type	0 Central Domestic Hot Water Heating Distribution System	05 Dwelling Unit Distribution Type	06 Number of Water Heaters In System	07 Water Heater Volume (gal)	08 Energy Factor, AFUE or Thermal Efficiency	09 Rated Input (Btuh or kW)	10 Standby Loss (% or Btu)	11 Back-Up Solar Savings Fraction
Gas Storage	DHW	Gas	N/A	Parallel	1	45	0.62	60,000	N/A	N/A

§150.0(j)2, 3 and the Field Inspector



CERTIFICATE OF INSTALLATION – DATA FIELD DEFINITIONS AND CALCULATIONS — CF2R-PLB-02-E
Single Dwelling Unit Hot Water System Distribution — (Page 1 of 4)

A. DHW DISTRIBUTION SYSTEM		
01	Water Heating System Name:	
02	Distribution type:	

B. MANDATORY MEASURES FOR ALL DOMESTIC HOT WATER DISTRIBUTION SYSTEMS	
01	Equipment shall meet the applicable requirements of the Appliance Efficiency Regulations (Section 110.3(b)1).
02	Unfired Storage Tanks are insulated with an external R-12 or combination of R-16 internal and external insulation. (Section 110.3(c)4).
03	All piping with a nominal diameter of 3/4 inch (19 millimeter) or larger must be insulated with R3.6 or 1" of insulation. (Section 150.0(j))
04	All hot water piping insulated from the water heater to the kitchen fixture or appliance with R3.6 or 1" of insulation (Section 150.0(j))
05	The first 5 feet of hot and cold water pipes shall be insulated from the storage tank with R3.6 or 1" of insulation. (Section 150.0(j))
06	Piping from the heating source to storage tank or between tanks must be insulated (Section 150.0(j))
07	All piping associated with a domestic hot water recirculation system regardless of the pipe diameter must be insulated (Section 150.0(j))
08	Piping from the heating source to storage tank or between tanks must be insulated (Section 150.0(j))
09	Piping buried below grade must be installed in a water proof and non-crushable casing or sleeve that allows for installation, removal, and replacement of the enclosed pipe and insulation. (Section 150.0(j))
10	All elbows and tees shall be fully insulated. (RA4.4.1)
11	Where insulation is required, no piping shall be visible due to insulation voids. (RA4.4.1)
12	All insulation shall fit tightly to the pipe (RA4.4.1)
13	The maximum length per dwelling unit of 1 inch diameter 150.0(j))
14	For Gas or Propane Water Heaters: Ensure the following 1. A 120V electrical receptacle is within 3 feet from the w 2. A Category III or IV vent, or a Type B vent with straigh 3. A condensate drain no more than 2 inches higher than 4. A gas supply line with capacity of at least 200,000 Btu

The responsible person's signature on this compliance document affi

C. (STD)-Standard Distribution System (trunk and branch syste	
01	Verification of measures B1 through B10 show compliance

The responsible person's signature on this compliance document affi

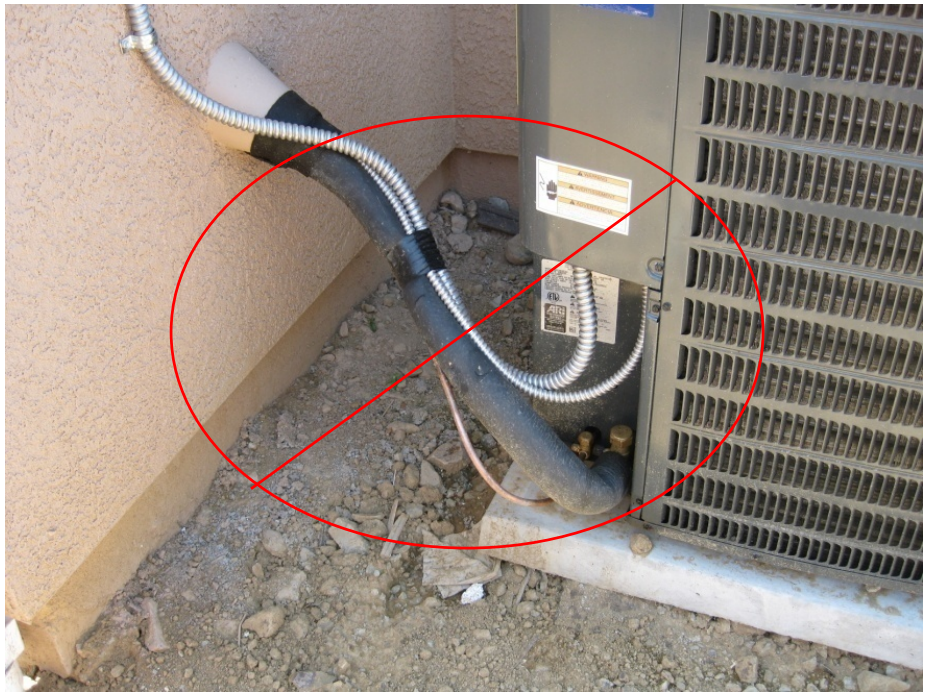
D. (PIC)- Pipe Insulation Credit (For trunk and branch Hot Wat	
01	All hot water piping 1" and smaller shall be insulated to R shall comply with the insulation requirements in Table 12

The responsible person's signature on this compliance document affi

- **Still verify installed pipe insulation at Rough Frame:**
  - ¾ inch or greater
  - Piping to the kitchen, etc.
  - Should be 1 inch thick for most piping
- **CF2R-PLB-02-E form completed**
  - PLB-20 forms req. if credits HERS verified
  - All forms must be registered when HERS testing is req.

§150.0(j)2, 3 and the Field Inspector cont.

- **Verify insulation for outside refrigerant is:**
  - ➢ Covered with a Class I or Class II vapor retardant
    - Nonperforated aluminum foil
    - Paint with 0.1 < perm rating ≤ 1.0
  - ➢ OR, verify thickness is equivalent to Class I or Class II



Lighting – High efficacy

2008 – *§150(k)1*

- Efficacy determined by lamp efficacy
  - TABLE 150-C
- High efficacy must:
  - Be pin based
  - Have electronic ballast, etc.
- Low efficacy if:
  - Contains medium screw base socket, line-voltage socket, etc.

2013 – *§150.0(k)1A*

- SIMPLIFIED
- Efficacy determined by luminaire type:
  - TABLE 150.0-A
  - Use TABLE 150.0-B (lamp efficacy) if not listed in TABLE 150.0-A
    - Lumens per watt increased

Lighting – Bathrooms

2008 – *§150(k)10*

- Grouped with reqs. for garages, laundry rooms, closets, and utility rooms
- Lighting must be:
  - High efficacy

    OR
  - Low efficacy lighting allowed if controlled by manual-on occupancy sensor

2013 – *§150.0(k)5*

- Solo reqs.
- A minimum of one high efficacy luminaire must be installed
- All other lighting must be:
  - High efficacy

    OR
  - Controlled by a vacancy sensor

Lighting – Garages, Laundry, etc.

2008 – *§150(k)10*

- Reqs. for bathrooms, garages, laundry rooms, closets, and utility rooms
- Lighting must be:
  - High efficacy

    OR
  - Low efficacy lighting allowed if controlled by manual-on occupancy sensor

2013 – *§150.0(k)6*

- Reqs. for bathrooms separate
- Lighting must be:
  - High efficacy

    AND
  - Lighting must be controlled by a vacancy sensor
- NO exceptions

Lighting – IC/AT Rated

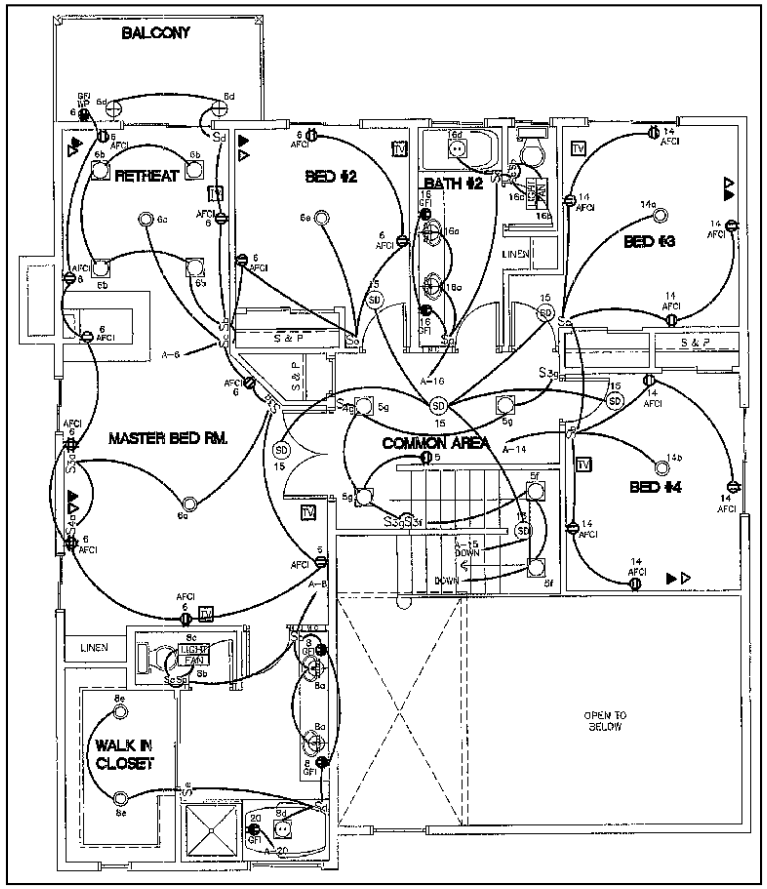
2008 – *§150(k)12*

- Lighting recessed into insulated ceilings must be:
  - IC rated (zero clearance)
  - AT rated (airtight – leakage)
  - Sealed with a gasket or caulk between the housing and ceiling

