TRI-COUNTY REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

September 9, 2026

# Energy Code Compliance Verification (formerly HERS) – Overview and Envelope

*Jennifer Rennick – In Balance Green Consulting*

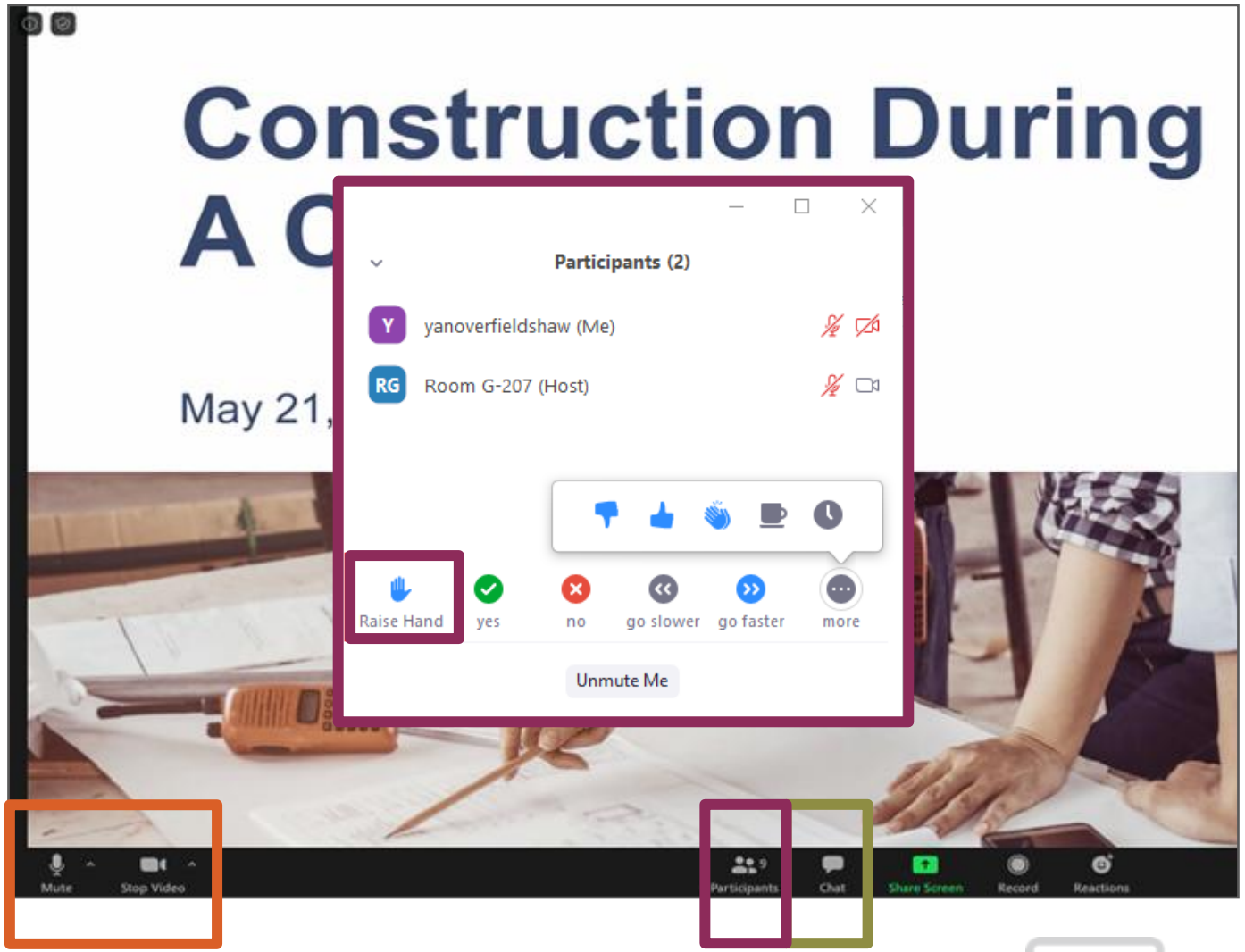
*Paul Dunn – Central Coast Energy Compliance*

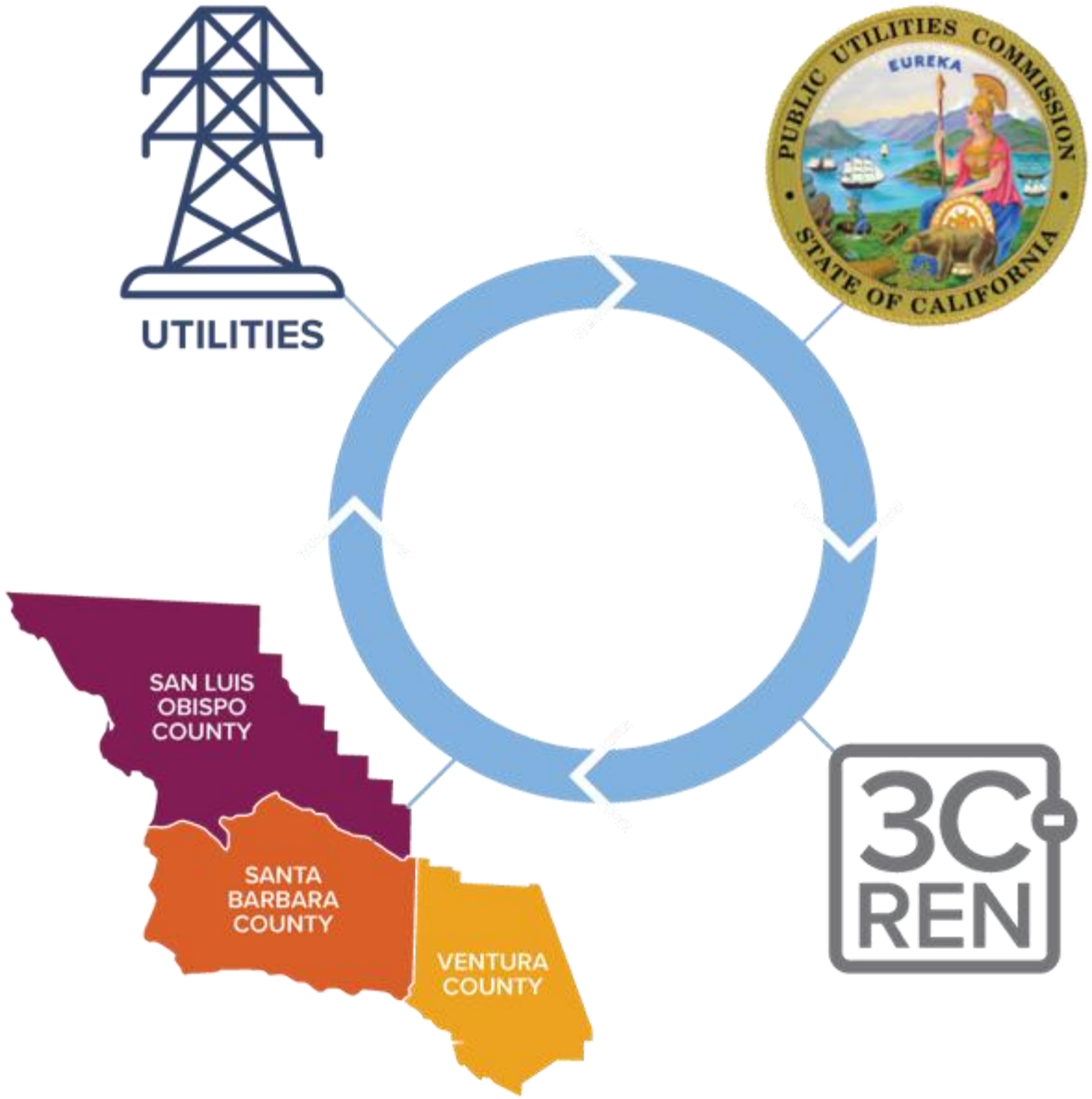


# Before We Begin

Here are some quick reminders:

- Call in? Please **share** full name to confirm attendance
- To receive AIA LUs, you **must attend** at least 80% of the training. Attendance will be verified
- Use the "**Chat**“ to share questions or comments
- Slides/recording are **shared** after most events and can be found on 3C-REN's on-demand page
- 3C-REN does **not** allow **AI notetakers**, unless used to accommodate a disability






# Tri-County Regional Energy Network

3C-REN is a collaboration between the tri-counties

Our programs reduce energy use for a more sustainable, equitable and economically vibrant Central Coast

Our free services are funded via the CPUC, bringing ratepayer dollars back to the region

# Our Services

## Incentives

### HOME ENERGY SAVINGS

**3c-ren.org/for-residents**
**3c-ren.org/multifamily**

### COMMERCIAL ENERGY SAVINGS

**3c-ren.org/commercial**

Contractors can enroll at
**3c-ren.org/contractors**

## Training

### BUILDING PERFORMANCE TRAINING

**3c-ren.org/events**
**3c-ren.org/building**

### ENERGY CODE CONNECT

**3c-ren.org/code**

View past trainings at
**3c-ren.org/on-demand**

## Technical Assistance

### AGRICULTURE ENERGY SOLUTIONS

**3c-ren.org/agriculture**

### ENERGY ASSURANCE SERVICES

**3c-ren.org/assurance**

3C REN

# Energy Code Compliance Verification (formerly HERS)

Under the new 2025 energy code, HERS rating is now called Energy Code Compliance (ECC), but regardless of the name change, the 3rd-party verification process is still a great way to improve energy performance and meet the Title 24 Energy code. In this two-part course, we'll cover what architects and builders need to know to successfully integrate ECC measures into residential design and construction.

Part 1 will provide an overview of ECC verification, show how it fits into the building code and address envelope-related ECC measures.

Part 2 will address ECC measures relating to mechanical and plumbing systems.

- **Energy Code Compliance Verification —Overview and Envelope**

- Energy Code Compliance Verification —HVAC, DHW, and IAQ

https://www.3c-ren.org/calendar-of-events-and-trainings/

# Today's Learning Objectives

- Learn the roles and communication points for integrating ECC measures into permit plans, Title 24 documents and construction schedules.
- Identify the library of ECC measures and which are Mandatory/Prescriptive and which are optional for use in Performance compliance.
- Understand the requirements for Quality Insulation Installation (QII) and tips for passing the first time.
- Learn the process for checking Air Leakage and how to use the tools at key construction milestones.

**Learning Units:**

- 1.5 AIA HSW LUs
- 0.15 ICC CEUs

# Agenda

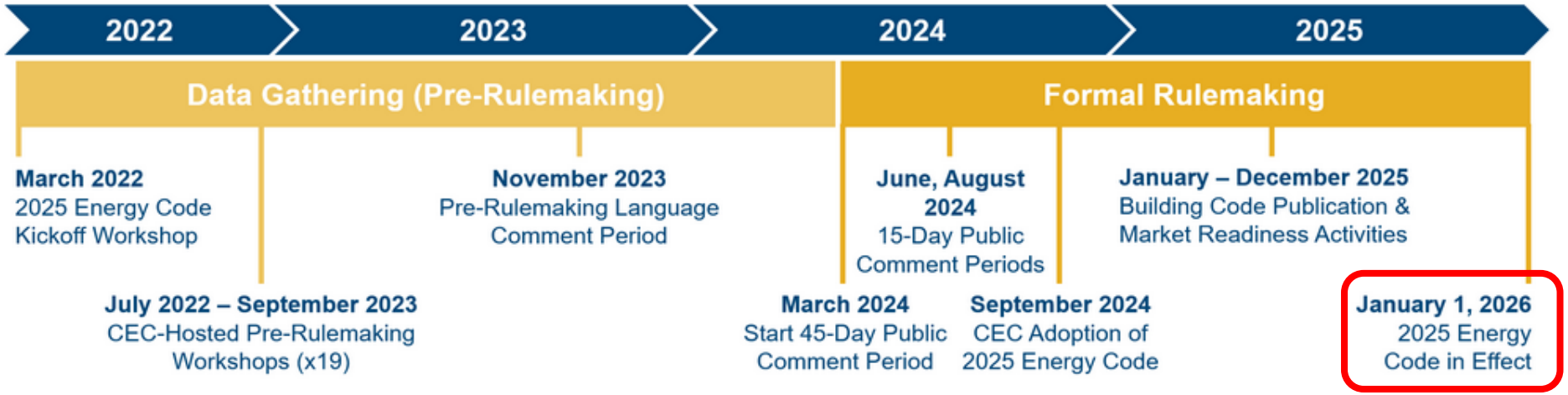
1. 2025 Energy Code and ECC (formerly HERS) Overview
2. Supporting Forms –Envelope
    a. Air-Sealing
    b. Insulation
    c. Air-Leakage Testing

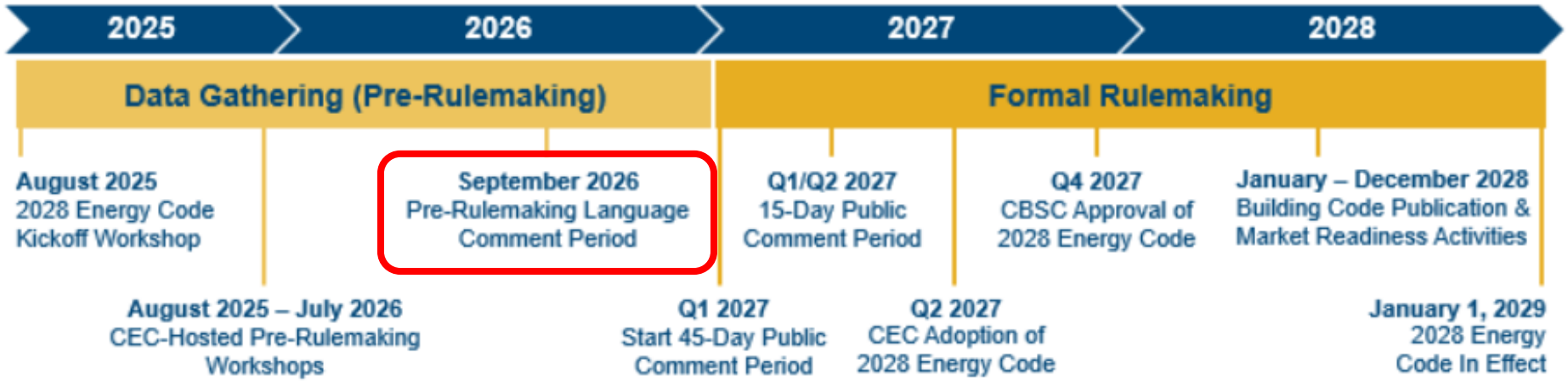




# 2025 Energy Code and ECC Overview

# Multi-year Adoption Cycle




For more information visit energy.ca.gov

# Except…
# AB 130: Pause on parts of the 2028 Code Cycle

| | | | |
|---|---|---|---|
| **Residential Standards** | **2025 Code** Effective 1/1/2026 (No 2028 Residential Code) | | **2031 Code** Effective 1/1/2032 |
| **Nonresidential Standards** | **2025 Code** Effective 1/1/2026 | **2028 Code** Effective 1/1/2029 | **2031 Code** Effective 1/1/2032 |

**2028 Code…? May depend on substance and breadth of allowed changes*

# What's Covered in the Energy Code?



- Building Envelope: Roof, Floors, Walls, Windows
- Domestic Hot Water
- Heating, Cooling and Ventilation Systems
- Lighting
- Building-Scale Solar Energy and Battery Systems
- Field Verification and Diagnostic Testing
- Covered Process Loads
  - Refrigerated Warehouses
  - Controlled Environment Horticulture
  - Elevators, etc.

# What is *not* covered in the energy code



- Household Appliances (Title 20)
- Small Residential-Scale Heating and Cooling Systems (Title 20)
- Walk-in Coolers and Freezers / Stand-alone Systems (Title 20)
- Refrigerated Warehouses under 3,000 sf
- Agricultural Barns / Warehouses (other than covered process or human occupied)
- Temporary Structures

# Residential and Multifamily – *HERS* will be replaced by *ECC*

**OLD**

## HERS

- Title 20 (Ch 4, Art 8, Sec 1670)
- 2022 and Prior Code Cycles
- HERS –Home Energy Rating System
- HERS Rater
  - HERS Field Verification and Diagnostic Testing

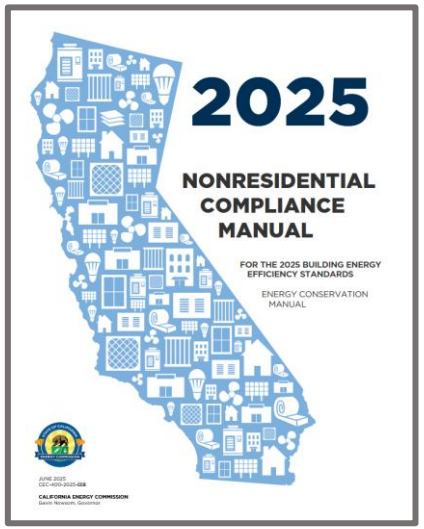
**NEW**

## ECC Program

- Title 24, Art 1, Sec 10-103.3
- 2025 Code
- ECC –Energy Code Compliance
- ECC-Rater
  - **FV&DT** –Field Verification and Diagnostic Testing

# Title 24, Part 6 Energy Code Standards and Supporting Documents

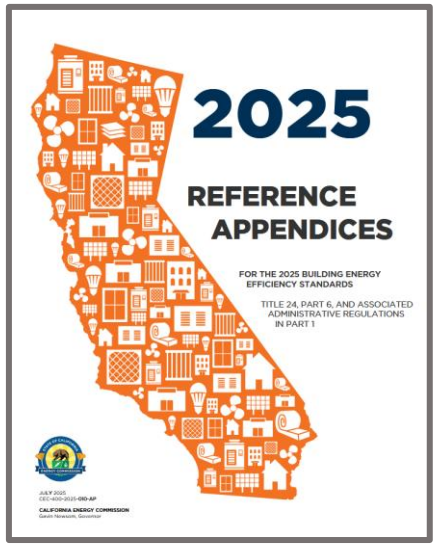


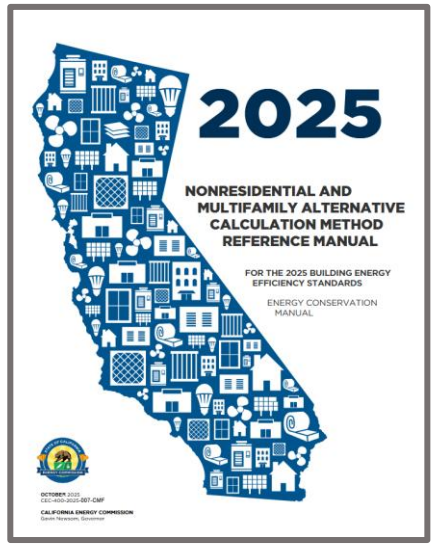



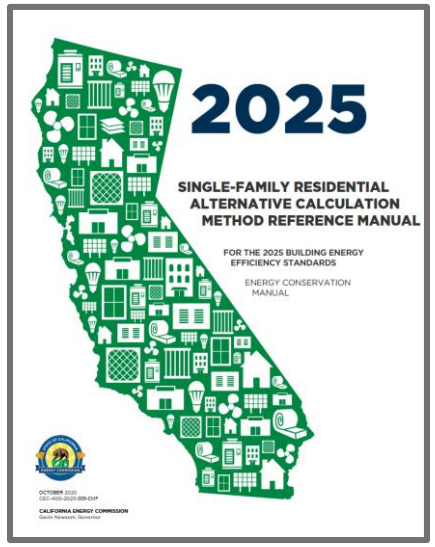


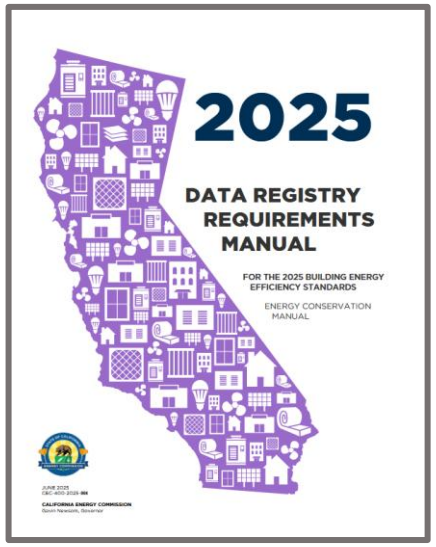




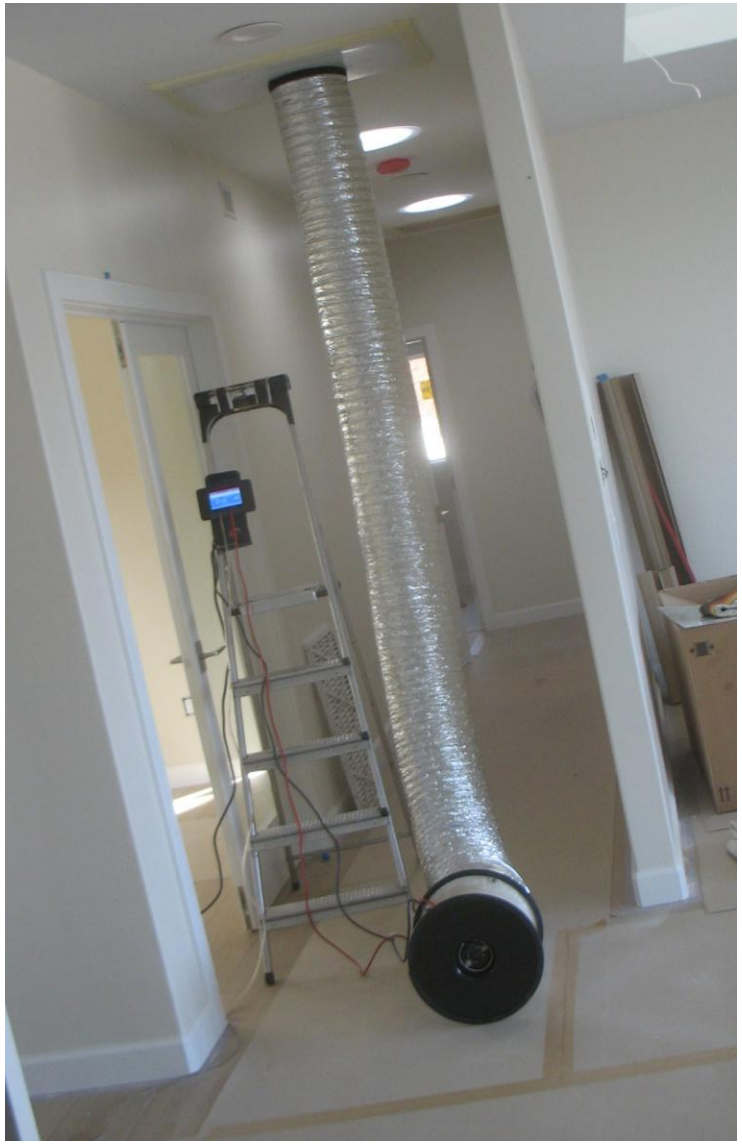




**https://www.energy.ca.gov**

# ECC Rater's Work

- Duct Leakage Testing
- Blower Door / Envelope Leakage Testing
- QII –Quality Insulation Installation
- Field Verifications:
  - Refrigerant Charge
  - Exhaust Fan and Kit Hood Fans
  - HVAC Efficiency and Capacity
- Assist/Complete: CF-2R and CF-3R, etc

