

BayREN Codes & Standards Training

Part I:

Improving Energy Code Compliance in Low-rise New Construction

Residential New Construction



BayREN Codes & Standards Trainings

- The BayREN Codes & Standards program is a joint effort of Bay Area cities and counties to achieve full compliance with provisions of the California Energy Code
- BayREN trainings seek to provide building department staff and private sector building professionals with tools and strategies for improving energy code compliance
- This is one class in a series of classes presented at no cost to building departments. Contact your BayREN county representative for information on scheduling additional classes.

Introduction

Learning Objectives:

- Understand the overall compliance process for residential new construction (and larger additions).
- Identify what 2013 compliance documentation is required on permit applications.
- Determine which building features are most likely to affect energy code compliance.
- Focus plan review and field verification efforts on most impactful building energy features.

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Introduction

2013 vs. 2016 Codes

Note:

- The information presented in this class is applicable to both the 2013 and 2016 versions of the energy code.
- While there were substantial changes, they mostly affect the features that have to be installed and not the process for verifying those features, which is what this class covers.
- Summaries of the 2016 changes are provided as extra handouts.
- Where there are differences between the two code versions, they are called out in these materials.

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Introduction

- The energy code compliance process relies heavily on documentation. Keeping track of all the documentation can be very challenging.
- There are very useful online tools to help keep track of the forms for most projects, called “HERS registries”.

Approved HERS Provider Categories

Provider	2013 Standards		
	Newly Constructed	Alterations	Whole House
CalCERTS	Yes ^a	Yes	Yes
CHEERS	Yes ^a	Yes	
USERA		Yes ^b	

^a Also approved for NSHP.

^b Third party quality control program, by Enalasis, for residential buildings.

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Introduction

- **Login to the HERS provider (CalCERTS) registry to check the status of any project that requires HERS Verification.**
- Projects are searchable in the registry by registration number, address, or permit number.
- BayREN has a class specifically on how to get the most out of a HERS registry.

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Introduction

- Building departments have direct access to registered documents within their jurisdiction through the revamped HERS provider registry.

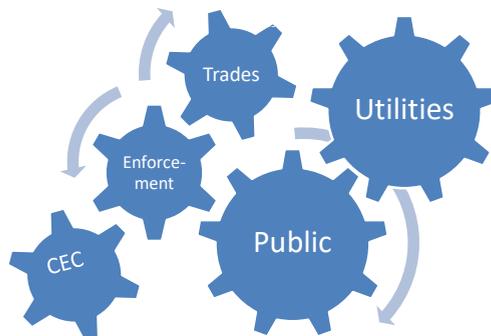
Building department sign-up information.



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The Compliance Process

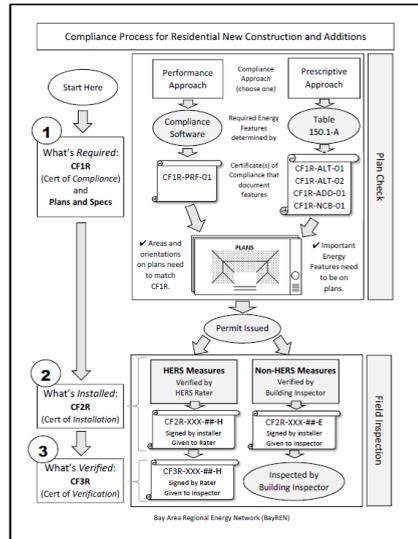
- Before “diving into” the details of the energy code, it is first important to understand the overall process and how different people fit into it.



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Compliance Process Flow Diagram

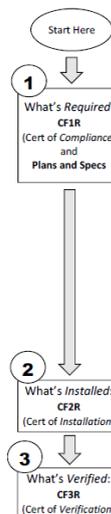
Refer to full-size copy provided with your handouts.



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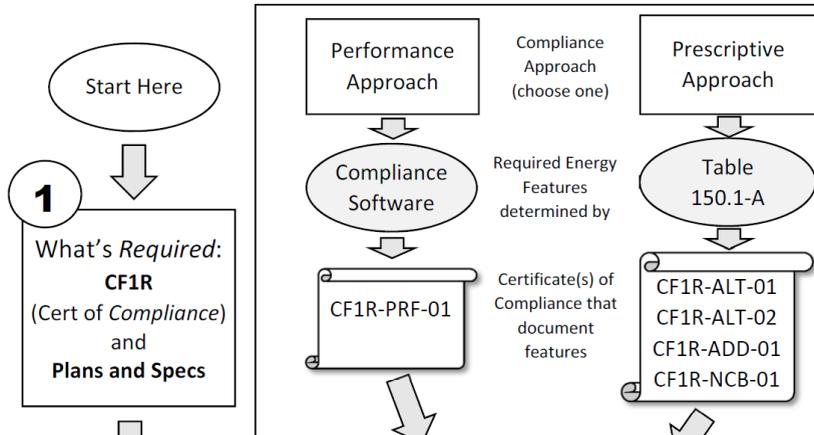
Compliance Process Flow Diagram

- Notice that the forms (CF1R, CF2R, and CF3R) are there and follow a simple 1 - 2 - 3 flow.
- Notice that process is divided into Plan Check and Field Inspection sections and that good communication must flow between them.
- The forms are intended to facilitate this.



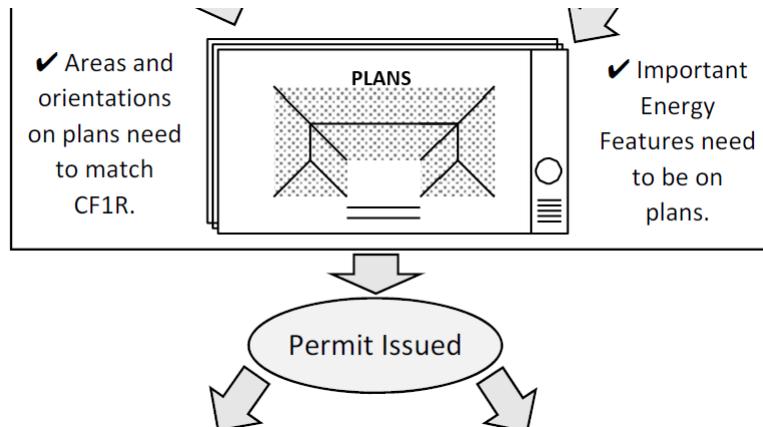
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Compliance Process Flow Diagram



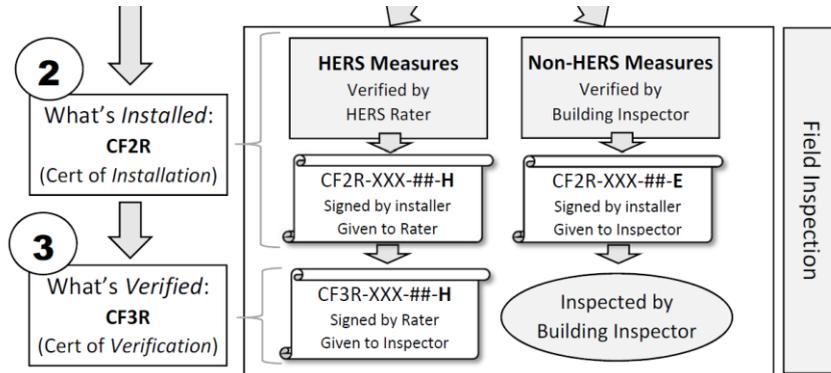
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Compliance Process Flow Diagram



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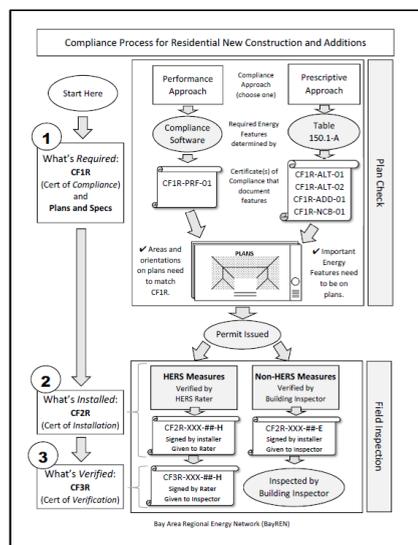
Compliance Process Flow Diagram



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Compliance Process Flow Diagram

Any questions?