2013 – *§150.0(k)8*

- ALL recessed lighting must be IC and AT rated, and sealed
- Ballast for recessed compact fluorescent lighting must be certified to the CEC to qualify as high efficacy

§150.0(k) and the Plans Examiner



- **Still verify lighting and controls on electrical plans:**
  - Verify at least one high efficacy fixture in each bathroom
  - Verify high efficacy fixtures and vacancy controls in garages, laundry rooms, and utility rooms

§150.0(k) and the Field Inspector

- **Verify high efficacy lighting installed at rough frame:**
  - Bathroom (at least one)
  - Garages, laundry/utility rooms
- **Verify vacancy sensors installed at Final**
  - Bathroom (low efficacy)
  - Garages, laundry/utility rooms
- **CF2R-LTG-01-E form req.**
  - Must be registered if HERS testing req.

** All recessed cans must be IC and AT rated*

HVAC – Duct Insulation

2008 – *§150(m)1*

- Minimum R-4.2 duct insulation required
- Insulation not required if ducts are enclosed entirely in conditioned space:
  - Directly conditioned
  - Indirectly conditioned (attic with roof insulation; not ceiling insulation)

2013 – *§150.0(m)1*

- Minimum R-6 duct insulation required
- Insulation required for ducts located in indirectly conditioned space
- Insulation not required if:
  - Ducts are enclosed entirely in directly conditioned; AND
  - Duct location verified by a HERS rater

HVAC – Duct Leakage

2008 – *§151(f)10*

- Prescriptive requirement
- Allowed leakage applicable across the board (single family, multi-family, etc.)
  - Less than 6% leakage criteria at Final
  - Less than 4% at Rough-In (no air handler)

2013 – *§150.0(m)11*

- Mandatory measure
- Allowed leakage project dependent:
  - Single Family/Townhomes
    - 6% or less w/air handler
    - 4% or less w/out air handler
  - Multifamily
    - 12% or less
    - 6% or less to outside

HVAC – Airflow/Fan Watt

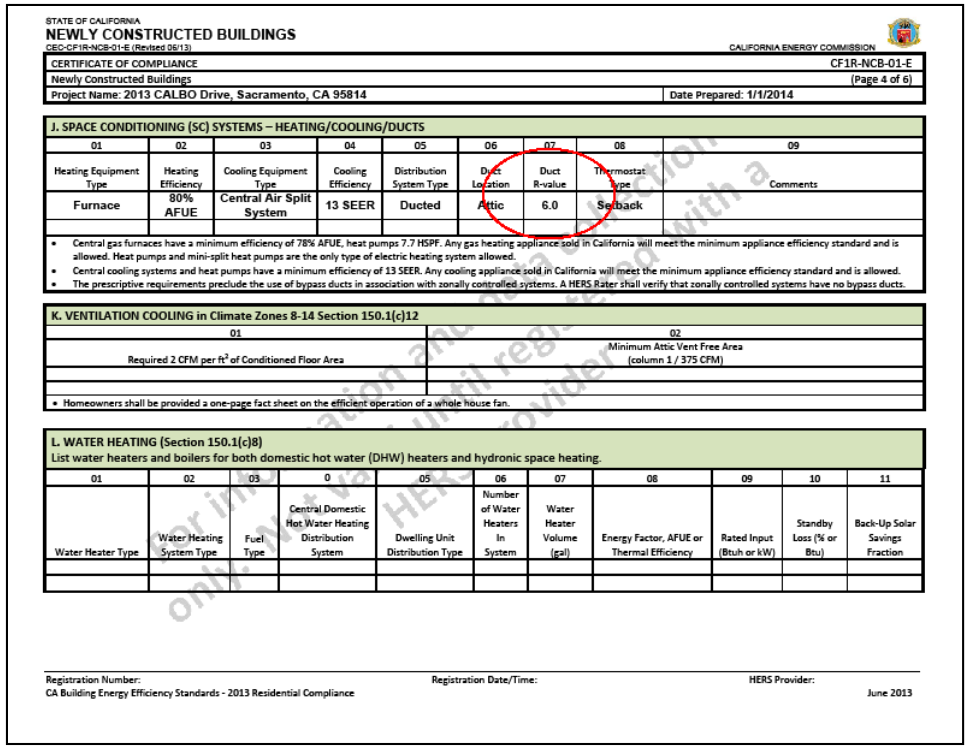
2008 – *§151(f)7A*

- Prescriptive requirement
  - Climate Zones 10 through 15
- Required only for split A/Cs and heat pumps
- Minimum airflow of 350 CFM/ton
- Fan watt draw of 0.58 W/CFM or less

2013 – *§150.0(m)13*

- Mandatory measure
  - ALL Climate Zones
- Required for ducted systems, including split AND packaged A/Cs and heat pumps
- Return duct and grille sizing alternative in:
  - TABLE 150.0-C; and
  - TABLE 150.0-D

§150.0(m) and the Plans Examiner



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 06/13) — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 4 of 6)
Project Name: 2013 CALBO Drive, Sacramento, CA 95814	Date Prepared: 1/1/2014

J. SPACE CONDITIONING (SC) SYSTEMS – HEATING/COOLING/DUCTS

01 Heating Equipment Type	02 Heating Efficiency	03 Cooling Equipment Type	04 Cooling Efficiency	05 Distribution System Type	06 Duct Location	07 Duct R-value	08 Thermostat Type	09 Comments
Furnace	80% AFUE	Central Air Split System	13 SEER	Ducted	Attic	6.0	Setback	

- Central gas furnaces have a minimum efficiency of 78% AFUE, heat pumps 7.7 HSPF. Any gas heating appliance sold in California will meet the minimum appliance efficiency standard and is allowed. Heat pumps and mini-split heat pumps are the only type of electric heating system allowed.
- Central cooling systems and heat pumps have a minimum efficiency of 13 SEER. Any cooling appliance sold in California will meet the minimum appliance efficiency standard and is allowed.
- The prescriptive requirements preclude the use of bypass ducts in association with zonally controlled systems. A HERS Rater shall verify that zonally controlled systems have no bypass ducts.

K. VENTILATION COOLING in Climate Zones 8-14 Section 150.1(c)12

01 Required 2 CFM per ft² of Conditioned Floor Area	02 Minimum Attic Vent Free Area (column 1 / 375 CFM)

- Homeowners shall be provided a one-page fact sheet on the efficient operation of a whole house fan.

L. WATER HEATING (Section 150.1(c)8)
List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating.

01 Water Heater Type	02 Water Heating System Type	03 Fuel Type	0 Central Domestic Hot Water Heating Distribution System	05 Dwelling Unit Distribution Type	06 Number of Water Heaters In System	07 Water Heater Volume (gal)	08 Energy Factor, AFUE or Thermal Efficiency	09 Rated Input (Btuh or kW)	10 Standby Loss (% or Btu)	11 Back-Up Solar Savings Fraction

Registration Number: | Registration Date/Time: | HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance — June 2013

- **Verify on CF1R form:**
  - Duct insulation is R-6 or greater *(Section J)*
  - Verify mandatory HERS testing *(Section M)*
- **Can require a mechanical schedule on the building plans**

§150.0(m) and the Field Inspector

- **Verify R-6 or greater duct insulation installed**
  - Must match/exceed CF1R
  - Verify on CF2R-MCH-01-H
- **Verify CF2R and CF3R forms for mandatory HERS testing**
  - Duct leakage *(MCH-20)*
  - Airflow/Fan Watt *(MCH-22 and MCH-23)*

Water Heating

2008 – *§150(n)*

- Reqs. for recirc. loops serving multiple dwelling units
  - Air release valve
  - Backflow prevention
  - Pump priming
  - Isolation valves
  - Etc.

2013 – *§150.0(n)*

- Gas/propane water heaters shall have:
  - 120V elect. receptacle within 3 ft
  - Category III or IV vent, or Type B vent w/ straight pipe
  - Condensate drain no higher than 2 in. above water heater base
  - Gas supply line with capacity of at least 200,000 Btu/hr.