***And so much more!!!***



*Duct Leakage Testing in Progress*

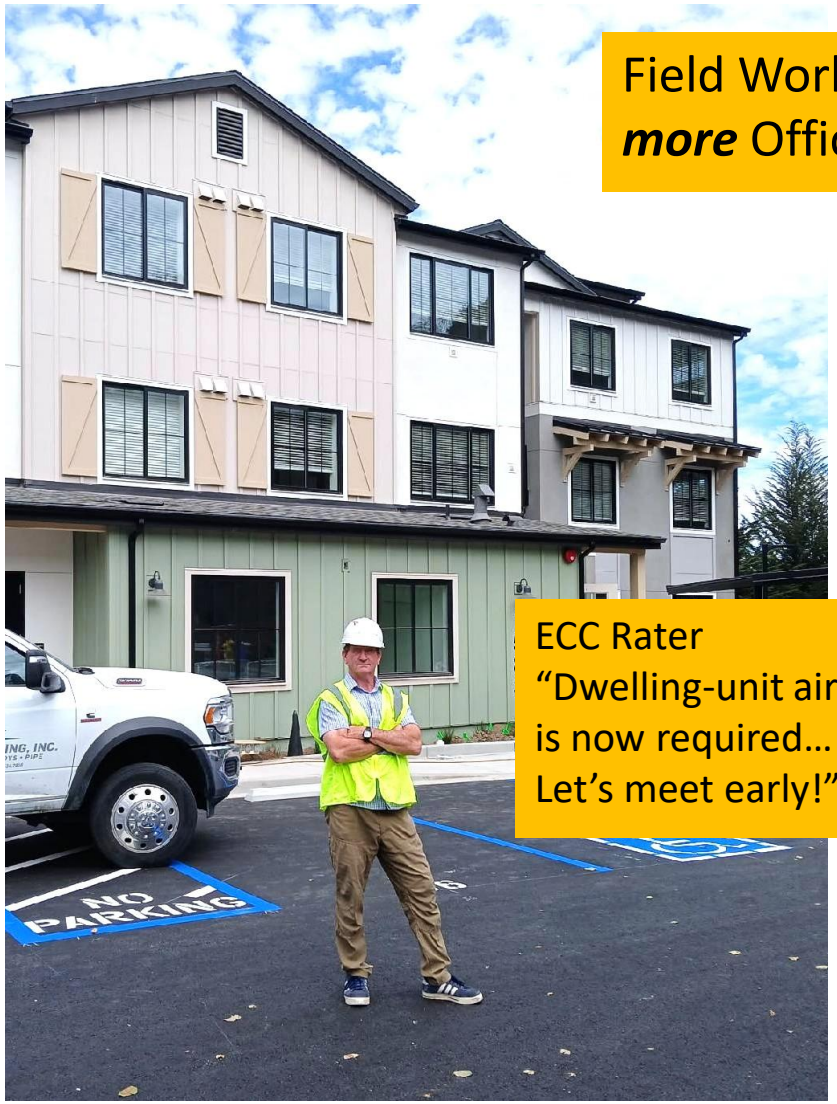
# How will a ECC Rater's Work Change Under 2025?

**Procedural:**

- Participation in Quality Assurance Program
- New Photo Documentation Requirements
- New CEC Annual Reporting Requirements

**Potentially, New Scope of Work**:

- Multifamily Compartmentalization Testing – Now Mandatory
- Fault Indicator Display Verification for ERV/HRV –New Prescriptive Component
- Heat Pumps Refrigerant Charge Verification – New Prescriptive Component
- Consumer Summary Report




Field Work and…
***more*** Office Work

ECC Rater
"Dwelling-unit air-leakage is now required…
Let's meet early!"

# Overview of Forms for Residential Single Family and Low-Rise Multifamily Construction

## Single Family (Duplexes and Townhouses)

- **CF1R** – Forms used to show ***Compliance*** with the energy code at initial plan submittal
- **CF2R** – Forms used during construction to demonstrate that the energy code features met ***Installation*** requirements
- **CF3R** – Forms used after installation to confirm that the energy code features met the ***Verification*** requirements

## Low-Rise Multifamily (3 Stories or Less)

- **LMCC** – Forms used to show ***Compliance*** with the energy code at initial plan submittal
- **LMCI** – Forms used during construction to demonstrate that the energy code features met ***Installation*** requirements
- **LMCV** – Forms used after installation to confirm that the energy code features met the ***Verification*** requirements

# Review:  Current Process for Residential Permitting




CF-1R Compliance created and uploaded to California's Data Registry

CF-2R Installation completed and signed on California's Data Registry

CF-3R Verification completed signed on California's Data Registry

Building Official Confirms CF-2R's and CF-3R's are finished and the Project Status Report (PSR) is 'complete'

Similar Process for Multifamily Permitting

CHEERS is the only approved Data Registry for the 2025 Energy Code

# ECC Program –Quality Assurance Review

- **Ref Section 10-103.3(d)5B**
- **Audit Program for all ECC-Raters**
  - ECC-Provider maintains the audit program
  - Audit program staff may not be an active ECC-Rater
- **Exemplary ECC-Rater**
  1) Continuously certified for min 5 years
  2) Pass all audits within a 12-month period:
     - Quality insulation installation (QII) shadow audit
     - Non-QII shadow audit
     - In-lab audit
     - A desk audit



*HVAC Design Air Flow. Rater testing proper air flow of a wall register with a flow hood.*

# New Annual Reporting Requirements 10-103.3(e)2G

**Independent Raters** (i.e. not employed by a Rater-Company):

Independent ECC-Raters shall submit an **Annual Activity Report** no later than the end of **March of each year starting in 2027 to the Commission** that includes the information listed in Section10-103.3(f)2Fiii and Section 10-103.3(f)2Fiv.

**Section10-103.3(f)2Fiii**: The total number of field verifications and diagnostic tests performed by ECC-Raters working for the ECC-Rater Company during the prior calendar year, organized by enforcement agency.

**Section 10-103.3(f)2Fiv**: The total and average cost of services charged for each type of field verification and diagnostic test performed by ECC-Raters working for the ECC-Rater Company during the prior calendar year.

Note: *Rater-Companies will have slightly different reporting requirements.*

# New Summary Report for the Consumer  10-103.3(b)1Avi

ECC-Raters or ECC-Rater Companies shall provide a report to the building or project owner for field verification or diagnostic testing services performed on the project site. The report may be provided through a contractor or other project representative to the building or project owner but must be a conspicuous and separate document from other documents provided by the contractor or project representative. The report must include all of the following elements:

**a.** The ECC-Rater's or ECC-Rater Company's name, logo (if any), contact information, and certification number.

**b.** The ECC-Provider data registry link and registry numbers for all compliance documents registered by the ECC-Rater or ECC- Rater Company for the project.

**c**. An itemization of each field verification or diagnostic test, as well as any other services performed for the project, the amount charged, and the results in terms of pass or fail.

# Update to JA7 – Data Registry

*New Code Language:*

**JA7.5.6.3 Photographic Documentation for Registered Documents**

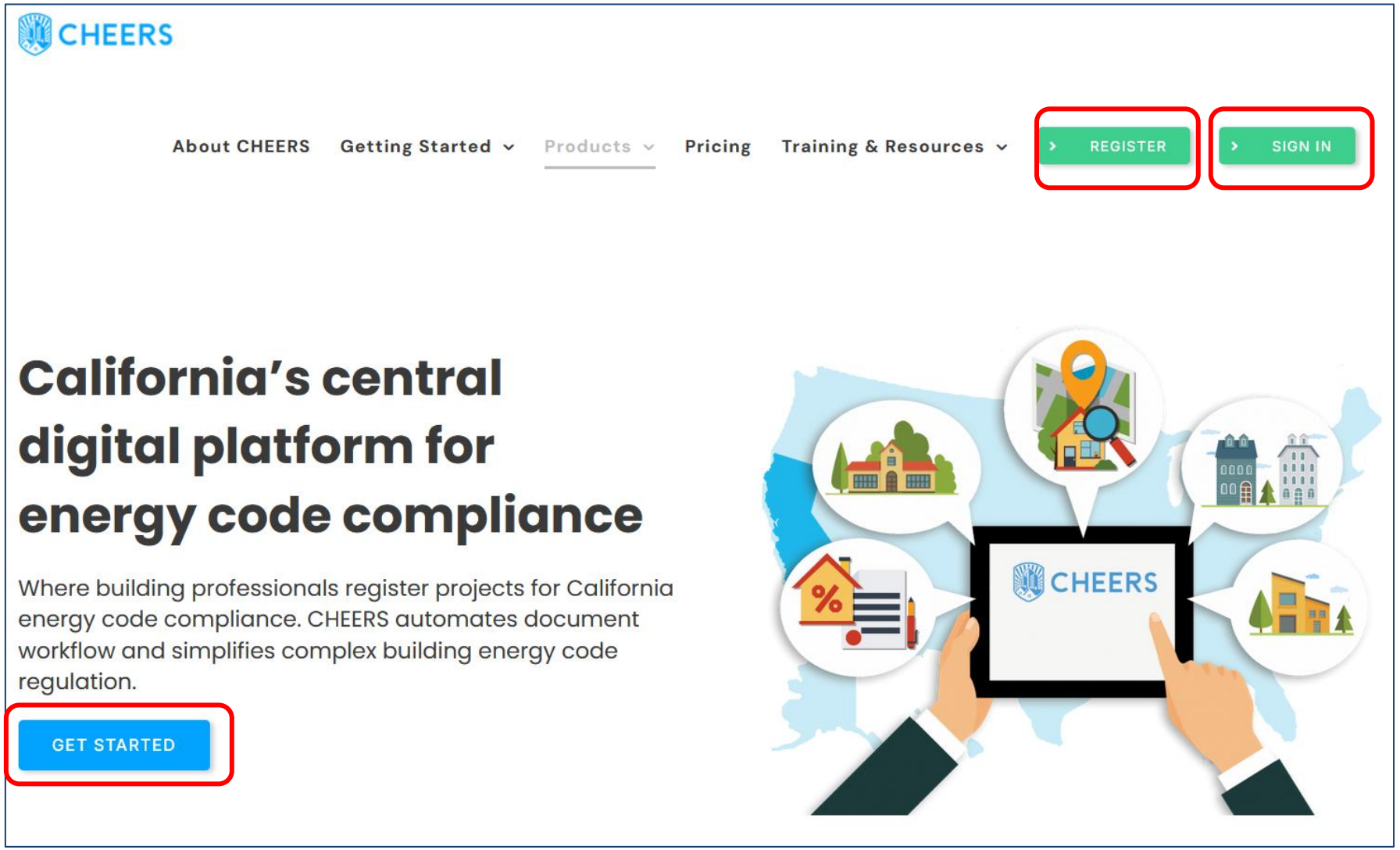
If a registered compliance document is associated with photographic evidence, the photograph shall be stored as a Joint Photographic Experts Group (JPEG) file and comply with the following requirements:

(a) Photographs shall not to be issued with registered compliance documents.
(b) Photographs shall be stored by the ECC-Provider and made available to the Commission upon request.
(c) Photographs shall show the specific equipment being tested, or measure being verified.
(d) Photographs shall include sufficient background to identify the location of the project site.
(e) Photographs shall include a time and location stamp.

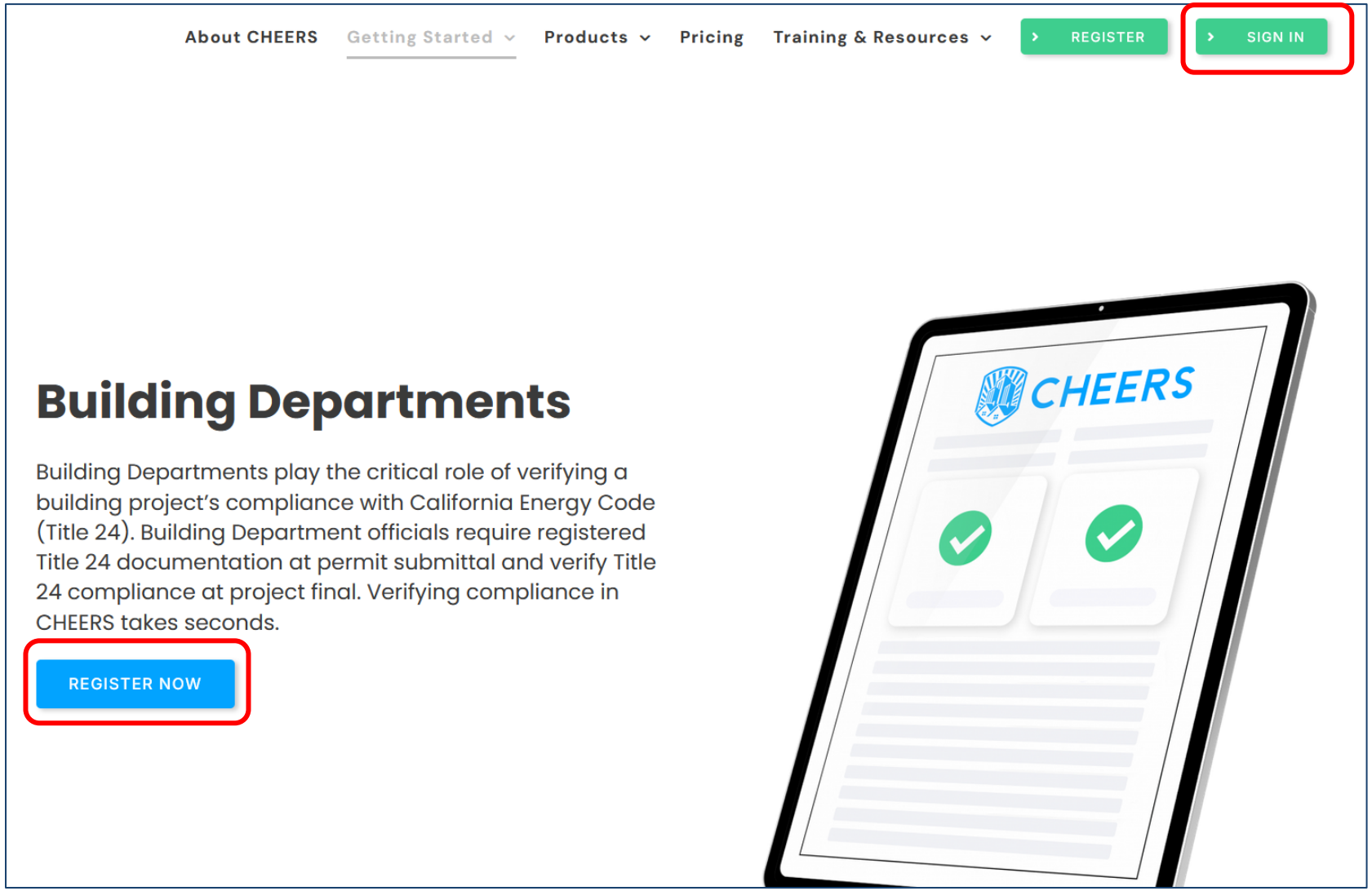
# Forms & CHEERS On-Line Registry

# CHEERS –Data Registry – On-Line Portal

cheers.org



# Building Department Registration – Access to Project Status Report (PSR)



# List of Example CF2R Forms

| | |
|---|---|
| CF2R-ELC-01 | Electric Ready Requirements: |
| CF2R-ENV-01 | Fenestration Installation: |
| CF2R-ENV-03 | Insulation Installation: |
| CF2R-ENV-04 | Roofing-Radiant Barrier: |
| CF2R-ENV-20 | Building Leakage Diagnostic Test: |
| CF2R-ENV-21 | QII-Framing Stage: |
| CF2R-ENV-22 | QII-Insulation Installation: |
| CF2R-LTG-01 | Lighting: |
| CF2R-MCH-01 | Space Conditioning Systems, Ducts and Fans: |
| CF2R-MCH-02 | Whole House Fan: |
| CF2R-MCH-25 | Refrigerant Charge: |
| CF2R-MCH-27 | IAQ and MV: |
| CF2R-MCH-31 | HERS Whole House Fan: |
| CF2R-MCH-32 | Local Mechanical Exhaust: |
| CF2R-PLB-02 | SD HWS Distribution: |
| CF2R-PLB-03 | Pool and Spa: |
| CF2R-PLB-22 | HERS SD HWS Distribution: |
| CF2R-PVB-01 | Photovoltaic Systems: |
| CF2R-PVB-02 | Battery Storage Systems: |
| CF2R-SRA-02 | Minimum Solar Zone Area Worksheet: |

**Categories:**

- ELC - Electric Ready
- ENV - Envelope
- LTG - Lighting
- MCH - Mechanical
- PLB - Plumbing
- PVB - Solar Photovoltaic and Battery Storage
- SRA - Solar Zone Area

**Project Scope of Work Determines:**

- Mandatory Requirements, and
- Prescriptive Requirements, or
- Performance Credits (Optional)

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01-E

**Project Name:** [redacted]

**Calculation Date/Time:** 2026-02-02T12:31:25-08:00

(Page 1 of 10)

**Calculation Description:** [redacted]

**Input File Name:** [redacted].ribd25

| GENERAL INFORMATION | | | | | |
|---|---|---|---|---|---|
| 01 | Project Name | [redacted] | | | |
| 02 | Run Title | [redacted] | | | |
| 03 | Project Location | [redacted] | | | |
| 04 | City | [redacted] | 05 | Standards Version | 2025 |
| 06 | Zip code | [redacted] | 07 | Software Version | CBECC 2025.2.0.1 |
| 08 | Climate Zone | 9 | 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 | 0.21 |
| 18 | Total Cond. Floor Area ($ft^2$) | 1462 | 19 | Glazing Percentage (%) | 18.67% |
| 20 | ADU Bedroom Count | n/a | 21 | ADU Conditioned Floor Area | n/a |
| 22 | Fuel Type | All electric | 23 | No Dwelling Unit: | No |

**COMPLIANCE RESULTS**

Building Complies with Computer Performance

This building incorporates features that require field testing and/or verification by a certified ECC rater under the supervision of a CEC-approved ECC provider.

This building incorporates one or more Special Features shown below

**REQUIRED SPECIAL FEATURES**

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Solar Electric Generation Systems / Solar PV System requirements for newly constructed residential buildings are suspended per Executive Order N-29-25
- Indoor air quality, balanced fan
- IAQ Ventilation System: as low as 0.14 W/CFM
- IAQ Ventilation System Heat Recovery: minimum 60 SRE and 60 ASRE
- IAQ Ventilation System: supply outside air inlet, filter, and H/ERV cores accessible per RACM Reference Manual
- Floor has high level of insulation
- Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed
- One or more heat pump water heaters have been modeled as demand response compatible

Registration Number: 426-P010032508A-000-000-0000000-0000

Registration Date/Time: 02/02/2026 12:37

ECC Provider: CHEERS

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CA Building Energy Efficiency Standards - 2025 Single-Family Compliance

Report Version: 2025.0.000

Schema Version: rev 20250101

Report Generated: 2026-02-02 12:32:50

# CF1R-PRF-01-E Lists the Project General Information and Required Special Features

Only "Passing" CF1R's will be Watermarked

Special Features will Trigger CF2Rs – Installation Requirements

3C REN

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

**Project Name:** [redacted] **Calculation Date/Time:** 2026-02-02T12:31:25-08:00 (Page 2 of 10)

**Calculation Description:** [redacted] **Input File Name:** [redacted].ribd25

**ECC FEATURE SUMMARY**

The following is a summary of the features that must be field-verified by a certified ECC Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the ECC Registry

- Indoor air quality ventilation
- Kitchen range hood
- Verified Refrigerant Charge
- Verified heat pump rated heating capacity

**Compliance Summary**

| | Long Term System Cost (LSC)[1] | | Source Energy Use | Peak Cooling** |
|---|---|---|---|---|
| | Efficiency[2] ($/ft²-yr) | Total[3] ($/ft²-yr) | Total[3] (kBtu/ft²-yr) | Electricity (kWh) |
| Standard Design | 12.7 | 32.61 | 13.77 | 282.337 |
| Proposed Design | 9.78 | 29.72 | 7.5 | 271.579 |
| **Compliance Margins** | 2.92 | 2.89 | 6.27 | 10 |
| | Pass | Pass | Pass | Pass |

**RESULT*:** Complies

[1]Long-term System Cost (LSC) is a 30-year present value cost to California's energy system. LSC is not a predicted utility bill.
[2]Efficiency measures include energy efficient improvements such as better building envelope and more efficient mechanical equipment
[3]Total includes the sum of efficiency measures, and no solar photovoltaic (PV) measures and battery storage measures
* Building complies when Proposed Design is equal to or less than Standard Design in all applicable compliance categories
** Peak cooling target represents 120% of the standard design building peak cooling energy use.