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Compliance Documents List (Forms)

CF-2R – Certificates of Installation – Non-HERS Measures (-E)

- | | | |
|-----------------|---|--|
| Common | { | ▪ CF2R-ENV-01-E: fenestration (windows, skylights, etc.) |
| | | ▪ CF2R-ENV-02-E: air sealing features (weather stripping, caulking, backdraft dampers, etc.) |
| | | ▪ CF2R-ENV-03-E: insulation |
| | | ▪ CF2R-ENV-04-E: roofing products |
| | | ▪ CF2R-LTG-01-E: lighting features |
| | | ▪ CF2R-MCH-01-E: mechanical systems (HVAC) |
| Not very common | { | ▪ CF2R-MCH-02-E: whole house fan |
| | | ▪ CF2R-MCH-04-E: evaporative coolers |
| | | ▪ CF2R-PLB-01-E: Multi-family central hot water distribution systems |
| | | ▪ CF2R-PLB-02-E: Single-family central hot water distribution systems |
| | | ▪ CF2R-PLB-03-E: Pool and spa heating systems |

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Compliance Documents List (Forms)

CF-2R – Certificates of Installation – HERS Measures (-H)

- CF2R-ENV-20-H: Envelope air leakage (blower door test)
- CF2R-ENV-21-H: QII Framing Stage (batt, loose fill, etc.)
- CF2R-ENV-22-H: QII Ceiling Air Barrier
- CF2R-ENV-23-H: QII Insulation Stage
- CF2R-ENV-24-H: QII Framing Stage (SIP & ICF)
- **CF2R-MCH-20-H: sealed ducts***
- CF2R-MCH-21-H: Supply duct location verification
- **CF2R-MCH-22-H: HVAC system fan efficacy (fan watt draw)***
- **CF2R-MCH-23-H: HVAC system fan airflow***
- CF2R-MCH-24-H: Blower door, when infiltration is used to meet whole house ventilation
- **CF2R-MCH-25-H: HVAC system refrigerant charge***
- CF2R-MCH-26-H: Rated system verification (High SEER/EER)
- **CF2R-MCH-27-H: ventilation to the ASHRAE 62.2 standard***
- CF2R-MCH-28-H: Return Duct sizing table verification (alternative to airflow/Fan watt draw test)
- CF2R-MCH-29-H: Supply duct surface area and buried ducts verification
- CF2R-PLB-21-H: Multi-family central hot water distribution systems
- CF2R-PLB-21-H: Single-family central hot water distribution systems

*Most common HERS Tests

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Compliance Documents List (Forms)

- For each CF2R-XXX-##-H there is a corresponding CF3R-XXX-##-H, Certificate of Verification
- The list of CF3Rs would look exactly like the list of CF2R-Hs
- The HERS registry will make sure the correct HERS documents (CF2R and CF3R) get used and completed.

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What to Check on a CF1R

- Refer to the “What to Verify on a CF1R” checklist tool provided in your handouts.

BAY AREA Regional Energy Network	Permit Number: _____ Date Completed: _____ Completed By (Initials): _____
What to Check on a CF1R-PRF-01 (Residential Performance Approach)	
The following items highlight the more important features to be verified on the CF1R-PRF-01 form.	
General Information Section	
<input type="checkbox"/> Item 08 Climate Zone – Should be correct for location of project. <input type="checkbox"/> Item 12 Project Scope (New, addition, etc.) – Should match permit scope of work. <input type="checkbox"/> Item 14 Total Conditioned Floor Area – Should match plans. <input type="checkbox"/> Item 17 Front Orientation (degrees or “cardinal”) if master plan – Should match plans. <input type="checkbox"/> Item 18 Number of Dwelling Units – Should match plans, project description. <input type="checkbox"/> Item 21 Number of Stories – Should match plans, project description. <input type="checkbox"/> Item 23 Glazing Percentage – Total glass area divided by floor area (Item 14, above). Should match plans.	
Compliance Results Section	
<input type="checkbox"/> Item 02 Building Incorporates HERS Features – Leverage any listed HERS tests to reduce inspections. <input type="checkbox"/> Column 07 Compliance Margin – How much it exceeds code by. <3% small discrepancies may affect compliance. 3% to 10%: only large discrepancies will affect compliance. >10%: only very large discrepancies will affect compliance. Note: Energy Star and some other codes require a compliance margin of 3%.	
Opaque Surfaces Section (CF1R-ENV-03*)	
<input type="checkbox"/> Column 03 Items – These are just arbitrary test descriptors. Make sure all sides of the house are listed. <input type="checkbox"/> Column 03 Construction – Reference a later section that details each surface type. <input type="checkbox"/> Columns 04 and 05 Azimuth and Orientation – Make sure all sides of the house are listed. <input type="checkbox"/> Column 06 Gross Area – Check to see if they are reasonable, according to plans.	
Attic Section (CF1R-ENV-04*)	
<input type="checkbox"/> Column 06 – If radiant barrier is specified, installation is verified in the field. <input type="checkbox"/> Column 07 – If cool roof is specified, reflectance and emittance are verified in the field.	
Windows Section (CF1R-ENV-05*)	
<input type="checkbox"/> Column 05 Orientation-Azimuth and Column 07: Area – Should match plans. <input type="checkbox"/> Column 08 and 09 U-factor and SHGC – important to verify in the field.	
Overhangs and Glazing Section	
<input type="checkbox"/> Column 02 Depth – Length of overhang. Quickly check anything > 1' against plans. <input type="checkbox"/> Column 03 Construction name – Referenced from Opaque Surfaces Section, Column 03: Construction.	
Building Envelope HERS Verification Section (CF1R-ENV-06*)	
<input type="checkbox"/> Column 06 Assembly Layers – Look for R-values. These should be verified in the field. <input type="checkbox"/> Leverage any listed HERS tests to reduce inspections.	
Water Heating Sections (CF1R-PLB-02*)	
<input type="checkbox"/> System Type, Number of Tanks, Energy Factor and volume should be verified in the field. <input type="checkbox"/> Leverage any listed HERS tests to reduce inspections. (CF1R-PLB forms)	
HVAC Sections (CF1R-AICh-01*)	
<input type="checkbox"/> System Type, Efficiency, Duct locations and Duct R-value should be verified in the field. <input type="checkbox"/> Leverage any listed HERS tests to reduce inspections. (CF1R-AICh forms)	
Indoor Air Quality Test Section (CF1R-AICh-02*)	
<input type="checkbox"/> Leverage any listed HERS tests to reduce inspections.	
Declaration Statements	
<input type="checkbox"/> Documents should be signed by authorized individuals (digital signatures are legal).	
*The CF1R/CF1R forms shown above are how the installers/HERS raters will document proper installation of features.	
BayREN Checklist What to Check on a CF1R-PRF-01	(revised 12/21/15) Page 1

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What to Check on a CF1R

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- Item 13 Number of Dwelling Units – Should match plans, project description.
- Item 17 Number of Stories – Should match plans, project description.
- Item 21 Glazing percentage – Total Glass area divided by floor area (Item 14, above). Should match plans.

Only 7 items

GENERAL INFORMATION					
01	Project Name	Residence			
02	Calculation Description	Title 24 Analysis			
Project Location					
04	A City	Menlo Park	05	Standards Version	Compliance 2014
06	Zip code	94025	07	Compliance Manager Version	BEMCmpMgr 2013-2 (595c)
08	Climate Zone	CZ3	09	Software Version	EnergyPro 6.2
10	Building Type	Single Family	11	Front Orientation (deg/Cardinal)	213
12	Project Scope	Newly Constructed	13	Number of Dwelling Units	1
14	Total Cond. Floor Area (FT²)	3843	15	Number of Zones	2
16	Slab Area (FT²)	0	17	Number of Stories	2
18	Addition Cond. Floor Area	NA	19	Natural Gas Available	Yes
20	Addition Slab Area (FT²)	NA	21	Glazing Percentage (%)	16.1%

21 items!

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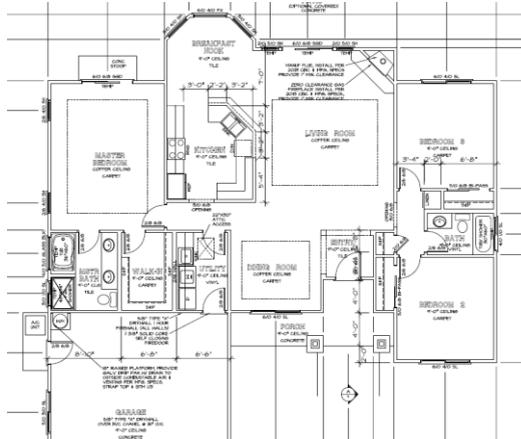
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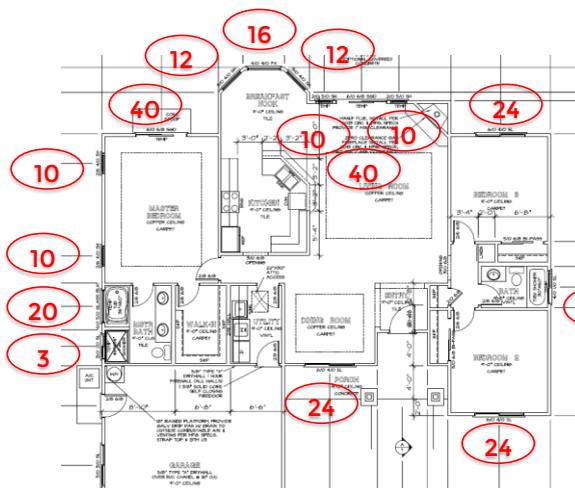
What to Check on a CF1R



1. Add up all the glass area (don't forget skylights)
2. Divide by conditioned floor area (Item 14)

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What to Check on a CF1R



Total Glass Area
Cond Floor Area

= Glazing percentage

- Their % number should not be lower than yours.
- OK if their number is a little higher.
- NOT OK if their number is much higher than yours.

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What to Check on a CF1R

Mainly just informational.

Compliance Results Section

- Row 02 Building Incorporates HERS Features – Leverage any listed HERS tests to reduce inspections.
- Column 07 Compliance Margin – How much it exceeds code by. <5%: small discrepancies may affect compliance. 5% to 10%: only large discrepancies will affect compliance. >10%: only very large discrepancies will affect compliance. Note: Energy Star and some reach codes require a compliance margin of 15%.