§150.0(n) and the Plans Examiner

- **Verify mandatory measures on building plans**
  - ➢ Not identified on CF1R
  - ➢ Can require a water heating schedule

    OR
  - ➢ Require mandatory measure note block

Mandatory Measures Note Block for Water Heating (Title 24, Part 6)

Water heating systems using gas or propane water heaters to serve individual dwelling units shall include the following components:

1. A 120V electrical receptacle that is within 3 feet from the water heater and accessible to the water heater with no obstructions; and
2. A Category III or IV vent, or a Type B vent with straight pipe between the outside termination and the space where the water heater is installed; and
3. A condensate drain that is no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance, and
4. A gas supply line with a capacity of at least 200,000 Btu/hr.

§150.0(n) and the Field Inspector

- **Verify at Final**
  - ➢ 120V elect. receptacle within 3 ft
  - ➢ Category III or IV vent, or Type B vent w/ straight pipe
  - ➢ Condensate drain no higher than 2 in. above water heater base
  - ➢ Gas supply line with capacity of at least 200,000 Btu/hr.

** Listed on **CF2R-PLB-02-E** form*

Ventilation – ASHRAE 62.2

2008 – *§150(o)*

- Meet ASHRAE Standard 62.2 – Indoor Air Quality
- Local exhaust fans req. in:
  - Bathrooms – 50 cfm
  - Kitchens – 100 cfm
- Whole building exhaust fan req.
- Prescriptive "sizing" alt. may be used for airflow

2013 – *§150.0(o)*

- Whole building exhaust fan airflow must be verified by a HERS Rater
- Use of continuously operating central forced air system air handlers in CFI systems for whole-house ventilation prohibited

§150.0(o) and the Plans Examiner

Ventilation Schedule

Local Ventilation Rate Summary	
Kitchens Fan Flow = 100 cfm Sone Rating = 3 sone Duct Size (diameter) = 4 inches Duct Length = 10 feet	Bathrooms Fan Flow = 50 cfm Sone Rating = 3 sone Duct Size (diameter) = 4 inches Duct Length = 15 feet
Whole-Building Ventilation	
Location = Master Bathroom Fan Flow = 70 cfm (continuous) Sone Rating = 1 sone Duct Size (diameter) = 4 inches Duct Length = 20 feet	Whole House Fan Calculation = $Q_{fan} = 0.01A_{floor} + 7.5(N_{br} + 1)$ Where: Q_{fan} = fan flow rate, (cfm) A_{floor} = conditioned floor area, ft^2 N_{br} = number of bedrooms; not to be less than one $Q_{fan} = 0.01(2,500\ ft) + 7.5(5 + 1)$ $Q_{fan} = 25 + 7.5(6)$ $Q_{fan} = 25 + 45$ $Q_{fan} = 70$ cfm

- **Still verify specifications for ventilation:**
  - ➢ Local exhaust requirements
    - 50 cfm or greater in ALL bathrooms
    - 100 cfm or greater in ALL kitchens
  - ➢ Whole building exhaust fan
    - Based on CFA, # of rooms, etc.
- **Can require a ventilation schedule on plans**

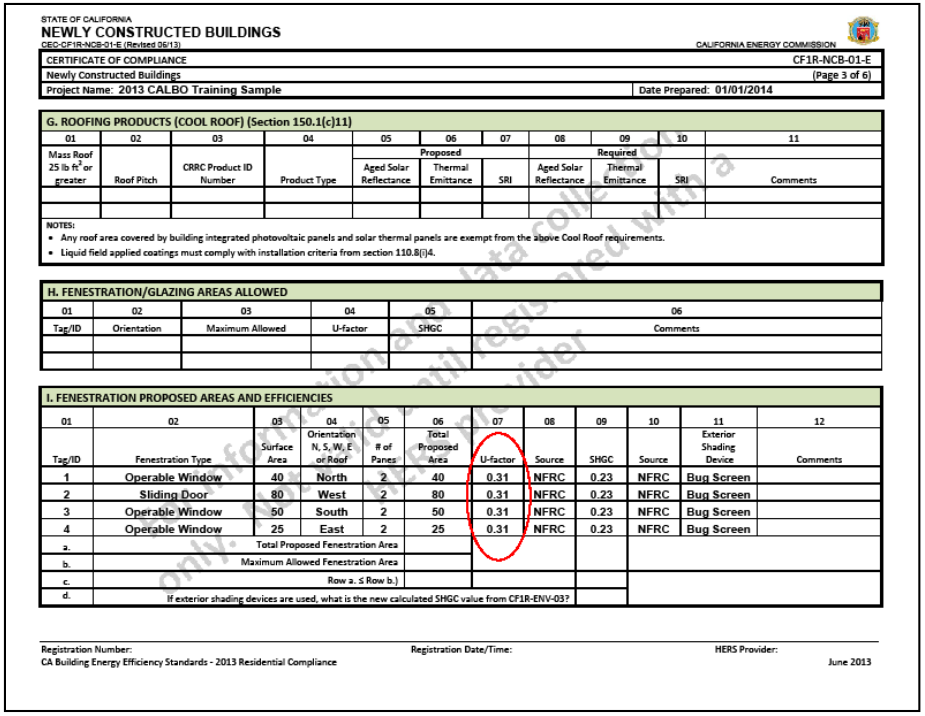
§150.0(o) and the Field Inspector

- **Still verify exhaust fan housings installed at Rough Frame**
  - In bathrooms and kitchens
- **Still verify exhaust fan airflow on motor at Final**
- **Verify CF2R and CF3R forms for mandatory HERS testing**
  - MCH-27 form req.
  - Inspector may rely on HERS rater results for verification

Fenestration

- New mandatory measure in §150.0(q)
- Windows and skylights must have a U-factor of 0.58 or less
  - Can calculate weighted average U-factor to meet requirement
- EXCEPTION:
  - Up to 10 ft^2 of fenestration or 0.5% of the CFA, whichever is greater, may be exempt from the maximum U-factor requirement of 0.58

§150.0(q) and the Plans Examiner



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 05/13) — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 3 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/2014

G. ROOFING PRODUCTS (COOL ROOF) (Section 150.1(c)11)

01	02	03	04	05	06	07	08	09	10	11
Mass Roof 25 lb ft² or greater	Roof Pitch	CRRC Product ID Number	Product Type	Proposed Aged Solar Reflectance	Proposed Thermal Emittance	Proposed SRI	Required Aged Solar Reflectance	Required Thermal Emittance	Required SRI	Comments

NOTES:
- Any roof area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof requirements.
- Liquid field applied coatings must comply with installation criteria from section 110.8(i)4.

H. FENESTRATION/GLAZING AREAS ALLOWED

01	02	03	04	05	06
Tag/ID	Orientation	Maximum Allowed	U-factor	SHGC	Comments

I. FENESTRATION PROPOSED AREAS AND EFFICIENCIES

01	02	03	04	05	06	07	08	09	10	11	12
Tag/ID	Fenestration Type	Surface Area	Orientation N, S, W, E or Roof	# of Panes	Total Proposed Area	U-factor	Source	SHGC	Source	Exterior Shading Device	Comments
1	Operable Window	40	North	2	40	0.31	NFRC	0.23	NFRC	Bug Screen	
2	Sliding Door	80	West	2	80	0.31	NFRC	0.23	NFRC	Bug Screen	
3	Operable Window	50	South	2	50	0.31	NFRC	0.23	NFRC	Bug Screen	
4	Operable Window	25	East	2	25	0.31	NFRC	0.23	NFRC	Bug Screen	
a.	Total Proposed Fenestration Area										
b.	Maximum Allowed Fenestration Area										
c.	Row a. ≤ Row b.)										
d.	If exterior shading devices are used, what is the new calculated SHGC value from CF1R-ENV-03?										

Registration Number: — Registration Date/Time: — HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance — June 2013

- **Still verify U-factor values on CF1R** *(Section I)*
  - ➢ Cannot exceed 0.58 (unless avg. or exempt)
- **Still verify U-factor values on Structural or Architectural plans**
  - ➢ Can require a window schedule on building plans

§150.0(q) and the Field Inspector

- **Still verify U-factor values at Rough Frame**
  - NFRC label
  - Cannot exceed 0.58 (unless avg. or exempt)
- **Verify U-factor on CF2R-ENV-01-E form**
  - Must be registered if HERS testing req.