Solar Electric Generation Systems / Solar PV System requirements for newly constructed residential buildings are suspended per Executive Order N-29-25

Registration Number: 426-P010032508A-000-000-0000000-0000 Registration Date/Time: 02/02/2026 12:37 ECC Provider: CHEERS

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# CF1R Form will list the ECC Feature Summary and show the Compliance Summary Results

**ECC Features trigger CF3Rs – Field Verification**

**A project 'Complies' when all metrics show a 'Pass'**

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

**Project Name:** [redacted] **Calculation Date/Time:** 2026-02-02T12:31:25-08:00 (Page 10 of 10)

**Calculation Description:** [redacted] **Input File Name:** [redacted]ribd25

**DOCUMENTATION AUTHOR'S DECLARATION STATEMENT**

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

| Documentation Author Name: | Documentation Author Signature: |
|---|---|
| Jennifer Rennick | Jennifer Rennick |
| Company: In Balance Green Consulting | Signature Date: 02/02/2026 |
| Address: 1411 Marsh Street, Suite 109 | CEA/AEA/ECC Certification Identification (if applicable): |
| City/State/Zip: San Luis Obispo, CA 93401 | Phone: 805-423-8359 |

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

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

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. 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.
5. I understand that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building and shall be made available to the enforcement agency for all applicable inspections. I will take the necessary steps to fulfill this requirement.
6. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy. I will take the necessary steps to fulfill this requirement.

| Responsible Designer Name: | Responsible Designer Signature: |
|---|---|
| [redacted] | [redacted] |
| Company: [redacted] | Date Signed: 02/02/2026 |
| Address: [redacted] | License: |
| City/State/Zip: SAN LUIS OBISPO, CA 93496 | Phone: [redacted] |

*Digitally signed by California Home Energy Efficiency Rating Services (CHEERS). This digital signature is provided in order to secure the content of this registered document, and in no way implies Registration Provider responsibility for the accuracy of the information.*

Registration Number: 426-P010032508A-000-000-0000000-0000 Registration Date/Time: 02/02/2026 12:37 ECC Provider: CHEERS

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CA Building Energy Efficiency Standards - 2025 Single-Family Compliance Report Version: 2025.0.000 Report Generated: 2026-02-02 12:32:50

Schema Version: rev 20250101

# Last page shows Documentation Author, and the Responsible Person

**The Responsible Person is the *designer* eligible under Div 3 of the Business and Professions Code**

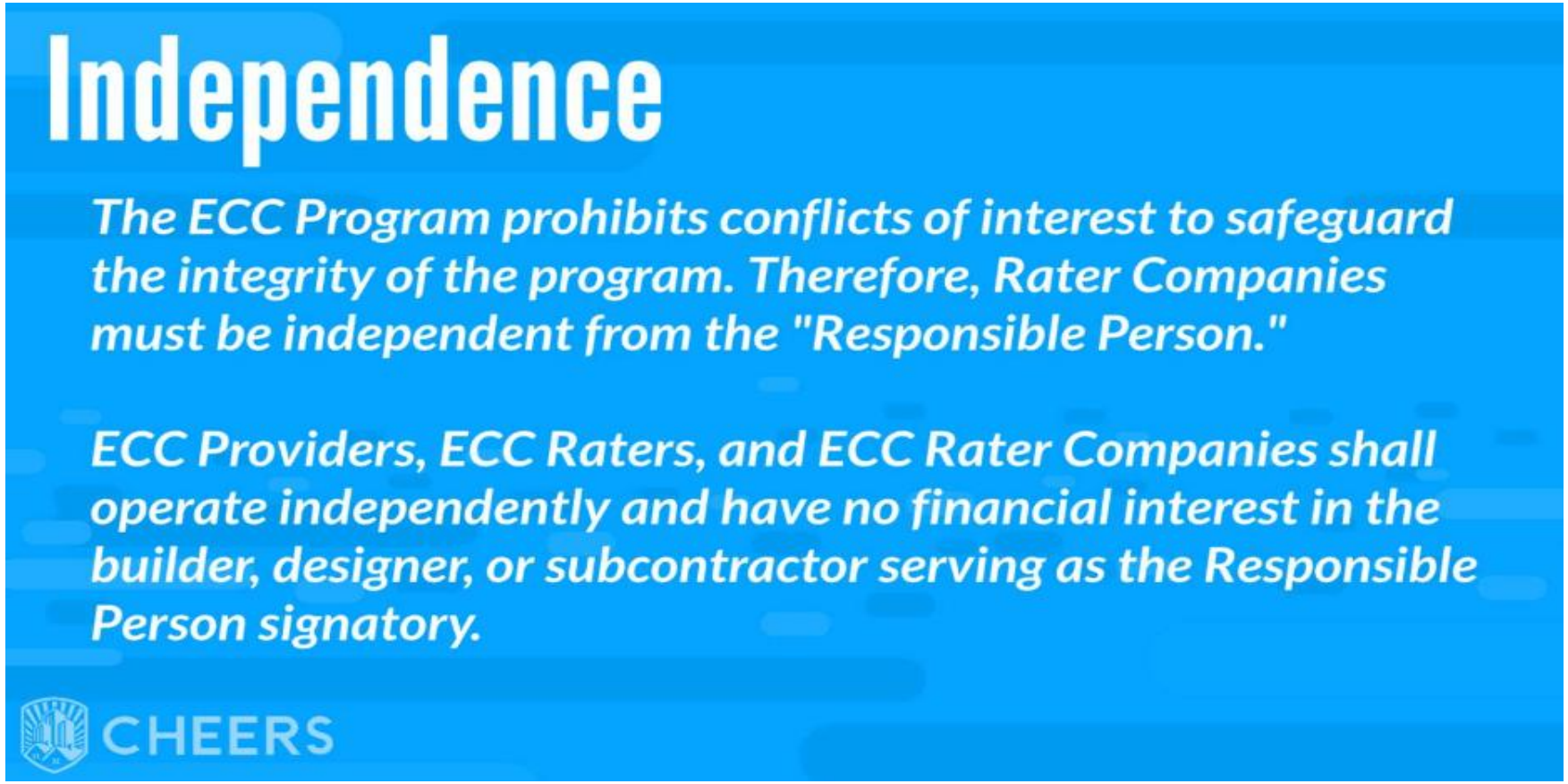
# The Responsible Person is the Designer

- The designer is the person responsible for the overall building design.
- The designer is responsible for specifying the building features that determine compliance with the Energy Standards and other applicable building codes.
- The designer is required to provide a signature on the certificate of compliance (i.e. CF1R, LMCC, or NRCC) to certify that the building has been designed to comply with the Energy Standards.
- Licensed Architects and Professional Engineers (Structural, Civil, or Mechanical and Electrical) can sign as the Responsible Persons/Designers per Div 3 for the portions of the project design for which they are responsible.
- California Div 3 Business and Professions Code allows unlicensed designers to prepare design documentation for wood-framed single-family residential building no more than two stories high, not counting a possible basement; and two-story, wood-framed multifamily buildings with no more than four dwelling units.

**Code References:**

- California Div 3 Business and Professions Code, 5537 and 6737
- Title 24, Part 6 Section 10-103(a)

# CHEERS ECC Program Training Excerpt: Conflicts of Interest

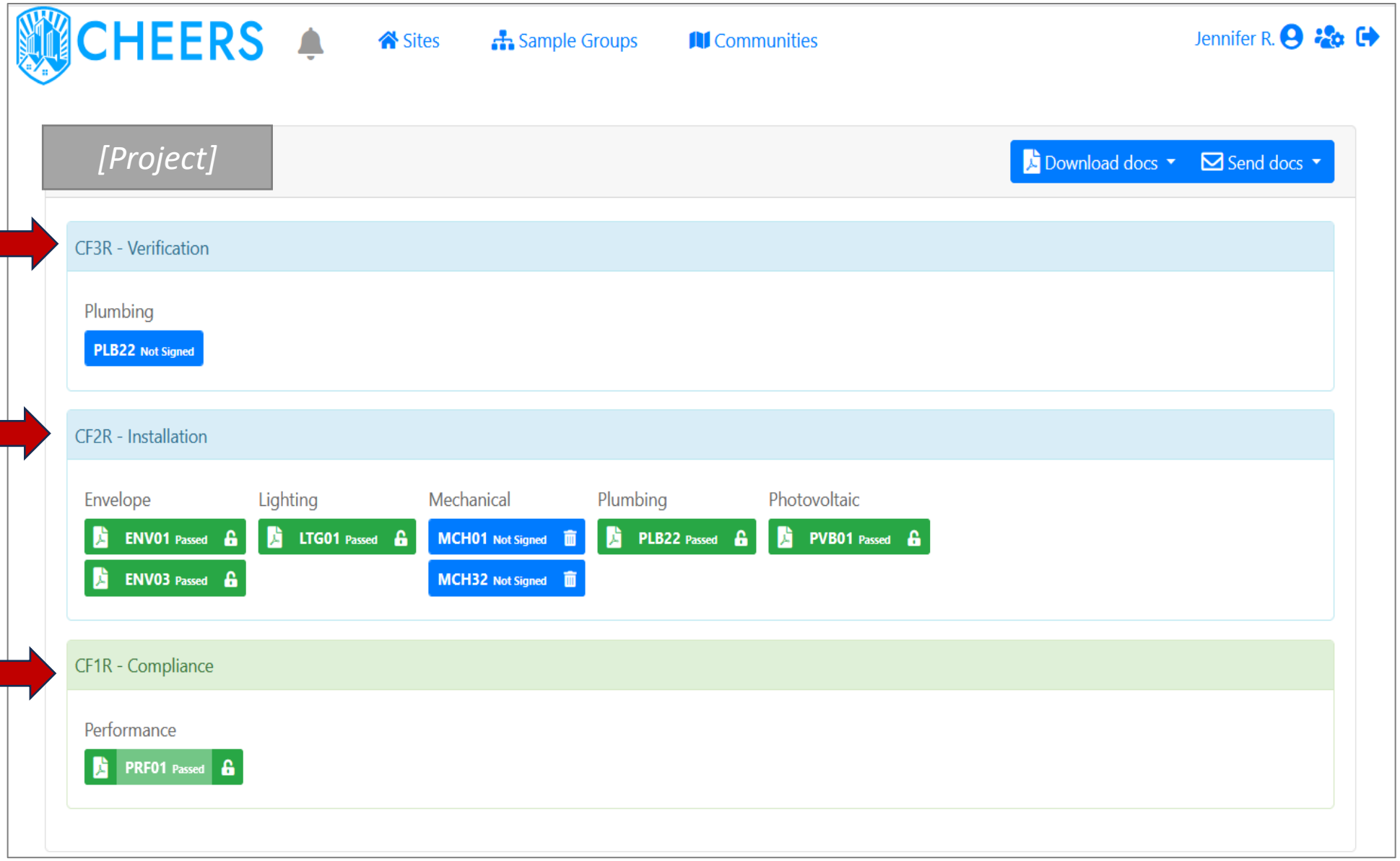



cheers.org

Raters are
- *not* the Designers, and
- *not* the Responsible Person(s)

Raters
- can create project ‘sites’ and/or ‘communities’
- have “view only” access
- can invite other members to the project

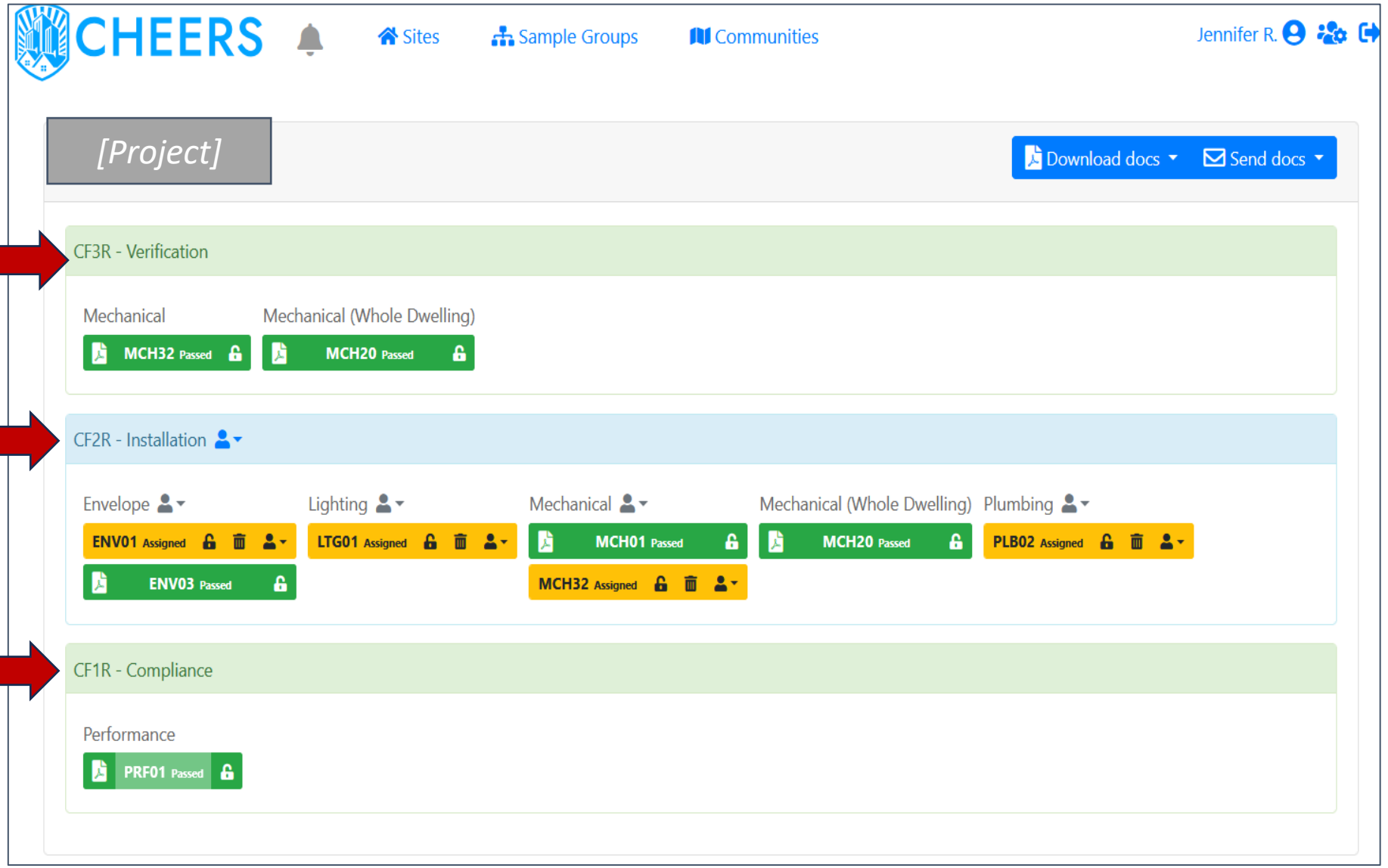
# CHEERS Registry –Project in Progress




**Blue:**
**The Form is incomplete, i.e. 'Not Signed' or 'Not Started'**

**Green:**
**The Form is Complete, Signed, and 'Passed'**

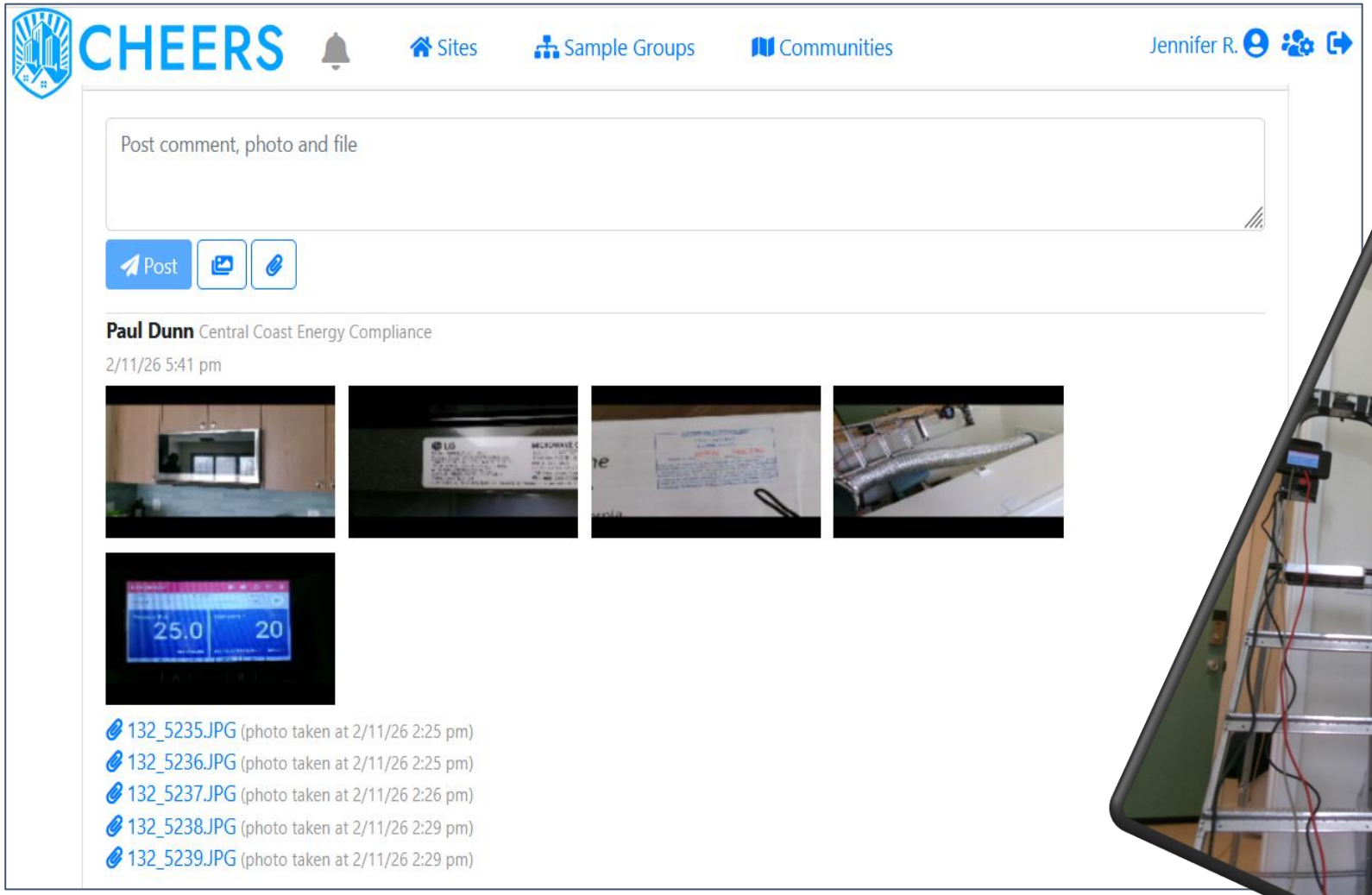
# CHEERS Registry –Project in Progress

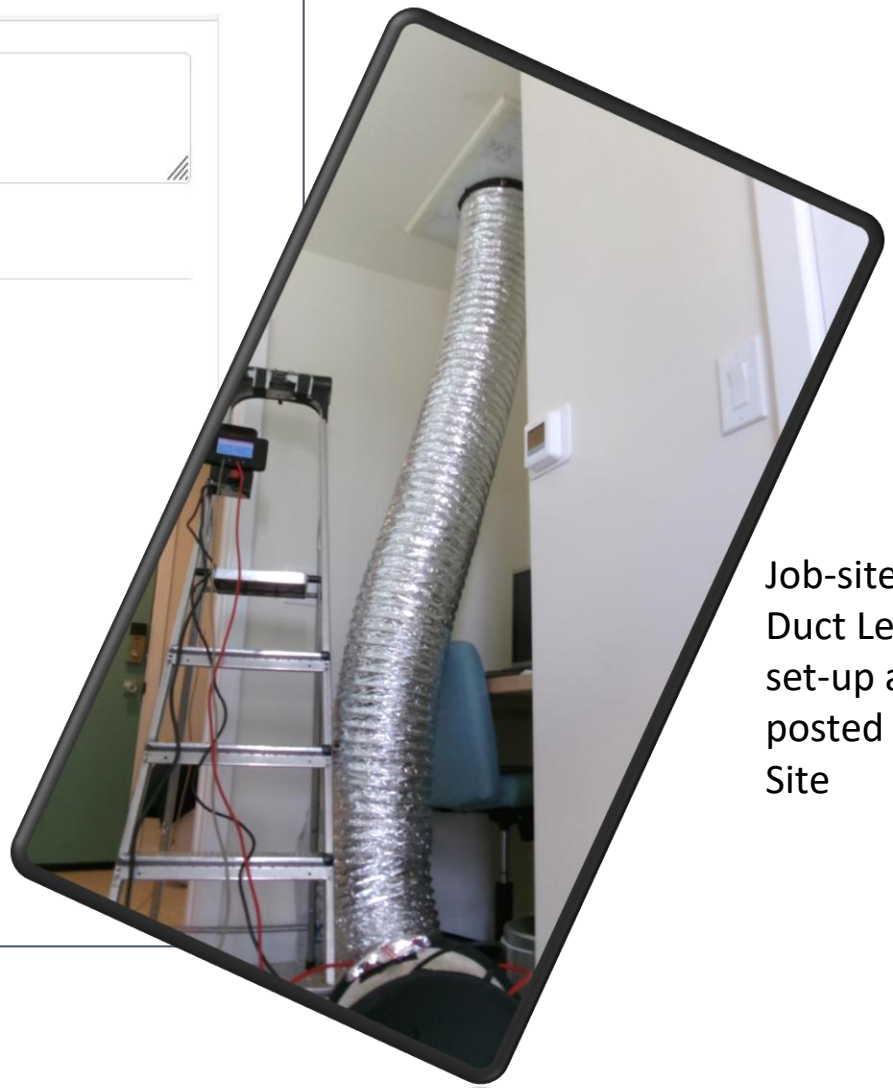



**Goldenrod:**
**The Form is 'Assigned', but not yet accepted**

**Green:**
**The Form is Complete, Signed, and 'Passed'**

# ECC Rater can Post Comments and Photos of the Project



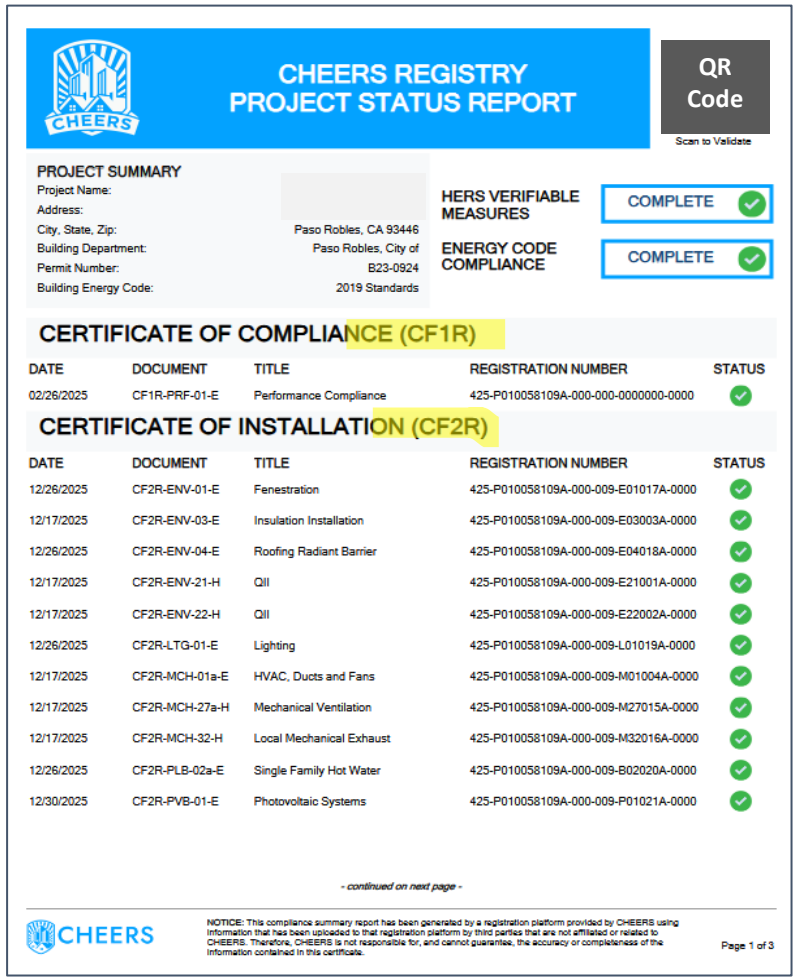



Job-site photos of Duct Leakage Testing set-up and results are posted to the Project Site

