We will be starting soon!

Thanks for joining us

Residential Compliance Forms for Permitting

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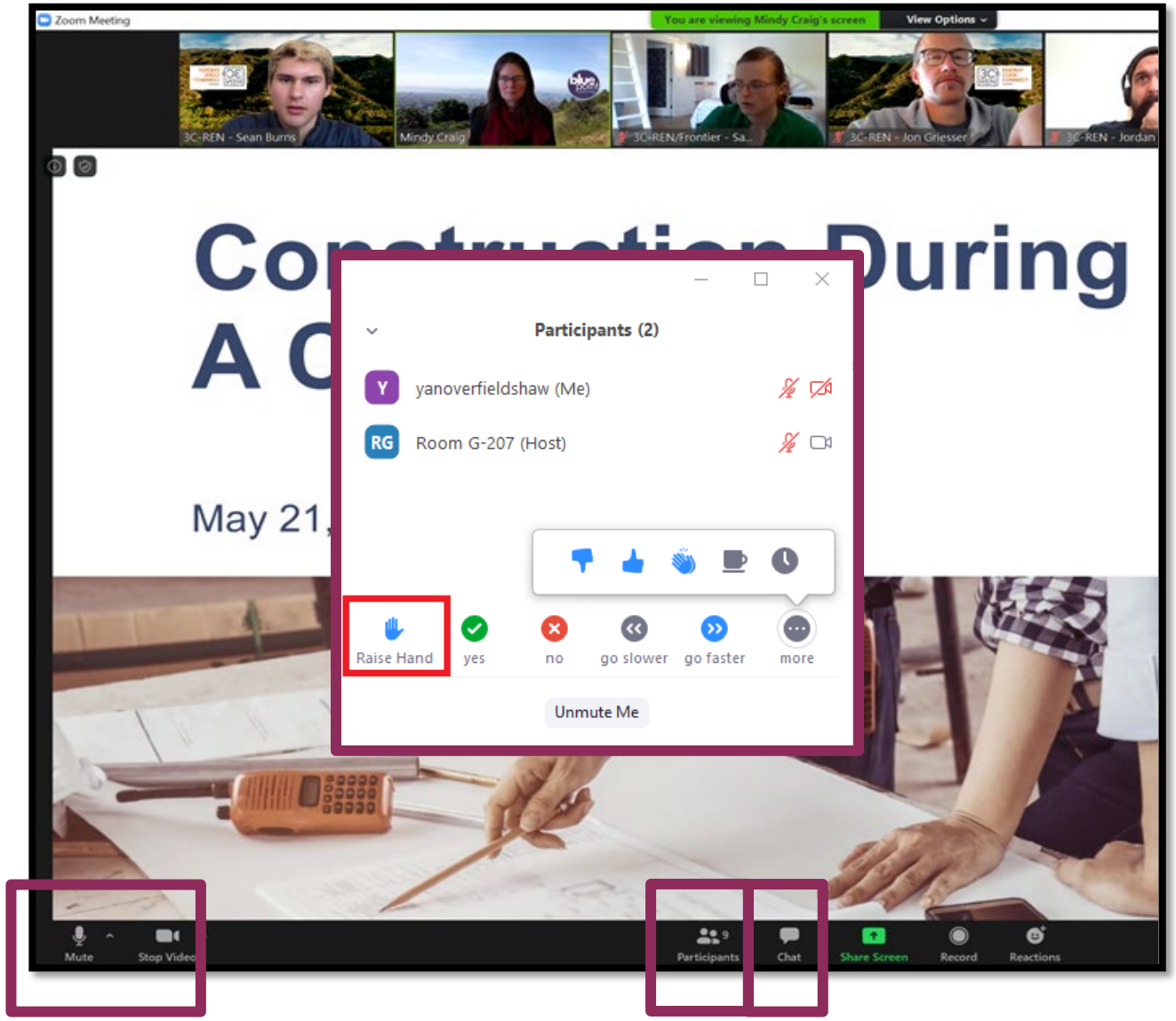
Nov 7, 2023