Let's talk about the changes to the Energy Standards – Prescriptive Measures (New construction)

Prescriptive Method – Overall Changes

2008 – *§151(f)*

- Component Package C
  - Electric home (no gas avail.)
  - Reqs. in TABLE 151-B
- Component Package D
  - Gas home
  - Reqs. in TABLE 151-C
- Component Package E
  - Gas home w/metal windows
  - Reqs. in TABLE 151-D

2013 – *§150.1(c)*

- Package C removed
  - Performance Approach req. for electric resistance heating
- Component Package D now A
  - Component Package A is the only prescriptive approach
  - Reqs. in TABLE 150.1-A
- Package E removed

Insulation

2008 – *§151(f)1*

- Package D requirements:
  - Cavity insulation reqs. only for framed assembly types
    - R-value
  - Below grade wall insulation req. only in Cl. Zn. 13

2013 – *§150.1(c)1*

- Package A requirements:
  - Must meet R-value or U-factor
  - Cavity and continuous insulation requirements for walls
    - 2 X 6 walls must meet U-factor req.
  - Below grade insulation required in ALL Cl. Zns. (interior or exterior)

§150.1(c)1 and the Plans Examiner

STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 06/13)
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 1 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/14

A. GENERAL INFORMATION

01	Project Name:	CALBO Home	02	Date:	01/01/14
03	Project Location:	2013 CALBO Drive	04	Compliance Method:	Performance
05	CA City:	Sacramento	06	Building Front Orientation (deg or cardinal):	North
07	Zip Code:	95814	08	Number of Dwelling Units:	1
09	Climate Zone:	12	10	Fuel Type:	Natural Gas
11	Building Type:	☒ Single Family ☐ Multi Family	12	Total Conditioned Floor Area:	1,500 ft^2
13	Project Type:	☒ Newly Constructed Building ☐ New Addition greater than 1,000 ft^2	14	Slab Area:	1,500 ft^2

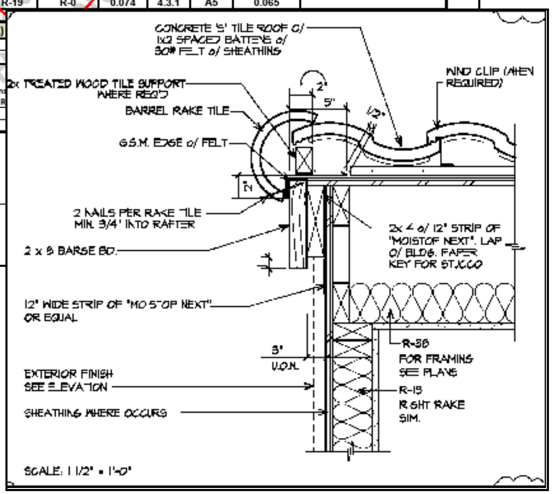
B. OPAQUE SURFACE DETAILS – Framed (Section 150.1(c)1)

01	02	03	04	05	06		07	08	09	10	11
					Proposed					Required	
				Frame Spacing (inches)				Appendix JA4 Reference			
Tag/ID	Assembly Type	Frame Type	Frame Depth (inches)		Cavity R-value	Continuous Insulation R-value	U-Factor	Table	Cell	U-Factor from Package A	Comments
1	Ceiling	Wood	2 X 4	16 in.	R-38	R-0	0.026	4.2.1	A9	0.025	
2	Wall – North	Wood	2 X 4	16 in.	R-15	R-4	0.065	4.3.1	C4	0.065	
3	Wall – South	Wood	2 X 4	16 in.	R-15	R-4	0.065	4.3.1	C4	0.065	
4	Wall – East	Wood	2 X 6	16 In.	R-19	R-0	0.074	4.3.1	A5	0.065	
5	Wall – West	Wood	2 X 6	16 in.	R-19	R-0	0.074	4.3.1	A5	0.065	

C. OPAQUE SURFACE DETAILS – Non-framed (Section 150.1(c)1)

01	02	03	04
Tag/ID	Assembly Type	Assembly Materials	Thickness (inches)

Registration Number:
CA Building Energy Efficiency Standards - 2013 Residential Compliance



- **Most applicants use Performance Approach**
  - ➢ Penalized if insulation R-values are less, or if assembly U-factor is more
  - ➢ May see more continuous insulation, OR trade off
- **Still verify insulation values on CF1R** ***(Section B, C, D)***
- **Still verify values match Structural/Architectural plans**

** Remember mand. insulation reqs.*

§150.1(c)1 and the Field Inspector

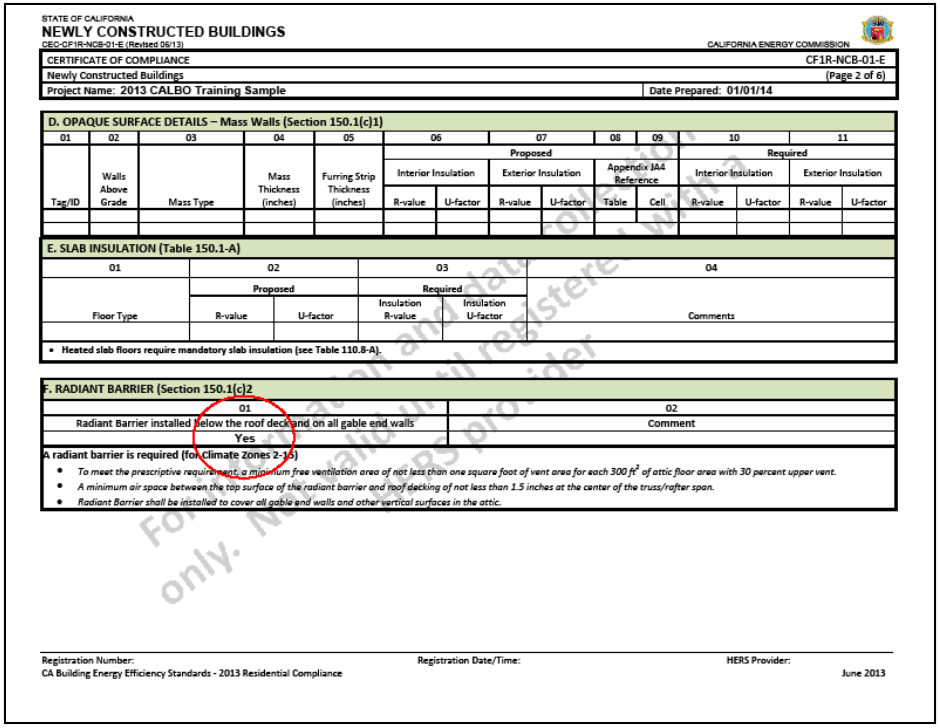
** CF2R-ENV-02-E req. for env. sealing*

- **Verify installed R-values:**
  - Below grade insulation at Foundation Stage
  - Continuous insulation at Rough Frame
  - Still verify wall, ceiling, raised floor insulation at Insulation Stage
- **Verify R-values on CF2R-ENV-03-E form**
  - Registered if HERS req.

Radiant Barrier

2008 – *§151(f)2*	2013 – *§150.1(c)2*
• Required in Climate Zones 2, 4, and 8 through 15 • Specified in "Special Features" section on CF-1R • Verified on CF-6R-ENV-01 form • Must be installed under roof deck and on gable ends and walls	• Required in Climate Zones 2 through 15 • Specified in Section F of the CF1R • Verified separately on CF2R-ENV-04-E form ➢ Including free ventilation area requirements

§150.1(c)2 and the Plans Examiner



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 05/13) — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 2 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/14

D. OPAQUE SURFACE DETAILS – Mass Walls (Section 150.1(c)1)

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

E. SLAB INSULATION (Table 150.1-A)

01	02		03		04
	Proposed		Required		
Floor Type	R-value	U-factor	Insulation R-value	Insulation U-factor	Comments

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

F. RADIANT BARRIER (Section 150.1(c)2

01	02
Radiant Barrier installed below the roof deck and on all gable end walls	Comment
Yes	

A radiant barrier is required (for Climate Zones 2-15)

- *To meet the prescriptive requirement, a minimum free ventilation area of not less than one square foot of vent area for each 300 ft² of attic floor area with 30 percent upper vent.*
- *A minimum air space between the top surface of the radiant barrier and roof decking of not less than 1.5 inches at the center of the truss/rafter span.*
- *Radiant Barrier shall be installed to cover all gable end walls and other vertical surfaces in the attic.*

Registration Number: | Registration Date/Time: | HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance — June 2013

- **Most applicants use Performance Approach**
  - ➢ Penalized if radiant barrier not modeled when req.
- **Still verify if modeled on CF1R** *(Section F)*
- **Verify specifications on Structural/Architectural plans (footnote for roof)**

§150.1(c)2 and the Field Inspector

- **Still verify installation when modeled at Rough Frame**
  - ➢ Must cover gable ends and walls
- **Verify specifications on CF2R-ENV-04-E**
  - ➢ Must be registered if HERS testing required.