COMPLIANCE RESULTS				
01	Building Complies with Computer Performance			
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.			
03	This building incorporates one or more Special Features shown below			
ENERGY USE SUMMARY				
04	05	06	07	08
Energy Use (KTDV/f)	Standard Design	Proposed Design	Compliance Margin	Percent Improvement
Space Heating	10.63	10.46	0.17	1.6%
Space Cooling	1.05	1.90	-0.85	-81.0%
IAQ Ventilation	1.01	1.01	0.00	0.0%
Water Heating	8.81	7.88	0.93	10.6%
Photovoltaic Offset	---	0.00	0.00	---
Compliance Energy Total	21.50	21.25	0.25	1.2%
Total Energy (including AMEU)	61.95	61.70	0.25	0.4%

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Water Heating	8.81	7.88	0.93	10.6%
Photovoltaic Offset	---	0.00	0.00	---
Compliance Energy Total	21.50	21.25	0.25	1.2%
Total Energy (including AMEU)	61.95	61.70	0.25	0.4%

Energy use of house if built to prescriptive measures.

Energy use of house as designed.

Difference

% better than code.

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What to Check on a CF1R

Opaque Surfaces Section (CF2R-ENV-03*)

- ☐ Column 01 Name – These are just arbitrary text descriptors. Make sure all sides of the house are listed.
- ☐ Column 03 Construction – References a later section that details each surface type.
- ☐ Columns 04 and 05 Azimuth and Orientation – Make sure all sides of the house are listed.
- ☐ Column 06 Gross Areas – Check to see if they are reasonable, according to plans.

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft ²)	Window Area (ft ²)	Tilt(deg)
Front Wall	Main Floor	R-21 Wall	213	Front	285	38	90
Left Wall	Main Floor	R-15 Wall	303	Left	440	51	90
Rear Wall	Main Floor	R-15 Wall	33	Back	783	249.968	90
Right Wall	Main Floor	R-15 Wall	123	Right	290	21.3	90
Left Front Wall	Main Floor	R-15 Wall	258	45	20	9	90
Right Front Wall	Main Floor	R-15 Wall	168	315	20	9	90
Front 2 x 4 Wall	Main Floor	R-13 Wall 1	213	Front	95	18	90
Roof	Main Floor	R-38 Roof Attic			391		
Raised Floor	Main Floor	R-30 Floor Crawlspace			2216		
Front Wall 2	Upper Floor	R-21 Wall	213	Front	435	57	90
Left Wall 2	Upper Floor	R-15 Wall	303	Left	440	51	90

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- ☐ Columns 04 and 05 Azimuth and Orientation – Make sure all sides of the house are listed.
- ☐ Column 06 Gross Areas – Check to see if they are reasonable, according to plans.

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft ²)	Window Area (ft ²)	Tilt(deg)
Front Wall	Main Floor	R-21 Wall	213	Front	285	38	90
Left Wall	Main Floor	R-15 Wall	303	Left	440	51	90
Rear Wall	Main Floor	R-15 Wall	33	Back	783	249.968	90
Right Wall	Main Floor	R-15 Wall	123	Right	290	21.3	90
Left Front Wall	Main Floor	R-15 Wall	258	45	20	9	90
Right Front Wall	Main Floor	R-15 Wall	168	315	20	9	90
Front 2 x 4 Wall	Main Floor	R-13 Wall 1	213	Front	95	18	90
Roof	Main Floor	R-38 Roof Attic			391		
Raised Floor	Main Floor	R-30 Floor Crawlspace			2216		
Front Wall 2	Upper Floor	R-21 Wall	213	Front	435	57	90
Left Wall 2	Upper Floor	R-15 Wall	303	Left	440	51	90

Names of surface types detailed in a later section

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What to Check on a CF1R

Opaque Surfaces Section (CF2R-ENV-03*)

- Column 01 Name – These are just arbitrary text descriptors. Make sure all sides of the house are listed.
- Column 03 Construction – References a later section that details each surface type.
- Columns 04 and 05 Azimuth and Orientation – Make sure all sides of the house are listed.
- Column 06 Gross Areas – Check to see if they are reasonable, according to plans.

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft ²)	Window Area (ft ²)	Tilt(deg)
Front Wall	Main Floor	R-21 Wall	213	Front	285	38	90
Left Wall	Main Floor	R-15 Wall	303	Left	440	51	90
Rear Wall	Main Floor	R-15 Wall	33	Back	783	249.968	90
Right Wall	Main Floor	R-15 Wall	123	Right	290	21.3	90
Left Front Wall	Main Floor	R-15 Wall	258	45	20	9	90
Right Front Wall	Main Floor	R-15 Wall	168	315	20	9	90
Front 2 x 4 Wall	Main Floor	R-13 Wall 1	213	Front	95	18	90
Roof	Main Floor	R-38 Roof Attic			391		
Raised Floor	Main Floor	R-30 Floor Crawlspace			2216		
Front Wall 2	Upper Floor	R-21 Wall	213	Front	435	57	90
Left Wall 2	Upper Floor	R-15 Wall	303	Left	440	51	90

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What to Check on a CF1R

Opaque Surfaces Section (CF2R-ENV-03*)

- Column 01 Name – These are just arbitrary text descriptors. Make sure all sides of the house are listed.
- Column 03 Construction – References a later section that details each surface type.
- Columns 04 and 05 Azimuth and Orientation – Make sure all sides of the house are listed.
- Column 06 Gross Areas – Check to see if they are reasonable, according to plans.

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft ²)	Window Area (ft ²)	Tilt(deg)
Front Wall	Main Floor	R-21 Wall	213	Front	285	38	90
Left Wall	Main Floor	R-15 Wall	303	Left	440	51	90
Rear Wall	Main Floor	R-15 Wall	33	Back	783	249.968	90
Right Wall	Main Floor	R-15 Wall	123	Right	290	21.3	90
Left Front Wall	Main Floor	R-15 Wall	258	45	20	9	90
Right Front Wall	Main Floor	R-15 Wall	168	315	20	9	90
Front 2 x 4 Wall	Main Floor	R-13 Wall 1	213	Front	95	18	90
Roof	Main Floor	R-38 Roof Attic			391		
Raised Floor	Main Floor	R-30 Floor Crawlspace			2216		
Front Wall 2	Upper Floor	R-21 Wall	213	Front	435	57	90
Left Wall 2	Upper Floor	R-15 Wall	303	Left	440	51	90

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What to Check on a CF1R

Attic Section (CF2R-ENV-04*)

- ☐ Column 06 – If Radiant Barrier is specified, installation is **verified in the field**.
- ☐ Column 07 – If Cool Roof is specified, reflectance and emittance are **verified in the field**.

01	02	03	04	05	06	07
Name	Construction	Roof Rise	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof
Attic	Attic Roof Cons	8	0.1	0.85	Yes	No



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What to Check on a CF1R

Attic Section (CF2R-ENV-04*)

- ☐ Column 06 – If Radiant Barrier is specified, installation is **verified in the field**.
- ☐ Column 07 – If Cool Roof is specified, reflectance and emittance are **verified in the field**.

01	02	03	04	05	06	07
Name	Construction	Roof Rise	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof
Attic	Attic Roof Cons	8	0.1	0.85	Yes	No

	Initial Weathered	
	Solar Reflectance	0.27 0.26
	Thermal Emittance	0.92 0.81
	Rated Product ID Number	0676-0043
Licensed Seller ID Number	----	
Classification	Production Line	
<small>Cool Roof Rating Council ratings are determined for a fixed set of conditions, and may not be appropriate for determining seasonal energy performance. The actual effect of solar reflectance and thermal emittance on building performance may vary. Manufacturer of product stipulates that these ratings were determined in accordance with the applicable Cool Roof Rating Council procedures.</small>		

Minimums (when required – not required in this example)

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What to Check on a CF1R

Windows Section (CF2R-ENV-01*)

- Column 03 Orientation-Azimuth and Column 07. Area – *Should match plans.*
- Columns 08 and 09: U-factor and SHGC – **Important to verify in the field.**

WINDOWS									
01	02	03	04	05	06	07	08	09	10
Name	Type	Surface (Orientation-Azimuth)	Width(ft)	Height (ft)	Multiplier	Area (ft ²)	U-factor	SHGC	Exterior Shading
Window	Window	Front Wall (Front-213)	----	----	1	28.0	0.30	0.67	
Window in Door	Window	Front Wall (Front-213)	----	----	1	10.0	0.55	0.67	
Window 2	Window	Left Wall (Left-303)	----	----	1	51.0	0.30	0.67	
Window 3	Window	Rear Wall (Back-33)	----	----	1	90.0	0.30	0.67	
10080	Window	Rear Wall (Back-33)	10.0	8.0	1	80.0	0.30	0.67	
10080 2	Window	Rear Wall (Back-33)	12.0	8.0	0.833	80.0	0.30	0.67	
Window 4	Window	Right Wall (Right-123)	----	----	1	21.3	0.30	0.67	
Window 5	Window	Left Front Wall (Left-Front-258)	----	----	1	9.0	0.30	0.67	

Use the same numbers you used to calculate glazing percentage, but now pay attention to orientation.