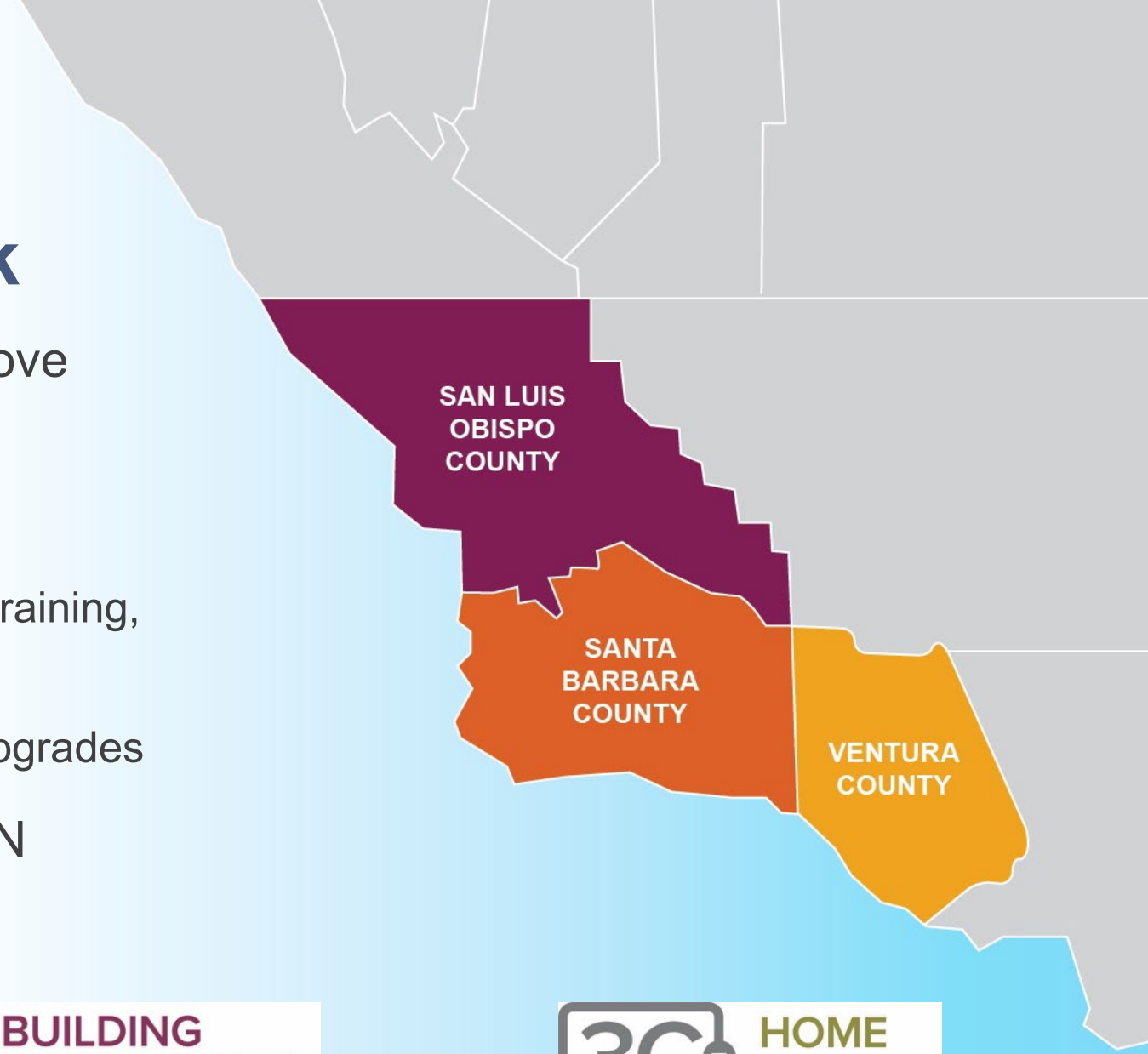
Zoom Orientation

- Please be sure your full name is displayed
- Please mute upon joining
- Use "Chat“ box to share questions or comments
- Under "Participant" select "Raise Hand" to share a question or comment verbally
- The session may be recorded and posted to 3C-REN's on-demand page. Feel free to ask questions via the chat and keep video off if you want to remain anonymous in the recording.



3C-REN: Tri-County Regional Energy Network

- Three counties working together to improve energy efficiency in the region
- Services for –
  - **Building Professionals:** industry events, training, and energy code compliance support
  - **Households:** free and discounted home upgrades
- Funded by ratepayer dollars that 3C-REN returns to the region



3C REN ENERGY CODE CONNECT

3C REN BUILDING PERFORMANCE TRAINING

3C REN HOME ENERGY SAVINGS

3C REN ENERGY CODE CONNECT

- Serves all building professionals
- Three services –
  - **Energy Code Coach**
  - **Training and Support**
  - **Regional Forums**
- Makes the Energy Code easy to follow

Energy Code Coach:
3c-ren.org/codes
805.781.1201

Event Registration:
3c-ren.org/events

BUILDING PERFORMANCE TRAINING

- Serves current and prospective building professionals
- Expert instruction:
  - **Technical skills**
  - **Soft skills**
- Helps workers to thrive in an evolving industry

Event Registration:
3c-ren.org/events

3C REN HOME ENERGY SAVINGS

Multifamily (5+ units)

- No cost technical assistance
- Rebates up to $750/apartment plus additional rebates for specialty measures like heat pumps

Single Family (up to 4 units)

- Sign up to participate!
- Get paid for the metered energy savings of your customers

Enrollment:
3C-REN.org/contractor-participation

Today's Learning Objectives

We will walk through the 2022 Residential Title 24 energy code compliance forms, highlighting the areas that are significant to the project's results.

- Understand how to read and correlate information from permit drawings to the CF-1R
- Identify areas of inconsistency that frequently snag a plan review.
- Learn what aspects of the CF-1R are not as impactful, requiring less attention
- Determine which measures identified in the CF-1R trigger construction verification.

Learning Units:

- 0.10 ICC CEU approved for this course
- 1.0 AIA HSW pending for this course

Overview of Forms for Residential Single Family Construction

- CF-1R – Forms used to show ***Compliance*** with the energy code at initial plan submittal
- CF-2R – Forms used during construction to demonstrate that the energy code features met ***Installation*** requirements
- CF-3R – Forms used after installation to confirm that the energy code features met the ***Verification*** requirements

Process for Residential Permitting

CF-1R Compliance created and uploaded to HERS Registry

CF-2R Installation completed and uploaded to HERS Registry

CF-3R Verification completed and uploaded to HERS Registry

Building Official Confirms CF-2R and CF-3R s are 'Cleared'

HERS – Home Energy Rating System

We have two HERS Providers, CalCERTS and CHEERS, in California. These organization are responsible for training and certifying HERS Raters, and supporting the California Energy Code HERS Registry.

CF1R-PRF-01-E for the 2022 Energy Code, Single Family

Watermark

Registration Date and Number

- **Box 08** Climate Zone
- **Box 12** Project Scope
- **Box 14** Addition Condition Floor Area
- **Box 18** Conditioned Floor Area
- **Box 11** Dwelling Units
- **Box 13** Bedrooms
- **Box 20** ADU Bedrooms
- **Box 15** Number of Stories

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD — CF1R-PRF-01-E

Project Name: New House — Calculation Date/Time: 2023-04-19T10:30:30-07:00 — (Page 1 of 11)

Calculation Description: New Title 24 Compliance Run — Input File Name: House, ribd22