Fenestration

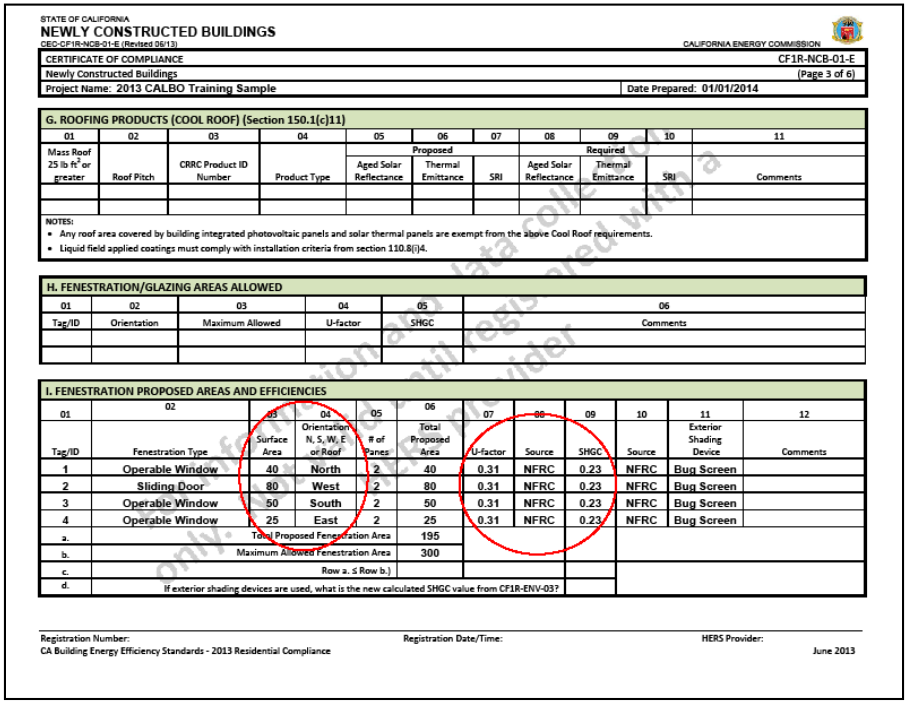
2008 – *§151(f)3, 4*

- Package D requirements:
  - 0.40 U-factor in all Cl. Zns.
  - 0.40/0.35 SHGC in Cl. Zns. 2 and 4 through 15
  - 20% maximum glazing area
  - 5% west facing glazing area in Cl. Zns. 2, 4, and 6 through 15

2013 – *§150.1(c)3, 4*

- Package A requirements:
  - 0.32 U-factor in all Cl. Zns.
  - 0.25 SHGC in Cl. Zns. 2, 4, and 6 through 16
  - 5% west facing glazing area in Cl. Zns. 2, 4, and 6 through 16

§150.1(c)3, 4 and the Plans Examiner



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 06/13) — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE — CF1R-NCB-01-E
Newly Constructed Buildings — (Page 3 of 6)
Project Name: 2013 CALBO Training Sample — Date Prepared: 01/01/2014

G. ROOFING PRODUCTS (COOL ROOF) (Section 150.1(c)11)

01	02	03	04	05	06	07	08	09	10	11
Mass Roof 25 lb ft² or greater	Roof Pitch	CRRC Product ID Number	Product Type	Proposed: Aged Solar Reflectance	Proposed: Thermal Emittance	Proposed: SRI	Required: Aged Solar Reflectance	Required: Thermal Emittance	Required: SRI	Comments

NOTES:
- Any roof area covered by building integrated photovoltaic panels and solar thermal panels are exempt from the above Cool Roof requirements.
- Liquid field applied coatings must comply with installation criteria from section 110.8(j)4.

H. FENESTRATION/GLAZING AREAS ALLOWED

01	02	03	04	05	06
Tag/ID	Orientation	Maximum Allowed	U-factor	SHGC	Comments

I. FENESTRATION PROPOSED AREAS AND EFFICIENCIES

01	02	03	04	05	06	07	08	09	10	11	12
Tag/ID	Fenestration Type	Surface Area	Orientation N, S, W, E or Roof	# of Panes	Total Proposed Area	U-factor	Source	SHGC	Source	Exterior Shading Device	Comments
1	Operable Window	40	North	2	40	0.31	NFRC	0.23	NFRC	Bug Screen	
2	Sliding Door	80	West	2	80	0.31	NFRC	0.23	NFRC	Bug Screen	
3	Operable Window	50	South	2	50	0.31	NFRC	0.23	NFRC	Bug Screen	
4	Operable Window	25	East	2	25	0.31	NFRC	0.23	NFRC	Bug Screen	
a.	Total Proposed Fenestration Area				195						
b.	Maximum Allowed Fenestration Area				300						
c.	Row a. ≤ Row b.)										
d.	If exterior shading devices are used, what is the new calculated SHGC value from CF1R-ENV-03?										

Registration Number: — Registration Date/Time: — HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance — June 2013

** Remember mand. 0.58 U-factor*

- **Most applicants use Performance Approach**
  - ➢ Penalized if window efficiencies or areas are higher
- **Still verify efficiencies and areas on CF1R** *(Section I)*
- **Still verify values match Structure/Architecture plans**
  - ➢ Can require window schedule on plans

§150.1(c)3, 4 and the Field Inspector

- **Still verify efficiencies and areas at Rough Frame**
  - NFRC label for efficiency
  - Both eff. and area must match the CF1R
- **May verify eff. and area on CF2R-ENV-01-E form**
  - Must be registered if HERS testing req.

HVAC – Refrigerant Charge

2008 – *§151(f)7*

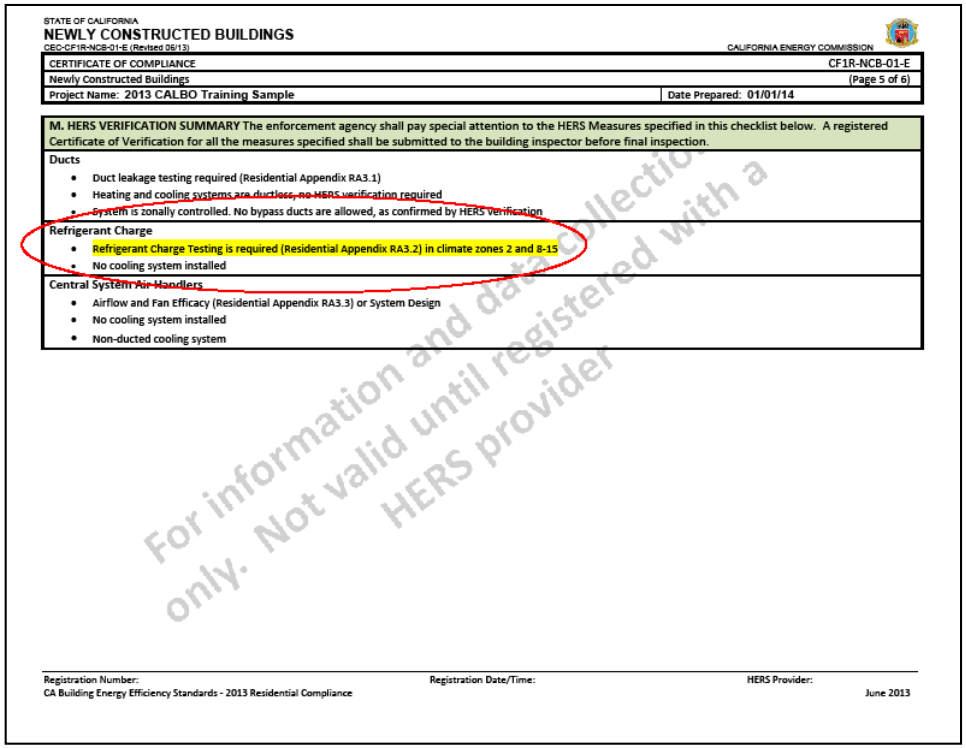
- Prescriptive requirement
- Req. for only for ducted split central A/C and heat pump systems
  - Min. airflow of 300 cfm/ton
  - CID alternative
- Req. in Cl. Zns. 2, and 8 through 15

2013 – *§150.1(c)7*

- Req. for air cooled A/Cs and air source heat pumps:
  - Ducted split systems
  - Ducted packaged systems
  - Mini splits systems
- Exception for packaged systems if manuf. verified charge (CF2R req.)
- Winter Setup test method

§150.0(c)7 and the Plans Examiner

- **Most applicants use Performance Approach**
  - ➢ Prescriptive; not Mandatory
  - ➢ Penalized if not modeled when req.
- **Still verify if modeled on CF1R** *(Section M)*
- **Can require a mechanical schedule on the building plans**



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 05/13) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 5 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/14

M. HERS VERIFICATION SUMMARY The enforcement agency shall pay special attention to the HERS Measures specified in this checklist below. A registered Certificate of Verification for all the measures specified shall be submitted to the building inspector before final inspection.