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What to Check on a CF1R

Windows Section (CF2R-ENV-01*)

- Column 03 Orientation-Azimuth and Column 07. Area – *Should match plans.*
- Columns 08 and 09: U-factor and SHGC – **Important to verify in the field.**

WINDOWS									
01	02	03	04	05	06	07	08	09	10
Name	Type	Surface (Orientation-Azimuth)	Width(ft)	Height (ft)	Multiplier	Area (ft ²)	U-factor	SHGC	Exterior Shading
Window	Window	Front Wall (Front-213)	----	----	1	28.0	0.30	0.67	
Window in Door	Window	Front Wall (Front-213)	----	----	1	10.0	0.55	0.67	
Window 2	Window	Left Wall (Left-303)	----	----	1	51.0	0.30	0.67	
Window 3	Window	Rear Wall (Back-33)	----	----	1	90.0	0.30	0.67	
10080	Window	Rear Wall (Back-33)	10.0	8.0	1	80.0	0.30	0.67	
10080 2	Window	Rear Wall (Back-33)	12.0	8.0	0.833	80.0	0.30	0.67	
Window 4	Window	Right Wall (Right-123)	----	----	1	21.3	0.30	0.67	
Window 5	Window	Left Front Wall (Left-Front-258)	----	----	1	9.0	0.30	0.67	

Make sure NFRC labels do not get removed prior to field inspection! Put a note on the plans!

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What to Check on a CF1R

Overhangs and Fins Section

- ☐ Column 02 Depth – Length of overhang. Quickly check anything > 1' against plans.

OVERHANGS AND FINS													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Window	Depth	Dist Up	Overhang			Left Fin				Right Fin			
			Left Extent	Right Extent	Flap Ht.	Depth	Top Up	DistL	Bot Up	Depth	Top Up	Dist R	Bot Up
10080	10	1	2.8	2.8	0	0	0	0	0	0	0	0	0
10080 2	11.5	1	1.8	1.8	0	0	0	0	0	0	0	0	0
5080	1	0.3	4.9	6	0	7.5	0	4.9	0	0	0	0	0
6050	1	0.3	1.7	1.7	0	0	0	0	0	0	0	0	0
3030	2.3	0.3	1	1	0	0	0	0	0	0	0	0	0
5050	1	0.3	5.7	14	0	0	0	0	0	0	0	0	0

Permanent patio covers.
Inset front door with porch, etc.

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What to Check on a CF1R

Opaque Surface Constructions Section (CF2R-ENV-03*)

- ☐ Column 01 Construction name – Referenced from Opaque Surfaces Section, Column 03. Construction.
- ☐ Column 06 Assembly Layers – Look for R-values. **These should be verified in the field.**

OPAQUE SURFACE CONSTRUCTIONS					
01	02	03	04	05	06
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Assembly Layers
Attic Roof Cons	Attic Roofs	Wood Framed Ceiling	2x4 Top Chord of Roof Truss @ 24 in. O.C.		<ul style="list-style-type: none"> Roofing: Light Roof (Asphalt Shingle) Above Deck Insulation - no insulation - Roof Deck: Wood Siding/sheathing/decking Cavity: - no insulation - Inside Finish: - select inside finish -
R-0 Roof Attic	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 24 in. O.C.		<ul style="list-style-type: none"> Attic Floor: - no attic floor - Cavity: - no insulation - Sheathing/Insulation: - no sheathing/insul. - Inside Finish: Gypsum Board
R-13 Wall	Interior Walls	Wood Framed Wall	2x4 @ 16 in. O.C.	R 13	<ul style="list-style-type: none"> Inside Finish: Gypsum Board Sheathing/Insulation: - no sheathing/insul. - Cavity: R 13 Sheathing/Insulation: - no sheathing/insul. - Other Side Finish: Gypsum Board
R-30 Floor Crawlspace	Floors Over Crawlspace	Wood Framed Floor	2x10 @ 16 in. O.C.	R 25	<ul style="list-style-type: none"> Floor Surface: Carpeted Concrete Fill: - no concrete fill - Floor Deck: Wood Siding/sheathing/decking Cavity: R 25 Sheathing/Insulation: - no sheathing/insul. - Exterior Finish: - select finish -
R-21 Wall	Exterior Walls	Wood Framed Wall	2x6 @ 16 in. O.C.	R 21	<ul style="list-style-type: none"> Inside Finish: Gypsum Board Sheathing/Insulation: - no sheathing/insul. - Cavity: R 21 Sheathing/Insulation: - no sheathing/insul. - Exterior Finish: Wood Siding/sheathing/decking

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What to Check on a CF1R

Opaque Surface Constructions Section (CF2R-ENV-03*)

- Column 01 Construction name – Referenced from Opaque Surfaces Section, Column 03. Construction.
- Column 06 Assembly Layers – Look for R-values. **These should be verified in the field.**

OPAQUE SURFACE CONSTRUCTIONS					
01	02	03	04	05	06
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Assembly Layers
Attic Roof Cons	Attic Roofs	Wood Framed Ceiling	2x4 Top Chord of Roof Truss @ 24 in. O.C.		<ul style="list-style-type: none"> • Roofing: Light Roof (Asphalt Shingle) • Above Deck Insulation - no insulation - • Roof Deck: Wood Siding/sheathing/decking • Cavity - no insulation - • Inside Finish - select inside finish -
R-0 Roof Attic	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 24 in. O.C.		<ul style="list-style-type: none"> • Attic Floor - no attic floor - • Cavity - no insulation - • Sheathing/insulation - no sheathing/insul. - • Inside Finish: Gypsum Board
R-13 Wall	Interior Walls	Wood Framed Wall	2x4 @ 16 in. O.C.	R 13	<ul style="list-style-type: none"> • Inside Finish: Gypsum Board • Sheathing/insulation - no sheathing/insul. - • Cavity: R 13 • Sheathing/insulation - no sheathing/insul. - • Other Side Finish: Gypsum Board
R-30 Floor Crawlspace	Floors Over Crawlspace	Wood Framed Floor	2x10 @ 16 in. O.C.	R 25	<ul style="list-style-type: none"> • Floor Surface: Carpeted • Cavity: R 25 • Floor Deck: Wood Siding/sheathing/decking • Cavity: R 25 • Sheathing/insulation - no sheathing/insul. - • Exterior Finish - select finish -
R-21 Wall	Exterior Walls	Wood Framed Wall	2x6 @ 16 in. O.C.	R 21	<ul style="list-style-type: none"> • Inside Finish: Gypsum Board • Sheathing/insulation - no sheathing/insul. - • Cavity: R 21 • Sheathing/insulation - no sheathing/insul. - • Exterior Finish: Wood Siding/sheathing/decking

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What to Check on a CF1R

Building Envelope HERS Verification Section (CF3R-ENV forms*)

- Leverage any listed HERS tests to reduce inspections.

BUILDING ENVELOPE - HERS VERIFICATION			
01	02	03	04
Quality Insulation Installation(QII)	Quality Installation of Spray Foam Insulation	Building Envelope Air Leakage	ACH @ 50 Pa
Not Required	Not Required	Not Required	---

HERS rater will thoroughly inspect insulation.

HERS rater will pressure test home for leakage.

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What to Check on a CF1R

Water Heating Sections (CF2R-PLB-02*)

- System Type, Number of Heaters, Energy Factor and Volume should be **verified in the field**.
- Leverage any listed HERS tests to reduce inspections. (CF3R-PLB forms)

WATER HEATING SYSTEMS							
01	02			03		04	
Name	Distribution Type			Number of Heaters		Solar Fraction (%)	
DHW Sys 1	Recirculation, Demand Control Push Button			1		0.0%	

WATER HEATERS							
01	02	03	04	05	06	07	08
Name	Heater Element Type	Tank Type	Tank Volume (gal)	Energy Factor or Efficiency	Input Rating	Tank Exterior Insulation R-value	Standby Loss (Fraction)
DHW Heater 1	Natural Gas	Large Storage	75	0.96	80000-Btu/hr	0	0.0191

WATER HEATING - HERS VERIFICATION							
01	02	03	04	05	06	07	
Name	Pipe Insulation	Parallel Piping	Compact Distribution	Point-of Use	Recirculation with Manual Control	Recirculation with Sensor Control	
DHW Sys 1-hers-dhw	n/a	n/a	n/a	n/a	n/a	n/a	

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What to Check on a CF1R

Water Heating Sections (CF2R-PLB-02*)

- System Type, Number of Heaters, Energy Factor and Volume should be **verified in the field**.
- Leverage any listed HERS tests to reduce inspections. (CF3R-PLB forms)

WATER HEATING SYSTEMS							
01	02			03		04	
Name	Distribution Type			Number of Heaters		Solar Fraction (%)	
DHW Sys 1	Recirculation, Demand Control Push Button			1		0.0%	

WATER HEATERS							
01	02	03	04	05	06	07	08
Name	Heater Element Type	Tank Type	Tank Volume (gal)	Energy Factor or Efficiency	Input Rating	Tank Exterior Insulation R-value	Standby Loss (Fraction)
DHW Heater 1	Natural Gas	Large Storage	75	0.96	80000-Btu/hr	0	0.0191

WATER HEATING - HERS VERIFICATION							
01	02	03	04	05	06	07	
Name	Pipe Insulation	Parallel Piping	Compact Distribution	Point-of Use	Recirculation with Manual Control	Recirculation with Sensor Control	
DHW Sys 1-hers-dhw	n/a	n/a	n/a	n/a	n/a	n/a	

HERS rater will thoroughly inspect pipe insulation, layout, etc..