# Project Status Report (PSR) –For AHJ's

**Green Checkmarks:**

- The Measures are Complete
- Forms are Signed, and
- Everything Passes



CHEERS REGISTRY
PROJECT STATUS REPORT

QR Code
Scan to Validate

**PROJECT SUMMARY**

| | |
|---|---|
| Project Name: | |
| Address: | |
| City, State, Zip: | Paso Robles, CA 93446 |
| Building Department: | Paso Robles, City of |
| Permit Number: | B23-0924 |
| Building Energy Code: | 2019 Standards |

HERS VERIFIABLE MEASURES — COMPLETE

ENERGY CODE COMPLIANCE — COMPLETE

**CERTIFICATE OF COMPLIANCE (CF1R)**

| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| 02/26/2025 | CF1R-PRF-01-E | Performance Compliance | 425-P010058109A-000-000-0000000-0000 | ✓ |

**CERTIFICATE OF INSTALLATION (CF2R)**

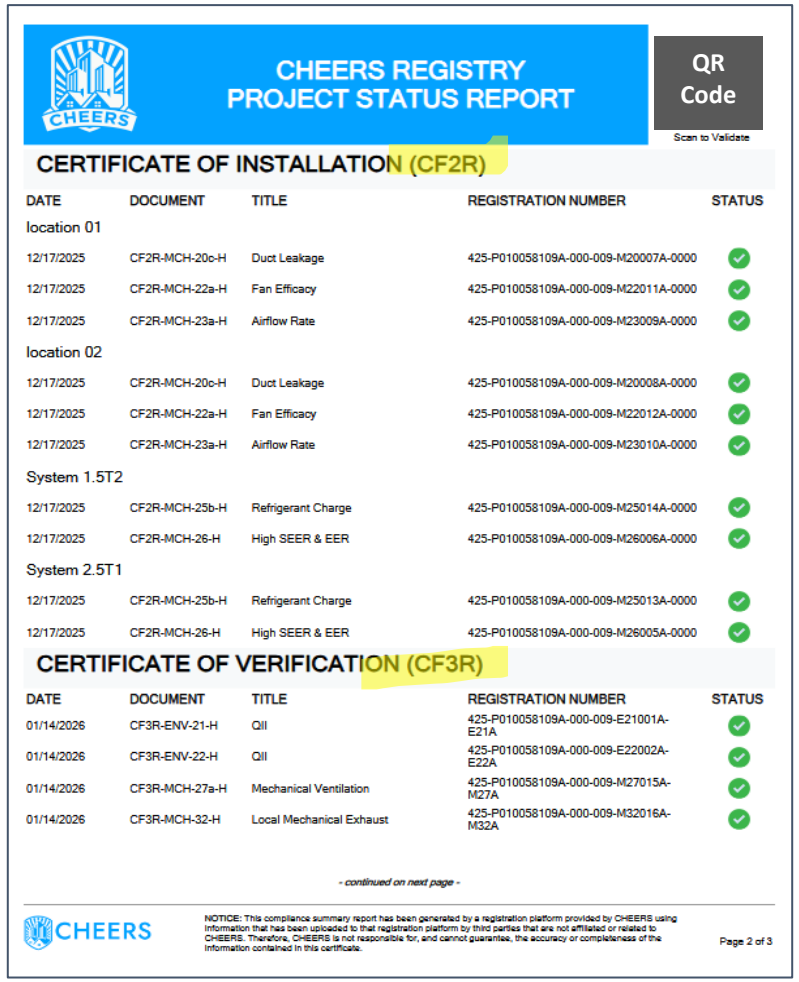
| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| 12/26/2025 | CF2R-ENV-01-E | Fenestration | 425-P010058109A-000-009-E01017A-0000 | ✓ |
| 12/17/2025 | CF2R-ENV-03-E | Insulation Installation | 425-P010058109A-000-009-E03003A-0000 | ✓ |
| 12/26/2025 | CF2R-ENV-04-E | Roofing Radiant Barrier | 425-P010058109A-000-009-E04018A-0000 | ✓ |
| 12/17/2025 | CF2R-ENV-21-H | QII | 425-P010058109A-000-009-E21001A-0000 | ✓ |
| 12/17/2025 | CF2R-ENV-22-H | QII | 425-P010058109A-000-009-E22002A-0000 | ✓ |
| 12/26/2025 | CF2R-LTG-01-E | Lighting | 425-P010058109A-000-009-L01019A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-01a-E | HVAC, Ducts and Fans | 425-P010058109A-000-009-M01004A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-27a-H | Mechanical Ventilation | 425-P010058109A-000-009-M27015A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-32-H | Local Mechanical Exhaust | 425-P010058109A-000-009-M32016A-0000 | ✓ |
| 12/26/2025 | CF2R-PLB-02a-E | Single Family Hot Water | 425-P010058109A-000-009-B02020A-0000 | ✓ |
| 12/30/2025 | CF2R-PVB-01-E | Photovoltaic Systems | 425-P010058109A-000-009-P01021A-0000 | ✓ |

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CHEERS REGISTRY
PROJECT STATUS REPORT

QR Code
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**CERTIFICATE OF INSTALLATION (CF2R)**

| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| location 01 | | | | |
| 12/17/2025 | CF2R-MCH-20c-H | Duct Leakage | 425-P010058109A-000-009-M20007A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-22a-H | Fan Efficacy | 425-P010058109A-000-009-M22011A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-23a-H | Airflow Rate | 425-P010058109A-000-009-M23009A-0000 | ✓ |
| location 02 | | | | |
| 12/17/2025 | CF2R-MCH-20c-H | Duct Leakage | 425-P010058109A-000-009-M20008A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-22a-H | Fan Efficacy | 425-P010058109A-000-009-M22012A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-23a-H | Airflow Rate | 425-P010058109A-000-009-M23010A-0000 | ✓ |
| System 1.5T2 | | | | |
| 12/17/2025 | CF2R-MCH-25b-H | Refrigerant Charge | 425-P010058109A-000-009-M25014A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-26-H | High SEER & EER | 425-P010058109A-000-009-M26006A-0000 | ✓ |
| System 2.5T1 | | | | |
| 12/17/2025 | CF2R-MCH-25b-H | Refrigerant Charge | 425-P010058109A-000-009-M25013A-0000 | ✓ |
| 12/17/2025 | CF2R-MCH-26-H | High SEER & EER | 425-P010058109A-000-009-M26005A-0000 | ✓ |

**CERTIFICATE OF VERIFICATION (CF3R)**

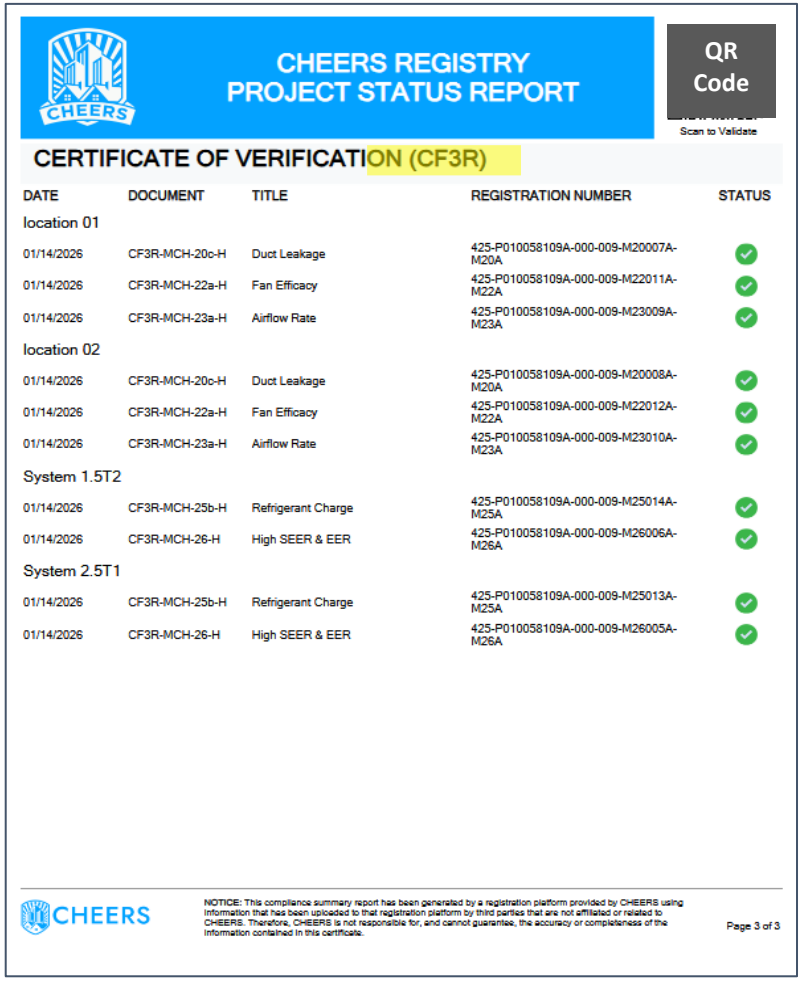
| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| 01/14/2026 | CF3R-ENV-21-H | QII | 425-P010058109A-000-009-E21001A-E21A | ✓ |
| 01/14/2026 | CF3R-ENV-22-H | QII | 425-P010058109A-000-009-E22002A-E22A | ✓ |
| 01/14/2026 | CF3R-MCH-27a-H | Mechanical Ventilation | 425-P010058109A-000-009-M27015A-M27A | ✓ |
| 01/14/2026 | CF3R-MCH-32-H | Local Mechanical Exhaust | 425-P010058109A-000-009-M32016A-M32A | ✓ |

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CHEERS REGISTRY
PROJECT STATUS REPORT

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**CERTIFICATE OF VERIFICATION (CF3R)**

| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| location 01 | | | | |
| 01/14/2026 | CF3R-MCH-20c-H | Duct Leakage | 425-P010058109A-000-009-M20007A-M20A | ✓ |
| 01/14/2026 | CF3R-MCH-22a-H | Fan Efficacy | 425-P010058109A-000-009-M22011A-M22A | ✓ |
| 01/14/2026 | CF3R-MCH-23a-H | Airflow Rate | 425-P010058109A-000-009-M23009A-M23A | ✓ |
| location 02 | | | | |
| 01/14/2026 | CF3R-MCH-20c-H | Duct Leakage | 425-P010058109A-000-009-M20008A-M20A | ✓ |
| 01/14/2026 | CF3R-MCH-22a-H | Fan Efficacy | 425-P010058109A-000-009-M22012A-M22A | ✓ |
| 01/14/2026 | CF3R-MCH-23a-H | Airflow Rate | 425-P010058109A-000-009-M23010A-M23A | ✓ |
| System 1.5T2 | | | | |
| 01/14/2026 | CF3R-MCH-25b-H | Refrigerant Charge | 425-P010058109A-000-009-M25014A-M25A | ✓ |
| 01/14/2026 | CF3R-MCH-26-H | High SEER & EER | 425-P010058109A-000-009-M26006A-M26A | ✓ |
| System 2.5T1 | | | | |
| 01/14/2026 | CF3R-MCH-25b-H | Refrigerant Charge | 425-P010058109A-000-009-M25013A-M25A | ✓ |
| 01/14/2026 | CF3R-MCH-26-H | High SEER & EER | 425-P010058109A-000-009-M26005A-M26A | ✓ |

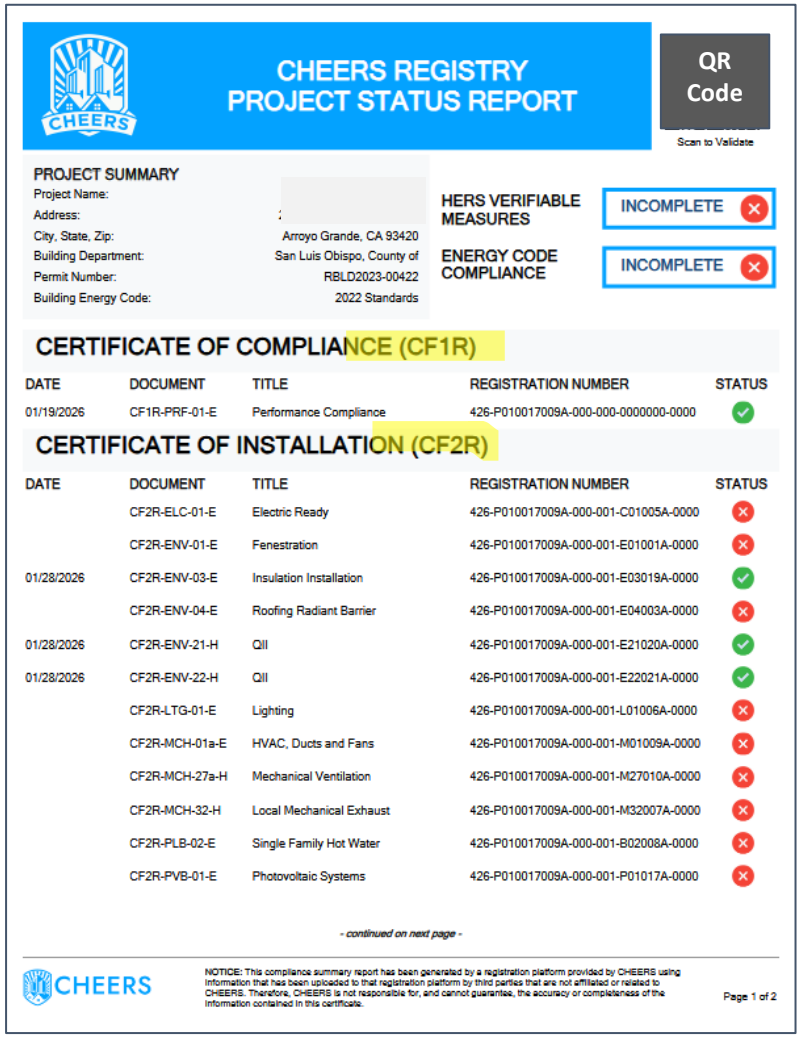
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# Project Status Report (PSR) –For AHJ's

**Red 'X':**

- Measures is not complete
- Form is not signed, and/or
- Measure not passing



CHEERS REGISTRY
PROJECT STATUS REPORT

QR Code
Scan to Validate

PROJECT SUMMARY

| | |
|---|---|
| Project Name: | |
| Address: | |
| City, State, Zip: | Arroyo Grande, CA 93420 |
| Building Department: | San Luis Obispo, County of |
| Permit Number: | RBLD2023-00422 |
| Building Energy Code: | 2022 Standards |

HERS VERIFIABLE MEASURES: INCOMPLETE

ENERGY CODE COMPLIANCE: INCOMPLETE

CERTIFICATE OF COMPLIANCE (CF1R)

| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| 01/19/2026 | CF1R-PRF-01-E | Performance Compliance | 426-P010017009A-000-000-0000000-0000 | ✓ |

CERTIFICATE OF INSTALLATION (CF2R)

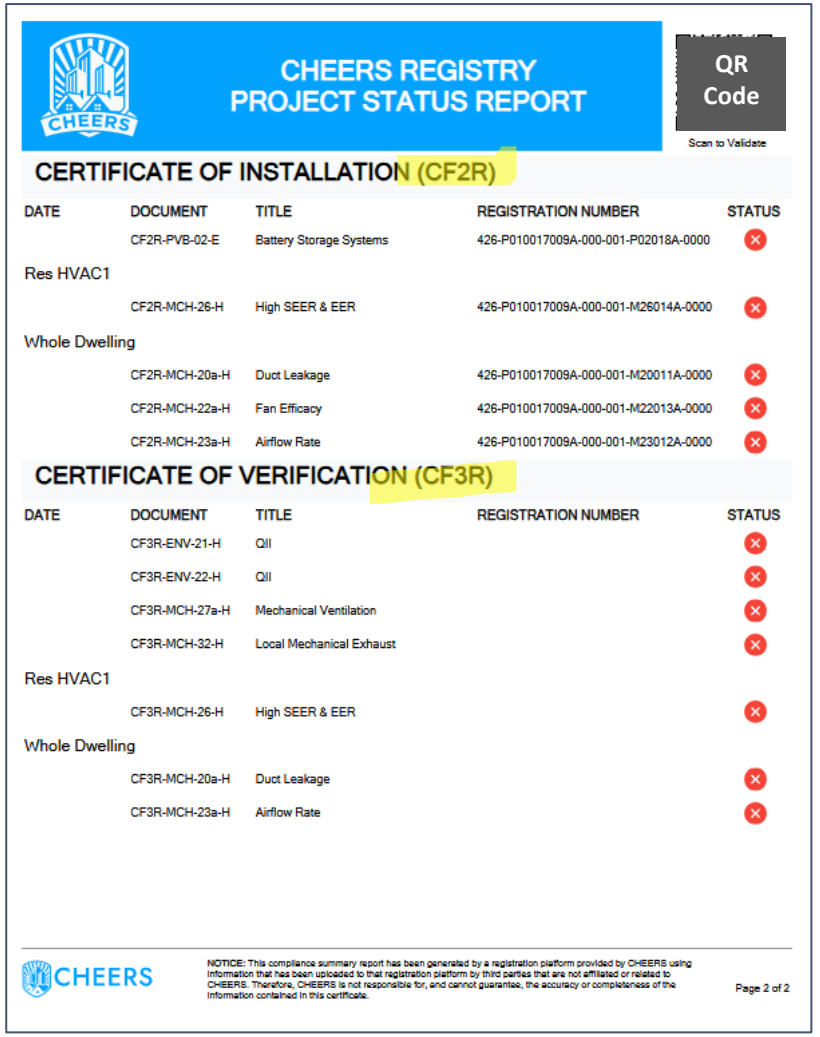
| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| | CF2R-ELC-01-E | Electric Ready | 426-P010017009A-000-001-C01005A-0000 | ✗ |
| | CF2R-ENV-01-E | Fenestration | 426-P010017009A-000-001-E01001A-0000 | ✗ |
| 01/28/2026 | CF2R-ENV-03-E | Insulation Installation | 426-P010017009A-000-001-E03019A-0000 | ✓ |
| | CF2R-ENV-04-E | Roofing Radiant Barrier | 426-P010017009A-000-001-E04003A-0000 | ✗ |
| 01/28/2026 | CF2R-ENV-21-H | QII | 426-P010017009A-000-001-E21020A-0000 | ✓ |
| 01/28/2026 | CF2R-ENV-22-H | QII | 426-P010017009A-000-001-E22021A-0000 | ✓ |
| | CF2R-LTG-01-E | Lighting | 426-P010017009A-000-001-L01006A-0000 | ✗ |
| | CF2R-MCH-01a-E | HVAC, Ducts and Fans | 426-P010017009A-000-001-M01009A-0000 | ✗ |
| | CF2R-MCH-27a-H | Mechanical Ventilation | 426-P010017009A-000-001-M27010A-0000 | ✗ |
| | CF2R-MCH-32-H | Local Mechanical Exhaust | 426-P010017009A-000-001-M32007A-0000 | ✗ |
| | CF2R-PLB-02-E | Single Family Hot Water | 426-P010017009A-000-001-B02008A-0000 | ✗ |
| | CF2R-PVB-01-E | Photovoltaic Systems | 426-P010017009A-000-001-P01017A-0000 | ✗ |

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PROJECT STATUS REPORT

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CERTIFICATE OF INSTALLATION (CF2R)

| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| | CF2R-PVB-02-E | Battery Storage Systems | 426-P010017009A-000-001-P02018A-0000 | ✗ |
| Res HVAC1 | | | | |
| | CF2R-MCH-26-H | High SEER & EER | 426-P010017009A-000-001-M26014A-0000 | ✗ |
| Whole Dwelling | | | | |
| | CF2R-MCH-20a-H | Duct Leakage | 426-P010017009A-000-001-M20011A-0000 | ✗ |
| | CF2R-MCH-22a-H | Fan Efficacy | 426-P010017009A-000-001-M22013A-0000 | ✗ |
| | CF2R-MCH-23a-H | Airflow Rate | 426-P010017009A-000-001-M23012A-0000 | ✗ |

CERTIFICATE OF VERIFICATION (CF3R)

| DATE | DOCUMENT | TITLE | REGISTRATION NUMBER | STATUS |
|---|---|---|---|---|
| | CF3R-ENV-21-H | QII | | ✗ |
| | CF3R-ENV-22-H | QII | | ✗ |
| | CF3R-MCH-27a-H | Mechanical Ventilation | | ✗ |
| | CF3R-MCH-32-H | Local Mechanical Exhaust | | ✗ |
| Res HVAC1 | | | | |
| | CF3R-MCH-26-H | High SEER & EER | | ✗ |
| Whole Dwelling | | | | |
| | CF3R-MCH-20a-H | Duct Leakage | | ✗ |
| | CF3R-MCH-23a-H | Airflow Rate | | ✗ |

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**Under the 2025 Energy Code:**

**The ECC Rater will remain as the "Rater of Record" even if the Rater 'fails' the project's required energy measures or features.**

3C REN

# New Rule: ECC Raters of Record

## CHEERS Training Excerpt




**This is a new requirement**

**Rater of Record is a new tool introduced in the ECC Program to support Raters.**

**A Rater Company can protect a project from Rater Shopping when there is a registered failure on a project.**

The ECC Program supports Raters that fail a job from losing the job to Rater shopping.

Rater Companies can keep a job within the company if one of their Raters registers a failed field verification or diagnostic test.

A Rater that fails a job becomes the Rater of Record and is protected from losing that job to another Rater or Rater Company unless specific conditions are met.

### How to Release a Rater of Record

10-103.3(b)1Aviii - under any of the following circumstances, the ECC Provider may release a project from the ROR but must verify that the retest for the failed field verification or diagnostic test is legitimate either through a site visit, photographic evidence (or other remote verification,) or a desk audit (Section 10-103.3(d)5Civ) on the project:

- The ROR agrees to release the project.
- The ROR is physically unable to continue work on the project due to injury, misfortunate, or availability.
- The ROR's certification has been suspended (Section 10-103.3(d)7C) or decertified (Section 10-103.3(d)7D).
- The ROR is unwilling to continue work on the project.