Ducts
- Duct leakage testing required (Residential Appendix RA3.1)
- Heating and cooling systems are ductless, no HERS verification required
- System is zonally controlled. No bypass ducts are allowed, as confirmed by HERS Verification

Refrigerant Charge
- Refrigerant Charge Testing is required (Residential Appendix RA3.2) in climate zones 2 and 8-15
- No cooling system installed

Central System Air Handlers
- Airflow and Fan Efficacy (Residential Appendix RA3.3) or System Design
- No cooling system installed
- Non-ducted cooling system

Registration Number: Registration Date/Time: HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance June 2013

§150.0(c)7 and the Field Inspector

STATE OF CALIFORNIA

REFRIGERANT CHARGE VERIFICATION

CEC-CF3R-MCH-25-H (Revised 06/13) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF VERIFICATION		CF3R-MCH-25
Refrigerant Charge Verification		(Page 1 of 3)
Project Name: 2013 CALBO Training Sample	Enforcement Agency: Local Jurisdiction	Permit Number: NC-010113
Dwelling Address: 2013 CALBO Drive	City Sacramento	Zip Code 95814

A. System Information
HERS Rater to field-verify all system information, discrepancies to be noted by overwriting entry.

01	System Identification or Name	HVAC 1
02	System Location or Area Served	Zone 1
03	Condenser (or package unit) make or brand	Cool Manuf.
04	Condenser (or package unit) model number	CU-2013421
05	Nominal Cooling Capacity (tons) of Condenser	2.5
06	Condenser (or package unit) serial number	4568721
07	Refrigerant Type	R-22
08	Other Refrigerant Type (if applicable)	N/A
09	Project Type	Completely New
10	Charge Indicator Display (CID) Status (Note: Even systems with a CID must have refrigerant charge verified by installer)	System does not have CID Installed
11	Is the system of a type that the minimum airflow can be verified using an approved measurement procedure (RA3.3 or RA3.2.2.7)?	Yes
12	Is the system of a type that approved refrigerant charge verification procedures can be used to verify compliance with the refrigerant charge verification requirements when temperatures are ≥ 55°F (RA3.2.2, or RA1)?	Yes
13	Date of HERS Rater Refrigerant Charge Verification for this system	01/01/14
14	Refrigerant charge verification method used by installer.	Superheat
15	Person who performed the Refrigerant Charge Verification reported on the Certificate of Installation:	HVAC Guys
16	HERS Verification Compliance Requirement Status	System qualifies for Group Sampling
17	Refrigerant charge verification method used by HERS Rater.	Superheat

Standard Charge Verification Procedure – CF3R-MCH-25a - Superheat Method

B. Metering Device Verification – HERS Rater is required to visually field verify all information from CF2R
Superheat Method can only be used on systems that do not have a variable metering device.

01	Refrigerant metering device	Fixed orifice
02	Superheat Method applicability status	Superheat Method applicable to system

C. Instrument Calibration – HERS Raters are required to calibrate their diagnostic tools.
Procedures for instrument calibration are given in Reference Residential Appendix RA3.2.2 and RA3.2.2.2

01	Date of Digital Refrigerant Gauge Calibration	01/01/14
02	Date of Digital Thermocouple Calibration	01/01/14
03	Digital Refrigerant Gauge Calibration Status	Current
04	Digital Thermocouple Calibration Status	Current

Registration Number: Registration Date/Time: HERS Provider:

CA Building Energy Efficiency Standards - 2013 Residential Compliance June 2013

- **Verify CF2R and CF3R forms when modeled on CF1R**
  - Standard measurement *(MCH-25a/b)*
  - Weigh-in *(MCH-25c)*
  - Winter set up *(MCH-25e)*
  - Packaged units *(MCH-25f)*
    - CF2R required only

Cool Roofs

2008 – *§151(f)12*

- Package D requirements:
  - Steep-sloped roofs < 5 lb/ft^2:
    - 0.20 SR and 0.75 TE, or 16 SRI in Cl. Zns. 10 – 15
  - Steep-sloped roofs ≥ 5 lb/ft^2:
    - 0.15 SR and 0.75 TE, or 10 SRI in ALL Cl. Zns.
  - Low-sloped roofs:
    - 0.55 SR and 0.75 TE, or 64 SRI in Cl. Zns. 13 and 15

2013 – *§150.1(c)11*

- Package A requirements:
  - Density criteria removed
  - Steep-sloped roofs:
    - 0.20 SR and 0.75 TE, or 16 SRI in Cl. Zns. 10 - 15
  - Low-sloped roofs:
    - 0.63 SR and 0.75 TE, or 75 SRI in Cl. Zns. 13 and 15

§150.1(c)11 and the Plans Examiner

- **Most applicant use Performance Approach**
  - Penalized if cool roof not modeled, or if values are lower, when req.
- **Still verify efficiencies if modeled on CF1R** *(Section G)*
- **Verify specifications on Structural/Architectural plans (footnote for roof)**

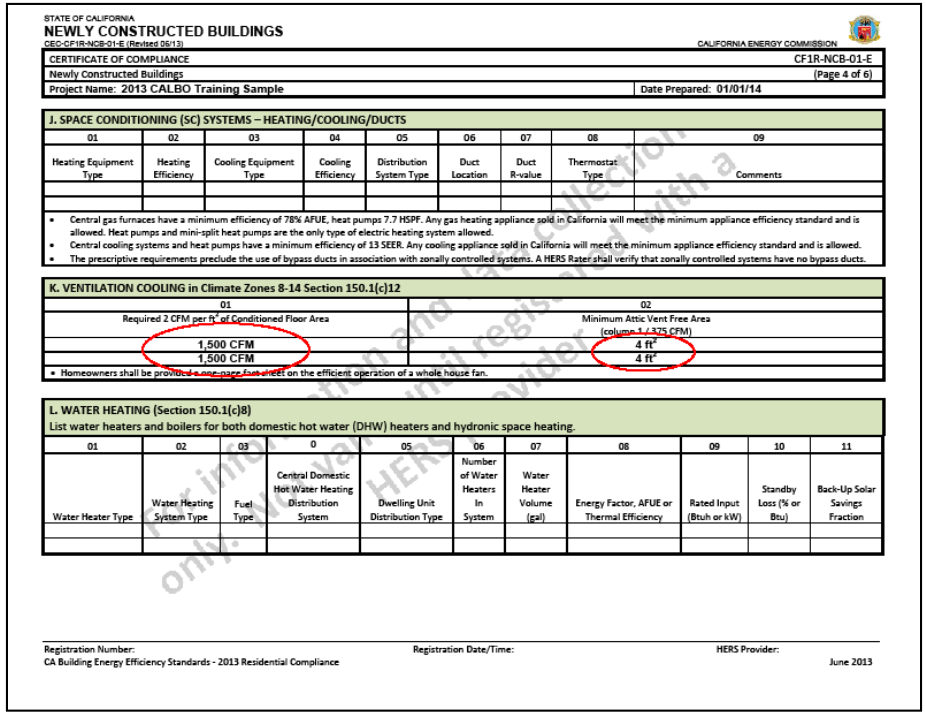
§150.1(c)11 and the Field Inspector

- **Still verify values when modeled at Rough Frame**
  - CRRC product label
  - Must meet or exceed values on CF1R
- **Verify specifications on CF2R**
  - Form under development
  - Must be registered if HERS testing req.

Ventilation Cooling

- New Prescriptive requirements in §150.1(c)12
- Requires one or more whole house fan (WHF)
  - Minimum 2 CFM/ft^2 of cond. floor area required for total WHF airflow
  - At least 1 sq. foot of attic vent free area for each 375 CFM of WHF airflow
- Required in Climate Zones 8 through 14
- WHF must be certified to the CEC

§150.1(c)12 and the Plans Examiner



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 05/13) — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 4 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/14

J. SPACE CONDITIONING (SC) SYSTEMS – HEATING/COOLING/DUCTS

01 Heating Equipment Type	02 Heating Efficiency	03 Cooling Equipment Type	04 Cooling Efficiency	05 Distribution System Type	06 Duct Location	07 Duct R-value	08 Thermostat Type	09 Comments

- Central gas furnaces have a minimum efficiency of 78% AFUE, heat pumps 7.7 HSPF. Any gas heating appliance sold in California will meet the minimum appliance efficiency standard and is allowed. Heat pumps and mini-split heat pumps are the only type of electric heating system allowed.
- Central cooling systems and heat pumps have a minimum efficiency of 13 SEER. Any cooling appliance sold in California will meet the minimum appliance efficiency standard and is allowed.
- The prescriptive requirements preclude the use of bypass ducts in association with zonally controlled systems. A HERS Rater shall verify that zonally controlled systems have no bypass ducts.

K. VENTILATION COOLING in Climate Zones 8-14 Section 150.1(c)12

01 Required 2 CFM per ft² of Conditioned Floor Area	02 Minimum Attic Vent Free Area (column 1 / 375 CFM)
1,500 CFM	4 ft²
1,500 CFM	4 ft²

- Homeowners shall be provided a one-page fact sheet on the efficient operation of a whole house fan.

L. WATER HEATING (Section 150.1(c)8)
List water heaters and boilers for both domestic hot water (DHW) heaters and hydronic space heating.

01 Water Heater Type	02 Water Heating System Type	03 Fuel Type	0 Central Domestic Hot Water Heating Distribution System	05 Dwelling Unit Distribution Type	06 Number of Water Heaters In System	07 Water Heater Volume (gal)	08 Energy Factor, AFUE or Thermal Efficiency	09 Rated Input (Btuh or kW)	10 Standby Loss (% or Btu)	11 Back-Up Solar Savings Fraction

Registration Number: | Registration Date/Time: | HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance — June 2013

- **Most applicants use Performance Approach**
  - Penalized if WHF not modeled when req.
- **If modeled, verify airflow + vent area on CF1R** *(Section K)*
  - Values must meet or exceed min. requirements
- **Can require ventilation cooling schedule on plans**

§150.1(c)12 and the Field Inspector

- **If modeled on CF1R, verify at Rough Frame**
  - WHF installation and airflow
  - Attic vent area
- **Verify specifications on CF2R-MCH-02**
  - Must be registered if HERS testing req.