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What to Check on a CF1R

The CF2R-MCH-01 is a very important form to collect regarding HVAC equipment

HVAC Sections (CF2R-MCH-01*)

- ➡ System Type, Efficiencies, Duct Locations and Duct R-Value **should be verified in the field.**
- Leverage any listed HERS tests to reduce inspections. (CF3R-MCH forms)

HVAC SYSTEMS						
01	02	03		04		05
Name	System Type	Heating System		Cooling System		Distribution System
		Name	Ducted	Name	Ducted	Fan System
HVAC System1	Other Heating and Cooling System	Heating Component 1	Yes	Cooling Component 1	Yes	Air Distribution System 1
Upper HVAC System2	Other Heating and Cooling System	Heating Component 2	Yes	Cooling Component 2	Yes	Air Distribution System 2
						Floor Area Served
						HVAC Fan 1
						HVAC Fan 2
						1627

HVAC - HEATING SYSTEMS		
01	02	03
Name	Type	Efficiency
Heating Component 1	Centrifumace - Fuel-fired central furnace	96 AFUE
Heating Component 2	Centrifumace - Fuel-fired central furnace	96 AFUE

HVAC - COOLING SYSTEMS				
01	02	03	04	05
Name	System Type	Efficiency		HERS Verification
		EER	SEER	
Cooling Component 1	Split/AirCond - Split air conditioning system	11.3	13	Cooling Component 1-hers-cool
Cooling Component 2	Split/AirCond - Split air conditioning system	11.3	13	Cooling Component 2-hers-cool

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What to Check on a CF1R

HVAC Sections (CF2R-MCH-01*)

- ➡ System Type, Efficiencies, Duct Locations and Duct R-Value **should be verified in the field.**
- Leverage any listed HERS tests to reduce inspections. (CF3R-MCH forms)

HVAC - DISTRIBUTION SYSTEMS							
01	02	03	04	05	06	07	08
Name	Type	Duct Leakage	Insulation R-value	Supply Duct Location	Return Duct	Bypass Duct	HERS Verification
Air Distribution System 1	Ducts located in a crawl space	Sealed and tested	6	Crawl Space	Crawl Space	None	Air Distribution System 1-hers-dist
Air Distribution System 2	Ducts located in unconditioned attic	Sealed and tested	6	Attic	Attic	None	Air Distribution System 2-hers-dist

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What to Check on a CF1R

HVAC Sections (CF2R-MCH-01*)

- System Type, Efficiencies, Duct Locations and Duct R-Value **should be verified in the field.**
- Leverage any listed HERS tests to reduce inspections. (CF3R-MCH forms)

HVAC COOLING - HERS VERIFICATION					
01	02	03	04	05	06
Name	Verified Airflow	Airflow Target	Verified EER	Verified SEER	Verified Refrigerant Charge
HVAC System1 SCSysRpt 1	Required	350	11.3	---	---
Upper HVAC System2 SCSysRpt 1	Required	350	11.3	---	---

HERS rater will test system airflow.

HERS rater will check make/model and efficiency.

HERS rater will check refrigerant charge.

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What to Check on a CF1R

HVAC Sections (CF2R-MCH-01*)

- System Type, Efficiencies, Duct Locations and Duct R-Value **should be verified in the field.**
- Leverage any listed HERS tests to reduce inspections. (CF3R-MCH forms)

HVAC DISTRIBUTION - HERS VERIFICATION					
01	02	03	04	05	06
Name	Duct Leakage Verification	Duct Leakage Target (%)	Verified Duct Location	Verified Duct Design	
				Return	Supply
Air Distribution System 1-hers-dist	Required	6.0	Not Required	Not Required	Not Required
Air Distribution System 2-hers-dist	Required	6.0	Not Required	Not Required	Not Required

HERS rater will test duct leakage

HERS rater will verify special duct location.

HERS rater will verify special design criteria.

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What to Check on a CF1R

HVAC Sections (CF2R-MCH-01*)

- System Type, Efficiencies, Duct Locations and Duct R-Value **should be verified in the field.**
- Leverage any listed HERS tests to reduce inspections. (CF3R-MCH forms)

HVAC - FAN SYSTEMS			
01	02	03	04
Name	Type	Fan Power (Watts/CFM)	HERS Verification
HVAC Fan 1	Single Speed PSC Furnace Fan	0.58	Required
HVAC Fan 2	Single Speed PSC Furnace Fan	0.58	Required

HERS rater will test system fan watt draw.

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What to Check on a CF1R

IAQ (Indoor Air Quality) Fans Section (CF3R-MCH-27*)

- Leverage any listed HERS tests to reduce inspections.

IAQ (Indoor Air Quality) FANS				
01	02	03	04	05
Name	IAQ CFM	IAQ Fan Type	IAQ Recovery Effectiveness(%)	HERS Verification
IAQ Fan	83	Exhaust	0	Required

HERS rater will inspect mechanical ventilation system and measure airflow.

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What to Check on a CF1R

Declaration Statements

☑ Documents should be signed by authorized individuals (digital signatures are legal).

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT	
1. I certify that the Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company:	Signature Date:
Address:	CEA/HERS Certification Identification (if applicable):
City/State/Zip:	Phone:
RESPONSIBLE PERSON'S DECLARATION STATEMENT	
I certify the following under penalty of perjury, under the laws of the State of California:	
<ol style="list-style-type: none"> I am eligible under Division 3 of the 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 identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. 	
Responsible Designer Name:	Responsible Designer Signature:
Company:	Date Signed:
Address:	License:
City/State/Zip:	Phone:

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Resource

www.energycodeace.com/content/forms-ace/



- The Forms Ace™ tool helps applicants (and building departments) determine which forms are applicable to a specific project. Use this tool to identify:
 - Necessary compliance steps
 - The compliance path that is least cumbersome to pursue
 - Which forms will be required & generate a checklist
 - Whether or not a project requires HERS verification

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BayREN Codes & Standards Training Part II: HERS Registry Training For Building Departments

Updated July 2016



INTRODUCTION

Introduction

2013 vs. 2016 Codes

Note:

- The information presented in this class is applicable to both the 2013 and 2016 versions of the energy code.
- While there were substantial changes, they mostly affect the features that have to be installed and not the process for verifying those features, which is what this class covers.
- Summaries of the 2016 changes are provided as extra handouts.
- Where there are differences between the two code versions, they are called out in these materials.

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BayREN Codes & Standards Trainings

- BayREN Codes & Standards is a joint effort of Bay Area cities and counties to achieve full compliance with provisions of the California Energy Code.
- BayREN trainings seek to provide building department staff and private sector building professionals with tools and strategies for improving energy code compliance.
- Today's class is part of the BayREN Compliance Enhancement for Residential Buildings Training Series.

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Today's Learning Objectives

- Understand how HERS verification fits into the overall compliance process.
- Understand when a project is required to be registered with a HERS provider and when it is not.
- Understand how to find a project in a HERS registry.
- Understand how to use the HERS registry to track compliance documentation for a project.
- Understand how to use a HERS registry to save time on field inspections.

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HERS Registry

- When a project requires HERS verified features, the CF1R Certificate of Compliance (and all subsequent CF2R and CF3R documents) must be “registered” with a HERS provider.
- A HERS registry is an on-line *database* that **generates**, tracks and stores the CF1R, CF2R and CF3R documents.
- It will be rare for projects not to require any HERS verification.

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HERS Registry

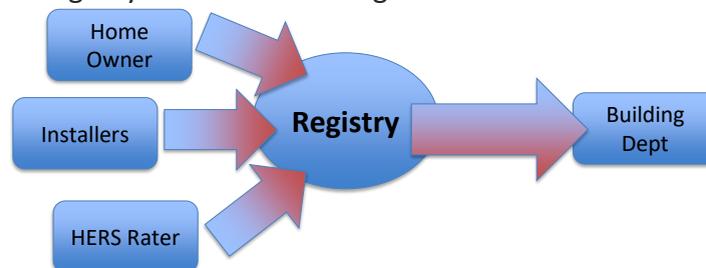
- The following projects all require HERS verification and therefore must be registered with a HERS provider:
 - Any new construction home.
 - Any addition over 1000 square feet.
 - Any addition or alteration that involves adding or replacing:
 - An A/C condenser,
 - An A/C coil,
 - An air handler (furnace) or
 - 40 feet or more of duct.
 - There are some exceptions to the HERS tests, but eligibility can be documented in the registry (they still can be registered). It's a good idea to use the registry to confirm that the project is really exempt. Registry can still be used to track CF2Rs.

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HERS Registry

Track the status of projects from start to finish

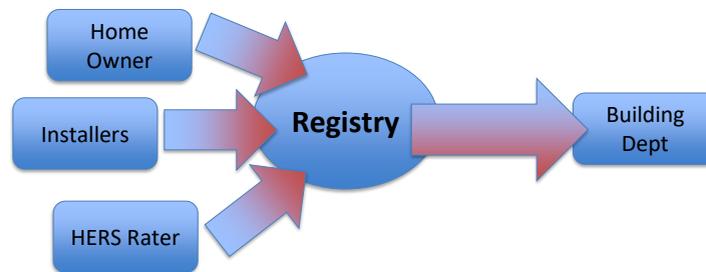
- Once a project is in the registry, it can be tracked from start to finish by anyone involved with the project, including the **building department**.
- It is common for things to change as a project progresses.
- The registry tracks these changes.