**Acknowledgement**

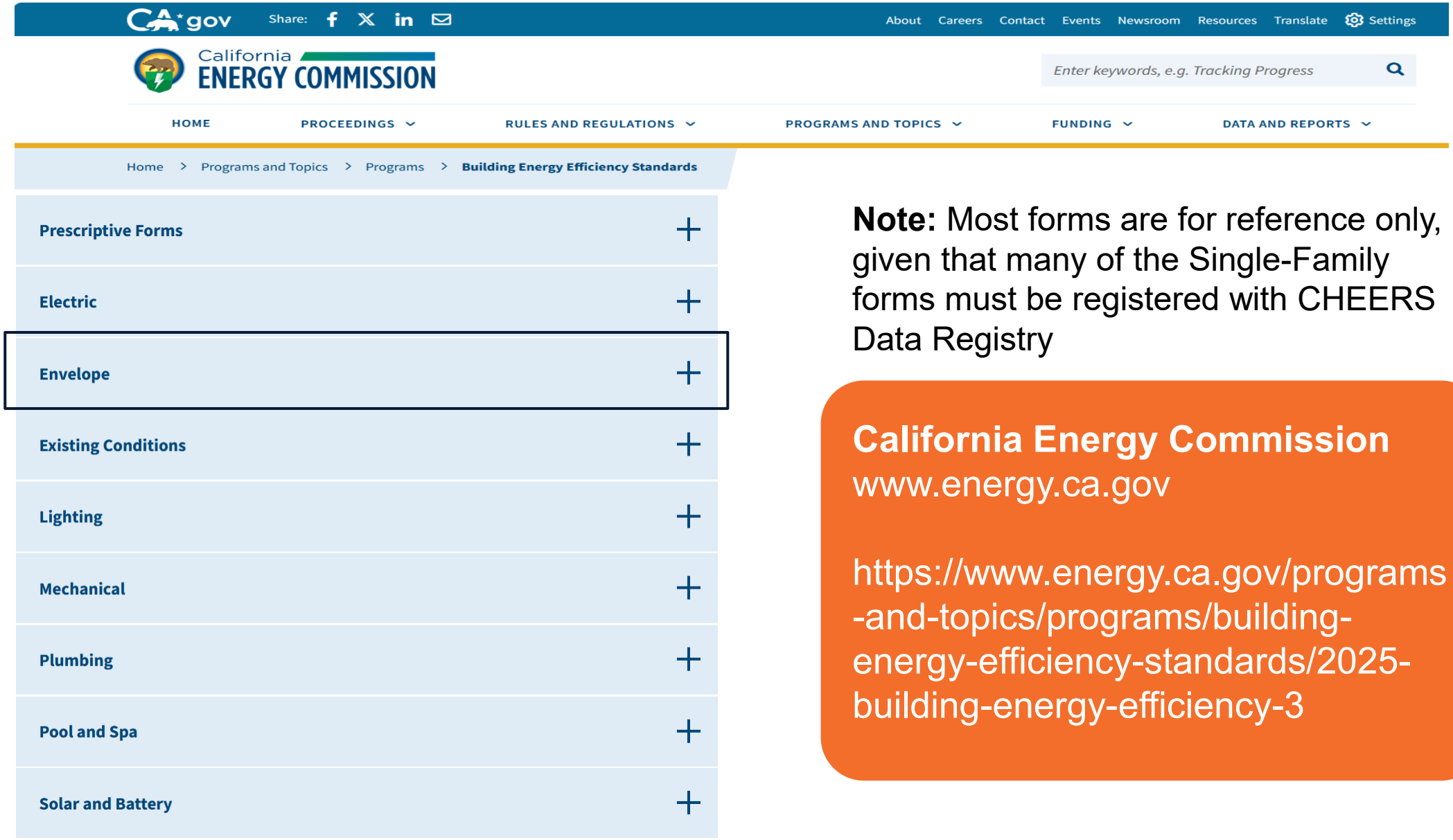
☐ I acknowledge the above mentioned information regarding the Rater of Record, including that a Rater that fails a job becomes the Rater of Record and is protected from losing that job to another Rater or Rater Company unless specific conditions are met.

**CHEERS ECC Program Training Excerpt:**

**The ECC Rater will acknowledge that they understand the new "Rater of Record" requirements and release circumstances.**

# Supporting Forms -Envelope

# CEC – 2025 Energy Code Compliance Documents - Forms




**Note:** Most forms are for reference only, given that many of the Single-Family forms must be registered with CHEERS Data Registry

**California Energy Commission**
www.energy.ca.gov

https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency-3

# 2025 Supporting Docs CF2R & CF3R

## Envelope

### Certificates of Installation

- CF2R-ENV-01-E Fenestration Installation
- CF2R-ENV-03-E Insulation Installation
- CF2R-ENV-04-E Roofing Ventilation and Radiant Barrier
- CF2R-ENV-20-H Building Air Leakage Diagnostic Test - Building Enclosures and Dwelling Unit Enclosures
- CF2R-ENV-21-H QII - Air Infiltration Sealing - Framing Stage
- CF2R-ENV-22-H QII - Insulation Installation

### Certificates of Verification

- CF3R-ENV-20-H Building Air Leakage Diagnostic Test - Building Enclosures and Dwelling Unit Enclosures
- CF3R-ENV-21-H QII - Air Infiltration Sealing - Framing Stage
- CF3R-ENV-22-H QII - Insulation Installation

**Reminder:**
E – Enforcement Agency
H – ECC (formerly HERS)

**QII - AIR INFILTRATION SEALING – FRAMING STAGE**

CALIFORNIA ENERGY COMMISSION CEC-CF3R-ENV-21-H

***SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS***

**CERTIFICATE OF VERIFICATION**

**Note:** This table completed by ECC Registry.

| | |
|---|---|
| Project Name: | Enforcement Agency: |
| Dwelling Address: | Permit Number: |
| City and Zip Code: | Permit Application Date: |

**A. Air Barrier Materials**

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Correction Notes.***

Note:

SPF insulation is an acceptable air barrier and sealant when installed to a minimum thickness of 2 inches for closed cell and 5.5 inches for open cell, except where not allowed by manufacturer (e.g., flues, vents, can lights, etc.).

| | | |
|---|---|---|
| 01 | A continuous sealed exterior air barrier is required in all thermal envelope assemblies to limit air movement between unconditioned/outside spaces and conditioned/inside spaces, and must comply using one of the following methods:<br>1. Using individual materials that have an air permeance not exceeding 0.004 cfm/ft² under a pressure differential of 0.3 in. w.g. (1.57 pcf) (0.02 L/s.m² at 75 pa) when tested in accordance with ASTM E2178; or<br>2. Using assemblies of materials and components that have an average air leakage not to exceed 0.04 cfm/ft² under a pressure differential of 0.3 in. w.g. (1.57 pcf) (0.2 L/s.m² at 75 pa) when tested in accordance with ASTM E2357, ASTM E1677, ASTM E1680, or ASTM E283; or<br>3. Testing the complete building and demonstrating that the air leakage rate of the building envelope does not exceed 0.40 cfm/ft² at a pressure differential of 0.3 in. w.g. (1.57 pcf) (2.0 L/s.m² at 75 pa) in accordance with ASTM E779 or an equivalent approved method. | |
| 02 | Method of Compliance | |
| 03 | Verification Status | ☐ Pass - all applicable requirements are met; or<br>☐ Fail - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or<br>☐ All N/A - This entire table is not applicable. |
| 04 | Correction Notes | |

**B. Raised Floor Adjacent to Unconditioned Space or Separate Dwelling Units**

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Correction Notes.***

# 2025 Supporting Docs LMCI & LMCV

**Envelope** X

**Certificate of Compliance**

- LMCC-ENV-01-E Envelope Component Approach

**Certificates of Installation**

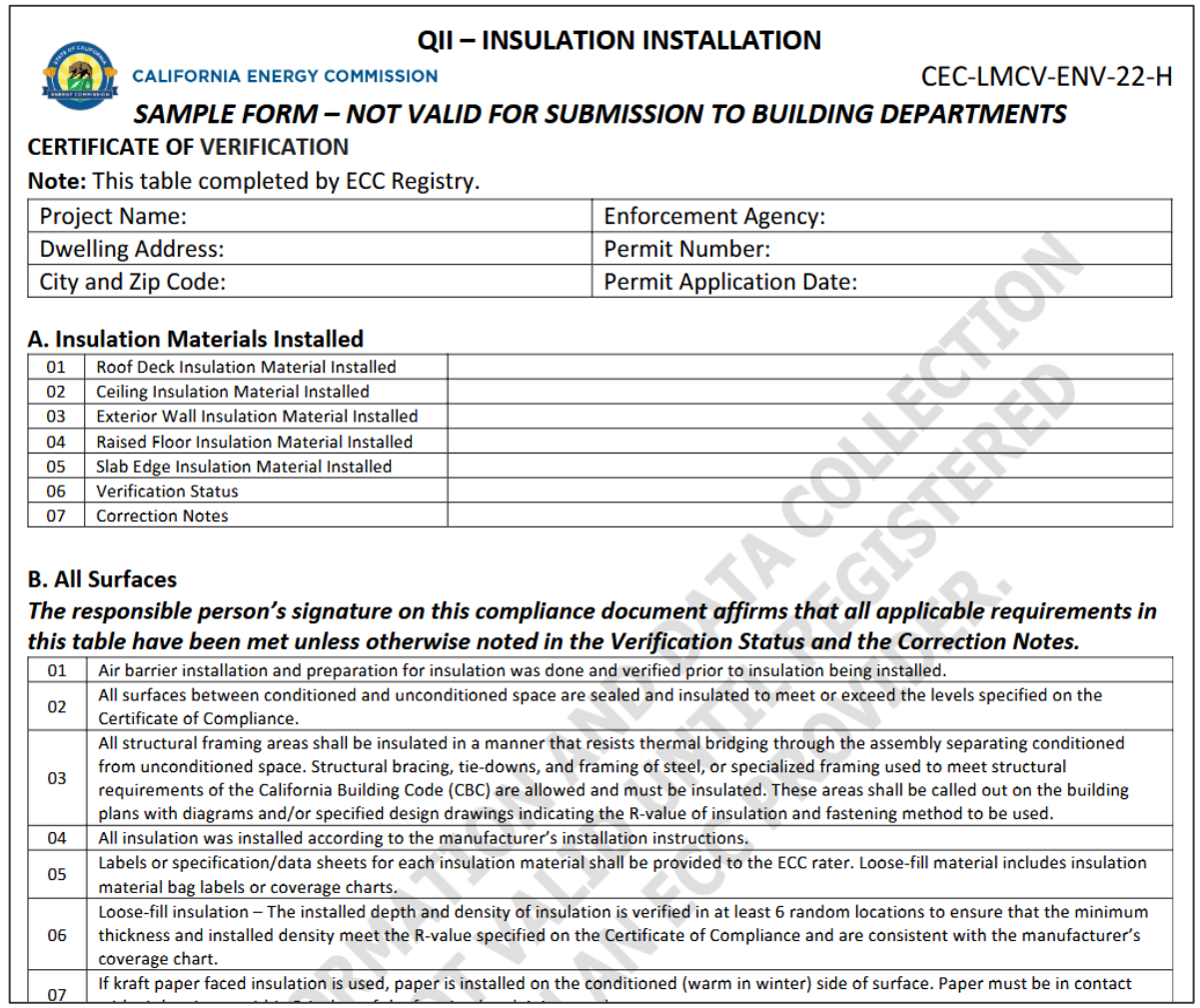
- LMCI-ENV-E Envelope Component Approach
- LMCI-ENV-21-H QII – Air Infiltration Sealing – Framing Stage
- LMCI-ENV-22-H QII – Insulation Installation

**Certificates of Verification**

- LMCV-ENV-21-H QII – Air Infiltration Sealing – Framing Stage
- LMCV-ENV-22-H QII – Insulation Installation

**Note**: Air Leakage Testing is part of the Mechanical under the MCH-27-H and MCH-24-H forms.

**Reminder:**
E – Enforcement Agency
H – ECC (formerly HERS)



**QII – INSULATION INSTALLATION**

CALIFORNIA ENERGY COMMISSION CEC-LMCV-ENV-22-H

***SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS***

**CERTIFICATE OF VERIFICATION**

**Note:** This table completed by ECC Registry.

| | |
|---|---|
| Project Name: | Enforcement Agency: |
| Dwelling Address: | Permit Number: |
| City and Zip Code: | Permit Application Date: |

**A. Insulation Materials Installed**

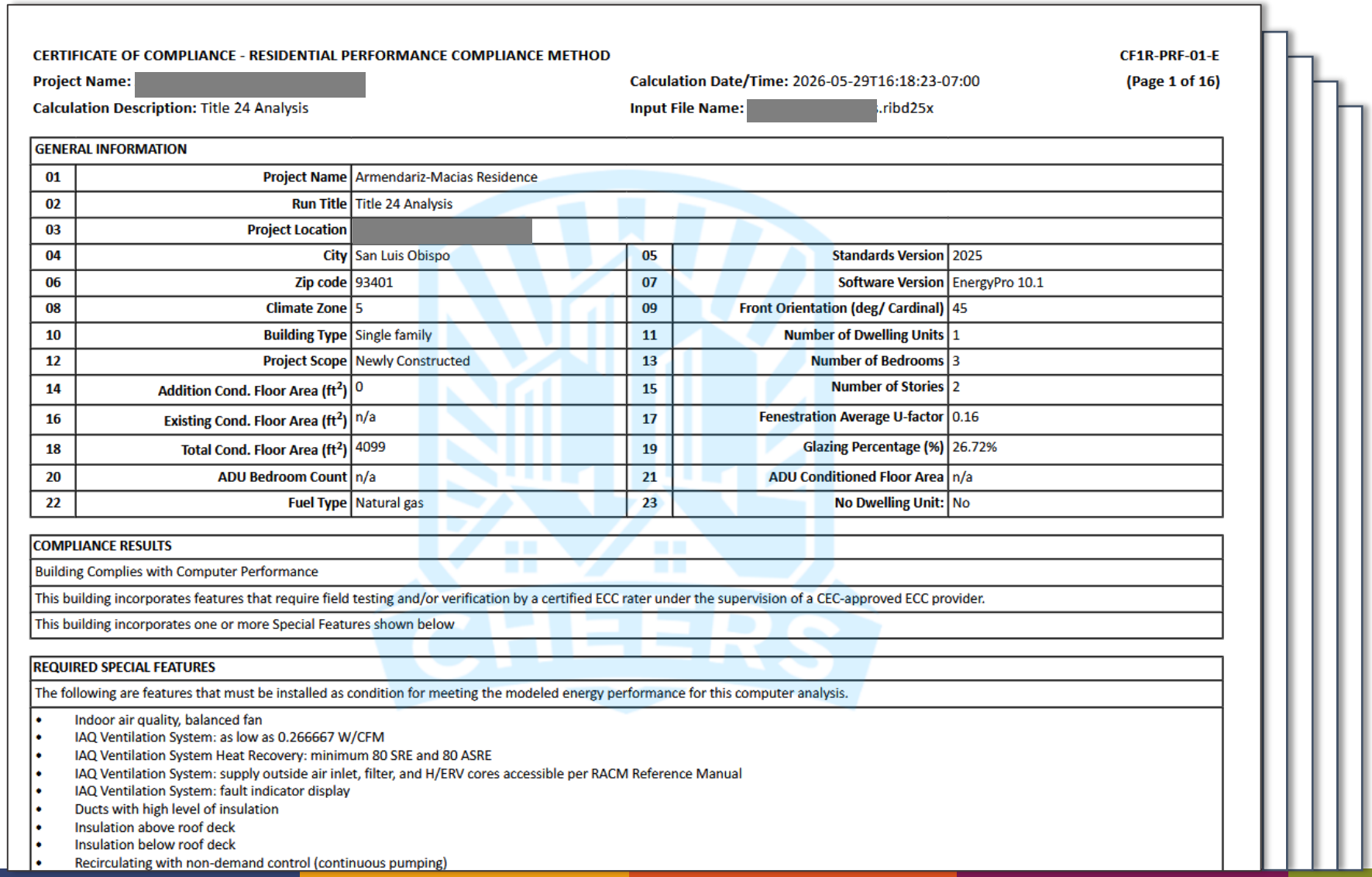
| | | |
|---|---|---|
| 01 | Roof Deck Insulation Material Installed | |
| 02 | Ceiling Insulation Material Installed | |
| 03 | Exterior Wall Insulation Material Installed | |
| 04 | Raised Floor Insulation Material Installed | |
| 05 | Slab Edge Insulation Material Installed | |
| 06 | Verification Status | |
| 07 | Correction Notes | |

**B. All Surfaces**

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Correction Notes.***

| | |
|---|---|
| 01 | Air barrier installation and preparation for insulation was done and verified prior to insulation being installed. |
| 02 | All surfaces between conditioned and unconditioned space are sealed and insulated to meet or exceed the levels specified on the Certificate of Compliance. |
| 03 | All structural framing areas shall be insulated in a manner that resists thermal bridging through the assembly separating conditioned from unconditioned space. Structural bracing, tie-downs, and framing of steel, or specialized framing used to meet structural requirements of the California Building Code (CBC) are allowed and must be insulated. These areas shall be called out on the building plans with diagrams and/or specified design drawings indicating the R-value of insulation and fastening method to be used. |
| 04 | All insulation was installed according to the manufacturer's installation instructions. |
| 05 | Labels or specification/data sheets for each insulation material shall be provided to the ECC rater. Loose-fill material includes insulation material bag labels or coverage charts. |
| 06 | Loose-fill insulation – The installed depth and density of insulation is verified in at least 6 random locations to ensure that the minimum thickness and installed density meet the R-value specified on the Certificate of Compliance and are consistent with the manufacturer's coverage chart. |
| 07 | If kraft paper faced insulation is used, paper is installed on the conditioned (warm in winter) side of surface. Paper must be in contact |

# After CF2R/CF3R's are complete, the project can obtain final Occupancy approval.



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

**Project Name:** [redacted] — **Calculation Date/Time:** 2026-05-29T16:18:23-07:00 — (Page 1 of 16)

**Calculation Description:** Title 24 Analysis — **Input File Name:** [redacted].ribd25x

| GENERAL INFORMATION | | | | | |
|---|---|---|---|---|---|
| 01 | Project Name | Armendariz-Macias Residence | | | |
| 02 | Run Title | Title 24 Analysis | | | |
| 03 | Project Location | [redacted] | | | |
| 04 | City | San Luis Obispo | 05 | Standards Version | 2025 |
| 06 | Zip code | 93401 | 07 | Software Version | EnergyPro 10.1 |
| 08 | Climate Zone | 5 | 09 | Front Orientation (deg/ Cardinal) | 45 |
| 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 | 2 |
| 16 | Existing Cond. Floor Area ($ft^2$) | n/a | 17 | Fenestration Average U-factor | 0.16 |
| 18 | Total Cond. Floor Area ($ft^2$) | 4099 | 19 | Glazing Percentage (%) | 26.72% |
| 20 | ADU Bedroom Count | n/a | 21 | ADU Conditioned Floor Area | n/a |
| 22 | Fuel Type | Natural gas | 23 | No Dwelling Unit: | No |

**COMPLIANCE RESULTS**

Building Complies with Computer Performance

This building incorporates features that require field testing and/or verification by a certified ECC rater under the supervision of a CEC-approved ECC provider.

This building incorporates one or more Special Features shown below

**REQUIRED SPECIAL FEATURES**

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Indoor air quality, balanced fan
- IAQ Ventilation System: as low as 0.266667 W/CFM
- IAQ Ventilation System Heat Recovery: minimum 80 SRE and 80 ASRE
- IAQ Ventilation System: supply outside air inlet, filter, and H/ERV cores accessible per RACM Reference Manual
- IAQ Ventilation System: fault indicator display
- Ducts with high level of insulation
- Insulation above roof deck
- Insulation below roof deck
- Recirculating with non-demand control (continuous pumping)

## Approval Process

- CF1R on ECC Registry
- CF2R on ECC Registry
- CF3R on ECC Registry
- Enforcement Agency (AHJ) can access the **Watermarked Forms**
- AHJ will see "PASS" on List of Required Forms

# Quality Insulation Installation (QII) ENV-21, 22 and MCH-21

**CF1R-PRF-01-E**

**Calculation Description:** 2 Story Example

**Input File Name:** 2StoryExample.ribd25

**ECC FEATURE SUMMARY**

The following is a summary of the features that must be field-verified by a certified ECC Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the ECC Registry

- Quality insulation installation (QII)
- Indoor air quality ventilation

**ECC QII Work Flow**:

- Triggered on CF1R
- Job Site Meeting "Review Requirements"
- ECC Inspection: Framing
  - Envelope Measures
  - HVAC/Duct Measures
- ECC Inspection: Insulation Install
  - Envelope Measures

**CF2R and CF3R Forms**

- CF2R-ENV-03-E Insulation Installation
- CF2R-ENV-21-H QII - Air Infiltration Sealing - Framing Stage
- CF2R-ENV-22-H QII - Insulation Installation
- CF2R-MCH-21-H QII - Air Infiltration Sealing - Framing Stage
- CF3R-ENV-21-HERS QII - Air Infiltration Sealing - Framing Stage
- CF3R-ENV-22-HERS QII - Insulation Installation

# QII – Air Sealing - Framing Stage for Low-rise Multifamily LMCI-ENV-21-H

**QII - AIR INFILTRATION SEALING - FRAMING STAGE**

CALIFORNIA ENERGY COMMISSION CEC-LMCI-ENV-21-H

***SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS***

**CERTIFICATE OF INSTALLATION**

**Note:** This table completed by HERS Registry.

| Project Name: | Enforcement Agency: |
|---|---|

**I. Air Barriers in Multifamily Dwellings**

| | |
|---|---|
| 01 | Each dwelling unit must be sealed to stop air movement between dwelling units. Treat adjacent dwelling units as unconditioned space for air sealing. |
| 02 | All penetrations through the floor and ceiling of each dwelling unit are sealed, including electric and gas utilities, water pipes, drain pipes, fire protection service pipes, and communication wiring. |
| 03 | Elevator penthouse, mechanical penthouse, stairwell doors, roof access hatches, and plumbing stacks that separate conditioned and unconditioned space are all sealed. |
| 04 | Vertical chases for garbage chutes, elevator shafts, HVAC ducting and plumbing shall be treated as unconditioned space for sealing. |
| 05 | Common hallways shall be treated as unconditioned space for sealing. |

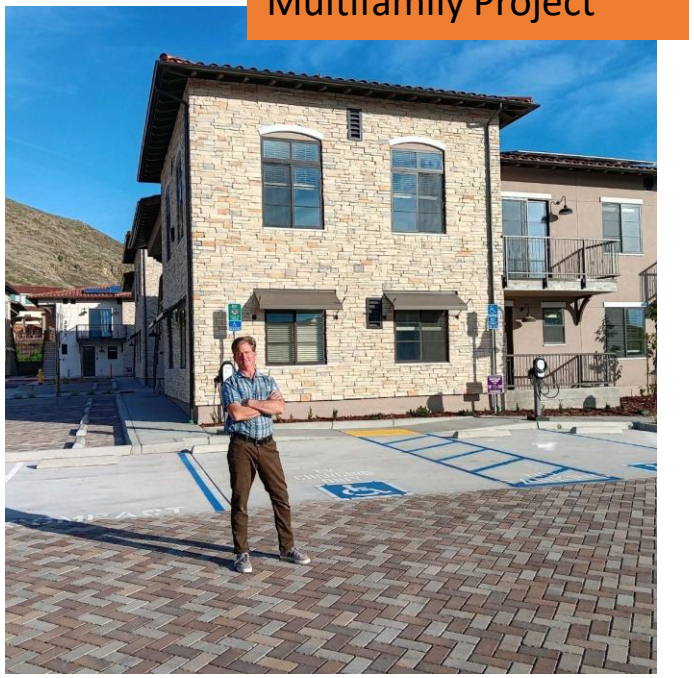
**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.**

| | | |
|---|---|---|
| | not exceed 0.40 cfm/ft² at a pressure differential of 0.3 in. w.g. (1.57 psf) (2.0 L/s.m² at 75 pa) in accordance with ASTM E779 or an equivalent approved method. | |
| 02 | Method of Compliance | |

Note:

SPF insulation is an acceptable air barrier and sealant when installed to a minimum thickness of 2 inches for closed cell and 5.5 inches for open cell, except where not allowed by manufacturer (e.g., flues, vents, can lights, etc.).