Let's talk about the changes to the Energy Standards – Additions

Additions – Prescriptive

2008 – *§152(a)*

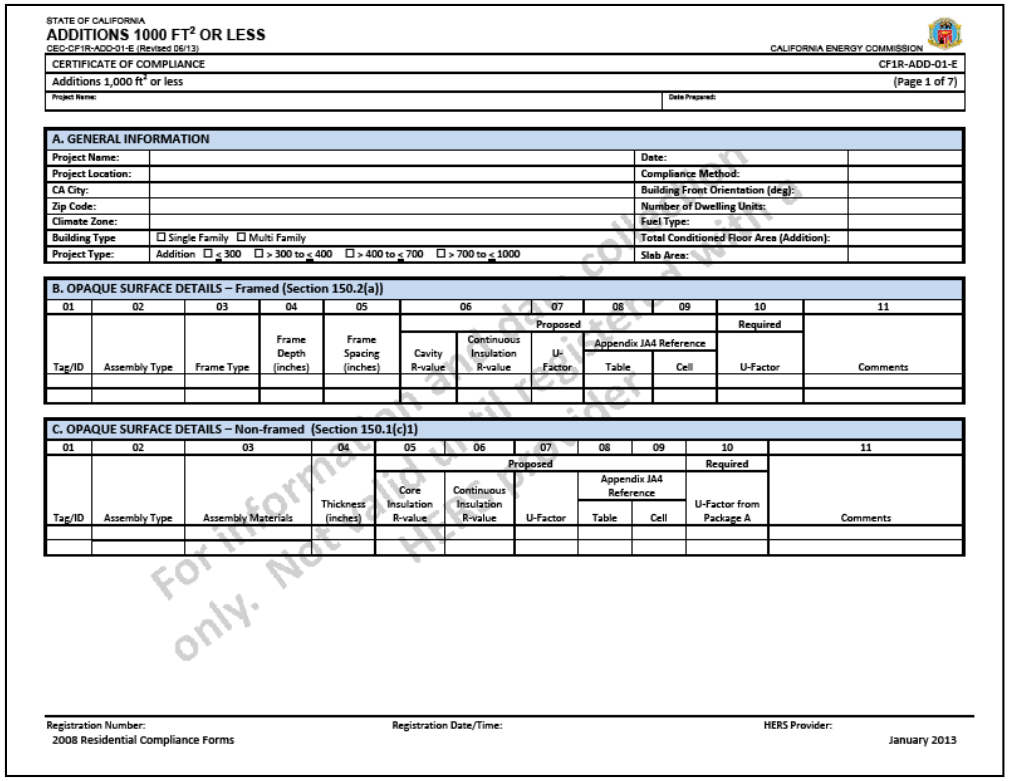
- Meet Package D reqs.
  - Some envelope alternatives and exceptions for:
    - Additions < 100 ft^2
    - Additions < 1,000 ft^2
  - Table 8-2 in Manual
- CF-1R or CF-1R-ADD form req. at Plan Review
- CF-6Rs req. at Final

2013 – *§150.2(a)*

- Meet Package A reqs.
  - Env. alternatives/exception for:
    - Additions ≤ 400 ft^2
    - Additions > 400 ft^2 and ≤ 700 ft^2
    - Additions > 700 ft^2
  - Tables 9-3A – C in Manual
- Can exempt additions < 300 ft^2 from CF1R and CF2R forms if HERS not req.

§150.2(a) and the Plans Examiner

- **Plan review like new construction:**
  - Verify values on CF1R or CF1R-ADD meet prescriptive reqs.
    - Use Tables 9-3A - C as reference
    - Must be registered if HERS testing req.
  - Verify values specified on respective section of building plans



STATE OF CALIFORNIA
ADDITIONS 1000 FT² OR LESS
CEC-CF1R-ADD-01-E (Revised 06/13)
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE — CF1R-ADD-01-E
Additions 1,000 ft² or less — (Page 1 of 7)
Project Name: — Date Prepared:

A. GENERAL INFORMATION

Project Name:		Date:	
Project Location:		Compliance Method:	
CA City:		Building Front Orientation (deg):	
Zip Code:		Number of Dwelling Units:	
Climate Zone:		Fuel Type:	
Building Type	☐ Single Family ☐ Multi Family	Total Conditioned Floor Area (Addition):	
Project Type:	Addition ☐ ≤ 300 ☐ > 300 to ≤ 400 ☐ > 400 to ≤ 700 ☐ > 700 to ≤ 1000	Slab Area:	

B. OPAQUE SURFACE DETAILS – Framed (Section 150.2(a))

01	02	03	04	05	06		07	08	09	10	11
					Proposed					Required	
Tag/ID	Assembly Type	Frame Type	Frame Depth (inches)	Frame Spacing (inches)	Cavity R-value	Continuous Insulation R-value	U-Factor	Appendix JA4 Reference: Table	Appendix JA4 Reference: Cell	U-Factor	Comments

C. OPAQUE SURFACE DETAILS – Non-framed (Section 150.1(c)1)

01	02	03	04	05	06	07	08	09	10	11
				Proposed					Required	
Tag/ID	Assembly Type	Assembly Materials	Thickness (inches)	Core Insulation R-value	Continuous Insulation R-value	U-Factor	Appendix JA4 Reference: Table	Appendix JA4 Reference: Cell	U-Factor from Package A	Comments

Registration Number: — Registration Date/Time: — HERS Provider:
2008 Residential Compliance Forms — January 2013

** Additions < 300 ft² exempt if no HERS req.*

§150.2(a) and the Field Inspector

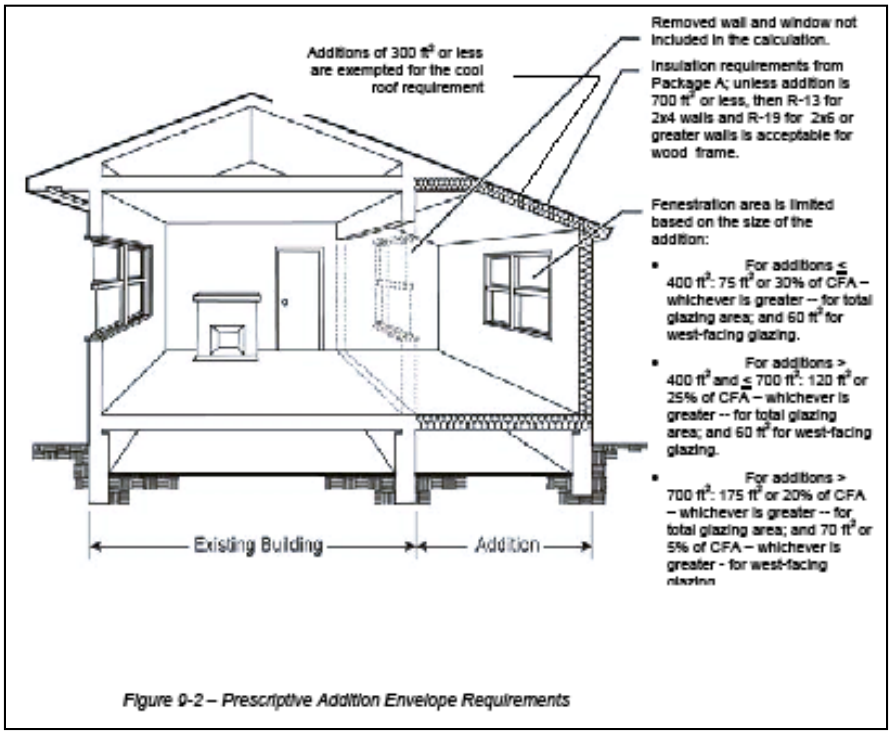


Figure 9-2 – Prescriptive Addition Envelope Requirements

- **Inspect like new construction:**
  - ➢ Verify installed efficiencies match CF1R or CF1R-ADD during respective stage of construction
  - ➢ Verify req. CF2R and CF3R forms (HERS)
    - All must be registered if HERS testing req.