GENERAL INFORMATION					
01	Project Name	New House			
02	Run Title	New Title 24 Compliance Run			
03	Project Location	123 NEW Street			
04	City	San Luis Obispo, CA	05	Standards Version	2022
06	Zip code	93401	07	Software Version	CBECC-Res 2022.2.0
08	Climate Zone	5	09	Front Orientation (deg/ Cardinal)	0
10	Building Type	Single family	11	Number of Dwelling Units	1
12	Project Scope	Newly Constructed	13	Number of Bedrooms	3
14	Addition Cond. Floor Area (ft^2)	0	15	Number of Stories	1
16	Existing Cond. Floor Area (ft^2)	n/a	17	Fenestration Average U-factor	0.2
18	Total Cond. Floor Area (ft^2)	999	19	Glazing Percentage (%)	33.90%

Note: These inputs are significant because they dictate IAQ ventilation (outside air) requirement

ld testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.

tures shown below

Energy Design Rating

- **Watermark,** etc.
- **RESULT : PASS**
- **PV** System Size

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01-E

Project Name: New House

Calculation Date/Time: 2023-04-19T10:30:30-07:00

Calculation Description: New Title 24 Compliance Run

Input File Name: House.ribd22

ENERGY DESIGN RATINGS

	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency[1] EDR (EDR2efficiency)	Total[2] EDR (EDR2total)	Source Energy (EDR1)	Efficiency[1] EDR (EDR2efficiency)	Total[2] EDR (EDR2total)
Standard Design	35.1	47.6	42			
Proposed Design	26	29	33.2	9.1	18.6	8.8
RESULT[3]: PASS						

[1]Efficiency EDR includes improvements like a better building envelope and more efficient equipment

[2]Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries

[3]Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded

- Standard Design PV Capacity: 2.20 kWdc
- PV System resized to 2.20 kWdc (a factor of 2.200) to achieve 'Standard Design PV' PV scaling

Energy Use Summary

Energy Use Summary

- Source Energy EDR1
- Design TDV Energy EDR2
- Regulated Energy Uses (credit/penalty)
- Unregulated Energy Uses

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: New House

Calculation Date/Time: 2023-04-19T10:30:30-07:00

(Page 3 of 12)

Calculation Description: New Title 24 Compliance Run

Input File Name: House..ribd22

ENERGY USE SUMMARY

Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft^2 -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft^2 -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft^2 -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft^2 -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	0.58	2.69	0.14	1.06	0.44	1.63
Space Cooling	0.73	24.65	0.33	16.93	0.4	7.72
IAQ Ventilation	0.42	4.46	0.42	4.46	0	0
Water Heating	2.07	22.48	7.28	31.09	-5.21	-8.61
Self Utilization/Flexibility Credit				-4.34		4.34
Efficiency Compliance Total	**3.8**	**54.28**	**8.17**	**49.2**	**-4.37**	**5.08**
Photovoltaics	-2.41	-66.42	-2.41	-71.17		
Battery			-4.86	-14.98		
Flexibility						
Indoor Lighting	0.88	8.9	0.88	8.9		
Appl. & Cooking	5.63	36.71	5.61	36.51		
Plug Loads	4.92	51.45	4.92	51.45		
Outdoor Lighting	0.2	1.88	0.2	1.88		
TOTAL COMPLIANCE	**13.02**	**86.8**	**12.51**	**61.79**		

Energy Use Intensity (EUI), PV, and Battery

Energy Use Intensity

- EUI—another metric

PV System

- Standard or custom design

Battery System

- If applicable, size/capacity

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E
(Page 4 of 12)

Project Name: New House
Calculation Date/Time: 2023-04-19T10:30:30-07:00
Calculation Description: New Title 24 Compliance Run
Input File Name: House..ribd22

ENERGY USE INTENSITY

	Standard Design (kBtu/ft^2 - yr)	Proposed Design (kBtu/ft^2 - yr)	Compliance Margin (kBtu/ft^2 - yr)	Margin Percentage
Gross EUI[1]	20.12	25.02	-4.9	-24.35
Net EUI[2]	7.89	12.78	-4.89	-61.98

Notes
1. Gross EUI is Energy Use Total (not including PV) / Total Building Area.
2. Net EUI is Energy Use Total (including PV) / Total Building Area.

REQUIRED PV SYSTEMS

01	02	03	04	05	06	07	08	09	10	11	12
DC System Size (kWdc)	Exception	Module Type	Array Type	Power Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)	Annual Solar Access (%)
1.96	NA	Standard (14-17%)	Fixed	none	true	150-270	n/a	n/a	<=7:12	96	98

BATTERY SYSTEMS

01	02	03	04	05	06	07
Control	Capacity (kWh)	Charging		Discharging		Round Trip Efficiency
		Charging Efficiency	Charging Rate (kW)	Discharging Efficiency	Discharging Rate (kW)	
Basic	13.5	0.95	n/a	0.95	n/a	0.9

Required Special Features

Some items will/should be shown or noted in the drawing set, for example:

- Insulation above roof deck, etc
- Battery System
- POU – Point of Use plumbing
- Compact (plumbing) distribution system credit

REQUIRED SPECIAL FEATURES
The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.
• Insulation above roof deck • Insulation below roof deck • Window overhangs and/or fins • Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed

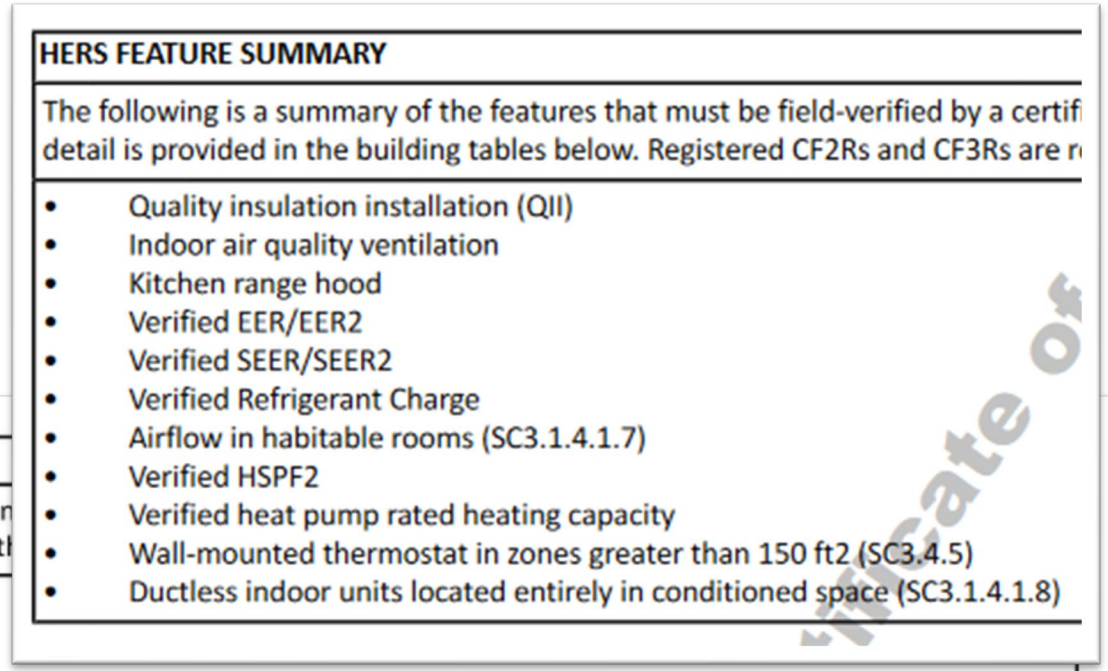
REQUIRED SPECIAL FEATURES
The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.
• Battery System: 13.5 kWh (Self Utilization Credit taken) • Ducts with high level of insulation • Floor has high level of insulation • Ducts in crawl space

REQUIRED SPECIAL FEATURES
The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.
• Variable capacity heat pump compliance option (verification details from VCHP Staff report, Appendix B, and RA3) • Compact distribution system basic credit • Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed

HERS Feature Summary

HERS Features must be field verified.

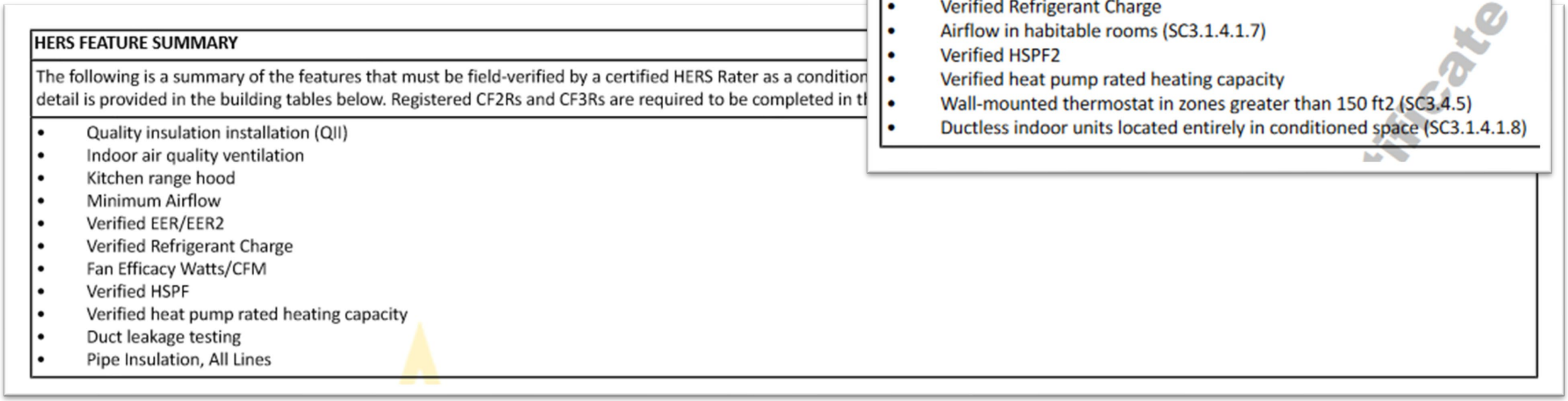
- Listed items may or may not impact the drawing set.
- Listed items do not impact the Plan-Check process.
- Listed items should be very important to the Builder – and may benefit the architect or ownership to show some of these items on the plan set.



HERS FEATURE SUMMARY

The following is a summary of the features that must be field-verified by a certifi
detail is provided in the building tables below. Registered CF2Rs and CF3Rs are r

- Quality insulation installation (QII)
- Indoor air quality ventilation
- Kitchen range hood
- Verified EER/EER2
- Verified SEER/SEER2
- Verified Refrigerant Charge
- Airflow in habitable rooms (SC3.1.4.1.7)
- Verified HSPF2
- Verified heat pump rated heating capacity
- Wall-mounted thermostat in zones greater than 150 ft2 (SC3.4.5)
- Ductless indoor units located entirely in conditioned space (SC3.1.4.1.8)



HERS FEATURE SUMMARY

The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition
detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in t

- Quality insulation installation (QII)
- Indoor air quality ventilation
- Kitchen range hood
- Minimum Airflow
- Verified EER/EER2
- Verified Refrigerant Charge
- Fan Efficacy Watts/CFM
- Verified HSPF
- Verified heat pump rated heating capacity
- Duct leakage testing
- Pipe Insulation, All Lines

Building, Zone, and Opaque Surfaces

Building – Features

- Quantity of systems

Zone Information

- Summary of each zone

Opaque Surfaces

- Walls, Floors, etc

BUILDING - FEATURES INFORMATION						
01	02	03	04	05	06	07
Project Name	Conditioned Floor Area (ft^2)	Number of Dwelling Units	Number of Bedrooms	Number of Zones	Number of Ventilation Cooling Systems	Number of Water Heating Systems
New House	999	1	3	1	0	1