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HERS Registry

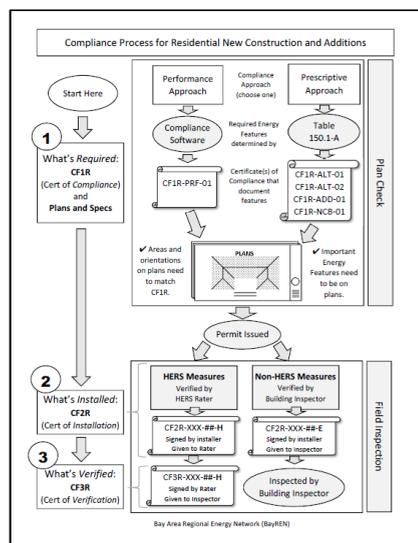
- No more paper (unless you prefer hard copies).
- Anyone can register a new project with a HERS Provider.
- Anyone can be given access to view the status of the project electronically.
- A project can be viewed in the field using a smart phone or tablet with internet access.



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Compliance Process Flow Diagram

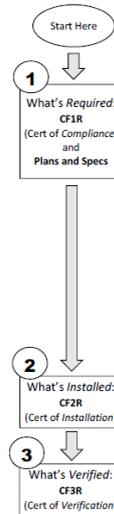
Refer to full-size copy provided with your handouts.



63

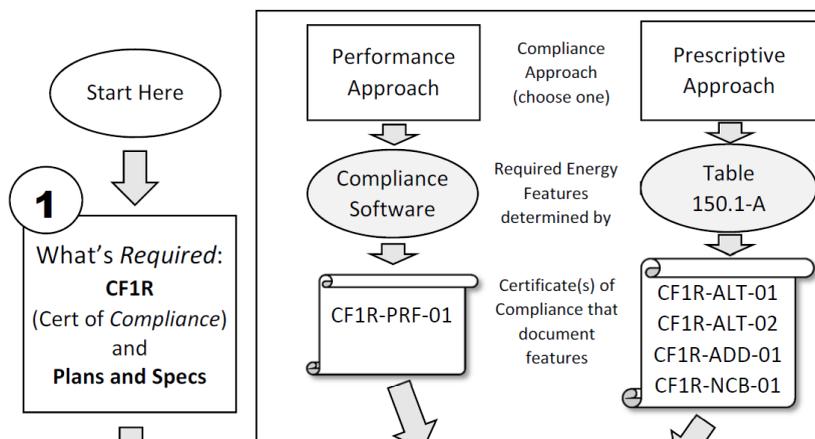
Compliance Process Flow Diagram

- Notice that the forms (CF1R, CF2R, and CF3R) follow a simple 1 - 2- 3 flow.
- Notice that process is divided into Plan Check and Field Inspection sections and that good communication must flow between them.
- The forms are intended to facilitate this.



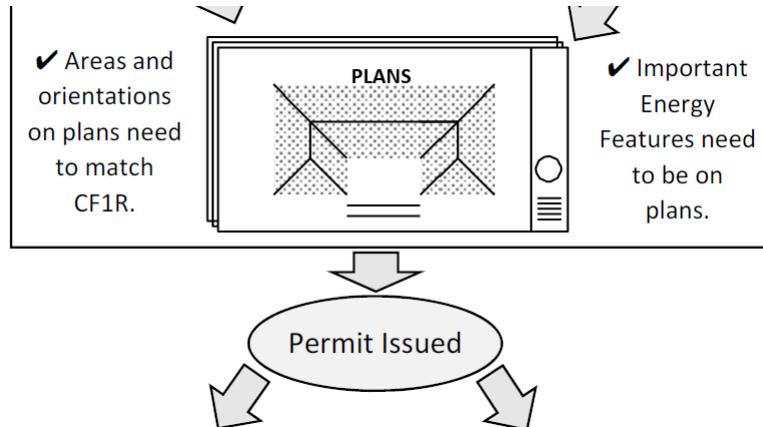
64

Compliance Process Flow Diagram



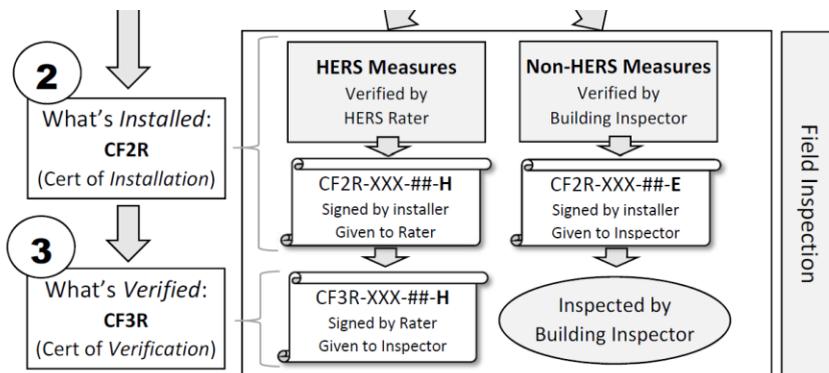
65

Compliance Process Flow Diagram



66

Compliance Process Flow Diagram

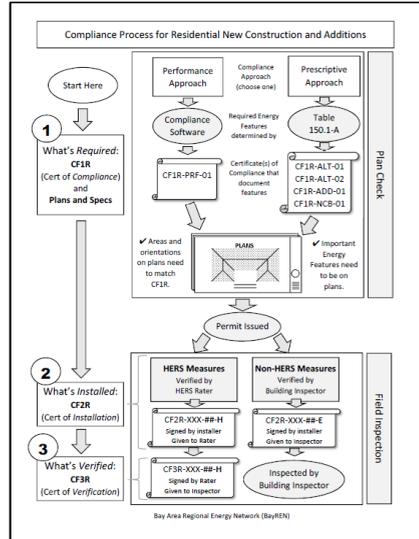


If a project requires HERS verification, **all** forms will be registered.

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Compliance Process Flow Diagram

Any questions?



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Compliance Documents List

Refer to full-size copy provided with your handouts.

BAY AREA Regional Energy Network

Compliance Documents (Forms)

CFIR - Certificates of Compliance

- CFIR-ALT-01: Used to demonstrate compliance for non-HVAC alterations (roof, windows, walls, etc.)
- CFIR-ALT-02: Used to demonstrate compliance for HVAC alterations (change-outs, cut-ins, re-ducts, etc.)
- CFIR-ADD-01-E: Used when the prescriptive approach is used to demonstrate compliance for additions less than or equal to 1000 square feet. See example in appendix.
- CFIR-ADD-01-H: Used when the prescriptive approach is used to demonstrate compliance for newly constructed homes and additions over 1000 square feet.
- CFIR-PRF-01-E: Used when the performance approach is used to demonstrate compliance for any kind of project.

CFZR - Certificates of Installation - Non-HERS Measures (E)

- CFZR-ENV-01-E: Fenestration (windows, skylights, etc.)
- CFZR-ENV-02-E: Air Sealing Features (weather stripping, caulking, backdraft dampers, etc.)
- CFZR-ENV-03-E: Insulation
- CFZR-ENV-04-E: Lighting Products
- CFZR-TS-01-E: Lighting Features
- CFZR-MCH-01-E: Mechanical Systems (HVAC)
- CFZR-MCH-02-E: Whole House Fan
- CFZR-MCH-03-E: Evaporative Coolers
- CFZR-PLB-01-E: Multi-Family Central Hot Water Distribution Systems
- CFZR-PLB-02-E: Single-Family Central Hot Water Distribution Systems
- CFZR-PLB-03-E: Pool and Spa Heating Systems

CFZR - Certificates of Installation - HERS Measures (H)

- CFZR-ENV-20-H: Envelope Air Leakage (Blower Door Test)
- CFZR-ENV-21-H: Oil Framing Stage (bath, loose fill, etc.)
- CFZR-ENV-22-H: Oil Ceiling Air Barrier
- CFZR-ENV-23-H: Oil Insulation Stage
- CFZR-ENV-24-H: Oil Framing Stage (SP & ICF)
- CFZR-MCH-20-H: Sealed Duct*
- CFZR-MCH-21-H: Supply Duct Location Verification
- CFZR-MCH-22-H: HVAC System Fan Efficiency (Fan Watt Draw)**
- CFZR-MCH-23-H: HVAC System Fan Airflow*
- CFZR-MCH-24-H: Blower Door, when infiltration used to meet whole house ventilation
- CFZR-MCH-25-H: HVAC System Refrigerant Charge*
- CFZR-MCH-26-H: Radon System Verification (High SEER/SEER)
- CFZR-MCH-27-H: Ventilation to the Outside (C.O.2) Standard*
- CFZR-MCH-28-H: Return Duct Sizing Table Verification (Alternative to Airflow/Fan Watt Draw Test)
- CFZR-MCH-29-H: Supply Duct Surface Area and Leaked Ducts Verification
- CFZR-PLB-21-H: Multi-Family Central Hot Water Distribution Systems
- CFZR-PLB-22-H: Single-Family Central Hot Water Distribution Systems

For each CFZR-XXX-##-H there is a corresponding CFVR-XXX-##-H, Certificate of Verification
 * These are the most common HERS forms.
 The HERS rater will make sure the correct HERS documents (CFIR and CFZR) are used and completed.

bayren.org/loads
 info@bayren.org

December 21, 2015

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Compliance Documents List (Forms)

CF1R – Certificates of Compliance

- **CF1R-ALT-01:** Used to demonstrate compliance for non-HVAC alterations (roof, windows, walls, etc.)
- **CF1R-ALT-02:** Used to demonstrate compliance for HVAC alterations. (change-outs, cut ins, reducts, etc.)
- **CF1R-ALT-03/04:** Handwritten Versions of CF1R-ALT-02. Will need to be registered and converted to CF1R-ALT-02.
- **CF1R-ADD-01-E:** Used when the *prescriptive* approach is used to demonstrate compliance for additions less than or equal to 1000 square feet. See example in Appendix.
- **CF1R-NCB-01-E:** Used when the *prescriptive* approach is used to demonstrate compliance for newly constructed homes and additions over 1000 square feet.
- **CF1R-PRF-01-E:** Used when the *performance* approach is used to demonstrate compliance for any kind of project.