Multifamily Project



Forms are similar to Single Family, except items describing where assemblies must be sealed to stop air movement between dwellings.

# QII – Air Sealing, Insulation and Electrical Wiring

## CF2R-ENV-03-E Mandatory and part of QII

**INSULATION INSTALLATION**

CALIFORNIA ENERGY COMMISSION

CEC-CF2R-ENV-03-E

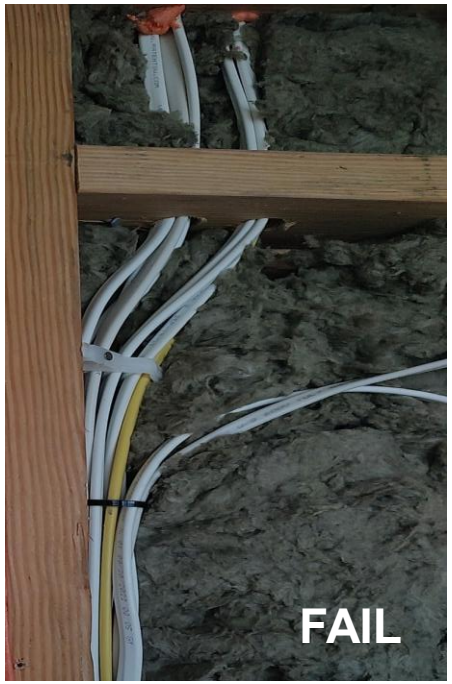
**H. Installed Insulation**

| Field | Field Description |
|---|---|
| 01 | Installed insulation R-values are the same or greater than listed on the CF1R. |
| 02 | No gaps or voids between the insulation and framing. |
| 03 | No gaps between the sides or ends of batt insulation. |
| 04 | Loose-fill insulation must be installed to the minimum installed weight per square foot (density) of the manufacturer's cut sheet for the proposed R-value. |
| 05 | Batt insulation is not compressed (no stuffing of the insulation into the cavity) and is installed to its full thickness. |
| 06 | Insulation is cut around obstructions such as electrical boxes. |
| 07 | Batt insulation is delaminated around all plumbing and electrical lines in ceilings, walls, and floors. |
| 08 | Band joists are insulated to the same R-value as the wall. |
| 09 | In all narrow cavities the insulation shall be cut to fit or filled with expanding foam. |
| 10 | Insulation was installed per manufacturer instructions. |

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.**

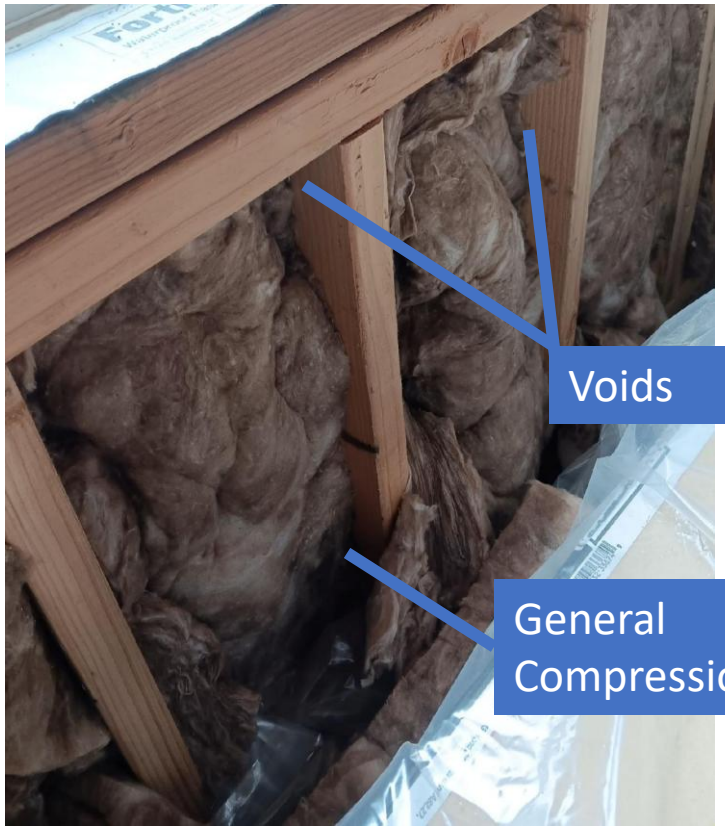
**I. Wall Insulation**




Unfinished Job: Electrical Wiring is on the surface of the batt insulation.

# QII – Quality Insulation Installation: Eliminate the Voids, Gaps, Compression and “No Stuffing”



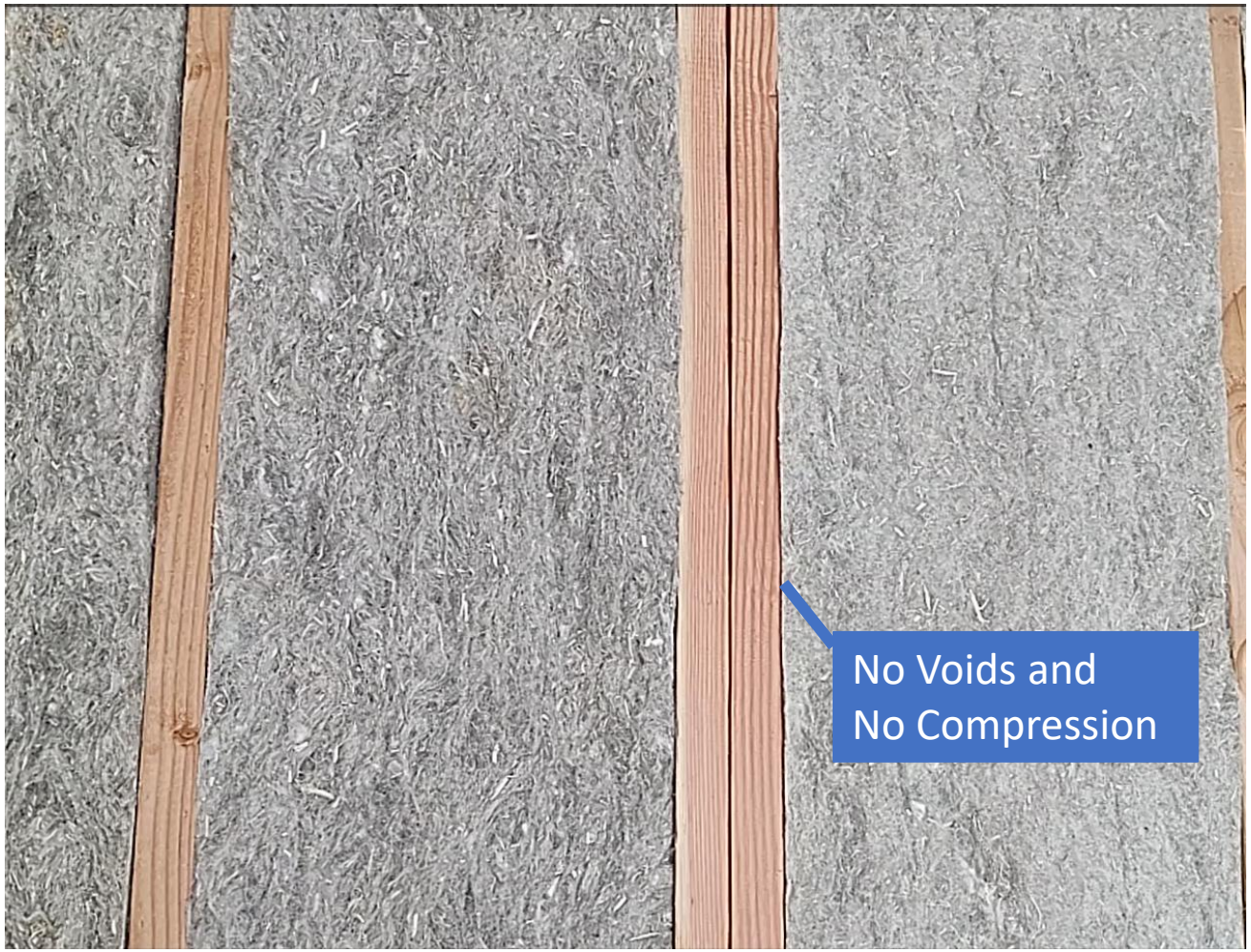

Insulation was compressed and “stuffed,” and not cut to size.

**Both of these would FAIL QII**




Insulation was compressed at the framing members.

# QII – Quality Insulation Installation




Insulation was cut and fit into each stud bay.



Hemp fiber insulation delivered to job site.

# QII – Made Easy with Blown-in Products

## INSULATION INSTALLATION

CALIFORNIA ENERGY COMMISSION

CEC-CF2R-ENV-03-E

**H. Installed Insulation**

| Field | Field Description |
|---|---|
| 01 | Installed insulation R-values are the same or greater than listed on the CF1R. |
| 02 | No gaps or voids between the insulation and framing. |
| 03 | No gaps between the sides or ends of batt insulation. |
| 04 | Loose-fill insulation must be installed to the minimum installed weight per square foot (density) of the manufacturer's cut sheet for the proposed R-value. |
| 05 | Batt insulation is not compressed (no stuffing of the insulation into the cavity) and is installed to its full thickness. |
| 06 | Insulation is cut around obstructions such as electrical boxes. |
| 07 | Batt insulation is delaminated around all plumbing and electrical lines in ceilings, walls, and floors. |
| 08 | Band joists are insulated to the same R-value as the wall. |
| 09 | In all narrow cavities the insulation shall be cut to fit or filled with expanding foam. |
| 10 | Insulation was installed per manufacturer instructions. |

**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.**

**I. Wall Insulation**



3C REN

# QII – Expanding Foam for Narrow Cavities and Windows

## QII - AIR INFILTRATION SEALING – FRAMING STAGE

CALIFORNIA ENERGY COMMISSION

CEC-CF2R-ENV-21-H

***SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS***

**C. Walls Adjacent to Unconditioned Space**

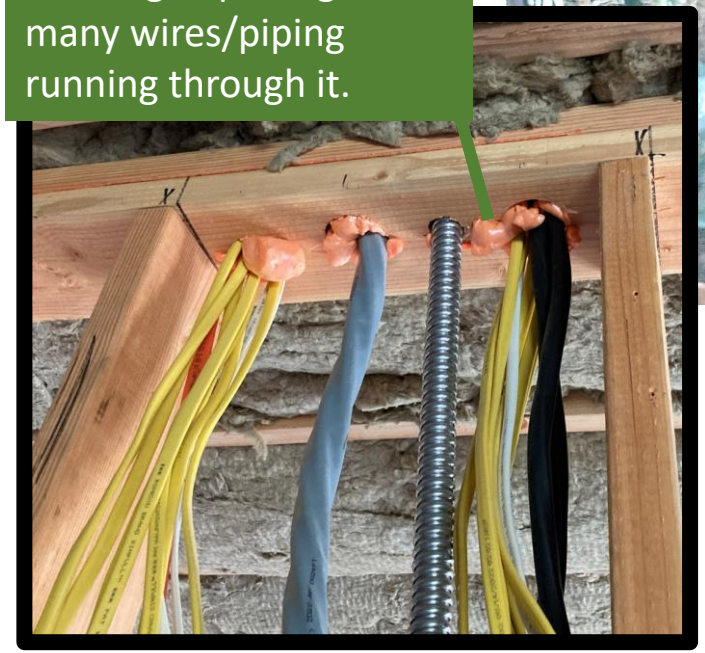
**The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.**

| | |
|---|---|
| 01 | All penetrations through the exterior wall air barrier are sealed to provide an airtight envelope to unconditioned spaces such as the outdoors, attic, garage, and crawlspace. |
| 02 | Exterior wall air barrier is sealed to the top plate and bottom plate in each stud bay. |
| 03 | All electrical boxes, including knockouts, that penetrate the air barrier to unconditioned space are sealed. |
| 04 | All openings in the top and bottom plate, including all interior and exterior walls, to unconditioned space are sealed; such as holes drilled for electrical and plumbing. |
| 05 | Exterior bottom plates (all stories) are sealed to the floor. |
| 06 | All gaps around windows and doors are sealed. The sealant used follows manufacturer specifications. |
| 07 | Rim joist gaps and openings are fully sealed. |
| 08 | Fan exhaust duct outlet/damper at the exterior wall are sealed. |
| 09 | Knee walls have solid and sealed blocking at the bottom, top, left, and right sides to prevent air movement into insulation. |

Cavities are filled with expanding foam



Note: it's more effective to seal small individual penetrations rather than one large opening with many wires/piping running through it.



Note: Foams are available in 'regular' and 'Fire-Rated.'
Air sealing gaps with Fire-Rated foams supports Home-Hardening efforts and complies with the Energy Code.

# Performance Method Credit: Spray Foam and ECC FV

Screen-Shot of EnergyPro Input:

Attic

☐ Unventilated

Truss Heel Height: 3.5 inches

☐ Insulation covers framing at underside of roof deck

This tab is used to edit the attributes of the assembly used for Residential Title 24 Performance calculations in the software.

Insulation

| Location | Insulation | Framing | Thickness |
|---|---|---|---|
| Cavity: | R 42 | 2x8 @ 24 in. O.C. | |
| Above Roof Deck: | 0 R-value | None | 0 inches |
| Below Roof Deck: | 0 R-value | None | 0 inches |

Other

Exterior Wall Finish: Stucco

☑ Non standard spray foam insulation requiring QII Inspection



Spray foam will expand unevenly as it cures. Closed Cell Medium Density: Measure to ½" variance in depth for an average installed R-Value

If spray foam has a higher R-value than Table 4.1.7 default values, a ECC rater can verify the higher R-value...

*Table 4.1.7: Required Thickness of SPF Insulation (inches) to Achieve Specified R-values*

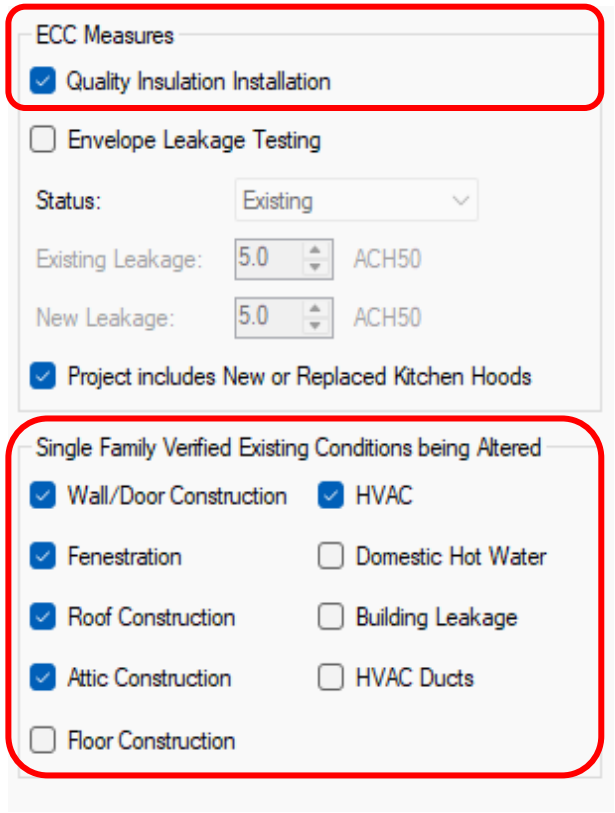
| **Equivalent R-Values for SPF insulation** | **11** | **13** | **15** | **19** | **21** | **22** | **25** | **30** | **38** |
|---|---|---|---|---|---|---|---|---|---|
| Required thickness of ccSPF Insulation @ R5.8/inch | 2.00 | 2.25 | 2.75 | 3.50 | 3.75 | 4.00 | 4.50 | 5.25 | 6.75 |
| Required thickness of ocSPF insulation @ R3.6/inch | 3.0 | 3.5 | 4.2 | 5.3 | 5.8 | 6.1 | 6.9 | 8.3 | 10.6 |

NOTE:
A HERS rater shall verify the installation of SPF insulation using the procedures specified in RA3.5.~~5~~6 whenever R-values other than the default R-value per inch listed in Table 4.1.7 are used for compliance (see *"Thermal Specifications"* in sections RA3.5.6.1).

**-- But the rater will need documentation of the material's R-value from the installer**

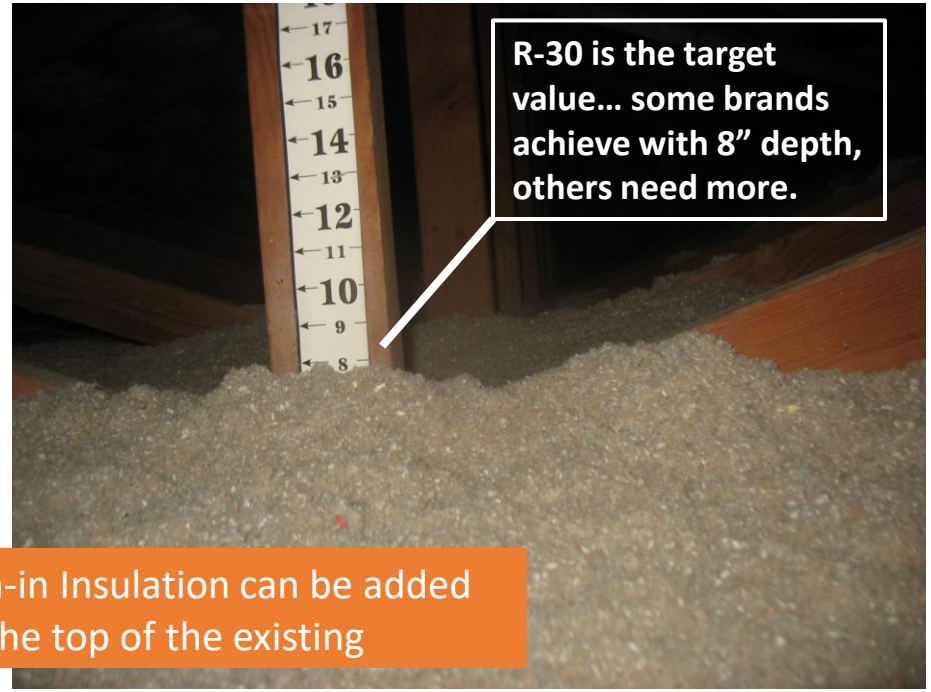
# Attic Ceiling Insulation: ECC Existing Conditions and New Construction

Screen-Shot of EnergyPro Inputs:






ECC – Verified Existing Condition
R-19 in theory, lots of room for improvement




Add New Insulation – Credit
under the Performance Method

**-- It's ugly up there. If home owners knew what their attics looked like...**

# QII – Batt Insulation over Spray Foam Air-Barrier

## Excerpt from form CEC-CF2R-ENV-21-QII-H:

**A. Air Barrier Materials**

Note: SPF insulation is an acceptable air barrier and sealant when installed to a minimum thickness of 2 inches for closed cell and 5.5 inches for open cell, except where not allowed by manufacturer (e.g., flues, vents, can lights, etc.).



2” Closed Cell Spray Foam is adhered to underside of roof deck.



Remaining cavity is filled with Batt Insulation. (Blown-in insulation would also be acceptable.)

# QII – Batt Insulation over Spray Foam –Works for Walls too

## Excerpt from Form CEC-CF2R-ENV-21-QII-H:

**A. Air Barrier Materials**

Note: SPF insulation is an acceptable air barrier and sealant when installed to a minimum thickness of 2 inches for closed cell and 5.5 inches for open cell, except where not allowed by manufacturer (e.g., flues, vents, can lights, etc.).



2” Closed Cell Spray Foam is adhered to underside of roof deck and walls.



Remaining cavity will be filled with Batt or Blown-in insulation.