ZONE INFORMATION						
01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft^2)	Avg. Ceiling Height	Water Heating System 1	Status
Conditioned	Conditioned	HVAC System 1	999	9	DHW System	New

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft^2)	Window and Door Area (ft2)	Tilt (deg)
South	Conditioned	R19 2x6	180	n/a	153.5	12	90
East	Conditioned	R19 2x6	90	n/a	565	67.96	90
North	Conditioned	R19 2x6	0	n/a	153.5	27	90
West	Conditioned	R19 2x6	270	n/a	452	231.78	90

Building, Zone, and Opaque Surfaces

Ignore - Name is manually entered

Ignore - Name is manually entered

Ignore - Not used

Ignore - (almost) always 90 deg

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft^2)	Window and Door Area (ft2)	Tilt (deg)
South	Conditioned	R19 2x6	180	n/a	153.5	12	90
East	Conditioned	R19 2x6	90	n/a	565	67.96	90
North	Conditioned	R19 2x6	0	n/a	153.5	27	90
West	Conditioned	R19 2x6	270	n/a	452	231.78	90

Building, Zone, and Opaque Surfaces

Columnm 02-Zone: "parent/child" modeling relationship

Columnm 04-Azimuth: Must match plans. Use best sampling practices to compare to site plan.

Column 06 and 07 - Gross Area for [Assemblies] and Window and Door: Must match plans. Use best sampling practices to compare to plans, elevations, etc.

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft^2)	Window and Door Area (ft2)	Tilt (deg)
South	Conditioned	R19 2x6	180	n/a	153.5	12	90
East	Conditioned	R19 2x6	90	n/a	565	67.96	90
North	Conditioned	R19 2x6	0	n/a	153.5	27	90
West	Conditioned	R19 2x6	270	n/a	452	231.78	90

Opaque Surfaces- Cathedral Ceilings and/or Attics

OPAQUE SURFACES - CATHEDRAL CEILINGS										
01	02	03	04	05	06	07	08	09	10	11
Name	Zone	Construction	Azimuth	Orientation	Area (ft^2)	Skylight Area (ft^2)	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Cool Roof
Roof Assembly	Conditioned	R30 Cathedral Ceiling	270	n/a	999	0	1	0.1	0.85	No

- **Column 06 - Area:** at a minimum match the floor area
- **Column 08 - Roof Rise:** confirm with plan set if > 2:12, i.e. steep roof
- **Column 09 and 10 - Roof Reflectance and Emittance:** 0.1 and 0.85 default values
- **Column 11 - Cool Roof:** If “yes,” confirm with CRRC material specifications and Columns 09 and 10 values

CRRC – Cool Roof Rating Council
The two basic characteristics that determine the "coolness" of a roof are solar reflectance and thermal emittance. Both properties are measured on a scale from 0 to 1, where 1 is 100% reflective or emissive.
See https://coolroofs.org for further information and a products directory of rated materials.

Opaque Surfaces- Cathedral Ceilings and/or Attics

ATTIC									
01	02	03	04	05	06	07	08	09	10
Name	Construction	Type	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof	Status	Verified Existing Condition
Attic __Garage__	Attic Garage Roof Cons	Unventilated	4	0.1	0.85	No	No	Existing	No
Attic House	Attic RoofHouse	Unventilated	4	0.1	0.85	No	No	Existing	No

- **Column 03 -Type:** Unventilated or Ventilated, confirm against plans
- **Column 04 - Roof Rise:** confirm with plan set if > 2:12, i.e. steep roof
- **Column 05 and 06 - Roof Reflectance and Emittance:** 0.1 and 0.85 default values
- **Column 07 - Radiant Barrier**: confirm against plans if in project scope
- **Column 08 - Cool Roof:** if “yes,” confirm with CRRC material specifications and Columns 09 and 10 values

Fenestration/Glazing

- If wall azimuth from opaque surfaces was confirmed correct, then **Columns 03-05** will be correct.
- **Columns 10 and 12 - U-Factor and SHGC**: SHGC > 0.5 and/or U-Factor < 0.2 is uncommon
  - U-Factor should be less than or equal to what is reported. SHGC should be as close to listed value as possible.
  - Inspectors - NFRC U-Factor needs to be ≤ the CF1R values. SHGC needs to be as close to CF1R value as possible
- **Column 09 – Area:** should match plans

FENESTRATION / GLAZING													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft^2)	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading
Window 07	Window	South		180	6	2	1	12	0.2	NFRC	0.25	NFRC	Bug Screen
Window 01	Window	East		90	6	2	1	12	0.2	NFRC	0.25	NFRC	Bug Screen
Window 02	Window	East		90	6	2	1	12	0.2	NFRC	0.25	NFRC	Bug Screen
Window 03	Window	East		90	2	2	1	4	0.2	NFRC	0.25	NFRC	Bug Screen
Door 01	Window	East		90	6	6.66	1	39.96	0.2	NFRC	0.25	NFRC	Bug Screen
Window 04	Window	North		0	3	3	1	9	0.2	NFRC	0.25	NFRC	Bug Screen

Overhangs and Slabs

Overhangs and Fins

- Units: feet
- Dist Up, e.g. above the window
- South and West can be most significant

OVERHANGS AND FINS													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Window	Overhang					Left Fin				Right Fin			
	Depth	Dist Up	Left Extent	Right Extent	Flap Ht.	Depth	Top Up	Dist L	Bot Up	Depth	Top Up	Dist R	Bot Up
Window 07	1	1.33	3	10	0	0	0	0	0	0	0	0	0
Window 04	6	1.33	4	4	0	0	0	0	0	0	0	0	0
Window 05	1	1.33	10	10	0	0	0	0	0	0	0	0	0
Window 06	1	1.33	3	10	0	0	0	0	0	0	0	0	0