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Compliance Documents List (Forms)

CF2R – Certificates of Installation – **Non-HERS Measures (-E)**

- | | | |
|------------------|---|--|
| Common | { | ▪ CF2R-ENV-01-E: fenestration (windows, skylights, etc.) |
| | | ▪ CF2R-ENV-02-E: air sealing features (weather stripping, caulking, backdraft dampers, etc.) |
| | | ▪ CF2R-ENV-03-E: insulation |
| | | ▪ CF2R-ENV-04-E: roofing products |
| | | ▪ CF2R-LTG-01-E: lighting features |
| | | ▪ CF2R-MCH-01-E: mechanical systems (HVAC) |
| Not very common. | { | ▪ CF2R-MCH-02-E: whole house fan |
| | | ▪ CF2R-MCH-04-E: evaporative coolers |
| | | ▪ CF2R-PLB-01-E: Multi-family central hot water distribution systems |
| | | ▪ CF2R-PLB-02-E: Single-family central hot water distribution systems |
| | | ▪ CF2R-PLB-03-E: Pool and spa heating systems |

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Compliance Documents List (Forms)

CF-2R – Certificates of Installation – HERS Measures (-H)

- CF2R-ENV-20-H: Envelope air leakage (blower door test)
- CF2R-ENV-21-H: QII Framing Stage (batt, loose fill, etc.)
- CF2R-ENV-22-H: QII Ceiling Air Barrier
- CF2R-ENV-23-H: QII Insulation Stage
- CF2R-ENV-24-H: QII Framing Stage (SIP & ICF)
- **CF2R-MCH-20-H: Sealed ducts***
- CF2R-MCH-21-H: Supply duct location verification
- **CF2R-MCH-22-H: HVAC system fan efficacy (fan watt draw)***
- **CF2R-MCH-23-H: HVAC system fan airflow***
- CF2R-MCH-24-H: Blower door, when infiltration used to meet whole house ventilation
- **CF2R-MCH-25-H: HVAC system refrigerant charge***
- CF2R-MCH-26-H: Rated system verification (High SEER/EER)
- **CF2R-MCH-27-H: ventilation to the ASHRAE 62.2 standard***
- CF2R-MCH-28-H: Return Duct sizing table verification (alternative to airflow/Fan watt draw test)
- CF2R-MCH-29-H: Supply duct surface are and buried ducts verification
- CF2R-PLB-21-H: Multi-family central hot water distribution systems
- CF2R-PLB-22-H: Single-family central hot water distribution systems

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*Most common HERS Tests

Compliance Documents List (Forms)

- For each CF2R-...-H Certificate of *Installation* there is a corresponding CF3R-...-H, Certificate of *Verification*
- The list of CF3Rs would look exactly like the list of CF2R-Hs
- The HERS registry makes sure the correct HERS documents (CF2R and CF3R) get used and completed.

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The Process – HVAC Alterations The Most Common HERS Project

- Knowing whether or not a HERS rater is required on the project needs to be determined as early as possible to prevent problems later.
- It is not required to be known prior to **issuing** a permit, or even performing the work, but because **it can have a substantial impact on cost and scope of the project**, it should be done as early as possible.
- Note that a CF1R is not required to **issue** a permit for an HVAC change-out, but is required to **close** a permit.

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The Process – HVAC Alterations

- The HERS Provider Registry does an excellent job walking people through the complicated process (like “Turbo-Tax”).
- It is *recommended* that all HVAC alterations start there.
- This will help the applicant determine:
 - whether or not HERS verification is required,
 - what HERS tests and compliance forms are required
- It provides on-line tracking of the process for all parties.
- It will also generate a CF1R appropriate to the project.
- The HERS Provider charges a small fee and not all projects are required to be registered with a HERS provider.

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The Process – HVAC Alterations

- Only projects that require HERS verification are *required* to be registered with a HERS Provider.
- This includes any alteration that involves the installation or replacement of the following:
 - A/C condenser
 - A/C coil
 - Package unit
 - Air handler (furnace, fan coil, etc.)
 - Any refrigerant containing component
 - More than 40' of ducts

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The Process – HVAC Alterations

- Exceptions to the requirement for **duct sealing (and HERS duct testing)** include:
 - Duct systems that are insulated or sealed with **asbestos**
 - Duct systems that have been **previously tested and verified** for duct leakage
 - Duct systems with **less than 40 feet of ducts outside of the insulated shell of the building**

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The Process – HVAC Alterations

- Exceptions to the requirement for **refrigerant charge** verification by a HERS rater include:
 - Project is not in climate zones 2, 8-15.
 - Factory charged package units

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The Process – HVAC Alterations

- When a permit applicant submits a **handwritten** CF1R-ALT-04 for an HVAC alteration, first determine if the CF1R indicates that HERS verification is needed.
 - If it does, then they will *eventually* have to register the project and the registry will guide the process.
 - If it does not, some effort should go into determining if the project is *correctly* described.
 - These forms are often filled out wrong. Why not let the registry do it?

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The Process – HVAC Alterations

- Residential Compliance Manual Appendix E flow charts can be used to determine if no HERS rater is truly required.
- Note that if a HERS rater is not required, the exceptions shown below should be field verified by the building inspector.
 - Ducts are insulated or sealed with asbestos.
 - Less than 40 of ducts outside of conditioned space.
 - Factory charged package unit.

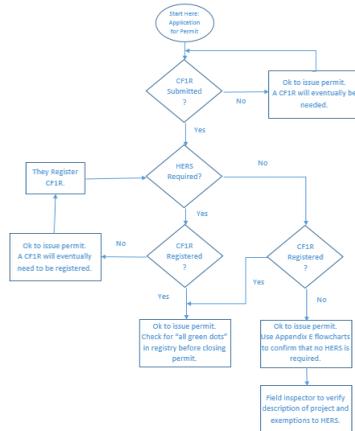
80

The Ideal Process – HVAC Alterations

1. HVAC contractor bids project
2. Project is entered into registry, registry says what tests are required
3. CF1R-ALT-02 generated and signed on-line
4. Get permit
5. Install equipment
6. Complete and sign CF2Rs on-line
7. HERS Tests
8. Complete and sign CF3Rs on-line
9. Inspections
10. Done

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The Process – HVAC Alterations

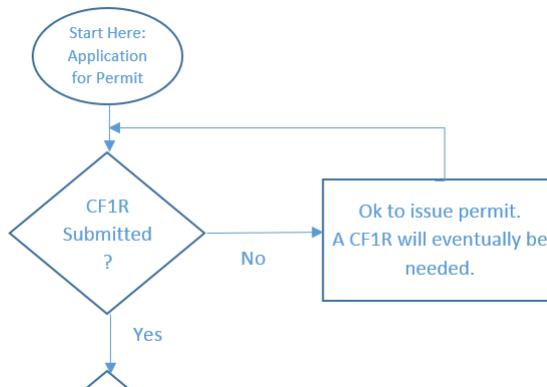


82

The Process – HVAC Alterations

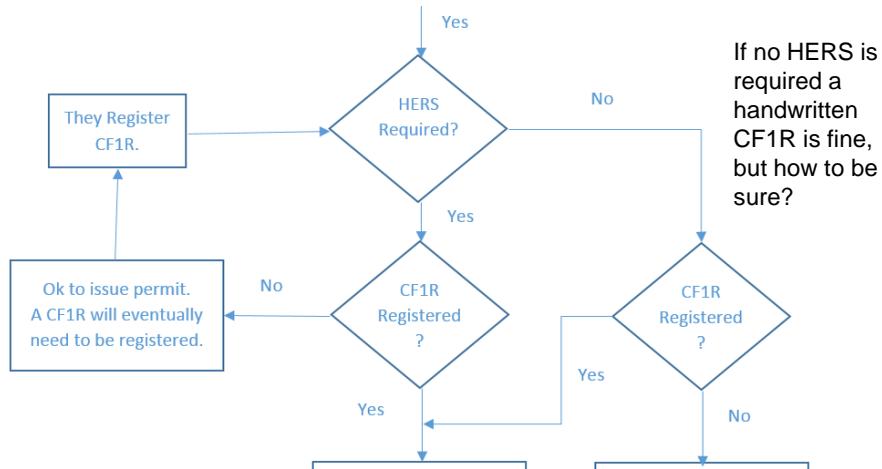
The energy code does say that a permit can be issued without a CF1R, but it is risky for the homeowners.