# QII – Insulation Installation - CF3R-ENV-22-H

| CERTIFICATE OF VERIFICATION | CF3R-ENV-22-H |
|---|---|
| QII - Insulation Installation | (Page 1 of 7) |

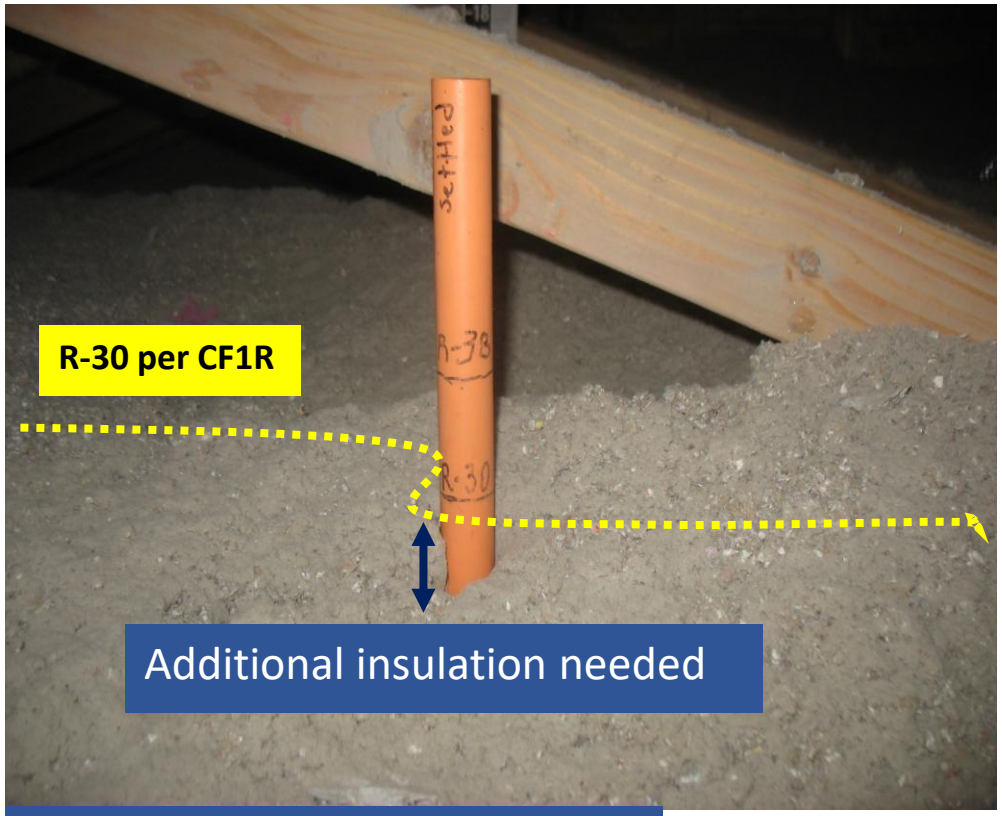
## A. Insulation Materials Installed

| | | |
|---|---|---|
| 01 | Roof Deck Insulation Material Installed | |
| 02 | Ceiling Insulation Material Installed | |
| 03 | Exterior Wall Insulation Material Installed | |
| 04 | Raised Floor Insulation Material Installed | |
| 05 | Slab Edge Insulation Material Installed | |
| 06 | Verification Status | |
| 07 | Correction Notes | |

## B. All Surfaces

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Correction Notes.***

| | | |
|---|---|---|
| 01 | Air barrier installation and preparation for insulation was done and verified prior to insulation being installed. | |
| 02 | All surfaces between conditioned and unconditioned space are sealed and insulated to meet or exceed the levels specified on the Certificate of Compliance. | |
| 03 | All structural framing areas shall be insulated in a manner that resists thermal bridging through the assembly separating conditioned from unconditioned space. Structural bracing, tie-downs, and framing of steel, or specialized framing used to meet structural requirements of the California Building Code (CBC) are allowed and must be insulated. These areas shall be called out on the building plans with diagrams and/or specified design drawings indicating the R-value of insulation and fastening method to be used. | |
| 04 | All insulation was installed according to the manufacturer's installation instructions. | |
| 05 | Labels or specification/data sheets for each insulation material shall be provided to the ECC rater. Loose-fill material includes insulation material bag labels or coverage charts. | |
| 06 | Loose-fill insulation – The installed depth and density of insulation is verified in at least 6 random locations to ensure that the minimum thickness and installed density meet the R-value specified on the Certificate of Compliance and are consistent with the manufacturer's coverage chart. | |
| 07 | If kraft paper faced insulation is used, paper is installed on the conditioned (warm in winter) side of surface. Paper must be in contact with air barrier to within 2-inches of the framing (stud, joists, etc.). | |
| | Verification Status | ☐ Pass - all applicable requirements are met; or |



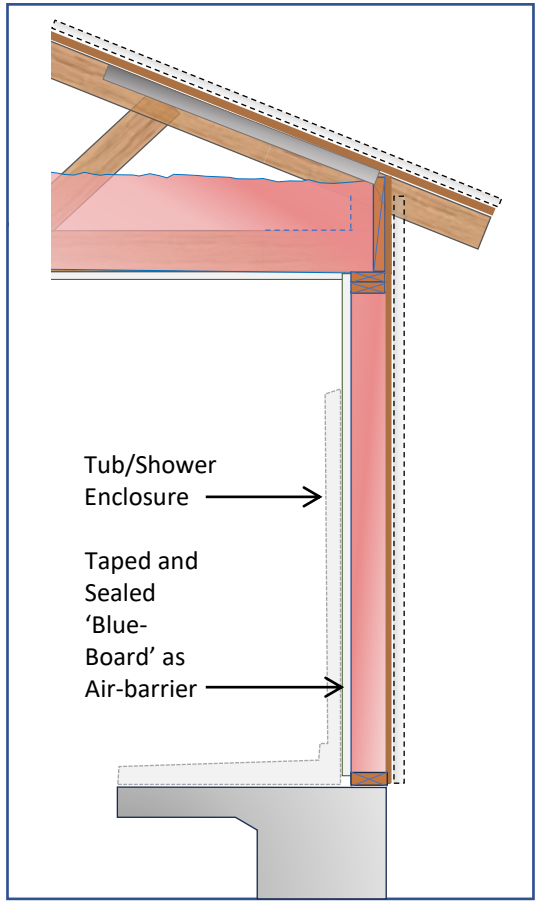

Loose-fill insulation depth and density is verified in at least 6 random locations to show the CF1R value has been met.

# QII – Tub and Shower Enclosures

## D. Wall Adjacent to Unconditioned Space

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Correction Notes.***

| | | |
|---|---|---|
| 01 | Insulation quality was verified prior to the installation of the interior air barrier (typically gypsum board). | |
| 02 | Loose-fill and batt insulation is in contact with all six sides of wall cavities (top, bottom, back, left, right, front [to be installed later]) with no gaps, voids, or compression. Special Situation: Where framing depth is greater than required insulation thickness (e.g., double walls or framed bump-outs) a secondary air barrier shall be installed and in contact with the insulation, so that the insulation fills the cavity formed by the additional air barrier. | |
| 03 | Insulation fits snuggly around obstructions (e.g., electrical boxes, plumbing and wiring) with no gaps, voids or compression. | |
| 04 | Structural metal tie-downs and shear panels are insulated between exterior air barrier and metal. | |
| 05 | Hard to access wall stud cavities, such as corner channels or wall intersections, are insulated to the proper R-value prior to the installation of exterior sheathing or exterior stucco lathe. | |
| 06 | Insulation and interior air barrier are installed behind tub, shower, fireplace enclosures and stairwells to the R-value listed on the Certificate of Compliance when located against exterior walls. | |
| 07 | All single-member window and door headers shall be insulated to a minimum of R-3 for a 2x4 framing, or equivalent width, and a minimum of R-5 for all other assemblies. No header insulation is required for single-member headers that are the same width as the wall, provided that the entire wall has at least R-2 insulation. | |
| 08 | After insulation is installed: All insulated walls have interior and exterior air barriers, including kneewalls and walls of skylight wells. Exception: Rim joists. Interior air barrier (typically gypsum board) is sealed to top plate. | |
| 09 | Verification Status | ☐ Pass - all applicable requirements are met; or<br>☐ Fail - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or<br>☐ All N/A - This entire table is not applicable. |
| 10 | Correction Notes | |




**Exterior Wall with a Continuous Air and Thermal Boundary – Install before the Tub/Shower is Installed**

# QII –Insulate hard to access wall cavities before exterior sheathing; insulate fireplace and tub enclosures



Insulation was blow-in behind the OSB panels.
Note: The proper air-barrier is at the exterior walls, not the fireplace surface.




Proper insulation and air-barrier missing behind tub at the exterior walls.

# QII – Insulation and Air Sealing can be a Team Sport



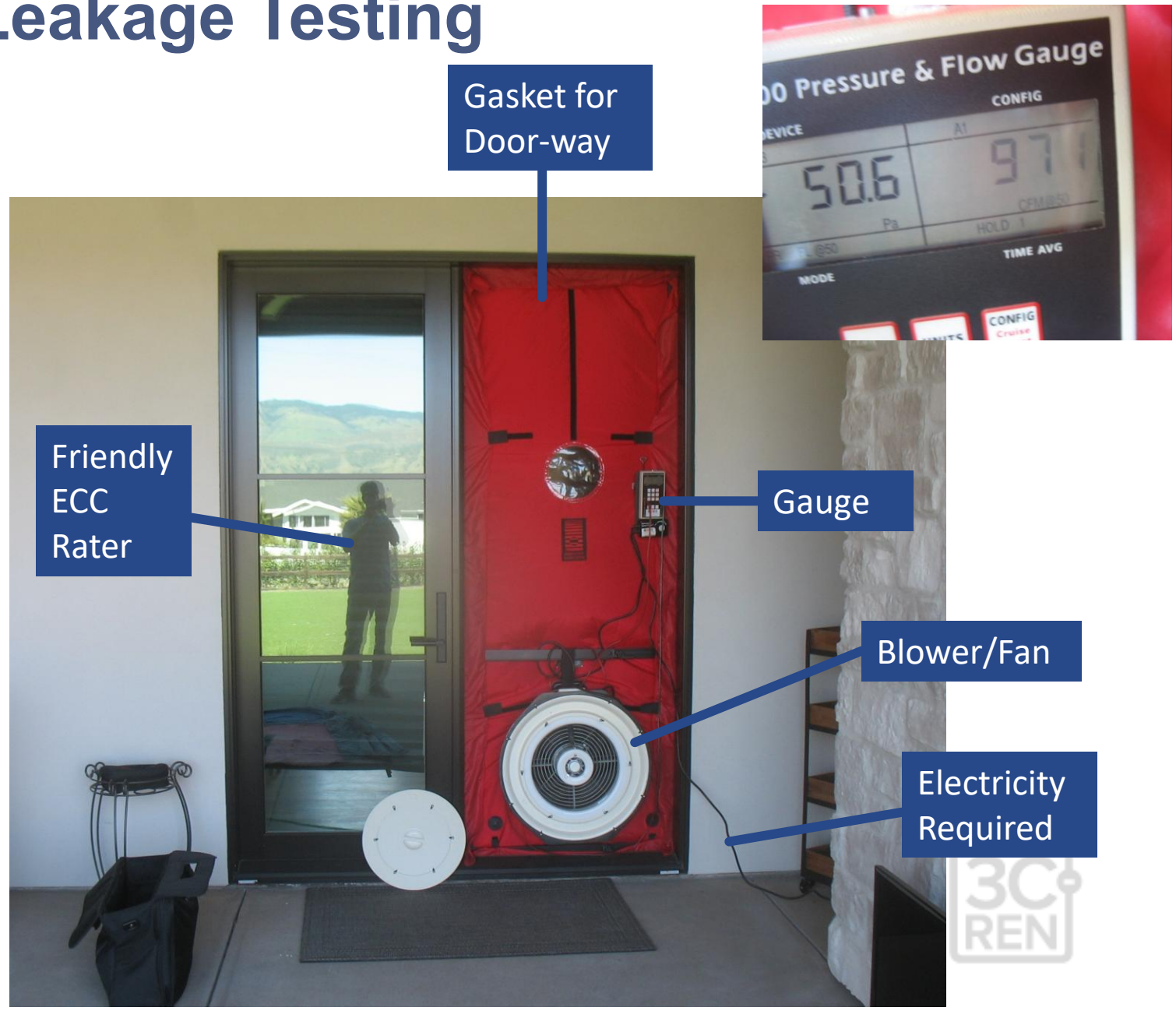
Insulation removed to install a duct to a duct boot and register

- Well executed job site work flow makes ECC QII and Envelope Air Leakage Sealing go smoothly and easily.
- Follow up with each trade to ensure one trades person is not undermining the other trades person's work.

"I've found that certain trades can affect thermal performance... In a bad way....!" --P.D., ECC Rater

# Building/Envelope Air Leakage Testing

- Measure Pressure (Pa) and Airflow Leakage (cfm)
- Equipment:
  - Blower Door Kit
  - Pressure & Flow Gauge
  - Shows a “Positive Pressurization” Test
- Envelope Leakage to/from:
  - Outdoors
  - Attic
  - Crawlspace



# Mechanical IAQ Ventilation for Multifamily –New Construction

**2025 Code**

**Outside air (OA) ventilation:**

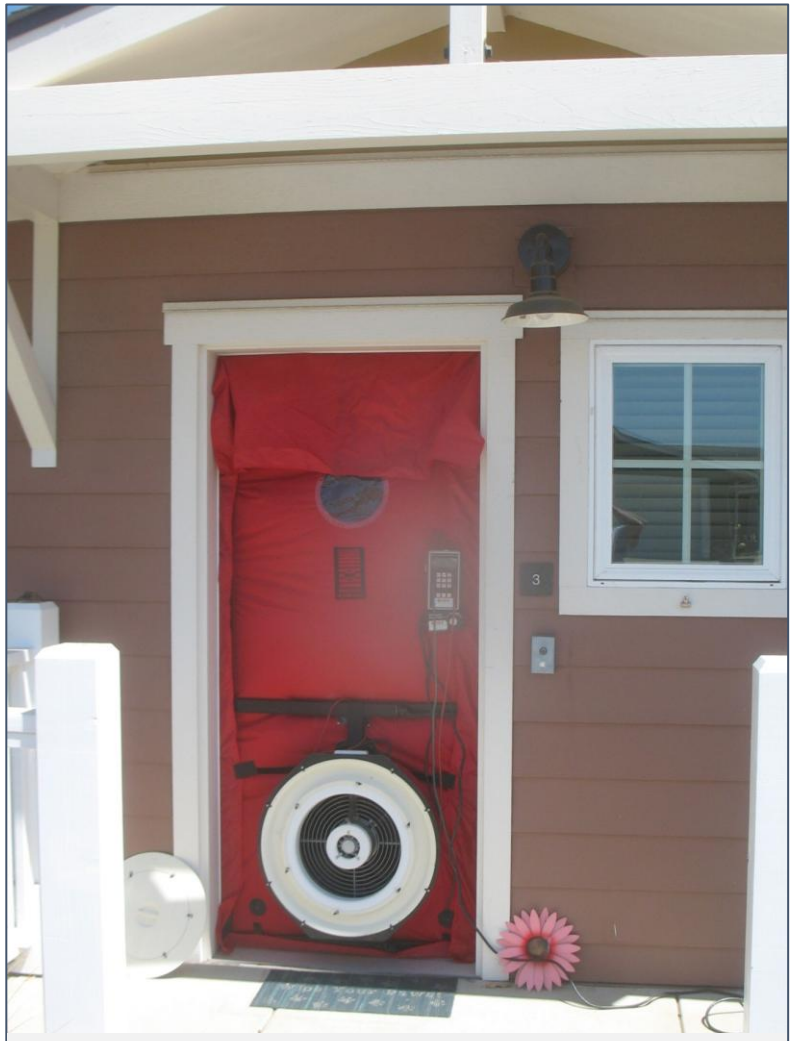
- Balanced Ventilation, or
- Supply Only Ventilation

**New Requirement:**

- Compartmentalization Testing – ECC-Rater

**Note:**
For ***new construction***, exhaust only IAQ ventilation is **no longer an option**.

For **additions**, balanced, supply or exhaust only IAQ ventilation remains **allowable**.



Compartmentalization Testing, i.e. Blower Door Testing

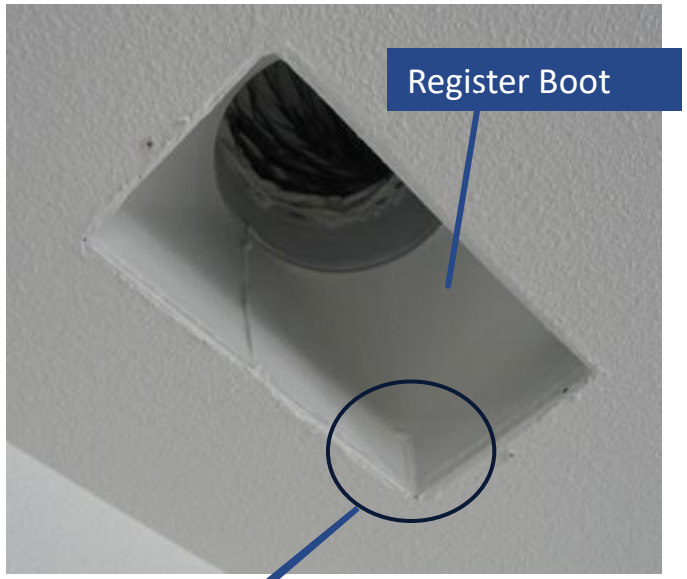
# Air-Sealing Common ‘Un-seen’ Problem Areas

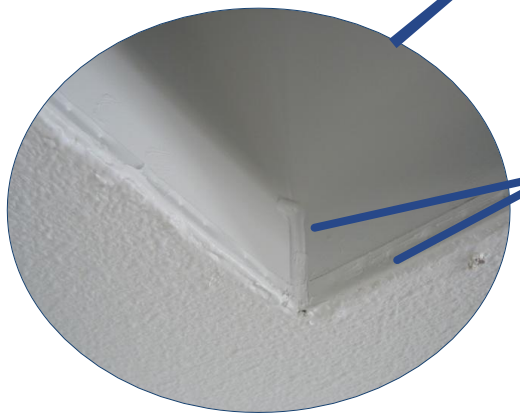
Before




Common Problem Area – Connection to Drywall

After

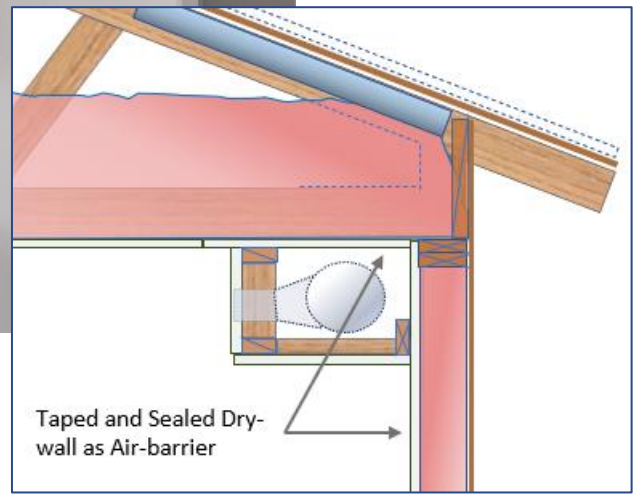



When ducts are in an unconditioned vented attic…

After

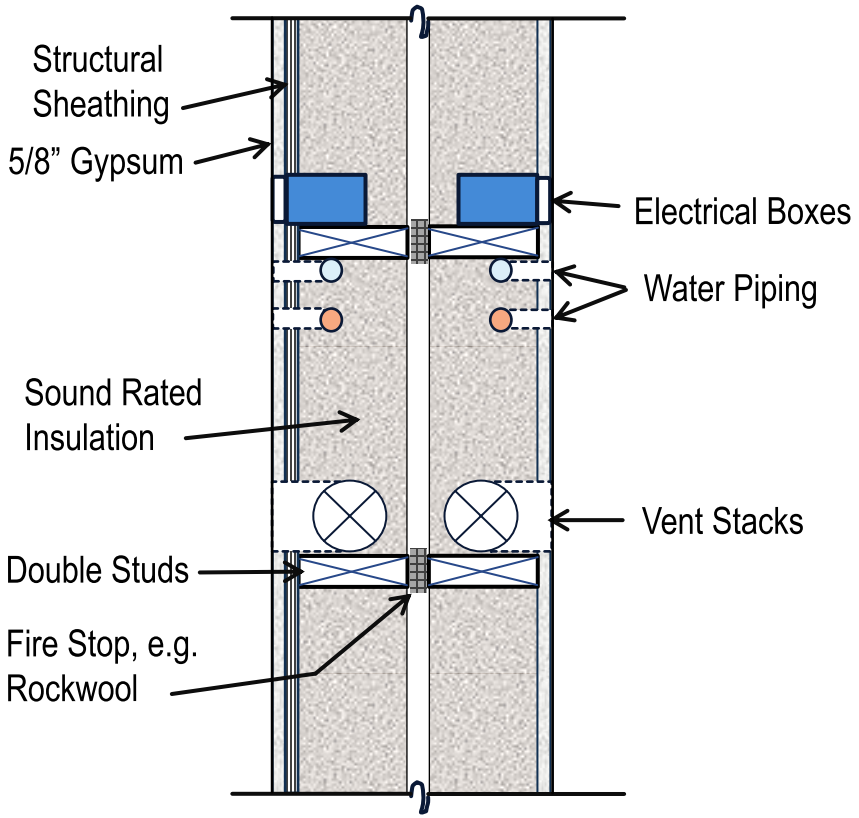



…bring ducts into the conditioned space.

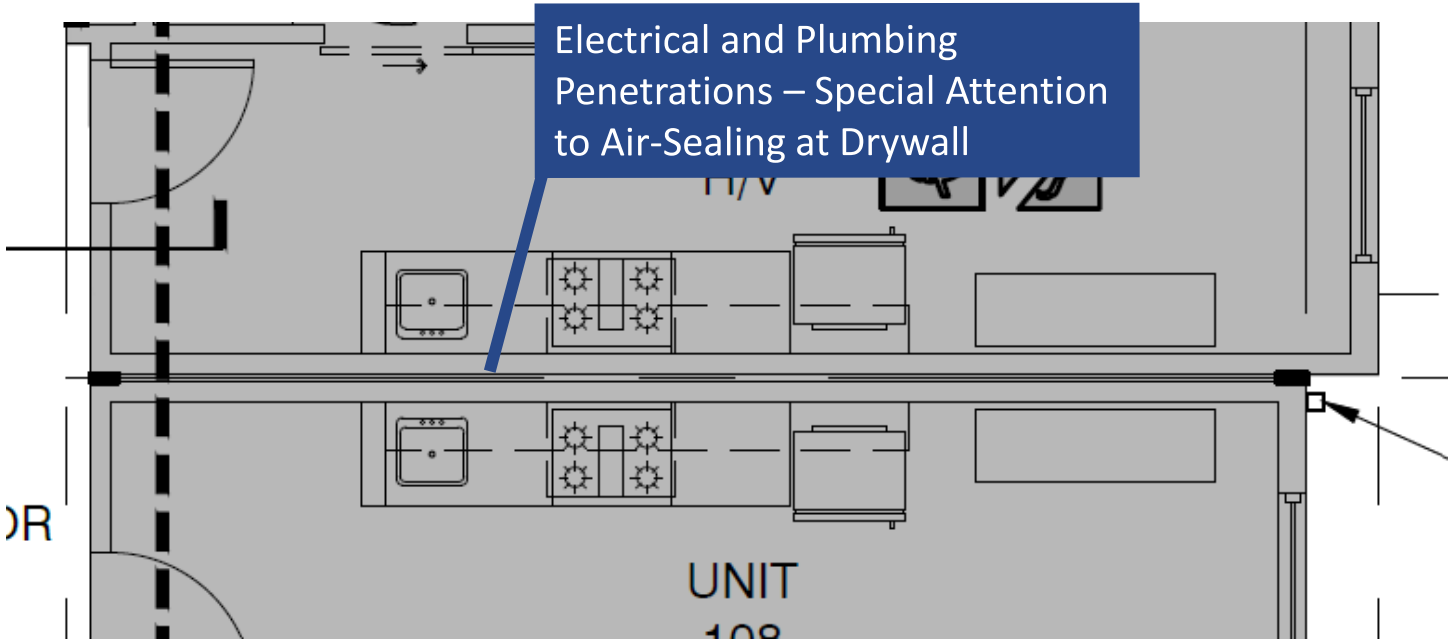
# Air-Sealing Party-Walls and Shared Floor/Ceilings

## Multifamily Party Wall –Looking Down




Most details are focused on sound classification/ratings and "fire stopping" material between the studs.