Slab Floors

- Edge Insulation
- Heated Slab

SLAB FLOORS							
01	02	03	04	05	06	07	08
Name	Zone	Area (ft^2)	Perimeter (ft)	Edge Insul. R-value and Depth	Edge Insul. R-value and Depth	Carpeted Fraction	Heated
Slab On Grade	Conditioned	999	151	R-5	48	0%	No

Opaque Surface Constructions and HERS

Opaque Surface Constructions

- Total Cavity R-value
- Continuous R-value

OPAQUE SURFACE CONSTRUCTIONS							
01	02	03	04	05	06	07	08
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Interior / Exterior Continuous R-value	U-factor	Assembly Layers
R19 2x6	Exterior Walls	Wood Framed Wall	2x6 @ 16 in. O. C.	R-21	None / None	0.069	Inside Finish: Gypsum Board Cavity / Frame: R-21 / 2x6 Exterior Finish: 3 Coat Stucco
R30 Cathedral Ceiling	Cathedral Ceilings	Wood Framed Ceiling	2x12 @ 24 in. O. C.	R-30	None / None	0.034	Roofing: Light Roof (Asphalt Shingle) Roof Deck: Wood Siding/sheathing/decking Cavity / Frame: R-30 / 2x12 Inside Finish: Gypsum Board

Building Envelope - HERS Verification

- HERS “cheat sheet”

BUILDING ENVELOPE - HERS VERIFICATION				
01	02	03	04	05
Quality Insulation Installation (QII)	High R-value Spray Foam Insulation	Building Envelope Air Leakage	CFM50	CFM50
Not Required	Not Required	N/A	n/a	n/a

Water Heating Systems

WATER HEATING SYSTEMS								
01	02	03	04	05	06	07	08	09
Name	System Type	Distribution Type	Water Heater Name	Number of Units	Solar Heating System	Compact Distribution	HERS Verification	Water Heater Name (#)
DHW System	Domestic Hot Water (DHW)	Standard	HPWH	1	n/a	None	n/a	HPWH (1)

- **Column 03 - Distribution System**: if there is a recirculation system, confirm its control type on the plan set matches the selected type on the CF1R
- **Column 05 - Number of Units**: confirm quantity is correct
- **Column 07- Compact Distribution**: if 'Expanded', requires HERS and linear takeoffs, should trigger a deeper investigation. The calculations need to be on the plan set, see Single Family Residential Compliance Manual Section 5.6.2.4.

Water Heaters – NEEA HPs and Other Types

WATER HEATERS - NEEA HEAT PUMP							
01	02	03	04	05	06	07	08
Name	# of Units	Tank Vol. (gal)	NEEA Heat Pump Brand	NEEA Heat Pump Model	Tank Location	Duct Inlet Air Source	Duct Outlet Air Source
HPWH	1	80	Rheem	RheemPROPH80T2R H37530	Outside	Outside	Outside

- **Column 02 - # of Units**: Simple confirmation
- **Column 04 & 05 - NEEA Brand and Model:** Ideally the plan set shows the NEEA brand and model consistent with the T24 (CF2R should match what is installed).
- **Column 06, 07, 08 - Tank and Duct Location:** Confirm system installation location, intake, and exhaust configuration on the plans is consistent with T24

Other Water Heater Types:

- ***Heat Pump*** - EF or UEF for a HPWH is misleading, the efficiency metric is actually COP and is expected to be in a range of 1.8-4.0.
- ***Gas*** – EF or UEF, Anticipate between 0.8 and 0.97
- ***Electric Resistance*** – EF or UEF, should be 0.98 or less, the efficiency is limited since electric resistance has a efficiency of 1 maximum.

Water Heaters – HERS Verification

WATER HEATING - HERS VERIFICATION						
01	02	03	04	05	06	07
Name	Pipe Insulation	Parallel Piping	Compact Distribution	Compact Distribution Type	Recirculation Control	Shower Drain Water Heat Recovery
DHW System - 1/1	Not Required	Not Required	Not Required	None	Not Required	Not Required

- **Column 03 - Parallel Piping:** if required the project is utilizing a manifold and feeds use points with ½" or smaller lines.
- **Column 04 - Compact Distribution:** if selected, confirm on plan set. Requires a weighted distance calculation method that should be shown on plans.
- If **Compact Distribution** is selected a table will be present that shows the distance to fixtures in ft.
- **Column 06 - Recirculation Control:** If recirculation is included, the type of control needs to be confirmed. Non-controlled recirculation is heavily penalized.
- **Column 07 - Shower Drain Water Heater Recovery:** New component that gives compliance credit if installed, if selected the component should be confirmed in the plan set.

Space Conditioning Systems, HVAC and HERS

Space Conditioning Systems

- All values should be confirmed

HVAC – Heat Pumps

- HERS Verifications triggered

HVAC Heat Pumps –HERS Verification

- Lists the verifications needed

HVAC – Distribution Systems

- 'No Ducts' vs 'Ducts in Attic' vs 'Ducts in Conditioned Space'
- HERS Verifications triggered

SPACE CONDITIONING SYSTEMS

01	02	03	04	05	06	07	08	09
Name	System Type	Heating Unit Name	Heating Equipment Count	Cooling Unit Name	Cooling Equipment Count	Fan Name	Distribution Name	Required Thermostat Type
HVAC System 1	Heat pump heating cooling	t24-SplitHeatPump	1	t24-SplitHeatPump	1	n/a	Distribution System 2	Setback

HVAC - HEAT PUMPS

01	02	03	04	05	06	07	08	09	10	11	12	13
Name	System Type	Number of Units	Heating				Cooling			Zonally Controlled	Compressor Type	HERS Verification
			Efficiency Type	HSPF / HSPF2 / COP	Cap 47	Cap 17	Efficiency Type	SEER / SEER2	EER / EER / CEER			
t24-SplitHeatPump	Ductless MiniSplit HP	1	HSPF2	7.5	18000	15000	EER2SEER2	14.3	11.7	Not Zonal	Single Speed	t24-SplitHeatPump-hers-htpump