Since one will eventually be needed why not require one now?



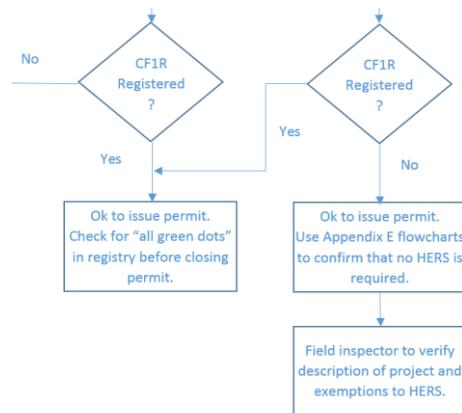
83

The Process – HVAC Alterations



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The Process – HVAC Alterations

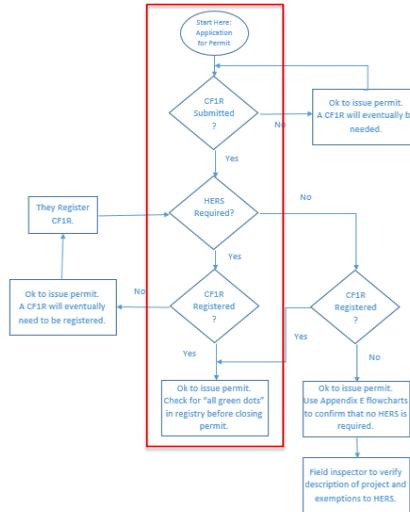


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The Process – HVAC Alterations

Keep it simple.

Require a registered CF1R for any project that may require HERS testing.



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Demo

Approved HERS Provider Categories

Provider	2013 Standards			2008 Standards		
	New Construction	Alterations	Whole House	New Construction	Alterations	Whole House
CalCERTS	Yes ^a	Yes	Yes	Yes ^a	Yes	Yes
CHEERS				Yes		
USERA		Yes ^b			Yes ^b	

^a Also approved for NSHP.

^b Third party quality control program, by Enalasis, for residential buildings.

From: <http://www.energy.ca.gov/HERS/providers.html>

The demonstration for this training will be with the CalCERTS registry because they are the only fully certified HERS provider at this time.

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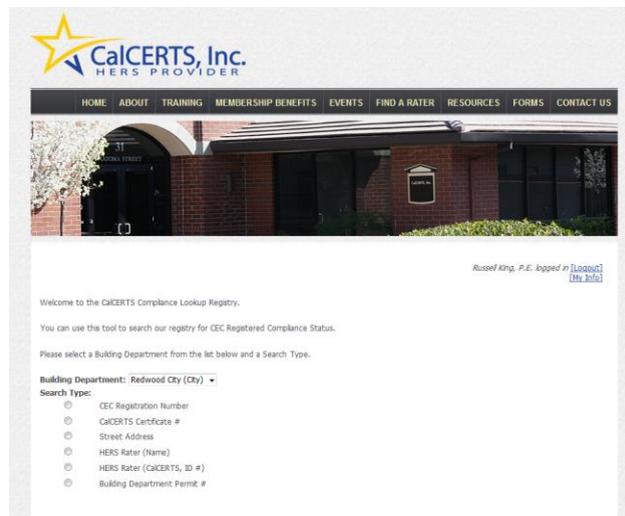
Demo



Home Page – www.calcerts.com - Log In here.

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Demo



Landing Page – Search Projects from here.

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Demo

CalCERTS, Inc. HERS PROVIDER

HOME ABOUT TRAINING MEMBERSHIP BENEFITS EVENTS FIND A RATER RESOURCES FORMS CONTACT US

Russell King, P.E. logged in [Logout](#) [My Info](#)

Building Department: City of Redwood City
Search by: Street Address

Street NUMBER:

Street NAME: (Do not include Way, Street, Pl. etc)

ZIP CODE:

Landing Page – Search Projects from here.

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Demo

CalCERTS, Inc. HERS PROVIDER

HOME ABOUT TRAINING MEMBERSHIP BENEFITS EVENTS FIND A RATER RESOURCES FORMS CONTACT US

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Building Department: City of Redwood City
Search by: Street Address

***** ALERT *****
2 records match your search criteria. Please select the address you are interested in from the list below.

Address	City / Zip	Project Type	Permit Number	Year Standards	HERS Rater
126 C Street	Redwood City / 94063	Alterations SFR	B14-184G	2013	Emerson, Suzanne Henderson (CC2005698)
126 Lincoln Ave	Redwood City / 94061	New Construction SFR		2001/2005	Young, Tommy (CC2005051)

Search Results Page – Fine Tune Search Here

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Demo

CalCERTS, Inc. HERS PROVIDER

HOME ABOUT TRAINING MEMBERSHIP BENEFITS EVENTS FIND A RATER RESOURCES FORMS CONTACT US

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MATCH FOUND: [BACK](#) [New Search](#)

GENERAL INFORMATION

Code Year Reference:	2013
Project Name:	Smiley Smith
Address:	136 C Street
City / State / Zip:	Redwood City / CA / 94062
Installation Agent/:	City of Redwood City
Permit Number / Date:	814-1845 / 10/1/2014

CPUR INFORMATION

Certificate Type:	Compliance
Registered Form:	CPUR-ALC-02
Registered Date:	10/07/2014 12:41
Registration Number:	214-401124984-00000000-0000

CPUR INFORMATION

System	Form	Registered Date	Registration Number
System 1	CPUR-HOH-01	10/07/2014 13:51	214-401124984-HO1000002A-0000
System 1	CPUR-HOH-20	10/13/2014 14:41	214-401124984-HO2000002A-0000

CPUR INFORMATION

System	Form	Registered Date	Registration Number
System 1	CPUR-HOH-20	10/13/2014 18:13	214-401124984-HO2000002A-HO20A

FINAL STATUS: **COMPLETE**

Project Page – Project Complete – All Green Dots

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Demo

CalCERTS, Inc. HERS PROVIDER

HOME ABOUT TRAINING MEMBERSHIP BENEFITS EVENTS FIND A RATER RESOURCES FORMS CONTACT US

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Building Department: City of Redwood City
Search by Street Address

Street NUMBER:
2564

Street NAME:
 (Do not include Way, Street, Pl, etc)

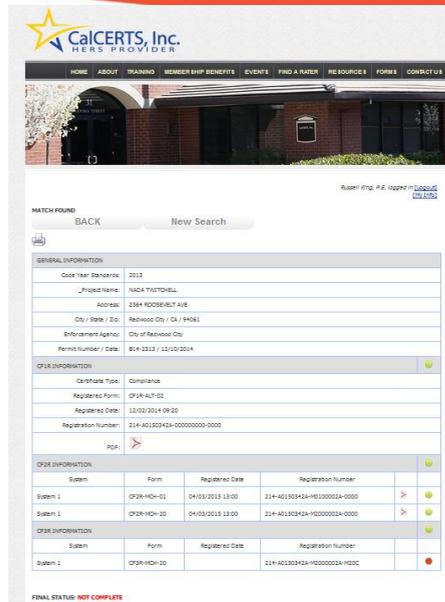
ZIP CODE:

[BACK](#) [SEARCH](#)

New Search

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Demo



Project Not Complete – Red Dot

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Demo

SAMPLE GROUP 665826

Clayton	1383 SHELL LN	94517
Redwood City	2564 ROOSEVELT AVE	94061
San Jose	2707 CLARION AVE	95148
San Jose	403 CAMILLE CIR	95134
San Jose	5280 ROMFORD DR	95124
Folsom	7222 PINE GROVE WAY	95630

Sample Group
All will be tested by installer.
One will be tested by rater.

95

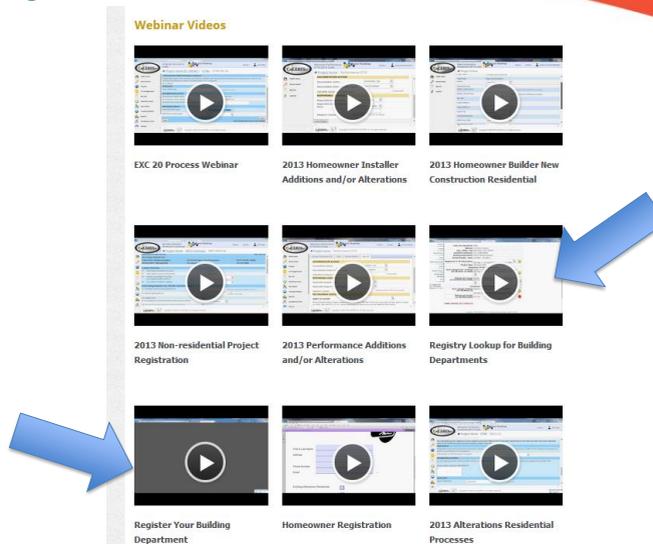
More Information



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Class Wrap-up

Final Questions and Class Evaluation

Contact information:

- BayREN Codes & Standards Program
 - www.bayren.org/codes
 - codes@bayren.org

Updated: 01/05/2016

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