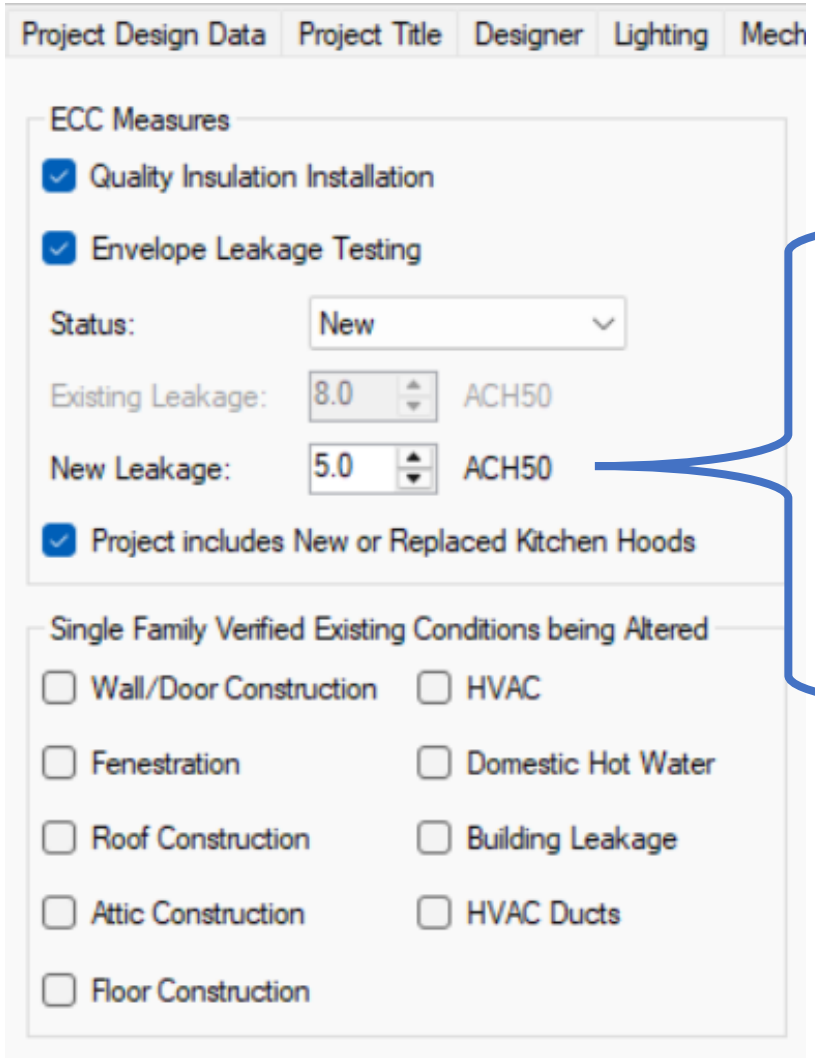
## Multifamily Party Walls




"…don't forget to air-seal at the bottom plate and the top plates too!" --P.D., ECC Rater

# Envelope Air Leakage Testing –Best Practices or Needed Performance Method Credit?

Screen-Shot of EnergyPro Inputs:




**Excerpt from the ACM:**

**ACH50 defaults to 5** for newly constructed buildings in single-family houses and townhomes have heating and cooling system **ducts**, or both, **outside** the conditioned space

In single-family homes and townhomes with **no ducts** in **unconditioned space**, the **default ACH50 is 4.4**

**User input of an ACH50 that is less than the default value becomes a special feature requiring ECC verification.**

New Homes with Ductless Systems are compared to ACH50 of 4.4. We usually target less than 2 ACH to 'see' much of a credit.

# Building/Enclosure Air Leakage ENV-20-H and MCH-24-H

**CF1R-PRF-01-E**

**ECC FEATURE SUMMARY**

The following is a summary of the features that must be field-verified by a certified ECC Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the ECC Registry

- Quality insulation installation (QII)
- Building air leakage/reduced infiltration
- Indoor air quality ventilation

**ECC Work Flow**:

- Triggered on CF1R
- Requirements on CF2R/CF3R
- "Kick-off" Job Site "Review" Meeting
- "Pre-Test(s)" can be performed after:
  - Envelope Sealing
  - HVAC/Duct Sealing
- Final Blower Door Test

**CF2R and CF3R Forms**

- CF2R-ENV-20a-H Building Air Leakage Diagnostic Test - Building Enclosures and Dwelling Unit
- CF2R-ENV-20b-H-EnclosureAirLeakage-SinglePointTest-Automatic Meter
- CF2R-MCH-24a-H-Enclosure Air Leakage Worksheet-Single Point Test-Manual Meter
- CF2R-MCH-24a-H-Enclosure Air Leakage Worksheet-Single Point Test-Automatic Meter
- CF3R-ENV-20a Building Enclosure Air Leakage Diagnostic Test - Building Enclosures and Dwelling Unit Enclosures - Single Point Test - Manual Meter
- CF3R-ENV-20b Building Enclosure Air Leakage Diagnostic Test - Building Enclosures and Dwelling Unit Enclosures - Single Point Test - Automatic Meter
- CF3R-MCH-24a Building Air Leakage Diagnostic Test Worksheet - Building Enclosures and Dwelling Unit Enclosures - Single Point Test - Manual Meter
- CF3R-MCH-24b Building Air Leakage Diagnostic Test Worksheet - Building Enclosures and Dwelling Unit Enclosures - Single Point Test - Automatic Meter

# QII - Air Infiltration Sealing CF2R-ENV-21-H

**C. Walls Adjacent to Unconditioned Space**

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.***

| | |
|---|---|
| 01 | All penetrations through the exterior wall air barrier are sealed to provide an airtight envelope to unconditioned spaces such as the outdoors, attic, garage, and crawlspace. |
| 02 | Exterior wall air barrier is sealed to the top plate and bottom plate in each stud bay. |
| 03 | All electrical boxes, including knockouts, that penetrate the air barrier to unconditioned space are sealed. |
| 04 | All openings in the top and bottom plate, including all interior and exterior walls, to unconditioned space are sealed; such as holes drilled for electrical and plumbing. |
| 05 | Exterior bottom plates (all stories) are sealed to the floor. |
| 06 | All gaps around windows and doors are sealed. The sealant used follows manufacturer specifications. |
| 07 | Rim joist gaps and openings are fully sealed. |
| 08 | Fan exhaust duct outlet/damper at the exterior wall are sealed. |
| 09 | Knee walls have solid and sealed blocking at the bottom, top, left, and right sides to prevent air movement into insulation. |



Conditioned 'Daylit' Basement to Crawl Space – Penetrations are air sealed and walls will be insulated.

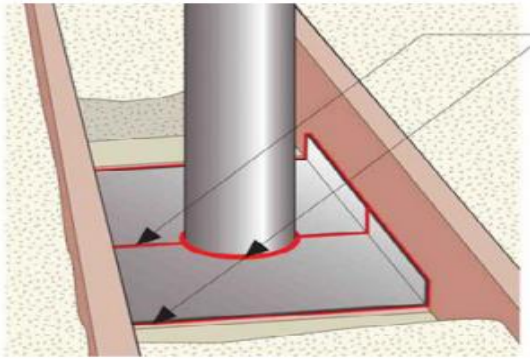
Meeting QII – Air Infiltration Sealing at the Framing Stage will make – Enclosure Air Leakage Testing much easier!

# QII - Air Infiltration Sealing CF2R-ENV-21-H

**D. Ceiling Air Barrier Adjacent to Unconditioned Space**

***The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.***

| | |
|---|---|
| 01 | There is a continuous air barrier at the ceiling level. All openings into walls, drops, chases or double walls are sealed. |
| 02 | All penetrations through the top plate of interior and exterior walls are sealed. |
| 03 | Fire sprinklers penetrating a ceiling air barrier shall be sealed to prevent air movement according to the manufacturer's instructions. |
| 04 | All fixtures cut into ceiling air barrier (e.g., HVAC registers, electrical boxes, fire alarm boxes, exhaust fan housing, and recessed lighting fixtures) are sealed to the surrounding dry wall. If it is not possible to seal the fixture directly, a secondary air barrier shall be created around the fixture. |
| 05 | All installed recessed lighting fixtures that penetrate the ceiling to unconditioned space are rated to be Insulation Contact and Airtight (IC and AT) which allows direct contact with insulation. |
| 06 | All dropped ceiling areas are covered with hard covers that are sealed to the framing, or else the bottom and sides of dropped ceiling areas are all insulated and sealed as ceilings and walls as required on the Certificate of Compliance. |
| 07 | All vertical chases (e.g., HVAC ducts and plumbing) and soffits are sealed at the ceiling level. |
| 08 | Chimneys and flues require sheet metal flashing at the ceiling level. The flashing shall be sealed to the chimney/flue with fire rated caulk. The flashing shall be sealed to the surrounding framing. |
| 09 | Framing locations where air may move down into the walls from the attic (e.g., double walls, pocket doors, architectural bump-outs, etc.) have a sealed hard cover to prevent air movement |




U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

Drawings and instructions in the guide show contractors the proper way to air seal around typical breaks in the ceiling. Here, sheet metal and fire-rated caulk provide air sealing around a flue pipe.

Meeting QII – Air Infiltration Sealing at the Framing Stage will make –ECC Building /Enclosure Air Leakage Testing much easier!

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# QII - Air Infiltration Sealing CF2R-ENV-21-H

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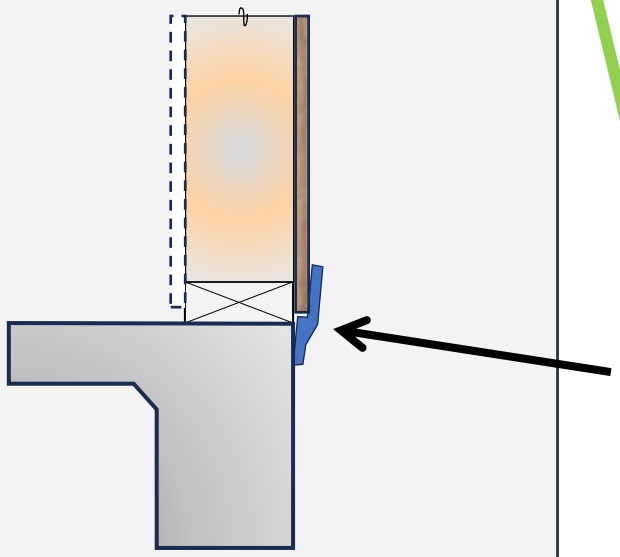

Exterior Bottom (Sill) Plates Sealed to Floor



# QII –Air Infiltration Sealing at the Sill Plates (and other Joints)

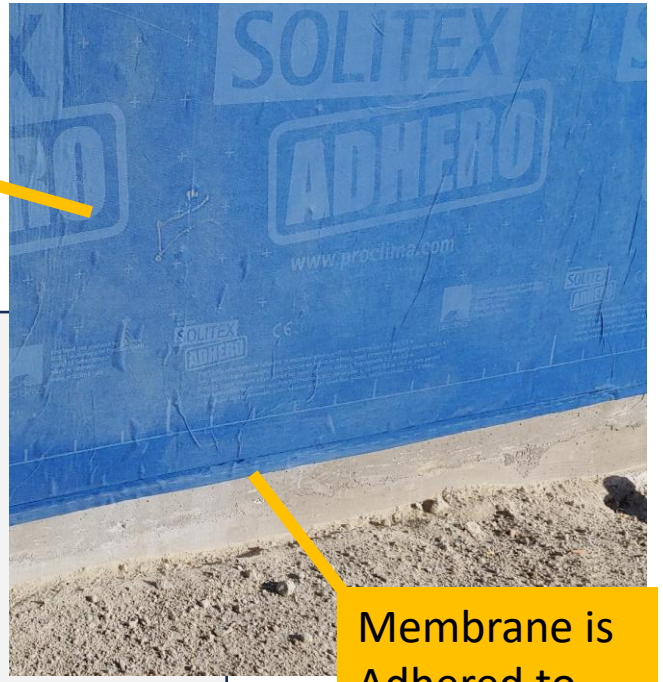
Liquid Applied Membrane



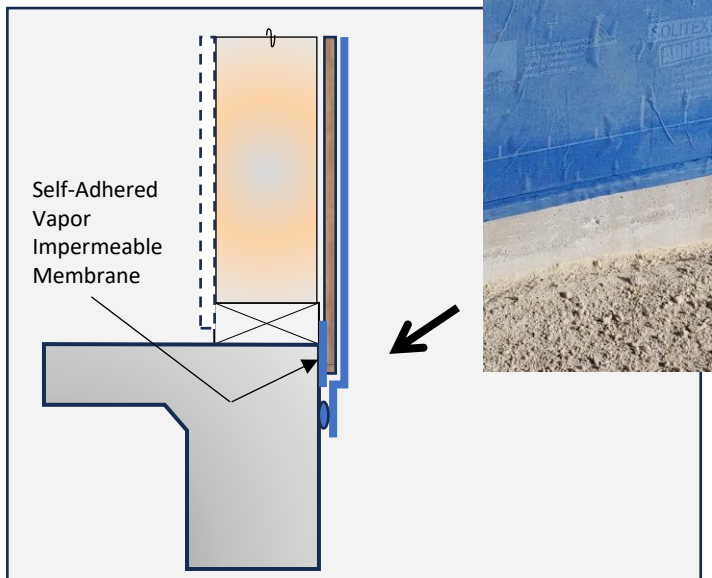


Typical sheathing location relative to sill plate

Self-Adhered Membrane




Membrane is Adhered to Foundation




Sheathing extends below the sill plate

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# QII - Air Infiltration Sealing CF2R-ENV-21-H

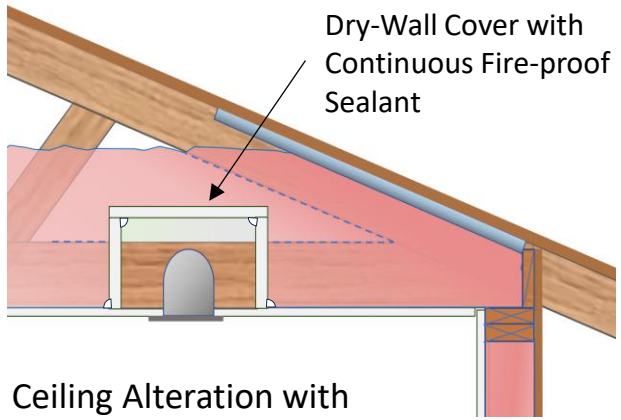
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| 08 | Chimneys and flues require sheet metal flashing at the ceiling level. The flashing shall be sealed to the chimney/flue with fire rated caulk. The flashing shall be sealed to the surrounding framing. |
| 09 | Framing locations where air may move down into the walls from the attic (e.g., double walls, pocket doors, architectural bump-outs, etc.) have a sealed hard cover to prevent air movement. |
| 10 | Attic access forms an airtight seal between the conditioned space and unconditioned space. Vertical attic access requires mechanical compression using screws or latches. |

DATA COLLECTION REGISTERED




Ceiling Alteration with
Existing Recessed Fixture

Meeting QII – Air Infiltration Sealing at the Framing Stage will make –ECC Building /Enclosure Air Leakage Testing much easier!

# Opportunity for Improvement

Key Take-Away:

From a ECC Rater's perspective ***not*** a lot will change in the day-to-day duties and activities performed in the field*, but*…

*…with a few minor changes in how the architect and builder work, the proposed changes and ECC work flow could be much easier for the builder, architect, energy consultant …*



# Work Flow –Make your projects easier!

"Pre-con meetings will become more imperative"

**ECC QII Work Flow**:

- Triggered on CF1R
- Job Site Meeting "Review Requirements"
- ECC Inspections Occur at
  - Framing, and
  - Insulation Install
- Non-ECC Inspections
  - Plumbing –HPWH Mandatory Measures
  - Plumbing –Distribution Types and Credit on CF1R

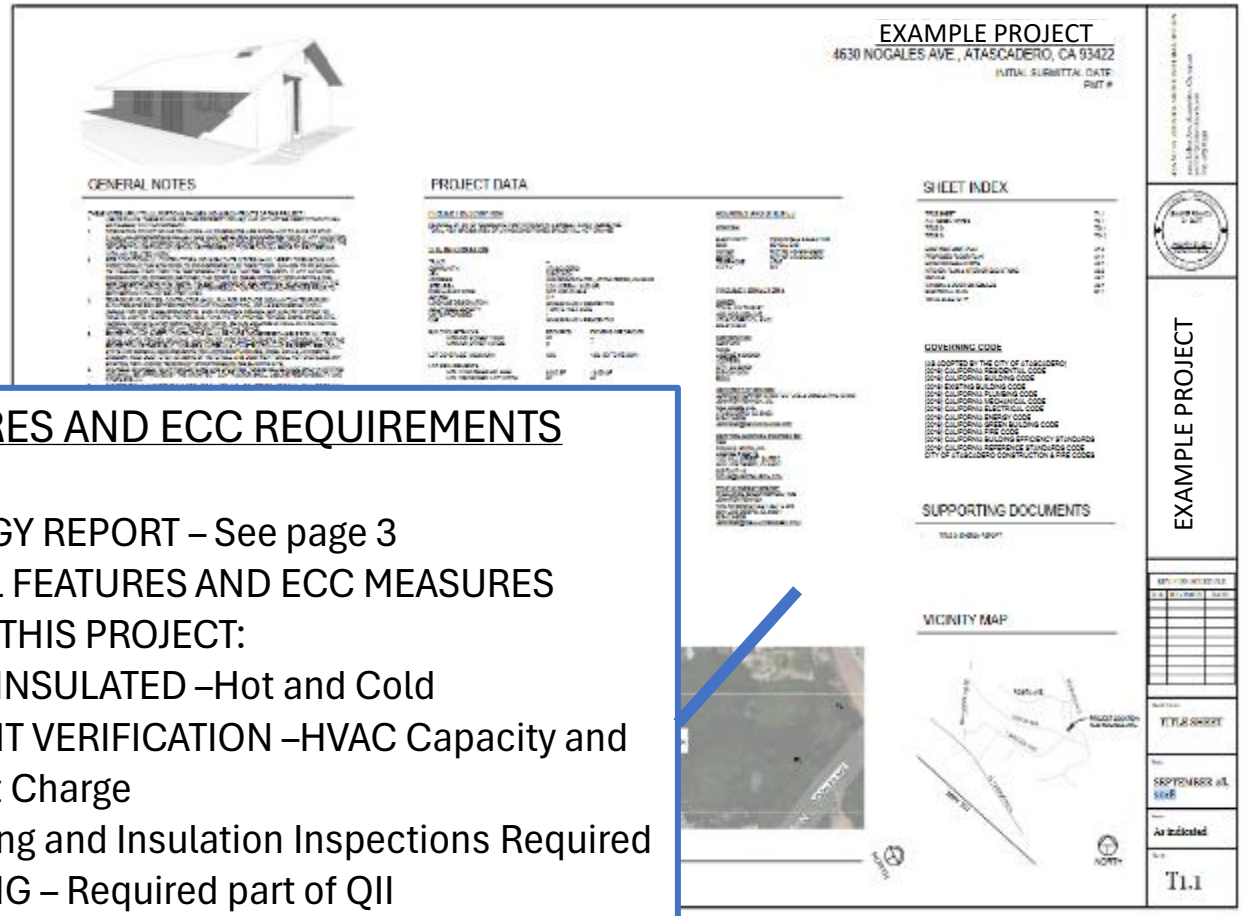


*QII Building Envelope Measures. Rater identifying improperly installed raised floor insulation.*

# Special Features and ECC Feature Summary on the Cover Sheet

Call out the Special Features and ECC Feature Summary on the Cover Sheet, suggested locations:

- ‘Code Summary’
- ‘Code Analysis’
- ‘Supporting Documents’
- ‘ECC Summary’
- ‘Special Features’

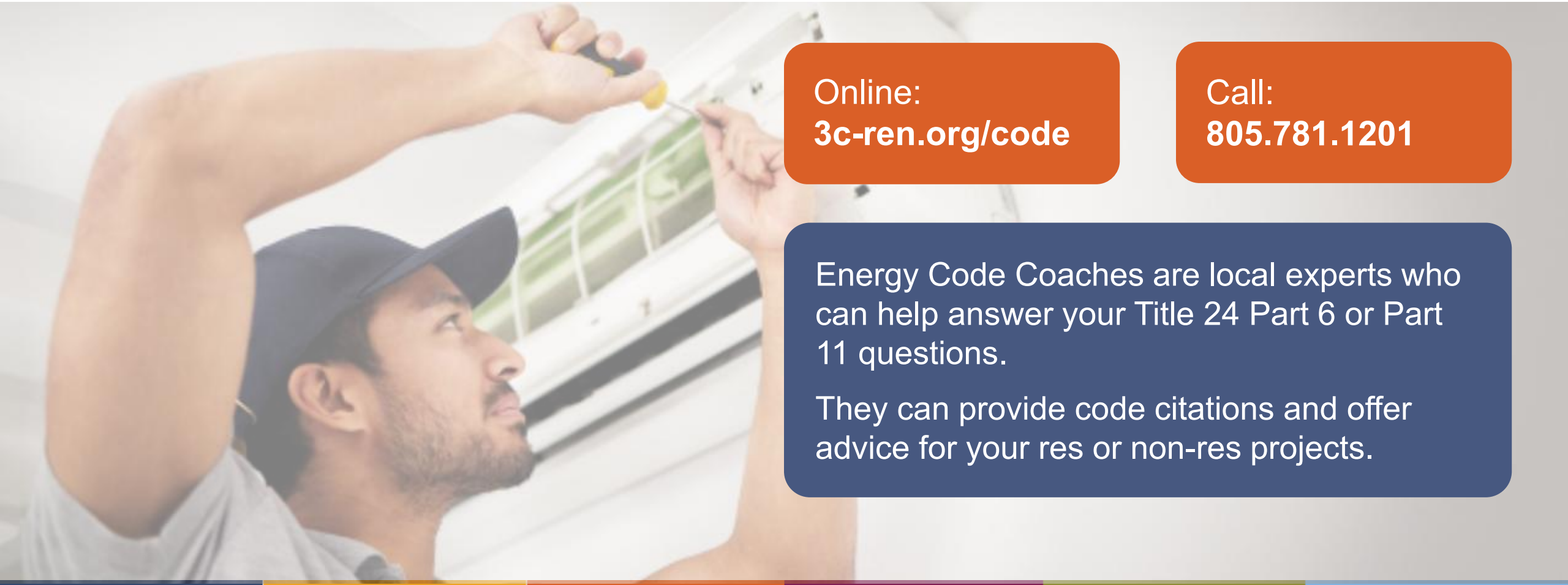



SPECIAL FEATURES AND ECC REQUIREMENTS

- TITLE 24 ENERGY REPORT – See page 3
- NOTE: SPECIAL FEATURES AND ECC MEASURES REQUIRED ON THIS PROJECT:
  - ALL PIPES INSULATED –Hot and Cold
  - EQUIPMENT VERIFICATION –HVAC Capacity and Refrigerant Charge
  - QII – Framing and Insulation Inspections Required
  - AIR SEALING – Required part of QII
  - AIR LEAKAGE TESTING – Coordinate Blower Door Testing with ECC Rater at Project On-set

# Questions about Title 24?

## 3C-REN offers a *free* Code Coach Service



Online:
**3c-ren.org/code**

Call:
**805.781.1201**

Energy Code Coaches are local experts who can help answer your Title 24 Part 6 or Part 11 questions.

They can provide code citations and offer advice for your res or non-res projects.

# Closing

## Continuing Education Units Available

- Contact dresurreccion@co.slo.ca.us for AIA and ICC LUs

## Coming to Your Inbox Soon!

- Slides & Recording

## Don't forget to register for Part 2!

- Energy Code Compliance Verification (formerly HERS) – HVAC, DHW, and IAQ

## Upcoming Events:

- 9/23 Higher-Performance Residential Remodels
- 11/5 Collaborative Solutions for Energy Code Compliance: Central Coast Conversation with the California Energy Commission **(In-person in SLO)**

**Any phone numbers who joined?**
**Please share your name!**