HVAC HEAT PUMPS - HERS VERIFICATION

01	02	03	04	05	06	07	08	09
Name	Verified Airflow	Airflow Target	Verified EER/EER2	Verified SEER/SEER2	Verified Refrigerant Charge	Verified HSPF/HSPF2	Verified Heating Cap 47	Verified Heating Cap 17
t24-SplitHeatPump-hers-htpump	Not Required	0	Not Required	Not Required	Yes	No	Yes	Yes

HVAC - DISTRIBUTION SYSTEMS

01	02	03	04	05	06	07	08	09	10	11	12
Name	Type	Design Type	Duct Ins. R-value		Duct Location		Surface Area		Bypass Duct	Duct Leakage	HERS Verification
			Supply	Return	Supply	Return	Supply	Return			
Distribution System 2	No ducts	Non-Verified	R-0.0	R-0.0			n/a	n/a	No Bypass Duct	Sealed and Tested	Distribution System 2-hers-dist

Indoor Air Quality (IAQ) Fans

INDOOR AIR QUALITY (IAQ) FANS								
01	02	03	04	05	06	07	08	09
Dwelling Unit	Airflow (CFM)	Fan Efficacy (W/CFM)	IAQ Fan Type	Includes Heat/Energy Recovery?	IAQ Recovery Effectiveness - SRE	Includes Fault Indicator Display?	HERS Verification	Status
SFam IAQVentRpt 1-1	22	0.14	Balanced	Yes	80	No	Yes	
SFam IAQVentRpt 1-2	22	0.14	Balanced	Yes	80	No	Yes	
SFam IAQVentRpt 1-3	22	0.14	Balanced	Yes	80	No	Yes	

- **Column 02- Airflow (CFM):** confirm system design ventilation meets or exceeds this value
- **Column 04 - IAQ Fan Type:** confirm if the proposed system is balanced or default (continuous exhaust). If balanced, confirm system with plan set
- **Column 06 - IAQ Recovery Effectiveness:** confirm with spec sheet. Anything above an 80% value should be double checked, as these systems are expensive and rarely used

Resource from 3C-REN

What to Check on a 2022 CF1R-PRF-01 for Building Departments

TRI-COUNTY REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

What to Check on a 2022 CF1R-PRF-01 for Building Departments

	Title of table shown as is on the CF1R	
	General Information	**Notes**
	Confirm watermark, registration date & registration number from CalCERTS or CHEERS match on all pages. Date stamps at bottom indicate when the model was run, when the project was registered in a HERS Registry, and when the report was generated	
	Confirm the following from the General Info table:	
	Box 08 Climate Zone- check against plan set & correct climate zone for the project address.	
	Box 12 Project Scope- check against permit scope (i.e. New Construction or Addition) *If it meets the Energy Code ADU definition, it'll be labeled an Addition*	
	Box 14 Addition Cond. Floor Area – see below but relevant to Addition scope projects	
	Box 18 Conditioned Floor Area- must be close to plans. Margin of error is up to Building Department to determine but Energy Modeling is supposed to use CFA to the exterior of wall, often creating a discrepancy between the architectural FA.	
	Box 11 (dwelling units), **Box 13** (bedrooms), and **Box 20** (ADU bedrooms) dictate ventilation requirements and are important- check against plan set	
	Box 15 Number of Stories- check against plan set	

X	**Energy Design Rating**	**Notes**
	Confirm the project complies	
	Minimum PV and kW DC size- check that the roof and/or electrical plan shows a system designed to meet said minimum kWdc.	
	Battery size (if applicable)- check with plan set	

Link to printable 2019 What to Check on a CF1R Form: rebrand.ly/5mgo61e

Printable 2022 form is coming soon…

X	Required Special Features and HERS Feature Summary (Many HERS features are not relevant at the plan check stage)	Notes
	Point of Use – Distance between WH and any fixture cannot exceed 15' for 3/8", 10' for ½", and 5' for ¾". Does not require a HERS Verification but is required to be confirmed on the CF2R & CF3R	See manual section…

X	Opaque Surfaces	Notes
	Column 01 Wall Name - ignore, wall name is manually entered	
	Column 03 Assembly Construction Name - ignore	
	Column 04 Azimuth- Must match plans. Use best sampling practices to compare with site plans	
	Column 05 Orientation - ignore	
	Column 06 and 07 Wall and Window Area- Must match plans. Use best sampling practices to compare with plans, more difficult to confirm than floor area.	

X	Opaque Surfaces - Cathedral Ceiling	Notes
	Column 03 Construction – This references the Opaque Surface Constructions table further in the document. Only useful in associating areas to the construction assembly	
	Column 06 Area - must be close to plans. Margin of error is up to Building Department to determine, should match floor area.	
	Column 08 Roof Rise- if a steep sloped roof (≥2:12) is selected, confirm on plan set	
	Columns 09 and 10 Reflectance and Emittance - 0.1 reflectance and 0.85 emittance are default. If any other value, confirm CRRC specifications for cool roof	
	Column 11 Cool Roof- if yes, confirm with Cool Roof Rating Council material specifications and columns 09 and 10.	
X	**Attic**	**Notes**
	Column 02 Construction – Same as above, this references the Opaque Surface Constructions table. Only useful in associating areas to the construction assembly	
	Column 03 Type – Unventilated or Ventilated, confirm against plans.	
	Column 04 Roof Rise- if a steep sloped roof (≥2:12) is selected, confirm on plan set	
	Columns 05 and 06 Reflectance and Emittance - 0.1 reflectance and 0.85 emittance are default. If any other value, confirm CRRC specifications for cool roof	
	Column 07 Radiant Barrier – Confirm against plans if in project scope.	
	Column 08 Cool Roof- if yes, confirm with Cool Roof Rating Council material specifications and columns 05 and 06	

X	Fenestration/Glazing	Notes
	If wall azimuth from opaque surfaces was confirmed correct, then **Columns 03-05** will be correct;	
	Columns 10 and 12 U-Factor and SHGC- SHGC > 0.5 and/or U-Factor < 0.2, is uncommon, confirm with window specifications a. U Factor should be less than or equal to what is reported. SHGC should be as close to listed value as possible. b. Inspectors - NFRC U-Factor needs to be ≤ the CF1R values. SHGC needs to be as close to CF1R value as possible	
	Column 09 – Area should match plans	

X	Opaque Doors	Notes
	Column 04 U-Factor- If ≤0.2 U-Factor, confirm with design specifications as insulated doors give credit.	