** Additions < 300 ft² exempt if no HERS req.*

Additions – Performance

2008 – *§152(b)2*

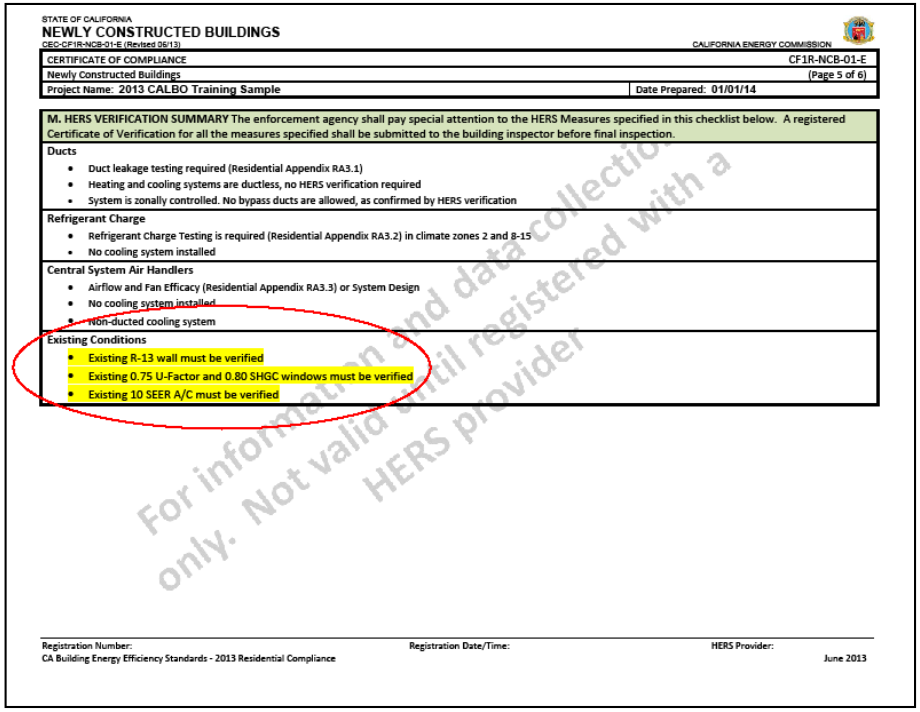
- Standard Budget based on Prescriptive requirements
- For E + A + A projects, Standard Budget may be based on existing conditions
  - ➢ Compliance credit for upgrading existing components
  - ➢ Credit for alteration upgrades may be traded off between addition

2013 – *§150.2(b)2*

- For E + A + A projects, Standard Budget may be based on existing conditions ONLY when verified by a HERS Rater
  - ➢ Compliance credit for upgrading existing components that are HERS verified
- Standard Budget for altered components outlined in TABLE 150.2-B

§150.2(b)2 and the Plans Examiner

- **Most applicants will use Performance approach**
  - ➢ Still verify if building "Complies" on CF1R
- **For E + A + A projects:**
  - ➢ Verify if HERS testing is modeled for existing conditions on CF1R *(Section M)*
  - ➢ If modeled, CF3R-EXC-20 required at plan review



STATE OF CALIFORNIA
NEWLY CONSTRUCTED BUILDINGS
CEC-CF1R-NCB-01-E (Revised 06/13) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-NCB-01-E
Newly Constructed Buildings	(Page 5 of 6)
Project Name: 2013 CALBO Training Sample	Date Prepared: 01/01/14

M. HERS VERIFICATION SUMMARY The enforcement agency shall pay special attention to the HERS Measures specified in this checklist below. A registered Certificate of Verification for all the measures specified shall be submitted to the building inspector before final inspection.

Ducts
- Duct leakage testing required (Residential Appendix RA3.1)
- Heating and cooling systems are ductless, no HERS verification required
- System is zonally controlled. No bypass ducts are allowed, as confirmed by HERS verification

Refrigerant Charge
- Refrigerant Charge Testing is required (Residential Appendix RA3.2) in climate zones 2 and 8-15
- No cooling system installed

Central System Air Handlers
- Airflow and Fan Efficacy (Residential Appendix RA3.3) or System Design
- No cooling system installed
- Non-ducted cooling system

Existing Conditions
- Existing R-13 wall must be verified
- Existing 0.75 U-Factor and 0.80 SHGC windows must be verified
- Existing 10 SEER A/C must be verified

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

Registration Number: Registration Date/Time: HERS Provider:
CA Building Energy Efficiency Standards - 2013 Residential Compliance June 2013

** HERS testing req. before permit issued*

Let's talk about the changes to the Energy Standards – Alterations (Prescriptive Approach)

Fenestration

2008 – *§152(b)1A, B*

- Package D requirements:
  - Replacement fen. must meet U-Factor and SHGC reqs.
  - Added fen. must meet efficiency and area reqs.
    - Exception: when fen. added ≤ 50 ft^2
- CF-1R-ALT required
- CF-6R-ENV-01 required

2013 – *§150.2(b)1A, B*

- Package A requirements:
  - Replacement fen. must meet efficiency reqs.
    - Exceptions for vertical glazing and skylights
  - Added fen. must meet efficiency and area reqs.
    - Exceptions for vertical glazing and skylights
- Can exempt from CF1R and CF2R forms

§150.2(b)1A, B and the Permit Process

- **Should req. CF1R-ALT-01 at permit** *(Sections D, E)*
  - Verify efficiency values and glazing area meet reqs.
  - May req. at Final
- **Verify at Final**
  - Replaced/added fen. meets values/areas on CF1R-ALT
  - CF2R-ENV-01 form

** Can exempt from CF1R and CF2R*

New space cond. system

2008 – *§152(b)1C*	**2013** – *§150.2(b)1C*
• Min. R-4.2 duct insulation	• Min. R-6.0 duct insulation
• Duct leakage req. in Cl. Zns. 2 and 9 – 16	• Duct leakage req. in ALL Cl. Zns.
• Airflow/FWD req. in Cl. Zns. 10 – 15	• Airflow/FWD req. in ALL Cl. Zns.
• RC req. in Cl. Zns. 2 and 8 – 15 for split systems	• RC req. in same Cl. Zns for split and packaged A/Cs and heat pumps, and mini-split systems
• Forms must be registered	

§150.2(b)1C and the Permit Process

- **CF1R-ALT-02 form**
  - Can req. at Final
  - HERS tests/forms specified
- **Verify at Final:**
  - Duct insulation ≥ R-6.0 (MCH-1)
  - Duct leakage (MCH-20)
  - AF/FWD (MCH 22 and 23)
  - RC (MCH-25)

Duct alterations

2008 – *§152(b)1D*

- When more than 40 linear feet added/replaced in uncond. space:
  - Min. R-4.2 duct insulation
  - Duct leakage req. in Cl. Zns. 2 and 9 – 16
    - 6% for new duct systems
    - Less than 15%
    - Less than 10% to outside
    - Reduce leakage by 60%
    - Smoke test

2013 – *§150.2(b)1D*

- When more than 40 linear feet added/replaced in uncond. or indirectly conditioned space:
  - Min. R-6.0 duct insulation
  - Duct leakage req. in ALL Cl. Zns.
    - 6% leakage req. when more than 75% of ducting replaced
    - Reduce leakage by 60% option removed

§150.2(b)1D and the Permit Process

- **CF1R-ALT-02 form**
  - Can req. at Final
  - Duct leakage specified
- **Verify at Final**
  - Duct insulation ≥ R-6.0
    - Uncond. and indirectly cond. space
  - Duct Leakage (MCH-20)
    - ALL Climate Zones

HVAC Changeouts

2008 – §152(b)1E, F

- Duct leakage req. in Cl. Zns. 2 and 9 – 16
  - Less than 15%
  - Less than 10% to outside
  - Reduce leakage by 60%
  - Smoke test
- RC req. in Cl. Zns. 2 and 8 – 15 for split systems

2013 – *§150.2(b)1E, F*

- Duct leakage req. in ALL Cl. Zns.
  - Reduce leakage by 60% option removed
- RC req. in same Cl. Zns. for:
  - Split A/Cs and heat pumps
  - Packaged A/C and heat pumps
  - Mini-split systems

§150.2(b)1E, F and the Permit Process

- **CF1R-ALT-02 form**
  - Can req. at Final
  - HERS tests/forms specified
- **Verify at Final:**
  - Duct leakage (MCH-20)
  - RC (MCH-25)
  - AF (MCH-23)

Re-roofs

2008 – *§152(b)1H*

- When more than 50% or 1,000 ft^2 replaced (whichever is less), must be cool roof
  - Steep-sloped roofs: same reqs. as prescriptive (new const.)
    - Numerous alternatives
  - Low-sloped roofs: same reqs. as prescriptive (new const.)
    - Exempt if no ducts in attic

2013 – *§150.2(b)1H*

- When more than 50% replaced, must be cool roof
  - Steep-sloped roofs: same reqs. as prescriptive (new const.)
    - Alternatives revised/added
  - Low-sloped roofs: same reqs. as prescriptive (new const.)
    - New roof deck alternative in TABLE 150.2-A

§150.2(b)1H and the Permit Process

** Can exempt from CF1R and CF2R*

- **Should req. CF1R-ALT-01 at permit** *(Section C)*
  - Verify SR and TE values meet reqs.
  - May req. at Final
- **Verify at Final**
  - Installed cool roof values meet or exceed CF1R-ALT
  - Verify CF2R (currently under development)

For more information

- **2013 Standards Website at:**
  - http://www.energy.ca.gov/title24/2013standards/index.html
- **CEC training (ICC Chapters)**
  - Contact Energy Standards Hotline at: Title24@energy.ca.gov
- **Utility training**
  - http://www.energy.ca.gov/title24/training/
- **HERS training (Building Departments)**
  - http://www.energy.ca.gov/HERS/providers.html
- **Ace Web Toolkit**
  - http://energydesignresources.com/resources/software-tools/ace-tools.aspx