X	Slab Floors	Notes
	Column 04 Perimeter- if abnormally small or 0 linear feet, confirm because this might be claiming a credit that isn't real. Rejection will require model to be rerun.	
	Column 08 Heated- if yes, verify hydronic system on plan set	
	Columns 05 & 06 Edge Insul. R-value and Depth – If the slab floor is heated, verify that slab insulation meets mandatory requirements	

X	Opaque Surfaces Construction	Notes
	Columns 04-06 Framing, Total Cavity R Value, and Interior/Exterior Continuous R Value- confirm with plan set	
	If time available: a. **Column 03** - Confirm wood or metal building. b. **Column 02** - Confirm roof insulation locations, attics will have two entries for ceiling and below roof decking, check against plan set	

X	Opaque Surfaces HERS Verification Table	Notes
	This is a HERS "cheat sheet". Required/not required are only options. If required, the correct HERS forms needs to be collected by inspector.	
	Inspectors - If QII is required, ensure inspection occurs before drywall installation	
	Inspectors – HERS Testing verification can also be helped by the Project Status Report document provided by CalCERTS.	

X	Water Heating Systems	Notes
	Column 03 Distribution System - if there is a recirculation system, confirm its control type on the plan set matches the selected type on the CF1R. **Column 05** Number of Units – confirm quantity is correct. **Column 07** Compact Distribution – If 'Expanded', requires HERS and linear takeoffs, should trigger a deeper investigation. The calculations need to be on the planset, see Single Family Residential Compliance Manual Section 5.6.2.4.	

X	Water Heaters - NEEA Heat Pump	Notes
	Column 02 # of Units – Simple confirmation **Column 04 & 05** NEEA Brand and Model – Ideally the plan set shows the NEEA brand and model consistent with the T24 (CF2R should match what is installed). **Column 06, 07, 08** Tank and Duct Location - a unit located indoors but drawing air from the outdoors is NOT located in conditioned space. Confirm system installation location, intake, and exhaust configuration on the plans is consistent with T24.	
X	**Water Heaters** (Heat Pump, Gas Instantaneous, Electric Resistance)	Notes
	Column 02 Heating Element Type – Confirm Heat Pump, Gas Instant, Electric Resistance against plans. **Column 04** # of Units – Simple confirmation **Column 06 & 07** Efficiency Type and Efficiency – • *Heat Pump* - EF or UEF for a HPWH is misleading, the efficiency metric is actually COP and is expected to be in a range of 1.8-4.0. • *Gas* – EF or UEF, Anticipate between 0.8 and 0.97 • *Electric Resistance* – EF or UEF, should be 0.98 or less, the efficiency is limited since electric resistance has a efficiency of 1 maximum. **Column 13** Tank Location – confirm the unit location on the plans is consistent with the T24 location.	

X	Water Heating – Compact Distribution	Notes
	If selected a table will be present that shows the distance to fixtures in ft, this should be confirmed on the plans as it gives credit to the project.	

X	Water Heating - HERS Verification	Notes
	Parallel Piping – If required the project is utilizing a manifold and feeds use points with ½" or smaller lines. **Compact Distribution -** is selected, confirm on plan set, as this is very difficult to achieve in single family residences. Requires a weighted distance calculation method that should be shown on plans.	

	Recirculation Control – If recirculation is included, the type of control needs to be confirmed. Non-controlled recirculation is heavily penalized. **Shower Drain Water Heater Recovery –** New component that gives compliance credit if installed, if selected the component should be confirmed in plan.	

X	Space Conditioning Systems	Notes
	HVAC Specifications - all values need to be confirmed per plan set as soon as possible. Minimum values must be met and the HERS verification will confirm in-field changes/accuracy.	

X	HVAC Distribution Systems	Notes
	Columns 02 Type - Must be confirmed with plan set. **Ducts in attic and Ducts in Conditioned Space are not the same thing**	
	Column 03 Duct Design Verified- If yes, confirm the duct design in the plan set matches the T24 input design, as there is a credit available but difficult to achieve	
	HERS Verification not relevant at plan check stage	

X	HVAC Fan Systems	Notes
	Column 03 HERS Rater must verify watt/cfm rating, a mandatory requirement.	

X	IAQ Fans	Notes
	Column 02 IAQ CFM - Confirm that of the system design ventilation meets or exceeds the CFM Minimum shown here	
	Column 04 IAQ Fan Type- confirm if the proposed system is balanced or default (continuous exhaust). If balanced, confirm system with plan set	
	Column 06 IAQ Recovery Effectiveness- confirm with spec sheet. Anything above an 80% value should be double checked, as these systems are expensive and rarely used	

Closing

- Continuing Education Units Available
  - Contact shuskey@co.slo.ca.us for AIA and ICC LUs
- Coming to Your Inbox Soon!
  - Slides, Recording, & Survey – Please Take It and Help Us Out!
- Upcoming Courses:
  - November 8 - Carbon Free Homes: Features, Benefits, Valuation
  - November 14 – The Power of Existing Buildings
  - November 29 – Residential Compliance Forms for Occupancy
  - December 5 - What Energy Consultants Need To Know About HERS Measures
- Visit www.3c-ren.org/events for our full catalog of trainings. 2024 courses coming soon!

Thank you!

For more info:
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